

T. Van Splunder, October 2022

# The Influence of External Factors on Client-Contractor Collaboration

And how to anticipate their impact up-front



# **The Influence of External Factors on Client-Contractor Collaboration**

**And how to anticipate their impact up-front**

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## Preface

This report is written in the context of the course CME2000 Master Thesis at the Faculty of Civil Engineering of the Technical University of Delft. The thesis is an opportunity for students to perform an extensive research during which the knowledge and skills acquired during the master courses can be applied. After successful completion of this research, the student will receive a passing grade for the master Construction Management and Engineering.

The aim of the present research is to address the external factors which influence client-contractor collaboration in construction. Collaboration has been proven to be instrumental to the construction process and many researchers and practitioners have been trying to optimize this ambiguous element for decades. In various courses this topic was discussed, which sparked my interest in boosting collaborations. By means of this research I hope to add to the available knowledge on collaboration, helping future research. By partnering with AT Osborne I got the opportunity to explore the profession of consultant and learn about applying academic knowledge to advise the market as well, providing an all-round valuable experience during my thesis. The challenge of completing such an extensive and lengthy research made me experience pressure, networking and joy I have not had before during my work. I am grateful for this, and a few words of thanks are in order.

First of all, I would like to thank Dr. E.J. (Erik-Jan) Houwing, Dr. Ir. M.G.C. (Marian) Bosch-Rekvelde and Dr. Ir. L.S.W. (Leonie) Koops for their willingness to chair and supervise my graduation process. Their supervision and (constructive) feedback were of a high standard and I appreciate having had such a varied and experienced committee. They were able to teach me how to be a researcher, which certainly improved the quality of this thesis. Furthermore, I would like to thank Mr. Ir. P. (Paul) Brinkman and Ir. K. (Koen) van Limbergen who allowed me the opportunity to perform my research at AT Osborne. They provided me with access to their network and were always open for questions. We have had very pleasant in-depth conversations regarding the topic, which I am grateful for.

Furthermore, I would like to thank the project teams of the Uithoornlijn, A24 Blankenburgverbinding, Nieuwegein City and Afsluitdijk for their participation in this research. Without the interviews I would not have been able to perform this research. The same goes for the experts of AT Osborne which took part in the expert meeting to validate my results.

Last but not least, I want to thank my girlfriend, family and close friends for the moral support during the graduation process. Apparently, researching external factors does not mean you will not experience any yourself, and they have always kept me motivated.

I hope you enjoy your reading,

Thijs van Splunder

*Delft, 6 October 2022*

## Abstract

In modern construction, collaboration has become a key element for the success of projects. Both clients and contractors are aware of the importance of maintaining a solid relationship. However, as collaboration is subject to ambiguous factors that influence both the content of the project and the social elements, it is proven to be difficult to achieve this mission. Elemental differences in the goals, ambitions and responsibilities of clients and contractors during projects still exist and cause differences in perception. Moreover, for each project a new team is set up and new relationships have to be built. One of the elements collaborations are subject to are external factors. These are especially hard to deal with due to the fact that the occurrence of said factors is beyond the control of the project team. This research provides insight in this volatile environment with the aim to increase the resilience of collaborations by reducing the influence of external factors. To achieve this goal, the following research question is used: “What external factors are present during construction projects that influence the collaboration between client and contractors and how can the impact of these events be reduced up-front?”

To answer this research question, a Q-study is performed. This method uses the subjectivity of respondents and translates this to numbers, in order to compare and analyse qualitative subjectivity. As input for this study, a model of the project environment is created by means of a desk study. Further literature research is performed on the domains of external factors in this model, to create a concourse of statements resembling external factors. Ultimately, 38 statements are selected on the basis of representativeness and relevance, and these are used to interview 28 respondents from the projects teams of the Uithoornlijn, A24 Blankenburgverbinding, Nieuwegein City and Afsluitdijk. The resulting Q-sorts are analysed to retrieve perspectives on the external factors present within the project teams. With these perspectives in mind, measures to reduce the impact of external factors on the client-contractor collaboration are proposed to create more resilient collaborations. To validate the results with respect to feasibility and necessity, an expert meeting is held.

As a result of the desk study, a distinction is made between the internal and the external environment. To this end, multiple existing models of the project environment have been reviewed to find the domains from which external factor originate. These models have been compared and combined to create a set of 8 domains from which external factors originate. These domains are both on a macro-level and directly related to the project team. To understand the relation between the external domains and the internal environment, a model is created to map the project environment with which project teams have to deal. This model is presented in figure 0.1. The project team is defined as the internal project environment.

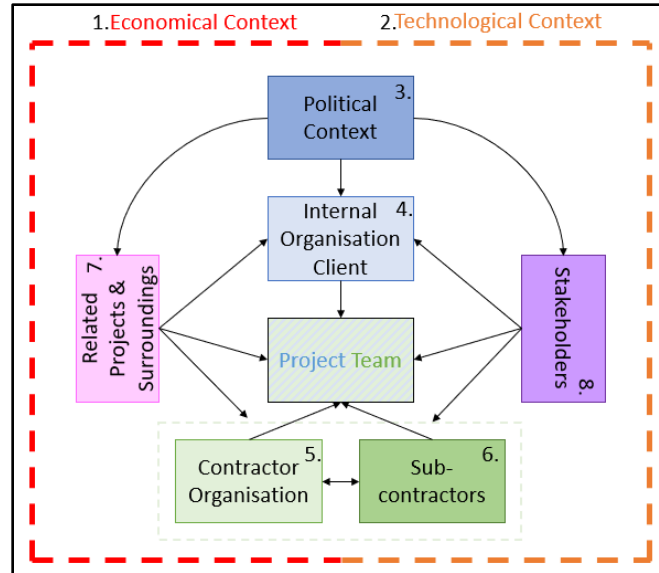


Figure 0.1 – Model of the Project Environment

The defined model is further analysed by performing a literature review regarding the domains of external factors. The literature review provided the base for the concourse and Q-set used to perform the Q-study. During interviews, the respondents were presented the question: “What has caused the most disruptive impact on the collaboration during the project?” The resulting perspectives are:

1. The asset owner disrupts the collaboration during projects
2. The surroundings disrupt the collaboration during projects
3. Factors that endanger the financial feasibility of the project disrupt the collaboration
4. Uncertainties that influence the planning disrupt the collaboration during projects

This confirms that as a result of the choice to organise project teams along the guidelines of the IPM-model to stimulate variation of capacities and personalities within project teams, the perspective of the external environment differs as well. These perspectives are retrieved from this specific P-set, but in reality more perspectives are present. The analysis shows a significant difference between process-oriented perspectives (1 and 2) and content-oriented perspectives (3 and 4). In the model of the project environment, perspectives 1 and 2 would experience influences from the related project & surroundings domains, whereas perspectives 3 and 4 are more vulnerable for influences from politics and parent organisations. Reviewing the perspectives, it can be concluded that project teams experience disruptions from the economical, political, client, contractor and stakeholder domains.

To reduce the influence of external factors on the dynamics within the project team, a framework of measures to create resilient collaborations is composed. The measures are divided in three categories: preliminary organisation, creating flexibility and attention to soft side. The main conclusions are that increased involvement of the asset owner at the start of the project is required, making it possible to align expectations. Moreover, budgeting by allocating money without earmarking it for parts of the project that are especially vulnerable for external influences will reduce the pressure on the project team when these events occur, as they will have the means to take the time to design a suitable approach. Finally, as regards the attention to the soft side, agreements on this topic can be incorporated in the advised code of conduct for the project team to value informal relationships.



The first category of measures is best implemented in phases 1 and 2 of the Project Life Cycle model, since the project scope for the tender and the relationship with the asset owner are designed during this phase. These measures address the external factors originating from the domain of the internal client organisation, contractor organisation and politics. Flexibility can be created during the second phase and requires safeguarding during the third phase. These measures anticipate for disruptions from the macro-domains of economical, technological and political factors. During the planning phase, the contractor has joined the collaboration and the flexibility measures can be discussed and agreed upon with the entire project team. This is the only phase of the Project Life Cycle where no additional measures regarding the soft side of collaboration are implemented. These measures support the other categories and create a more resilient project team overall. All three categories of measures contribute to reducing the influence of factors originating from the stakeholders domain.

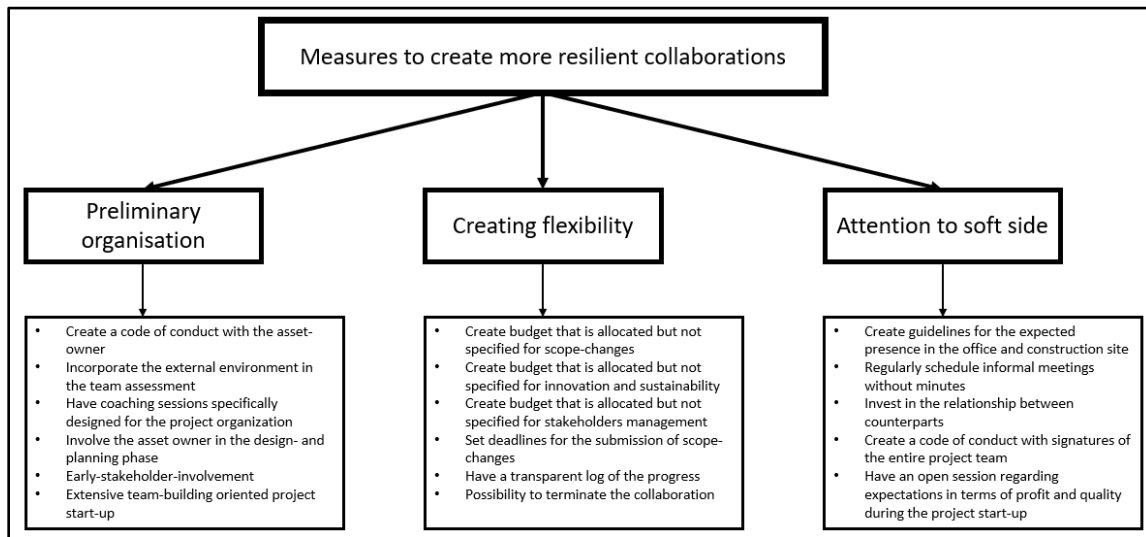


Figure 0.2 – Visualised overview of measures to create more resilient collaborations

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# 1. Introduction

This chapter will broadly introduce the concept of collaboration in the construction sector and the research topic of external factors by reviewing a mixture of scientific literature and related news articles. With this mixture not only the relevance and importance of this research is introduced, but the lead for the knowledge gap for this research as well. At the end of the chapter the reading guide is found.

## 1.1 Introduction

One of the most influential market segments for our daily lives is the construction sector. In most countries it is part of the standard street scenery, with projects taking place everywhere. Business Wire (2021) reports that the worldwide construction industry is estimated to grow up to 10.5 trillion dollars by 2023. However, this is not the only connection people have with the construction sector. We depend on it for housing, transportation and to some degree even safety. Multiple aspects of our lives rely on it and thus it is safe to say that we cannot live without the construction sector anymore. In the Netherlands its market share is as high as 9%, with a yearly turnover of 70 billion euros (Bouwend Nederland, 2021). As there is a need for housing, infrastructure and landscaping at all times, all over the world, it is an ever ongoing business train. The market is very competitive, but if a firm can establish a competitive edge, a lot of work can be gained (Pekuri, Pekuri, & Haapasalo, 2013). This seems positive, but it is one of the biggest pitfalls of the construction industry as well. To get the competitive edge, contractors are trying to apply as cheap as possible during tenders. To do so, they are focussed on standardizing tasks, learning from previous experiences and cutting expenses. This leaves little to no room for innovation and investments in their own organizations, as the cash flow is used to facilitate projects. As Olatunji, Sher & Gu (2010) state, the amount of available work has, among other things, created conservative tendencies in the construction industry. Nowadays society asks for a different approach to construction, as societal and environmental issues are increasingly valued. Where in the past a contractor would be awarded a project based on his budget expectations, they are now able to distinguish themselves from competitors by treating these values in their proposed design plan (Diemel & Fennis, 2018).

By focussing on these issues in the design plan, the variety of goals, tasks and required knowledge to perform the project increase. This makes that in today's society, which is ever-changing and developing, it is very challenging to successfully carry out large complex projects within time and budget (Liang, 2019). Project managers Barbulescu and Teunissen (2019) are even going as far as saying "the success of public projects seems to be a game of chance". In most industries, governments and firms are trying to take advantage of all the new technologies and knowledge available to increase the quality of the end result for its users. Firms are able to specialize in a certain field of work to create state-of-the-art designs and the technological possibilities seem endless. With this development, challenges in the traditional working methods can arise. The complexity of projects has been steadily increasing for quite some time, as Hertogh & Westerveld (2010) already pointed it out in their early research. They argued that this is due to the increase in expertise, resources, knowledge and amount of stakeholders in projects. As a result, large construction projects can be regarded as very complex, and research shows that they are often underperforming from either a scheduling or a budgeting point of view (Sohi, Hertogh, Bosch-Rekvelde, & Blom, 2016). Soibelman et al. (2011) concluded that collaboration is one of the tools that can be used by clients and contractors to reduce complexity in their project. They found that by gaining awareness of each other's structure and expertise the project efficiency can be improved, which makes collaboration a valuable aspect in the modern construction industry.

Collaboration, however, is a dynamic concept, especially in large, complex infrastructure projects. Despite defining and aligning the goals and interests of the client and contractor at the start of the project, they may grow apart over time when external factors or bottlenecks come into play during the realisation of the project (Gruneberg & Hughes, 2004). As this is an important factor for project success, more and more research is performed on collaboration in construction projects. For example, since 2017 the Delft University of Technology has had multiple yearly graduates on this topic (TU Delft, 2021). For a large part, these researches are looking into ways to improve collaboration by focussing on the internal cooperation and collaboration. They strive to develop more adaptive forms of collaboration, in which the parties involved can behave more flexible towards each other and adapt to each other's structure and needs (Ligthart, 2021), suitable for the complex environment of large construction projects (Nader, 2019). These environments tend to have many embedded risks which the client would like to distribute over its project partners, but clients are unwilling to assume all the risk for the project. However, the project environment brings opportunities as well, and the struggle for the division of the embedded risks and opportunities between client and contractor has resulted in public-private partnerships being implemented. There are various ways of designing a public-private partnership, which is indicative for the direct division and risks like DBM contracting variants and alliances. The general consensus with all these contracting models is that all the risks involved should not be absorbed by one single party. By having both the client and the contractor responsible and sharing in the benefits, the involvement of both parties in the project is stimulated as well. The public client and private contractor, however, tend to have different organizational structures, which requires a clear definition of their collaboration method and how they will communicate and handle decision making. This is tackled by creating a dedicated project team in which both the client and the contractor are represented.

However, in the complex and dynamic environment of public-private partnerships external dangers are lurking as well. As said, the client-contractor relationship is an important relationship present in construction projects. This collaboration is required to realize projects, as it couples incentives, money and expertise of the public and private domain (Eversdijk & Korsten, 2015). But as the motives of public clients and private contractors to join a project often differ, their collaboration can be vulnerable to external influences. Scope changes, scarcity of resources and inflation are all examples of factors that are outside the reach of both the client and the contractor, but can still influence or even disrupt their way of collaborating (Khalid & Rahman, 2019). This shows that external and internal aspects of client-contractor collaboration are classified separately, but still related and intertwined. Despite the differences in origins of influences coming from both, they both contribute to the overall project environment and can thus influence the collaboration. As the internal project environment is more allowing for direct changes and interventions, research to improve collaboration started here. Because the state of both environments can influence the resilience of the collaboration to changes in one another, this contributes to the overall resilience of client-contractor collaborations. However, due to their intertwined nature applying changes in the internal organization of the collaboration is unlikely to avoid all problems in the future. The external environment is full of risks that are not directly controllable or fully mitigatable. Communication and agreements on dealing with these influences could be the next step in increasing the resilience of client-contractor collaboration.

As mentioned, the internal environment of collaboration and success factors in public-private collaborations have been researched for some time already. The internal environment of collaboration is the part of the system that can be influenced directly by the parties involved in the collaboration. This

includes their communication, commitments to each other and collaboration agreement (Van den Ende & Van Marrewijk, 2014). The results of the researches have led to initiatives for more intensive ways of collaboration, such as alliance contracts, 2-phase contracts and new ways of filling in procurement strategies by means of assessments and interviews (Van Ommen, 2021). As the relationship clients and contractors manage to sustain during project development is highly indicative for the project outcome and future collaborations, it is necessary to improve understanding of these dynamics. By doing so, the collaboration between clients and contractors can be improved to create more stable relationships, which increases the chance of project success (Barraket & Loosemore, 2018). The external factors that influence collaboration during the realisation phase can be viewed as a separate environment. Influences from this environment are often unexpected and thus difficult to get a grip on. However, these unexpected changes can lead to escalation within a collaboration, which negatively influences the project outcome (Eyboosh, Dikmen, & Talat Birgonul, 2011). As external factors include a certain amount of uncertainty, they are difficult to describe and classify. This ambiguity makes that both clients and contractors can behave unexpectedly as a result of externalities. Unexpected reactions tend to create tension within a collaboration and can therefore be disruptive to the process (Love, Holt, Shen, Li, & Irani, 2002). The described dynamics show that external factors can have both a direct impact and an indirect influence on client-contractor collaboration by either directly influencing the project parameters or influencing the reaction of involved stakeholders towards externalities. To research the external environment, both are taken into account.

This indicates a research gap: with the current knowledge it is not exactly clear how the external factors relate to the internal project environment and what their separate implications on the client-contractor collaboration are. It is unclear if these external factors can only be addressed when they derail a project and cause escalation, which then requires a reactive approach as described by Eyboosh, Dikmen & Talat Birgonul (2011), or if a more preventive approach up-front would be feasible as well. Researching this gap would fit the outcomes of the research of Walker, Davis & Stevenson (2017) as well, as they conclude that reducing ambiguity and uncertainty increases the efficiency of construction projects. They describe that gaining more knowledge of external factors and being able to influence their impact could potentially decrease the ambiguity and uncertainty. To be able to do so, further research is required to gain additional knowledge into external factors and their influence on client-contractor collaboration. Moreover, insight in the tools and control measures that are implemented nowadays is required to determine which additional measures can be taken.

## 1.2 Reading Guide

The following structure is used to set up and perform the research. Chapter 2 will describe the context and subsequently the problem definition. It will explain the collaborations and project environment in modern construction, further defining the research gap that the scope of the research will be adjusted to. The relevance of the outcomes for the construction industry will be briefly elaborated as well. Next, in chapter 3 the chosen research method will be presented. After specifying the approach to answer the research goals, the Q-methodology and expert meeting are introduced. This method is used to perform the research. Each step in the research process will be explained, followed by the Q-question that will be presented to the respondents. To create a basis for the Q-methodology, the literature review of chapter 4 will first explore the project environment by reviewing existing models of the project environment. By combining these models, a workable model defining the internal and external project environment is developed. Each external domain defined in this model is researched to retrieve statements for the

concourse of the Q-study. The design of this Q-study will be established in chapter 5. To begin with, the Q-set is retrieved from the composed concourse. After that, the set of respondents is created, with an accompanying description of each participating project . Chapter 6 will present the results of the analysis of the interviews held. The method of analysis and the statistical outcomes are presented, after which the resulting factors are elaborated, interpreted and explained. Based on the insight in the existing perspectives regarding external factors in project teams that was gained through the analysis, chapter 7 will propose measures for project teams to anticipate external factors. These are structured by a framework dividing the measures into categories. The content of the measures is described, as well as the feasibility of implementation. Chapter 8 will discuss the research methods and findings. Finally, chapter 9 will present the conclusions and recommendations.

## 2. Context, Problem Definition and Research Questions

Chapter 1 introduced the project environment in which external threats are lurking for the project team and how these threats can influence their relationship. As this sets the context for this research, this chapter will elaborate on project environment and the relationship between the internal-external environment and which problems this can cause for the project organisation. It defines the research gap and provides an overview of the scope of the research.

### 2.1 Context

Projects nowadays not only consist of a complex scope, but the environment surrounding the project and the organisational structures designed to deal with projects are becoming increasingly complex as well (Liang, 2019). A part of this project environment is designed by the client and contractor and can therefore be controlled. Traditionally, uncontrollable aspects are defined as the external environment, from the point of view of a chosen actor, which is unpredictable and ambiguous. To set the context for this research, the external environment and its design will be introduced and addressed in this section.

#### 2.1.1 Collaboration in Construction

During the research, collaborations in the construction industry are reviewed. One of the first defining moments of a collaboration in this sector is the choice of a contracting model. A contracting model is used to distribute risks and responsibilities among the partners in the collaboration (Lee, Chong, & Wang, 2018). Over the years a multitude of models has been developed, as the wishes and needs of both clients and contractors have changed over time. Traditionally, contracting models created a well-defined division of risks and responsibilities to increase the accountability of partners, the so-called design and build contract (Turner D. , 2014). Over time clients started to ask more and more from their contractors, extending the design and build contracts to a point where contractors became responsible for the maintenance as well. This model is called the design, build and maintain (DBM), often extended with a financing part as well (DBFM). After some time it became apparent that the amount of risk allocated to the contractors in this model was unrealistically high, even to the point where contractors were not able to take on projects (Dahl, Horman, Pohlman, & Pulaski, 2005). Since then researchers have aimed to develop contracting models more suited to the current wishes and needs of the market.

One of these needs on the market are increased levels of collaboration. Both clients and contractors express the desire to work in a more integrated way and advocate trust and transparency to create an environment that stimulates innovation and communication (Faris, Gaterell, & Hutchinson, 2022). A problem with this approach, however, is that market parties appear to have different views on collaboration. This differentiation in views might not be apparent at the start of a project, but will eventually become clear when events occur and progress is made. To indicate where these problems start troubling the project team, one of the most accepted project life cycle frameworks developed by Cleland & King (1983) is used. The model is shown in figure 2.1. When looking into the project life cycle, clients and contractors are investing in their collaborations during the conceptualization and planning phase, however, in the termination phase it still occurs that collaborations have failed and monetary and planning milestones are not met (Sohi, Hertogh, Bosch-Rekvelde, & Blom, 2016). This indicates that the project team experiences disruptions during the third phase, the execution, of the project life cycle model for which they are insufficiently prepared.



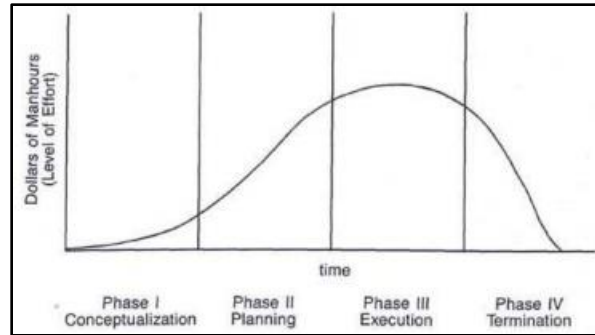


Figure 2.1 – Stages in the Project Life Cycle (Cleland & King, 1983)

### 2.1.2 The Project Environment

One of the aspects of realizing a construction project is accounting for the volatile environment in which the project has to be realized. To be better prepared for the unknown, we have created extensive methods of risk-management, helping teams to have an overview of any possible events during the project. Note that these can be both disruptions with a negative impact on the project, as well as opportunities creating a window for positive impact. However, as Mhetre, Konnur & Landage (2016) having an overview of the disruptions and opportunities does not always reduce their potential impact. During this critical execution phase, in which collaborations derail, the impact of external influences on the project team increase. Where the client and contractor can plan and design the project in a set environment with limited sunken costs, they enter a more unpredictable environment with additional players and interfaces when starting the execution. This means that the project team does not only have to deal with their internal organisation, but with external uncontrollable factors as well. Moreover, their dealing with changes becomes increasingly important, as the costs of changes to the project increase with the progress in the execution phase (Safapour & Kermanshachi, 2019).

To address this issue, insight in the project environment and defining the internal and external environment is required. In this way project teams would be able to better identify risks. Moreover, external influences tend to become disruptive by indirect effects caused by an event as well. The anticipation and reaction to an event is crucial for the effects an event will have on the collaboration. The NETLIPSE knowledge- and research organisation supported by the European Commission has tried to compose an overview of the project environment in the Infrastructure Project Assessment Tool, or IPAT (NETLIPSE, 2022). This model will function as the starting point for this research into the external project environment. The model is shown in figure 2.2 and illustrates the project delivery team, surrounded by the client, environment, stakeholders and private parties. Moreover, it shows that these experience political influences as well. During the literature study several models of the project environment will be researched to enhance the IPAT model to make it depict the project environment with a distinction between the internal and external environment.

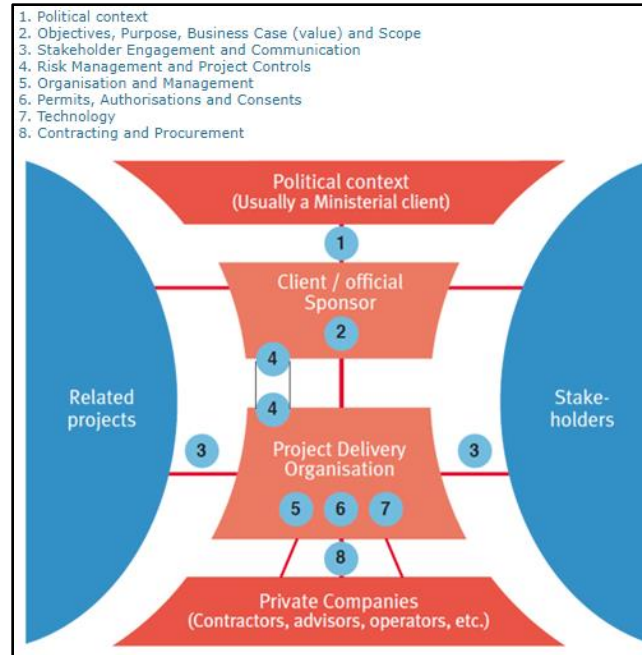


Figure 2.2 – The IPAT (NETLIPSE, 2022)

## 2.2 Problem Definition

From the introduction and context it shows that collaboration has become key in the realisation of projects over the last decades. Both the public clients and the private contractors voice their willingness to increase collaboration efforts. However, as clients and contractors still have intrinsic differences in motivation and goals when realising projects, they struggle to align their expectations when it comes to collaboration. As Turner and Simister (2001) state this is the main driver for the selection of contracting models and the reason it is not possible to have one ‘best’ model. One of the main reasons making this a difficult task, is the division of risks and responsibilities among the parties involved. When looking into the project life cycle model, it shows that collaborations are most vulnerable to risks during the execution phase. However, at this point agreements with regard to the risks and the allocation of responsibility have already been made in the previous phases. If these assessments are not accurate, the partnerships can derail as sometimes the consequences have been miscalculated. This makes the execution phase a particularly dangerous phase during projects.

The most difficult to predict influences during the execution phase arise from external factors, as their occurrence and impact depend on circumstances the project team cannot influence. Therefore, both their occurrence and impact are difficult to predict, causing problems if either of the two differs in reality from the prediction as this will put stress on the project team to adapt to a unexpected situation. When faced with unexpected situations people might alter their reactions, causing relationships to deteriorate. Therefore, the problem that is faced is defined as: collaborations in the construction industry derail during the execution phase, partly due to external influences.

### 2.2.1 Research Gap

It has become clear that the market is having trouble mitigating their collaboration through the often hectic execution phase during projects. Where they have enough mechanisms in place to deal with potential issues during the conceptualization and planning phase in a set environment, they can still clash

when executing the very same plans they created together. With alliance contracting and the 2-phase model they are experimenting new ways of structuring project organisations to tackle these problems, but it remains unsure which measures will protect the team during execution and when they have to be implemented.

Academic researchers focus on the interaction between client and contractors internally (Johnson & Filippini, 2009). Modern research has a high level of interest for the soft-side of collaboration in construction as well. However, by focussing on the internal interaction between client and contractors, an important factor is insufficiently taken into account. Indeed, the behaviour of people depends partly on their past experience as well as on the present (Biderman, Bakkour, & Shohamy, 2020). Furthermore, individuals in project teams are not only influenced by each other during construction, but by many external events as well. Right now a overview of the project environment and a distinction between the internal and external environment is lacking. Moreover, it is unknown how the external environment influences the internal organisation. As this knowledge might prove vital in partly stabilizing collaborations, the knowledge gap regarding the influences of external factors during execution will be addressed during this research.

### 2.2.2 Research Scope

To perform a structured research, scoping choices will have to be made. Collaboration in construction is a very broad topic and to add value to this topic, it has to be scoped down to a more specific aspect. As previously explained, a multitude of contracting models currently exist in the construction sector to set up collaborations. This offers the first scoping choice: which will be looked into during the research?

As the view of both the client and the contractor towards external factors are relevant, a contracting model in which the project team has a mirrored management team from both organisations would enable the best overview of both perspectives. The contracts that will be reviewed are the currently most used contracting models, the traditional design-build contracts and its variants. These are most suitable since division of risks and responsibilities between client and contractor is present as well as a mirrored management team. Therefore, it would provide perspectives from both sides of the collaboration. These types of contracts are only used for large infrastructural project and thus the scope shifts to these projects as well. Three other contracting models that are used for these type of projects are briefly discussed, to elaborate why they are less suitable for this research. Alliance contracting with integrated project teams are outside the scope due to the lack of mirrored project teams. Furthermore, framework contracts consist of a large amount of repetitive work, having more focus on the subcontractors as well. These are therefore not taken into account either. The last model that is not within the scope of the research is the 2-phase model. As this model is already trying to integrate a risk reducing element by offering a later moment to agree on a budget, it is less beneficial to analyse the effects of external factors.

Within those design and build contracts, the research will address the knowledge gap regarding the external project environment. As shown in the IPAT model, the project environment exists of a multitude of domains. As this volatile environment manages to derail collaborations during execution, it is worthwhile to identify this environment and determine why it is able to influence the internal organisation in this manner. However, as Mhetre et al. (2016) explain the external environment not only poses threats, but provides opportunities as well. The scope of this research includes the threats, as this research aims to avoid derailing collaborations opposed to boosting them. With the gained knowledge collaborations

can become more resilient. However, using opportunities might also add to the quality of collaborations and could be part of future research. The scoping choices are visualised in figure 2.3.

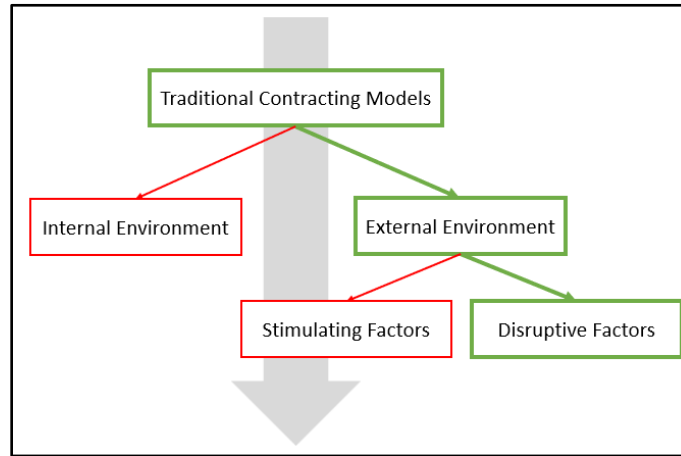


Figure 2.3 – Scope of the Research

## 2.3 Research Goal & Questions

With the problem and its context defined, this chapter will firstly elaborate on the goals for the research to be performed. Secondly, the research question to reach these goals is defined. The research will be conducted based on this leading main question, which is divided in multiple sub-questions that are described subsequently. In this manner all the information required to answer the main question is covered. At the end of the chapter the relevance of the research outcomes is addressed.

### 2.3.1 Research Goal

In the previous chapters it is explained how external factors can disrupt collaboration in construction projects, either by directly influencing the project, or by indirectly influencing it via the reaction of stakeholders to the externalities. With all the available knowledge on collaboration and efforts put into the development of collaboration methods and client-contractor relations, it is still difficult to catch the pain point. The external influences and the perception of them by partners are one of the involved influences that can sour the relationship. To address this issue the following goal is defined for this research:

**Goal:** Reduce the influence of disruptive external factors in client-contractor collaboration

The goal indicates the ambition to get insight in the origins of external factors and how they are a part of the project environment. Moreover, the usage of this insight to advise future collaboration partners on how to address the external factors to create stable and robust collaborations.

### 2.3.2 Research Questions

The main research question for the defined knowledge gap will have to address two main components: “What external factors do influence client-contractor collaboration and how?” and “How can we influence this impact for the benefit of the collaboration?” This challenge requires research into organizations and social sciences to analyse how project teams are designed and how people perceive events. To fill the identified knowledge gap and advice future collaborations, the following two-sided main research question is proposed:

**MQ:** What external factors are present during construction projects that influence the collaboration between client and contractors and how can the impact of these events be reduced up-front?

This research question consists of two elements: the identification of existing external factors and potential ways in which the impact can be reduced up-front. The following sub-questions will aid in addressing these problems:

**SQ1:** What are the origins of external factors that disrupt collaboration?

**SQ2:** What does the project environment in client-contractor collaboration look like?

**SQ3:** Which disruptive external factors do project teams experience?

**SQ4:** How do project teams currently feel the impact of external factors that disrupt collaboration in projects?

**SQ5:** Which possibilities are available to the client and/or contractor to reduce the impact of external factors?

The answers to the first three sub-questions will form the theoretical basis of the knowledge that is required to understand the problem, identify possible room for improvement and have in-depth talks with experts. The last three sub-questions are more practice-oriented and work towards said outcomes. They will retrieve insights and perspectives from experts regarding the problem and show the current impact and way of dealing with external factors. Based on the knowledge acquired by analysing these questions, a conclusion answering the main question and additionally an advice for the construction sector can be drawn up.

## 2.4 Relevance of Research Outcomes

The construction industry is aiming to increase the level of collaboration between project partners. However, at the moment collaboration remains an ambiguous term and difficult to optimize. Prebble (2015) states that there might be no ‘ultimate’ approach to collaboration. This indicates that collaboration requires a custom approach. To provide this custom approach, academics and working professionals invest time and resources into research on collaboration. A large amount of this research is focussed on the internal collaboration within project teams and the soft-side of collaboration. This is a starting point for the optimization of collaboration, as these are more controllable elements (Johnson & Filippini, 2009). However, in reality collaboration is not fully controllable. Influences from outside the internal project environment will occur, having both direct and indirect effects on the maintained relationship. To add to this custom approach for collaboration this research will gather insight in the uncontrollable external space surrounding the project team.

## 3. Research Methodology

Having established the goals and the accompanying research questions to be answered, this chapter will elaborate on the research approach taken and a fitting research method. It outlines the approach that will be taken to answer the questions and addresses the Q-method used to gather data. The method will be generally introduced and then broken down into the steps necessary from start to results.

### 3.1 Research Approach

As this research strives to answer the research question “What external factors are present during construction projects that influence the collaboration between client and contractors and how can the impact of these events be reduced up-front?”, it is clear that there are two components that will be addressed. Firstly, the more inductive part with the mapping of external factors and their influences. After that comes the deductive part, which seeks to create a working method to address the current influence of external factors in a fitting manner, if necessary. During this part the results from the analysis will be reviewed to advise on strategies to improve collaboration and when to implement them in the Project Life Cycle. These two components of the research question differ in nature and will require a different approach. Therefore the chosen research approach is a mixture of theoretical and empirical, and quantitative and qualitative research aspects.

To map the external factors, a theoretical approach is taken. This translates to performing desk research into client-contractor collaboration and the project environment. By using existing literature and academic sources, an overview of the project environment and different domains of external factors can be composed. Having this basic understanding is key for the second component of the research, where practical aspects are added. The knowledge on how the impact of external factors influences the project environment and how different stakeholders feel this impact, can be gathered from both literature and practice. Interviewing professionals will allow the composition of a dataset of the effects of external factors in client-contractor collaboration.

This empirical part of the research approach has a qualitative nature as well. Using qualitative methods to perform the research allows for gathering great detail from a small sample group and performing an in-depth analysis of this data (Doorewaard, Kil, & Van de Ven, 2015). In essence, the concepts of collaboration and externalities are both ambiguous terms that are hard to quantify. By interviewing experts in a qualitative manner, the backgrounds of respondents and their approaches to external factors insight in their perspective on the problem will be clear and a case can be formed. However, as said, collaboration is an ambiguous concept that is subject to the perception of the interviewee. In addition to this qualitative approach, finding a suitable method to quantify the underlying motives, or at least create an overview of the underlying preferences of the respondent, would help to create a more robust advice for dealing with externalities. This ambition is in line with the Q-method, which integrates the quantitative method by means of statistics in the research to identify the perception of respondents. The Q-method is further described and elaborated on in section 3.2.

With the insight from the Q-study measures to create more resilient collaborations can be advised to the market. This is initially done based on the literature review and qualitative output of the interviews. To validate the feasibility of these measures an expert meeting is organised where the proposed measures are reviewed (Beecham, Hall, Britton, Cottee, & Rainer, 2005). As a result of this meeting a last iteration to the advice can be made where the input from experts might alter the final set of measures.

## 3.2 Q-Methodology

This section will further introduce the Q-method, how it works and what it is used for. Furthermore, the steps taken during a Q-study will be described and the Q-question will be introduced as it guides the literature review.

### 3.2.1 Method Description

The Q-method is used to identify the perspective of respondents. In this particular research it will be used to identify the perspective of respondents regarding disruptive external factors in client-contractor collaboration. The Q-method is well suited to compare theoretical concepts and the views experts in the field have on these concepts by quantitatively measuring the attitude of the respondents to statements gathered from literature, news articles and practice (Cross, 2004). Furthermore, it combines the qualitative research approach with a quantitative component. This will expose the underlying preferences of respondents that they might not be aware of themselves (Brown, 1980). It does so by having respondents rank statements referring to identified external factors in scientific literature, news articles and practice. The respondents will rank the statements on an axis, indicating to what extent they agree or disagree with the statement. This means that the statements placed on the outer bounds of the axis are experienced as most impactful by the respondent and these will function as reference points to rank the remaining statements. Having multiple respondents rank the same statements during their Q-sort, will enable to group respondents based on their perspectives on the statements (Watts & Stenner, 2005). When multiple respondents have a significant overlap in their perspectives on the statements, they can be grouped. By adding the qualitative component of the Q-method, in which the background of the respondents is identified, these groups can be labelled so that a profile with a certain attitude towards the statements is created. These profiles will be used to analyse how the impact of external factors can be reduced so as to adopt a suitable working method for partners for partners who represent a 'typical' profile.

As Watts and Stenner (2005) state, combining the quantitative and qualitative gives the Q-method the power to measure the relative perspective of respondents on the statements (the quantitative part) while revealing the motives for the subjective ranking by the respondents at the same time, by interviewing the respondents while they are performing their Q-sort (the qualitative part). The focus of the Q-methodology on the subjective perspective of the actors is unique and is best expressed in the variables in the Q-methodology, which are the respondents. The Q-method therefore aims to find a correlation between persons and not between any other types of variables.

At the same time, the Q-method can be performed in a very structured manner, allowing the researcher to remain in control and have an overview of the process at all times. This process starts with desk research and ends with the composition of profiles of respondents. Watts and Stenner (2012) have created a guideline to perform the Q-method, with six steps required to successfully perform the study. These steps are described below, with a brief description of the application to this particular research on the influence of external factors in client-contractor collaboration.

Step 1 consists of creating a Q-question to lead the research and subsequently consulting scientific literature and news articles and talking with experts to collect statements. Having this variety of sources will create a comprehensive coverage of the topic and ensures that the topic is viewed from different angles. During this step, all possible statements are collected, even when there is a visible overlap. This set of statements is called the 'concourse'. It comprises all statements found in the different types of



sources. To build the concourse for this research, scientific journals, news articles on Cobouw and Nu.nl will be used. Furthermore an expert session with practitioners from AT Osborne is organized. The concourse can be found in section 4.2.

Step 2 consists of reducing the concourse to a Q-set. This is done by carefully filtering the concourse, getting rid of overlapping statements and choosing statements that occur in multiple sources to reach a smaller set of statements applicable for a Q-sort by the respondent. The Q-set can be found in section 5.1.

Step 3 consists of creating the P-set for the study. The P-set is the set of respondents who will perform the Q-sort and with whom the interviews will be performed. The Q-method sets itself apart from other research methods, as the respondents are not chosen randomly, but specifically by their experience and background. These considerations for the P-set can be found in section 5.2.

Step 4 consists of performing the interviews and having respondents fill out their Q-sort. In short, during this step the required data for the analysis is collected. The Q-sort forces respondents to rank the statements from totally agree to totally disagree and thereby reveals the underlying preferences of the respondent. During the Q-sort the researcher will ask the respondents about their reasoning behind their ranking, the choices for their extreme values and their general background.

Step 5 consists of the data analysis aimed at finding overlapping patterns in the Q-sort of multiple respondents. This is done by a factor analysis, in which a factor is 'a certain pattern in the filled in Q-sorts that can help to cluster similarly thinking respondents'. A factor expresses a certain ranking pattern of the statements and thereby shows a certain perspective on which external factors are more disruptive than others in client-contractor collaboration. Additionally, the analysis shows the degree of similarity of the filled in Q-sort of each respondent with the factors found. Respondents with a similar score for the same factor, have a similar perspective on the impact of external factors.

Step 6 consists of composing profiles and explaining what these represent in practice. The grouping of overlapping respondents is based on the quantitative analysis. Combining the qualitative part of step four, in which insight in the background and experiences of the respondent is gathered, enables the labelling of the created groups, making them profiles. These profiles represent a generally present perspective in practice of a set of practitioners. If potential project partners can be identified to correspond to one of these profiles up-front, a suitable working agreement can be designed to withstand external influences.

### 3.2.2 Q-Question

To perform a Q-Study not only statements and respondents need to be retrieved, but a Q-question needs to be formulated as well. This question is the leading question for respondents for their Q-sort. It proposes how they will need to rank the statements that they are presented with. More fundamentally it will also indicate the formulation of the statements and later in the process the describing of the resulting factors (Watts & Stenner, 2005).

The aim of this research is to find out which domains of external factors have a disruptive impact on the collaboration during construction projects. Therefore, the Q-question should present the respondent with the challenge to rank the statements on the level of disruptiveness they experienced in their collaboration as a result of said statement. To allow the respondents to do so, the following Q-question is defined to lead the Q-sort part of the interview:

*What has caused the most disruptive impact on the collaboration during the project?*

By using this question, the resulting factors will be labeled as “Domain X has the most disruptive impact on the collaboration”. These are suitable labels, as the underlying explaining variables might indicate a set of people with similar values in each factor. In this way the influence of the role, organisation and function of individuals on their perception of external factors can be analysed. Moreover the analysis will show which respondent load on each factor so the qualitative output of the interviews can be used to explain why individuals fit together in perspectives. This reveals insight in the dynamics within the project team, which is necessary to conclude how project teams are affected by external factors. This insight provides an opening to advice measures to protect the dynamics from external influences as problem areas are uncovered.

### 3.3 Expert Meeting

The expert meeting is used as a tool to validate the proposed measures to create more resilient collaborations. The measures are retrieved from literature and the qualitative output of the interviews. The former is based on academic research and thus the practical feasibility of these measures can be questioned. The latter possess the subjectivity of individuals and their specific project team. Therefore, these measures should be broadly validated before accepting them. To do so a panel of experts is presented the framework of measures to review and provide feedback on the applicability and feasibility of the proposed measures.

The expert meeting was attended by 5 experts of Dutch consultancy firm AT Osborne. The experts are part of the Infrastructure, Planning & Environment division of the firm. They are hired by client and contractor organisations to either be part of a project organisation or review projects. The experts differ in terms of age, gender, experience and previous working experience to stimulate discussion and broaden the view on projects of the panel. However, to ensure validity of the input of the experts at least 10+ years’ of experience was required. The panel exists of a contract manager, two managers project control, a program manager and a senior consultant. For privacy purposes their names are left out, however, their function and experience is summed up in table 3.1. From now on they will be referred to as ‘Expert 1, 2, 3, 4 or 5’. To ensure the view of both clients and contractors within the panel two experts with a background at contracting firms are participating, these are experts 2 and 4. Expert 5 has a background at Rijkswaterstaat, one of the leading client organisations in The Netherlands.

#	FUNCTION & EXPERIENCE
EXPERT 1	<b>Consultant and Contract Manager, 10+ years’ experience</b> Current Contract Manager for a large infrastructure program of the Municipality of Amsterdam
EXPERT 2	<b>Consultant and Manager Project Control, 10+ years’ experience</b> Advisor and Manager roles at Rijksvastgoedbedrijf and Rijkswaterstaat
EXPERT 3	<b>Senior Consultant and Program Manager, 25+ years’ experience</b> Current Program Manager for ProRail and a large area development project
EXPERT 4	<b>Senior Consultant, 35+ years’ experience</b> Senior advisor roles for large projects and programs (market approach, second opinions etc.)
EXPERT 5	<b>Consultant and Manager Project Control, 10+ years’ experience</b> Former Manager Project Control within the locks program of Rijkswaterstaat

Table 3.1 – Overview and labelling of participating experts

The attachment which was used as input for the expert meeting can be found in Appendix VIII. The expert meeting was documented by means of a summary with citations which is presented in Appendix IX.

## 4. Literature Review

The Q-study requires examples of external events for the respondents to rank and thus a distinction between the internal and external project environment is key. This will align the understanding of the project environment of the different respondents, allowing them to make decisions based on the same criteria. This research into the project environment is performed in section 4.1, resulting in a workable conceptual model. Moreover, to create the concourse and after that the Q-set, insight in the origins of external factors is needed. The final Q-set needs to cover the external project environment as much as possible to avoid respondents missing out on important externalities or not recognizing poorly defined statements. Section 4.2 addresses the different domains of external factors in the project environment, from which statements are retrieved for the concourse. For both parts of the desk study the Google, Google Scholar and Cobouw databases are used to retrieve information. Used keywords are: collaboration, project environment, external factors, external environment, project organisation and disruptions. Variations and combinations of these keywords are used to find specific sources.

### 4.1 Project Environment

As introduced, this section will review the project environment. To create a workable conceptual model of the project environment distinguishing the internal and external environment, multiple existing models are reviewed. After that, one of the more promising existing models is analysed more in-depth to be able to make some iterations to it and ultimately create a suitable conceptual model for this research. This model needs to comprehend and distinguish the internal and external project environment and show how they are related to each other.

#### 4.1.1 Existing Models of the Project Environment

The environment in which projects take place is often described as complex. This is due to both the interfaces with the physical surroundings and the amount of stakeholders involved. The latter does not necessarily make the project environment complex. It becomes complex when involved parties do not share the same vision and ambitions for the project. The chance of this occurring increases when a multitude of stakeholders is involved in a project (Eslerod, Huemann, & Savage, 2015). Within this complex environment the client and contractor have to organise themselves to adequately deal with their surroundings. As clients and contractors are not able to execute projects alone in the current industry due to the increased levels of expertise, knowledge and budget required, they will bundle their strengths (Klijn & Teisman, 2000). In the design and build contracts that are reviewed for this research, one of the leading clients in the Dutch construction industry, Rijkswaterstaat, has developed a model for the organisation of a shared project team during projects. Since they undertake many projects of a wide variety, they invested in a collaboration model, so they can build experience and know what can be expected. The model is called 'Integral Project Management' (IPM) and strives to positively stimulate both internal and external collaborations (Rijkswaterstaat, 2021). The model differentiates five processes during project management and assigns a specific role to each of the processes. The people taking on these roles form the project team. The first process is project management, which includes safeguarding the quality and being responsible for the end-product. Another process is project control, which aims to identify and control potential integral risks. Stakeholder management is the third process, where the relationship with the stakeholders surrounding the project is key. Then there is the technical management, which controls risks with regard to technical elements of the construction. The last process is contract management. The contract manager manages the risks between the client and the market and contracting with contractors.

When executing a project, both the client and the contractor will provide a management team with all five roles, creating a shared project team. A visualisation of how this team relates to the surroundings and market is provided in appendix I.I.

The IPM-model focuses on the internal organisation. However, as indicated, the environment in which projects are executed consists of many other factors. Todorovic et al. (2015) show in their research that one of the steps for gaining knowledge of the project environment is the acquisition of external knowledge. The project organisation will benefit from a carefully composed management team, but they still need to be aware of the remaining surroundings. Kanapeckiene et al. (2010) elaborate on a multitude of factors that need to be taken into account during construction project management. They defined a system of criteria for analysis of the project management life cycle (see figure 4.1). In this system of criteria a division between institutional and emotional factors is created. However, for successful project management both need to be taken into account. It can be observed that the organisational and managerial factors that are addressed by the IPM-model are but a part of the spectrum of criteria. It is described how decisions are often made by first taking economic, legal, technical and organisational factors into account.

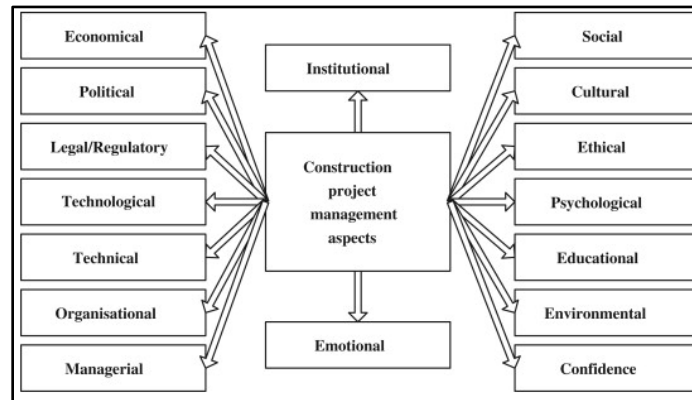


Figure 4.1 - Construction project management aspects (Kanapeckiene, Kaklauskas, Zavadskas, & Seniut, 2010)

One of the first models that implies the existence of an external project environment is the critical success/failure factors in projects model by Belassi and Tukul (1996) (see appendix I.II). It describes four domains of critical success/failure factors: factors related to the project manager, factors related to the project, factors related to the organization and factors related to the external environment. The first three domains are all related to or determined by the project team and are described as intertwined. The latter however, is seen as separate and influences the entirety of the model. This means that it is argued that the external environment both directly and indirectly influences project success or failure. When looking into the described external environment, the importance of political, economic and technological factors is underlined. Moreover, it introduces the client, competition and subcontractors as external presences. The client organisation can be organised separately from the project organisation, creating two entities with their own goals and ambitions. In the current construction industry, this is how project organisations are set-up, as clients have a larger portfolio to take care of, making them an external presence. With these domains being specified, it becomes clear how it is possible that the external environment influences all four processes which contribute to project success or failure. The client consultation & acceptance is influenced by competitors, whereas the project managers performance might be influenced by all domains. The preliminary estimates and availability of resources depend on the political, economic and

technological factors. Pinto and Slevin (1987) have found that environmental factors have the most influence during the planning phase of the project life cycle. Their results show that influence was interpreted as the amount of accommodating required during the decision making process as a result of external factors. During this research, influence is defined as disruptive impact on the project, which occurs more in the execution phase.

Another, more recent model, the Project Excellence Model (see appendix I.III) by Westerveld (2003), underlines the influence and importance of contracting partners and stakeholders during the execution of projects. It is argued that the co-operation of the project organisation with external parties determines the place of the project in its environment. Project organisations such as the mirrored IPM-team differ fundamentally from functionally organised permanent organisations (Turner J. , *The handbook of project based management*, 1997). Whereas permanent organisations focus on continuity and long term growth, project organisations are more specifically aimed at producing a certain project goal. As there is a set milestone for the project organisation, they benefit less from routine forming and long term efficiency development, as the organisation will be disbanded after delivery. The Project Excellence Model defines two focus points for project organisations for project success: result areas (project success criteria) and organisational areas (critical success factors). One of these critical success factors is the management of the external factors surrounding the project as described in the critical success/failure factors model. The managerial complexity model with MODeST dimensions (see appendix I.IV) created by Maylor et al. (2008) proposes an alternative overview of the project environment in a more goal-oriented manner. Projects are broken down into separate crucial processes for a successful delivery and the focus is primarily on the internal organisation. However, the research does acknowledge that the mission parameters are subject to and depending on influences from outside of the organisation. Therefore, it would be beneficial to enrich this model with the external project environment.

#### 4.1.2 The IPAT

One of the models that is aimed at obtaining a complete overview of the project environment is the Infrastructure Project Assessment Tool, or IPAT, created by the NETLIPSE organisation. The goal of the NETLIPSE organisation was to set up a continuous and interactive network for Large Infrastructure Projects (LIPs) throughout the European Union to disseminate experience and knowledge with regard to the management and organisation of LIPs (Reddy, 2019). The organisation aims to learn by analysing the successful projects and similar projects that encountered difficulties. Projects are considered to be successful when they are delivered with the agreed quality within time and budget. By evaluating and assessing the LIPs to identify the existing vulnerabilities, any infrastructure project can learn from them and make use of the lessons to improve the deliverables in the subsequent phases or future projects. An accurate understanding of the current capabilities and requirements of the project is imperative for facilitating a fact-based assessment tool. Hence the IPAT was developed by the NETLIPSE network, to measure the capability of the project at all stages of its development and delivery. The results of the IPAT assessments help in improving the factors that are hampering the projects' success and also help in identifying the strengths. Thus Staal-Ong et al. (2008) state that these assessments help in enhancing the quality of the management of the LIPs and boosting the chances of the project's success in the subsequent phases.

As most of the large infrastructure projects realized in Europe ran into unforeseen cost overruns and time delays, the huge amount of investments of the European Commission (EC) funds seemed ineffective (Crescenzi, Di Cataldo, & Rodriguez-Pose, 2016). This resulted in the need to improve the insights of the

EC regarding the execution and the feasibility of the infrastructure projects so that the capability of funding becomes more effective. To fill the gap that exists between evaluating the management and organization of projects, NETLIPSE developed the project assessment tool with the primary goal of efficiently deploying LIPs. From 2018 to date the IPAT version 2 has been in use with 8 themes. These themes are shown in figure 4.2. The IPAT can help assess, monitor, benchmark and evaluate transport projects, before, during and after implementation in a complete and uniform manner (Hertogh, Baker, Staal-Ong, & Westerveld, 2008). The IPAT measures the capability of a project at all stages of its development and delivery. The results give an independent peer assessment of the project team, identifying strengths but also any areas for improvement that need to be addressed to ensure success.

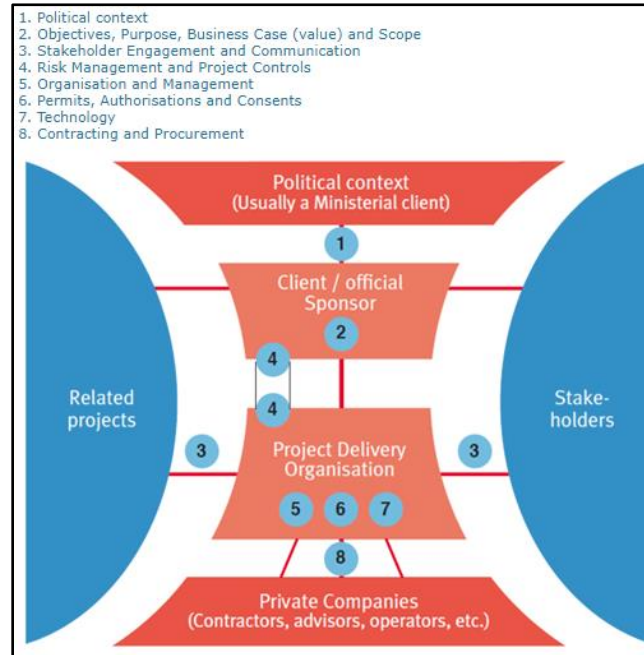


Figure 4.2 – The IPAT (NETLIPSE, 2022)

Since the development of the IPAT model it has been used for a multitude of different assessments on large infrastructure projects. The success of the IPAT model indicates that assessing not only the project, but also its environment, contributes to a stable project organisation. However, the IPAT focuses on the 8 themes that are described as practices to deal with the surrounding domains. With the IPAT, organisations can assess the degree of success of a project on these themes but not necessarily gain further insight in their project environment. For a comprehensive overview of the project environment some vital domains of influence that are mentioned in all previously described models, such as economic, technological and social domains, should be added (Kanapeckiene, Kaklauskas, Zavadskas, & Seniut, 2010). This means that to create a workable model of the project environment that distinguishes the internal and external project environment, the IPAT can be used as a baseline, but needs to be supplemented by other models found in the previous section.

#### 4.1.3 Conceptual Model of the Project Environment

To conclude the review of existing models of the project environment, a workable model distinguishing the internal and external project environment is created. This model consists of 8 domains of external influences surrounding the internal project organisation and is presented in figure 4.3. The IPAT is taken as a basis for the model since it is a proven model, used in practice to assess projects. The other models

presented in section 4.1.1 are used to enhance the IPAT model to provide a more complete depiction of the project environment. The IPAT addresses private companies as one domain of external influences, however, as Westerveld (2003) describes in the explanation of his Project Excellence Model there are two types of private companies during projects. The main contracting party, and the subcontractors they select to partake in the project. In the new model these distinction between private companies will be applied. Furthermore, the models of Belassi and Tukel (1996) and Kanapeckiene et al. (2010) show the importance of economical and technological factors during projects, which are lacking in the IPAT model. These are added as context setting domains, influencing all other domains present in the project environment. Factors from these domains can thus influence the project team both direct and indirect through other surrounding domains.

In the newly created model of the project environment the project team is the central, internal, organisation. This is the project team responsible for delivering the project in time and within budget. In traditional contracting this project team will consist of a mirrored project team, where both client and contractor supply a management team. As soon as this project team is created, they can be seen as a separate entity with, to a certain degree, common goals and ambitions. These goals and ambitions might differ from the original overarching client and contractor organisations. Therefore, this project team and their internal processes are defined as the internal project environment.

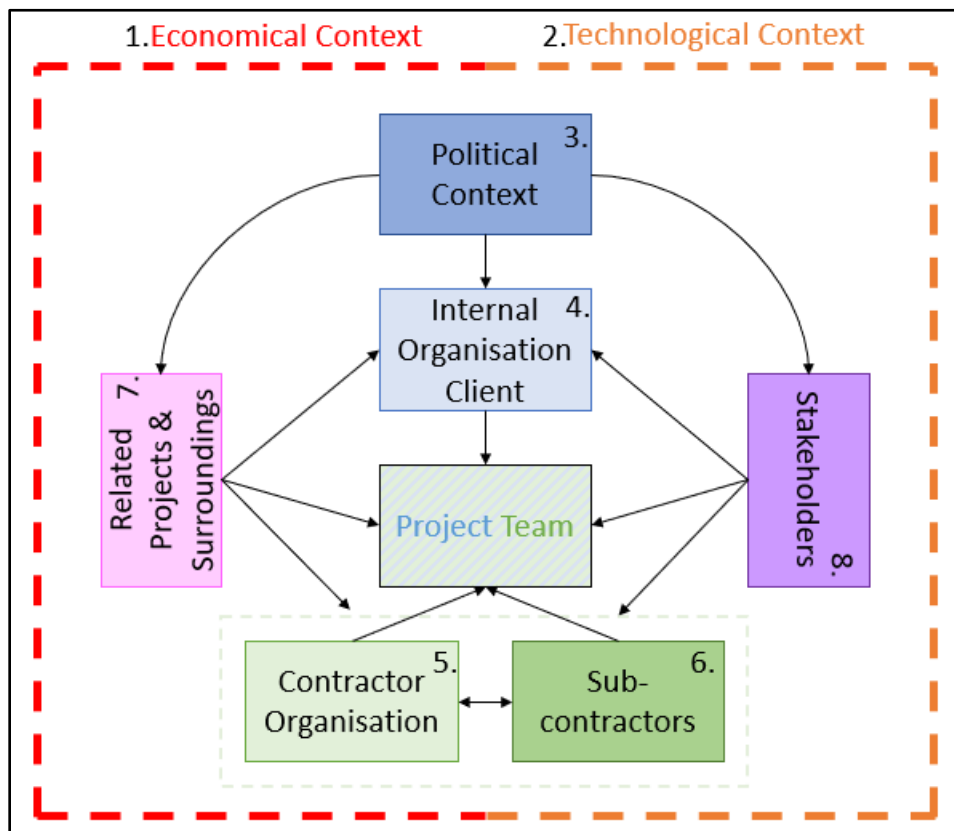


Figure 4.3 – Model of the Project Environment

Next, the project team is surrounded by the client and contractor organisations, as they have an interest in the project as well. Due to the internal organisations both supplying a part of the project team these overarching entities have a direct influence on the project team (4 and 5). In modern construction



contractors often do not have the internal capacity to perform all specialized work during large infrastructure projects and therefore possess a network of subcontractors to support the design and execution. Due to this connection between the contractor and subcontractors, they will directly influence the project team as well (6). The project team is also directly influenced by the stakeholders involved (8). This is a classic domain of external factors and can be difficult to manage due to misalignment of expectations. To counter this, there even is a specialized stakeholder manager present in the project team. The last direct influence is different from the IPAT and consists of related projects & surroundings (7). This creates coverage for the domain of both the physical and non-physical surroundings of the project. Surroundings refer to the interfaces with nearby project and the land that needs to be developed, whereas related projects relate to similar projects in which events might occur that influence for example safety protocols during execution. The stakeholders and related projects & surroundings domains influence not only the project team, but the overarching client and contractor organisations as well.

For the non-direct influences three main domains are defined. The political domain (3) will directly or indirectly influence the entire system mentioned in the previous paragraph. Client organisations might initiate projects because of political decisions and can be dependent on politics as regards the available budget. The behaviour of the surroundings and stakeholders can also change during the course of a project due to political decisions. The last two domains overarch the entirety of the system described so far. (Inter)national economic (1) and technological (2) developments might alter all the decisions made in politics, by clients, contractors and the behaviour of surroundings and stakeholders. Currently the war in Ukraine is a fair example of these overarching effects, as it affects the monetary feasibility of projects, causing delays (Platschorre, 2022).

## 4.2 External Project Environment

In this section the domains that are defined by the conceptual model created in section 4.1.3 are reviewed in-depth. As a result, this section will generate the input for the Q-study, namely the statements. As these domains are sources of external factors influencing the project team and their collaboration, looking into them will allow for the retrieval of externalities. These examples of externalities can be formulated into statements, which are used to build the concourse for the Q-study. The concourse is enriched with empirical research to retrieve statements from practice. To do so, a brainstorm session at AT Osborne was held where participants could share external influences they have experienced in their work. The results of this session are presented in Appendix III. For a more concise overview of the concourse Appendix II can be consulted. Here the statements are presented per domain, showing the source (type) from which it was retrieved.

### 4.2.1 Economical Context

One of the two context setting domains, influencing decisions and events happening in all other domains is the economical context of the project environment. In partnerships struck in the construction sector the client and the contractor always have different reasons for participating in the project. Where the client often initiates a project from the desire to generate value for society, the contractor is largely in it to make a profit. Bryde and Robinson (2005) state that the misalignment of goals and ambitions to participate in the project can create friction between both parties from the very start of the project. As a result, sudden changes in the economical context of the project environment can create even more friction, as both the client and the contractor might want to address them differently. The resulting

choices on how the changes in the economical context are being dealt with, but also the process to reach these decisions, can put tension on the collaboration.

Traditionally, in construction projects an agreement is reached between the client and the contractor to execute the project within a certain budget. These prices are offered by the contractors during the tender phase and the client will choose the most promising design, based on their selection criteria. The prices that are being offered by contractors will have an profit-margin as well, as ultimately the private firms would like to make a profit by executing the project. However, if they make this margin too large, they might not even be selected to execute the project. Therefore, the contractor has to search for design opportunities to generate profit (Carter & Bruce, 2005).

This estimation of the budget, with an opportunistic approach, is where changes in the economic context are able to hurt the collaboration. After having agreed on a price, raising costs or economic recession will influence the execution costs of the project and hurt the profit margin of the contractor. This could go as far as completely depleting the profit margins and making it impossible to continue the execution of the project (Jaya, Alaloul, & Musarat, 2021). To counter this effect, there is a mechanism in place called the price level. Once every set period of time the contractor is able to recalculate execution costs based on economic changes and discuss this with the client to gain additional budget (Vanbrussel, 2022). However, these discussions can create friction between both parties, as the client will require a sound argumentation and specification of the necessity of raises in the budget.

During a project, different price components influence budgeting decisions. A project starts out with acquiring the required area. As Koekoek explains (2010), in a small country like the Netherlands these prices can increase rather quickly based on economical welfare. The land is scarce, so when multiple projects are started due to an increase in the economy investors will try to acquire land surrounding the project to make a profit and landowners will increase their prices. Ultimately the area can be expropriated, but this is rather time consuming. Another factor are the material costs that are budgeted. Recently, materials such as steel and chips have become extremely scarce, due to which the prices of those materials are increased dramatically (Platschorre, Grote zorgen om prijsstijgingen: 'Staalbedrijven zijn in paniek', 2022). This is a sector-wide problem and causes projects to have both cost and budget overruns. The last component of the price-level to be discussed is a recently increasing problem. Due to a black-swan event, the war in Ukraine, the prices of gas, fuel and energy (Platschorre, 2022) have increased rapidly. For logistically complex projects where transportation of materials is key, the increase of fuel prices can put tension on the collaboration. In projects where machinery is working on a daily basis, the increase in energy prices can be felt (Papadopoulos, 2012). All in all, the calculation of the price level is an important factor, as it is only done once during a set time. When the specific components are exceeding the agreed price level, it puts the contractor in danger as it hurts their financial status, which will be felt in the collaboration as well.

Next to these price level factors, some more general economical influences are present as well. When the economic welfare of the Netherlands decreases, the possibilities to execute projects will deplete (Eadie, McKeown, & Anderson, 2013). This will put pressure on running projects to perform, as it becomes difficult for firms to spread risks and opportunities across multiple projects. Therefore, this project becomes vital to the performance of the firm and their possibilities to acquire a few of the scarce new projects. It is clear that this situation is difficult for the contractor. This is due in no small part to their enlistment on the exchange. With the reduced amount of projects, the contractor firms are hit directly as

well. Choi (2014) explains that the dropping values of firms due to project failure create difficult times in the management department of the firm. These internal struggles will be felt by the project teams executing projects as well. On a larger, international scale, in times of recession the rates of currencies can influence construction projects as well. If, for example, the value of the euro would drop quicker than other currencies, the import of materials from non-euro countries becomes exponentially more expensive, which will influence the budget and design choices (Kapila & Hendrickson, 2001).

However, there is also a downside to an increase in economical welfare. As the Netherlands is a relatively small country, there are clear boundaries in the availability of materials and manpower to execute projects. Doodeman (2020) reports that now that the economy is running smoothly, undercapacity occurs on the market leaving project teams unable to acquire the required people and machinery to execute their project.

#### **Retrieved statements:**

- Increase in the prices of materials
- Increase in the price level
- Declining share prices of construction firms
- Decrease in the value of the euro
- Insufficient available capacity
- Increase in land prices
- Increase in fuel prices
- Increase in energy prices
- Pressure on the budget due to economic recession
- Uncertainty of supply of materials

#### **4.2.2 Technological Context**

Another context setting domain, influencing decisions and events happening in all other domains, is the technological context of the project environment. The construction sector has technological characteristics making it subject to changes and developments in this domain. Traditionally the construction sector is not regarded as an innovative sector (Olatunji, Sher, & Gu, 2010), however, even the smallest changes in these directions can bring their own challenges for project teams. Additionally, the point of view regarding these changes might differ based on the background of project team members, causing internal disagreements.

One of the modern technological factors that play a role in the collaboration in construction projects is the software necessity and environment. At the beginning of this century Building Information Modelling was introduced. It is an integrated approach in which a model of the project containing the design, planning and costs is created. It helps project teams to monitor their project and find potential bottlenecks and other problems. As technological advancements in the IT-sector are still developing at a fast pace, the software for building modelling evolves as well. In Dutch construction industry BIM-models are commonly used and there are regular upgrades in these services, allowing for the possibility of greater detail. Migilinskas et al. (2013) describe how the decision on when to adopt these additional detail levels can be difficult in projects with a long lifespan. However, this is not only the case for project specific software. More generally, clients and contractors will adopt new software during projects, which forces the project team to make a choice: either adopt the new software systems or continue working with software systems that are not compatible with the parent organisation, which might cause problems down the line (Gonzalez-Barahona, Sherwood, Robles, & Izquierdo, 2017).

The more traditional technology and its development has influence in construction projects as well. Tools, machinery, building techniques and methods and materials are crucial during the execution phase and used on a daily basis. The research of Khair et al. (2018) shows that when tools and machinery are outdated but not replaced, it can hurt the efficiency and willingness to work on the project. It puts pressure on the contractor to take their responsibility, but as this raises their costs, they want to wait for an opportunity-window in which they can acquire the replacement tools and machinery for a favourable price. The development of building techniques and methods can create difficulties for the execution and logistics of the project (appendix III). The research of Xue et al. (2014) shows that contractors would like to adopt more efficient or cost-effective techniques and methods, whereas the client would like to adopt value-generating techniques and methods. With the adoption of either, the design and planning will need to be reviewed and adjusted. The client will need to convince the contractor and vice versa. Xue et al. conclude that the same process goes for the development of new cheap or sustainable building materials, which can alter the design and purchasing strategy of the project team. The choices regarding building materials can also be a necessity, as some materials might be extremely scarce to the point where they are not acquirable by the project team, which is currently happening due to the conflict in Ukraine (Platschorre, 2022).

The last factor in this domain is the building area, the soil on which the project will be realised. At the start of a project measurements and an in-depth study of the area is performed. Despite these efforts, it is possible to run into soil pollution or existing structures, requiring the project team to alter their design. This occurred at the Boekeloseburg project in the Netherlands, causing a lengthy judicial process and a blame culture within the project team, as the question arises “who should have noticed these defects?” (Waanders, 2022). The level of importance of this factor might differ between greenfield and brownfield projects, as the possibilities for research in the area differ. Greenfield projects are developed in an undeveloped area, whereas brownfield projects take place in an already developed area. Maurice et al. (2007) stated that this makes the research of the underlying land more difficult. During projects the client might have the wish for the area to be uniform and blend in with the existing environment. During the execution this might lead to additional changes in the logistical planning of the project.

#### **Retrieved statements:**

- Increased demands concerning the level of detail of the BIM model
- Implementation of new software systems at the parent organisations
- Outdated equipment that has to be replaced
- Implementation of new building techniques
- Limited insight in the situation of the land
- Scarcity of required materials
- Changes in the design due to innovation in building products
- Logistic changes due to desired uniformity of the land
- Logistic changes due to innovation in building methods

#### **4.2.3 Political Context**

The last of the context setting domains are the political influences. This domain is subject to the economical context and technological context as well, but will still influence a large part of the remaining project environment. In this domain choices regarding legislation and budget differentiation to different clients organisations are made. These choices depend on the currently leading political stream. But on a

lower level, this domain also consists of aldermen and officers who have a vision for the project on a more regional level (Schulz, 2017).

Firstly, the national political level is addressed. On this level, the context is determined for projects across the country and plans and programmes are created in which goals and ambitions are set that need to be realized. These goals and ambitions depend on two things. The leading political parties and the perception of these parties and their constituencies and the goals set for larger problems such as climate change by the European Union, which the Netherlands is a part of. The European Union creates an integral approach to international problems and sets goals for their members, so that the European Union as a whole can contribute to the welfare of our world. As a member you are required to meet these goals, otherwise fines and eventually even exclusion can be sanctioned (Europa Nu, 2019). However, the manner in which a member reaches these goals is decided by their national government. They will decide the national legislation regarding project parameters such as sustainability, budgeting and innovation (Valk, 2021). These can be complex factors for the project team to deal with, as they can change during the project and therefore require flexibility from the team and individuals. A recent example of this domain is the nitrogen problem in the construction sector (BouwendNederland, 2021). The nitrogen levels exceeded newly adopted requirements in certain projects, which caused multiple projects to be stopped immediately. It is still causing frustration for project teams as the government is taking a long time to decide how to proceed with these projects, so the delays keep increasing. As Razzaq et al. (2018) show in their research, project teams grow frustrated when the government does not show decisiveness, leading to delayed projects. Two other very practical aspects that are detrimental to the timely delivery of projects with the required quality are the availability of money and building grounds. In the Netherlands the government plays a role in distributing both these factors for projects in the public sector. Again, indecisiveness and lengthy considerations can hurt the collaboration within a project, as it immediately puts pressure on the project team (Engels & Sterken, 2007).

On a more regional level the project encounters the aldermen and officers working for the local governments. They maintain the governance and policy of the region and thus have a stake in the realisation of the projects. At this lower level, decentralized government, project teams encounter aldermen who are strongly coloured by their own vision for the region, opposed to general opinion (appendix III). This can cause frustration on its own with the project team, as certain members might not align with this vision. However, during the lifespan of a project aldermen and officers might be changed out due to reorganisations of the official system, causing these visions to change (Schulz, 2017). This would result in different project goals and changes in the design and an increased level of frustration within the project team. Furthermore, the political system of the Netherlands is designed in a manner where the leading parties in a region might differ from the nationally leading political parties. This differentiation might lead to conflicting project goals coming from different levels of governance (Nouska, 2021).

#### **Retrieved statements:**

- Change of aldermen
- Reorganisation of the civil service
- Political agenda of individual board members
- Change of political colour in the project environment
- Changing legislation as regards project parameters
- Difficult or impossible to obtain the required budget from the government
- Lack of project-relevant decision-making in politics

- Tightened requirements from the European administration
- Availability of land to be developed
- Project postponement due to nitrogen requirements
- Desire for innovation from the government

#### 4.2.4 Internal Client Organisation

This is the first domain that is directly related to the project team. The client organisation that initiates the project will provide (a part of) the project team, which is supplemented by the selected contractor. Therefore, the client organisation has direct ties with the project. This can lead to problems if they abuse this involvement with or their power over the project. Gibb & Isack (2001) and Boyd & Chinyio (2008) have performed and documented extended research in the construction client and their respective book and paper form the base of this analysis, with added notations from smaller or more specific sources.

As said, the client initiates the project. They decide upon project parameters and a reference design. This consists of the requirements and wishes from the client regarding the project. These wishes are often value-oriented, to improve the quality of life for the end users. Having these ambitions means that the client can be very involved in certain ambitious projects, as their reputation is at stake as well. This can result in the client trying to control and micro-manage every decision and situation made by the project team regarding the project, frustrating the project team. When the client is this highly involved in the project, another danger is lurking. The reference design can turn out to include mistakes or become unrealistic due to changes in economical and/or technological developments (Schleurholts, 2022). If the client appeared to be too ambitious with an innovative design, he has to review it and create additional budget. Receiving additional budget from the client organisation can be difficult for the project team (Platschorre, 2020).

One of the causes for difficulties for gaining additional budget is the spread of projects a client is running simultaneously. In their portfolio of projects not every project is as urgent or important to the organisation. If a new, very urgent or ambitious project is launched, the priority of the client may shift away from a currently ongoing project. This causes a delay in decision making and restrictions on the available resources. This is not the only cause of delayed decision making within a client organisation. As Boyd & Chino (2008) state, some organisations are running on inefficient internal procedures or generally have a laid-back culture. These slow processes can directly hurt the project planning and therefore put the collaboration under pressure. Regular personnel changes on important functions within the client organisations do not help this process, as a loss of knowledge and knowhow about the project specifics occurs, requiring the new staff to re-learn these (Mick, 2021).

Lastly, the external factors from the internal client organisation that can hurt the collaboration the most. The client is the 'owner' of the scope of the project. As said earlier, they initiate the project and create a reference design. However, as Gibb & Isack (2001) explain, the client can rethink initial design choices during the project based on a multitude of influences, for example political or societal pressure, innovative value and personnel changes. Depending on the contract type between the client and the contractor, they can either ask or demand the contractor to make changes to the design (Koenen, 2014). Even if the client will make budget available for these changes, it has significant implications for the planning and logistics of the project. When this happens too often, the project team can become frustrated with the client as the scope of the project remains unclear for the entire duration of the project. The team cannot work towards a common goal and does not know what is expected by the client (Cherns & Bryant, 1984). These events indicate that the client has a possibility to abuse their power. Depending on the contract there can

be an imbalance of power between the client and the contractor when the client is continuously changing their end-goal and requirements for the project.

**Retrieved statements:**

- High level of control from the client organisation
- Micro-management from the client organisation
- Delays in the process due to limited capacity of the client organisation
- Inefficient internal procedures in the client organisation
- Changing project priority of the client
- Slow decision-making in the client organisation as regards project parameters
- Limitation of the project budget from the client organisation
- Unclear or changing KES-requirements of the client organisation
- Unclear or changing project aim of the client organisation
- Scope changes from the client organisation
- Imbalance of power between client and contractor
- Desire for innovation from the client organisation
- High staff turnover and flow of staff within the client organisation
- Changes in the corporate culture of the client organisation
- Flaws in the reference design

#### 4.2.5 Contractor Organisation

The counterpart of the client organisation is the contractor organisation involved in the collaboration. They provide a part of the project team to supplement the client, so they will have direct ties with the project team as well. Due to their underlying financial motivation, their goals for the project tend to be fundamentally different from those of the client, which becomes clear when the risks and opportunities are divided in the contract.

As said, the contractor organisation has more financially-oriented goals for the project. As they are private firms, their motivation to engage in projects is to make money. However, as the construction sector is developing, more and more is asked from contractors. Where the lowest bidder often used to win the contract, nowadays collaborative characteristics, innovative building and sustainability are taken into account as well (Van Dijk, 2017). When offering a design and price in the tender, contractors will have to carefully balance these non-monetary factors against their underlying financial motives to be able to get selected by the client and allowed to perform the work. This balancing act from the contractor can go wrong, resulting in direct implications on the collaboration. Wood & Ellis (2005) state that when a contractor offers a price but later realizes that he is unable to provide the given design for this price, it is called an opportunistic tender. If this occurs, the workload for the project team increases, as it has to react quickly to avoid that the project is discontinued. The same holds when the contractor was not necessarily opportunistic in their offer, but simply made mistakes in the design (Odeh & Battaineh, 2002). The costs of these mistakes will need to be covered by the contractor, but it will decrease their financial liability for the remainder of the project.

The financial perspective of the contractor will further influence the project in two main manners: the financial goals the contractor has for the project in particular and their overarching financial goals as a firm (Zavadskas, Turskis, & Tamošaitiene, 2008). The first is already noticed during the contracting phase where most contractors are unwilling to take on large risks or participate in a risk-sharing culture. They will design their processes in a manner where the chances of making a profit on the project are optimized. The second can be felt during the execution of the process. Contractors can be inflexible in their way of



working and unwilling to adopt changes. As these changes indirectly impact their firm-value, they can be very strict in sticking to the specification of the contract without giving the client any room for additional wishes.

However, this depends on the firms' internal culture as well. Just as with the client organisations not all firms operate in the same manner and take on the same types of projects. The balancing act as described previously, where financial goals are balanced against value-adding goals, will depend on the current managers leading divisions and the overall management of the firm (Ommen, 2017). This means that when personnel changes occur, this balance might shift as well and the attitude of the contractor towards projects can suddenly change. This can put pressure on the project team that has designed its processes based on the previous culture within the firm. Wood & Ellis (2005) state that these personnel changes are bound to happen as contractors sometimes struggle with their internal capacity due to amount and size of projects they take on.

#### Retrieved statements:

- Work pressure due to an opportunistic tender by the client organisation
- Lack of capacity of the client organisation
- High staff turnover and flow of staff within the client organisation
- Changes in the corporate culture of the client organisation
- Flaws in the offered design
- Tensions within the client team due to disappointing annual results of the firm
- Limited flexibility due to the profit motive of the client organisation
- Commercial goals set by the client organisation for the project

#### 4.2.6 Subcontractors

This domain is closely related to the contractor organisation. In most contracts that establish a distinct division of responsibilities, the contractor is responsible for the selection and hiring of specialist subcontractors to assist the project team in the realisation of the project. These are often smaller firms, hired either to compensate for the lack of internal capacity of the contractor or due to very specialized knowledge within the firm.

However, hiring subcontractors to aid the project team is not without danger. Meijvogel (2007) explains that as they do not have any direct ties with the project team, they do not share the common goals set by the contractor and the client. Therefore, they operate more for their own gain and have a lesser sense of responsibility and involvement with regard to the project. Subcontractors will have their own schedules within the overall planning and when they generate too much slack on their activities due to their lack of involvement in the project, the next subcontractor relying on previous work might be unable to perform (Shanyanfar & Schonfeld, 2019). Aligning these schedules is key for the project team. However, subcontractors might fail to keep their promises due to the lack of liability. It is proven to be difficult for the project team to sanction subcontractors, especially for non-measurable performances such as collaborative performance and responsibility (Galloway, 2009). In addition to these difficulties, subcontractors can oversell their own capabilities and expertise. When they are struggling to deliver the expected quality of work, this will directly influence the project outcome. Here again the example of the Boekeloseburg is applicable (Waanders, 2022), where subcontractors took wrong soil samples and the project ended up being realized on polluted soil.

Other influences that subcontractors might experience with regard to the collaboration relate to the financial stability, their risk spreading and the communicative skills of the contractor. Just like larger contractors, the smaller firms spread their risks over their portfolio of projects (Arnoldussen, Groot, Halman, & Van Zwet, 2017). However, this means they have different projects to tend to. When the opportunities to gain profit within a different project increase, they will focus their capacity towards this other project. These spread responsibilities can hurt the planning of the project team. Here the key is to keep communicating to the subcontractor what is expected of them. But as Meijvogel (2007) explains this can prove to be difficult, as these smaller firms can be specialized and lack the internal infrastructure required to maintain efficient communications with the project team.

Lastly, there is the risk of subcontractors running into financial trouble. This can become a major cost factor for the project team, as these smaller firms lack the financial liability and capacity to pay back in case of bankruptcy (Kuit, 2012). Many projects with a large lifespan have struggled with this problem during economic recession. It will require the project team to find a replacement firm before the work can continue.

#### **Retrieved statements:**

- Failure to meet commitments by subcontractors
- Difficulties in communicating with subcontractors
- Impending bankruptcy of subcontractors
- Bankruptcy of subcontractors
- Split responsibility of subcontractors between different projects
- Lack of involvement by the subcontractor in the project
- Extension of the project due to mismatches between schedules of subcontractors
- Limited liability of the subcontractor in case of failure
- Discovery of inaccurate ground surveys by the subcontractor
- Decline in quality because subcontractors fail to deliver the promised knowledge and expertise
- Lack of responsibility of the subcontractor

#### **4.2.7 Related Projects & Surroundings**

This is one of the two ‘scattered’ domains. It is not necessarily an organized entity and the experienced influences from this domain can be very diverse. In the Netherlands, projects are often initiated from a larger, national, programme. These related projects and their process can influence the decision making concerning a project. The logistics of nearby projects can influence the daily operations of a project as well.

As said, in the Netherlands projects are often initiated and grouped in a (nationally) organized programme. Examples on different levels of government are ‘Het sluizenprogramma’ by Rijkswaterstaat or ‘Bruggen en Kademuren’ from Gemeente Amsterdam. These programmes set a certain standard for all the projects involved. If these requirements change during the lifespan of the project, the design of the project will have to be altered (Bleijenberg, 2021). Incidents and other situations in related projects influence the collaboration in the framework of a project as well. For example, after a fatal accident had occurred during construction activities on the lock of Limmel, all locks within the project received new safety standards and had to rearrange their construction site (Persbureau ANP, 2018).

As a result of the surroundings of a project, the process of receiving the right permits can be very lengthy. In brownfield projects the difficulties of existing infrastructure occur, while in greenfield projects sustainable goals need to be in place nowadays (Olander & Landin, 2005). Even when the project team

obtains the required permits to start the execution, the surroundings can still disrupt the project. As nearby projects have their own schedule and logistical planning, these activities might clash with the new project. When these interfaces are not anticipated, the project team can be forced to be flexible and rearrange the planning and the building site (Shanyanfar & Schonfeld, 2019). Another, more design-related cause for changes to the project is when the soil in the area turns out to be polluted. The Netherlands has clear legislation in place which foresees that either you are not allowed to build in these areas or you should make mitigating efforts in your design to deal with the pollution.

Another external difficulty coming from surrounding projects is related to the attention shift of the client and contractor towards new projects. When a project is under construction but situated close to a new project that is initiated with either high urgency or high prestige, the urgency of realizing the current project in time and within budget decreases within for example the regional government (Van Buuren, 2016). The project team will be forced to take this new project into account.

#### Retrieved statements:

- Disruptive planning of surrounding projects
- Interfaces with nearby projects come to light too late
- Tightening of requirements under the national programme covering the project
- Situations during the realisation of similar projects
- Clash with the logistical organisation of nearby projects
- Design modifications due to contaminated soil
- Project urgency ceases to exist due to surrounding projects
- Lengthy licensing process

#### 4.2.8 Stakeholders

Stakeholders constitute the 'classic' domain of external factors. A stakeholder is any group or individual who has a stake in the project. This can be because of investment, organizational power or simply a large interest in the outcome. The stakeholders can be vocal about the design choices and process, revealing downsides of the projects. Managing these opinions and compromising with stakeholders can reduce the influence of this domain. Olander & Landin (2005) and Razzaq et al. (2018) have performed and documented extended research in stakeholder influence in the construction industry. Their research forms the base of this analysis, with added notations from smaller or more specific sources.

In modern society the role of not only the media but also social media has increased. The opinions of stakeholders, especially when they are negative, can be published and read by anyone. If the project team is not in full agreement about certain choices, these negative articles can engrave the already existing friction within the team. Within larger projects these choices are discussed with the local residents and interest groups. In meetings with the project team they are allowed to voice their opinion and give suggestions, and to make objections regarding the project. However, despite organizing these sessions the local residents will often make their requirements and wishes known in a later stadium when the project has already started and is influencing their daily lives due to for example hindrance from nuisance (Van den Berg, 2022). Furthermore, the visions of interest groups regarding the project are not always aligned, making it difficult to satisfy them all (appendix III). Moreover, Razzaq et al. (2018) describe the ever present possibility that despite all mitigating efforts of the project team, the sentiment towards the project remains negative. In some cases stakeholders have experienced previous failed construction projects in their surroundings, making them sceptical towards any new initiatives, regardless of the existing plans. All the above factors might influence the process of obtaining permits to realize the project,

as stakeholders can submit complaints to the local government and objections to the court. This will immediately cause delays for the project (Olander & Landin, 2005).

Another cause of delay is the opportunism of landowners in the project environment. As soil is a scarcity in the Netherlands, as soon as a project is informally announced investors will try to acquire as much area surrounding the project location as possible to make a profit. However, the real delays are caused by private landowners who do not want to sell their land for moral or sentimental reasons. A buyout becomes difficult for the project team and the expropriation procedure has to be started. Sometimes it is possible to start up several parts of the project during this process, but often it will lead to delays (NOS, 2017). Lastly, the end users of a project need to be addressed. For specific projects such as the tram or train tracks, the users need to be willing and able to use the newly created system, as otherwise the project cannot fulfil its goals. In Amsterdam the underground safety system was being renewed, but the drivers of the underground were unwilling to adapt to the new style of trams and driving, due to which the project team had to provide additional training and make changes to the design (appendix III).

#### **Retrieved statements:**

- Negative reporting in the media
- Late input of requirements and wishes from the local community
- Objections from the local community against nuisance as a result of the project planning
- Conflicting visions of interest groups
- Objections from the local community during the licensing procedure
- Lack of flexibility of the end users
- Moral disputes due to the society's view on sustainability
- Negative opinion of the local community towards the project
- Lengthy expropriation procedures because of landowners who do not want to sell
- Irrational sentiment of the local community towards previous problematic projects
- Objections, complaints and proceedings by the local community

#### **4.2.9 Concluding the Concourse**

All domains of external factors which have been defined in the model of the project environment (figure 4.3) have been reviewed. An extensive overview of the sourcing of the literature review is presented in Appendix II. From each domain a sufficient amount of statements has been retrieved, confirming the relevance of the specified domains. Moreover, a multitude of statements is found in academic literature, news articles and proposed by professionals validating the relevance of the statement. The statements will now be sorted and selected on coverage of multiple types of sources, importance to the collaboration and relevance in the modern world to create a usable Q-set for the interviews.

## 5. Q-Design

Now that the concourse has been compiled, this chapter will focus on the specific design of the research. This consists of two main parts. First, the derivation of the Q-set from the concourse: which statements are suitable for use, based on experience, literature and relevant news articles? Second, what is the target group of the research? A description of the deciding parameters for respondents and an overview of the final set of respondents taking part in the Q-study will be provided.

### 5.1 Q-Set

After creating the concourse, the next step for designing a Q-interview is to make a selection of statements that will constitute the Q-set. The Q-set is a set of statements that respondents will be presented with in order to answer the defined Q-question: “What has caused the most disruptive impact on the collaboration during the project”. For this Q-question, the rating scale for the respondents goes from small disruptive impact to large disruptive impact. When creating the Q-set, again every defined domain of external impacts in the project environment model should be represented. To this end, at least 4 statements from each domain will be selected. However, all domains might not be equally influential or important. Table 5.1 shows the division of selected statements to represent the domains.

5	Economical Context
4	Technological Context
5	Political Context
6	Interne Client Organisation
5	Contractor Organisation
4	Sub-contractors
4	Related Projects & Surroundings
5	Stakeholders
<b>38</b>	

Table 5.1 – Overview of represented domains in the Q-set

The economical context is of great importance for the construction industry, with costs and benefits being one of the main drivers for taking on and completing projects. Also, this domain is time-dependent and will thus be likely to have reoccurring effects. Therefore, this domain will be represented with an additional statement. As politics is highly relevant for the context and initiation of projects, this domain is represented by an additional statement as well. The internal client organisation is so vital in the undertaking of projects, with influence on the scope and being part of the project team, that it is represented by the largest number of statements, namely 6. The management of contractor, the counterpart required to realize projects, will be represented with 5 statements. Here the client-side is represented by one statement more because of their role in initiating projects and setting project parameters. Lastly, the stakeholders will have an additional statement in the Q-set as well. This is an example of one of the more classic external domains that is proven to affect a system, as stakeholders tend to have different interests and goals than the project organisation.

In order to make a selection of suitable statements from the concourse to present to the respondents, multiple selection criteria are defined. The statements have been retrieved from different types of sources, namely literature, news articles or from practice. Three main criteria are applied to select statements: 1) the statement is retrieved from different types of sources, 2) the statement is described as having a vital influence, and 3) the statement is relevant in the ‘current world’, meaning it relates to currently ongoing issues such as sustainability, scarcity, COVID-19 crisis and the Ukraine conflict. In case

of combinations the statement is probably more topical, but at least one of these criteria should be met. To perform this review, an overview of the statements and their different sources is created. This overview shows all retrieved statements for each domain, including their source (typing) and can be found in appendix II. Combining this overview with the reported insight from the literature study in section 4.2, the statements for the Q-set are decided. The Q-set is seen in table 5.2, where table 5.1 is the legenda for the originating domains of the statements.

#	STATEMENT	LITERATURE	NEWS	PRACTICE
1	Increase in the prices of materials	x	x	x
2	Pressure on the budget due to economic recession	x	x	
3	Insufficient available capacity		x	x
4	Increase in fuel prices		x	x
5	Uncertainty of supply of materials	x	x	
6	Implementation of new software systems at the parent organisations	x	x	
7	Implementations of new building techniques	x	x	
8	Limited insight in the situation of the land		x	x
9	Changes in the design due to innovation in building products	x	x	
10	Changing legislation as regards project parameters	x		x
11	Reorganisation of the civil service	x	x	x
12	Change of political colour in the project environment		x	x
13	Difficult or impossible to obtain the required budget from the government	x		x
14	Lack of project-relevant decision-making in politics	x	x	x
15	High level of control from the client organisation	x		x
16	Delays in the process due to limited capacity of the client organisation	x		x
17	Changing project priority of the client	x		x
18	Slow decision-making in the client organisation as regards project parameters	x	x	x
19	Unclear or changing project aim of the client organisation	x	x	
20	Scope changes from the client organisation	x	x	x
21	Work pressure due to an opportunistic tender by the client organisation	x		x
22	High staff turnover and flow of staff within the client organisation	x	x	
23	Flaws in the offered design	x	x	
24	Limited flexibility due to the profit motive of the client organisation	x	x	
25	Commercial goals set by the client organisation for the project	x	x	
26	Difficulties in communicating with subcontractors	x		x
27	Impending bankruptcy of subcontractors		x	x
28	Extension of the project due to mismatches between schedules of subcontractors	x		x
29	Decline in quality because subcontractors fail to deliver the promised knowledge and expertise	x	x	
30	Disruptive planning of surrounding projects	x		x
31	Tightening of requirements under the national programme covering the project	x		x
32	Incidents during the realisation of similar projects		x	x
33	Lengthy licensing process	x		x
34	Negative reporting in the media	x		x
35	Late input of requirements and wishes from the local community			x
36	Objections from the local community against nuisance as a result of the project planning	x	x	x
37	Negative opinion of the local community towards the project	x	x	
38	Objections, complaints and proceedings by the local community	x	x	x

Table 5.2 – Overview of the Q-set

All in all this results in a Q-set of 38 statements, sufficiently representing each domain. As said, during the interview the respondents will rank these 38 statements on a scale of small disruptive impact, to large

disruptive impact. In a Q-study, this scale follows a (quasi-)normal distribution. The design of this scale is shown in figure 5.1.

Small impact			Medium impact					Large impact		
1	2	3	4	5	6	7	8	9	10	11
	12	13	14	15	16	17	18	19	20	
			21	22	23	24	25			
			26	27	28	29	30			
				31	32	33				
				34	35	36				
					37					
					38					

Figure 5.1. – Design of the quasi-normally distributed scale

The extremes of the distribution consist of just one statement. The purpose of this is to force the respondent to choose the statements they experience as most disruptive and create these extreme benchmarks to relate the other statements to. This will lead to clearer statistical differences during the analysis of the results. The complete scale follows 11 levels of impact, giving the respondent sufficient possibilities and levels of impact to rank the statements. The middle of a Q-design following a normal distribution has much more room for statements, in this case 8. This enables the respondent to store statements they do not feel strong about, without influencing the result as much as the outer bounds of the distribution. Within each level of impact on the scale, there is no preference present between the lowest and highest ranked statement (for example statements 17 and 33).

If the situation occurs that a respondent does not recognize a statement or has never experienced a statement, and therefore has difficulties ranking the statement, the following strategy is applied: the interviewer will re-explain both the origin and the implications of the statement. Based on this clarification, the respondent will re-assess the statement and hypothetically score the statement on the expected impact it could have had during his experiences. As the respondents will be experienced players with management functions within projects, they are deemed to be able to judge these hypothetical situations. As this should not happen for every respondent and for the same statement, the statistical implications on the results of ranking some statements based on judgement instead of experience will remain limited.

## 5.2 P-Set

The P-set consists of the respondents who will take part in the Q-study. As explained in the methodology, other methods often use random respondents, in which case the researcher does not influence his set of participants. By contrast, when performing a Q-study the respondents can be selected based on certain criteria, in order to have different points of view on the topic. This is the approach taken for this research, as it fits the topic of collaboration.

Collaboration always involves at least two parties, who are defined as the client and the contractor during this research. Consequently, we are interested in the perspectives of both parties and in categorisations within these perspectives. This means that respondents from both client and contractor organisations in the Netherlands are approached to participate in the Q-study. However, the function or role of the respondent within these organisations might be strongly indicative for their perspective. To indicate the functions that can be selected for the P-set, the IPM model of Rijkswaterstaat is used. This model defines 5 roles: project manager, manager project control, stakeholder manager, technical manager and contract manager. Although not all organisations in the Netherlands use this model to design their project teams,

the roles in other models contain similar tasks and responsibilities. As the IPM-model is a widely accepted and researched model, this standardization of functions is used to address respondents working in different models with the same title.

This results in the following selection criteria that will indicate differences in outcomes of the study depending on the chosen variety within said criteria:

- **Role:** Client/Contractor
- **Function:** Project manager, Contract manager, Technical manager, Manager project control and Stakeholder manager
- **Project(s)**
- **Parent organisation(s)**

The following differentiation of the selection criteria is used:

- **Role:** Client/Contractor (50/50)
- **Function:** Project manager, Contract manager, Technical manager, Stakeholder manager
- **Projects:** 4
- **Parent organisations:** 2 per project (8 in total)

This results in 32 respondents who will participate in the study, 4 projects with 2 organisations, each organisation represented by 4 respondents. By using this differentiation, the perspective of 4 project teams, which actually worked together, towards external factors is retrieved. This makes it possible to identify if the role or function that respondents have within the project, influences their perception of external factors. The advantage of using this differentiation is that multiple respondents describe the same project from their point of view. This reduces the individual bias and subjectivity. It could lead to overlapping perspectives between roles and functions. The role of manager project control is left out, as this function is often not present at combined project team meetings and therefore has less of an overview of the collaboration. A 'disadvantage' of the differentiation is the risk of the four project teams being completely aligned in their perspective. However, this would indicate that role and function are subordinate to the project on which a respondent is working.

This P-set filter comes with three main restrictions for the case selection. Firstly, all project using an alliance contract are outside the scope of this research. Having an intertwined team reduces the uniformity of the respondents and their initial perspective towards the collaboration. Secondly, to get a comprehensive overview of different perspectives, all parent organisations should be unique. When, for example, four different clients are analysed who all had the same contractor, the perspective of this particular contractor will be overrepresented in the study. Lastly, the project should be in the execution phase or recently completed for the respondents to have sufficient experience with external factors in their project and still actively remember their impact. Recently completed is understood as having a completion date not earlier than 2019. Taking these factors into account, the project teams of the following projects are approached to participate in the study:

- |                                    |   |
|------------------------------------|---|
| • <b>Uithoornlijn</b>              | Estimated completion date: Summer of 2024 |
| • <b>A24 Blankenburgverbinding</b> | Estimated completion date: 2024           |
| • <b>Nieuwegein City</b>           | Estimated completion date: Summer of 2022 |
| • <b>Afsluitdijk</b>               | Estimated completion date: 2025           |



This results in the P-set shown in table 5.3. A case study of these projects is performed in the next chapter, where background information and unique aspects of each project are addressed.

#	PROJECT	ROLE	ORGANISATION	FUNCTION
1	Uithoornlijn	Client	Vervoerregio Amsterdam	PM
2	Uithoornlijn	Client	Vervoerregio Amsterdam	CM
3	Uithoornlijn	Client	Vervoerregio Amsterdam	TM
4	Uithoornlijn	Client	Vervoerregio Amsterdam	SM
5	Uithoornlijn	Contractor	Dura Vermeer	PM
6	Uithoornlijn	Contractor	Dura Vermeer	CM
7	Uithoornlijn	Contractor	Dura Vermeer	TM
8	Uithoornlijn	Contractor	Dura Vermeer	SM
9	A24 Blankenburgverbinding	Client	Rijkswaterstaat	PM
10	A24 Blankenburgverbinding	Client	Rijkswaterstaat	CM
11	A24 Blankenburgverbinding	Client	Rijkswaterstaat	TM
12	A24 Blankenburgverbinding	Client	Rijkswaterstaat	SM
13	A24 Blankenburgverbinding	Contractor	BAAK	PM
14	A24 Blankenburgverbinding	Contractor	BAAK	CM
15	A24 Blankenburgverbinding	Contractor	BAAK	TM
16	Nieuwegein City	Client	Provincie Utrecht	PM
17	Nieuwegein City	Client	Provincie Utrecht	TM
18	Nieuwegein City	Client	Provincie Utrecht	SM
19	Nieuwegein City	Client	Provincie Utrecht	PC
20	Nieuwegein City	Contractor	Dura Vermeer	PM
21	Nieuwegein City	Contractor	Dura Vermeer	TM
22	Nieuwegein City	Contractor	Dura Vermeer	SM
23	Nieuwegein City	Contractor	Dura Vermeer	PC
24	Afsluitdijk	Client	Rijkswaterstaat	PM
25	Afsluitdijk	Client	Rijkswaterstaat	CM
26	Afsluitdijk	Client	Rijkswaterstaat	SM
27	Afsluitdijk	Contractor	Level	PM
28	Afsluitdijk	Contractor	Level	SM

Table 5.3 – P-Set overview

### 5.3 Case Selection

In order to perform the interviews, respondents from four different projects are approached to take part in the research. These project are: Uithoornlijn, A24 Blankenburgverbinding, Nieuwegein City and the Afsluitdijk. This section will provide a brief overview of each project, elaborating on their suitability for this research.

#### 5.3.1 Uithoornlijn

The Uithoornlijn is a project located in the province of North-Holland, near the village of Uithoorn. As this village is located close to Amsterdam, it is part of the public transport region Amsterdam. This region is under stress due to the vastly increasing amount of travellers. To ensure the accessibility and mobility of the region, the municipality of Amsterdam, by means of the Vervoersregio Amsterdam (VRA), is developing the public transport infrastructure surrounding Amsterdam. One of these developments is the

Uithoornlijn, which will extend the existing Amstelveenlijn to Uithoorn, offering a more reliable and faster mode of transport than the existing buses (Uithoornlijn, 2022).

As said, the client in this project is the VRA. The project is contracted to Dura Vermeer by means of a Design & Construct contracting model. This means the project team is responsible for the design and construction of the tram connection, after which it will be delivered to the asset owner. The agreed contracting sum for the Uithoornlijn is estimated at 55 million euros (Torbijn, 2020). The project team is organised by means of the IPM-model, with both the VRA and Dura Vermeer supplying the 5 defined management positions, completing a mirrored project team.

The Uithoornlijn has been divided in four sections of rails, separated by three stops. This allows for a phased approach towards the execution. Currently, the project is in execution, which is the third phase of the Project Life Cycle. The first milestones that will be reached are the completion of the rails and stops in section four, the village centre of Uithoorn (Uithoornlijn, 2022).

As the Uithoornlijn will run across the middle of a village and is attached to an existing connection, there are plenty of interfaces present with both the physical surroundings and stakeholders. Moreover, the contracting sum exceeds the European threshold for procurement. Taking these factors into account, this project qualifies as a complex infrastructural project. Adding to this the usage of a D&C contract organised with a mirrored IPM-team, makes the project suitable for this research.

### 5.3.2 A24 Blankenburgverbinding

The traffic density in the Rotterdam region is increasing on a yearly basis. As Rotterdam is surrounded by rivers, there are limited routes available to cross these to reach the region. The existing connections and highways will not provide the required capacity to ensure the mobility of the region for the years to come. Therefore, the A24 Blankenburgverbinding was initiated by Rijkswaterstaat. The goal of the project is to realise a new highway (the A24) which will connect the existing A15 and A20, a land tunnel (Hollandtunnel) and a water tunnel (Maasdeltatunnel) over Het Scheur (Rijkswaterstaat, 2022). The project takes place to the west of Rotterdam, increasing the mobility of this region.

Rijkswaterstaat is the client who initiated the project, but considering its large scope, they were looking for a partner who would be able to design and construct the object, as well as maintain it for 20 years. Consequently, the tender was aimed at finding a DBFM-partner. The eventually selected contractor is called BAAK. This is a consortium of Ballast Nedam, DEME Group and Macquarie. This consortium will absorb the involved risks and operate solely on the A24 Blankenburgverbinding. Within this consortium different specialised knowledge and financing power is brought together. Rijkswaterstaat and BAAK agreed upon a contracting sum of one billion euros, classifying this project as one of the largest projects currently being realised in the Netherlands (Geus, 2022).

Currently the project is in the third phase of the Project Life Cycle. The execution has been divided in two parts: the North-bank and the South-Bank of Het Scheur. The execution was started by realising the tunnel entrances on both banks, but the latest milestone was the drainage of the Maasdeltatunnel on the required depth.

As one of the largest ongoing infrastructural projects with a long lifespan, the A24 Blankenburgverbinding is bound to be influenced by external domains such as surroundings & stakeholders, economics and the

parent organisations. Their management teams are also organised along the lines of the IPM-model, as Rijkswaterstaat is the client. All in all, it is a suitable project to analyse.

### 5.3.3 Tram Nieuwegein City

The tram in Nieuwegein is part of the Nieuwegein City project which aims to improve the liveability of the city. One of the factors that attributes to the liveability is the mobility of the residents, which is improved by realising a tram connection to Utrecht. As the tram connection is part of a longer tram connection running through the province, the Province of Utrecht initiated and financed the project. This project is particularly difficult due to the very small area in which the new tramline has to be realised (Provincie Utrecht, 2022). Creating a working area and storing materials on location is difficult, as well as the management of closing other existing nearby routes.

As said, the Province of Utrecht is the client organisation of this project. The Nieuwegein City project is contracted to Dura Vermeer for a contracting sum of 15 million euros. The contracting model that was used for procurement is the E&C model, engineer and construct. The reason for this model is that the asset owner, which is the operating public transport organisation (Regiotram Utrecht), and the client already agreed upon a design which was taken into account during the tender. During this phase, the participants in the tender each presented their plan to engineer the existing design. Furthermore, the project team is organised as a mirrored IPM-team covering the five different project aspects. Because the project is the last in a series of tram projects organised by the Province, both parties will focus more on the milestones and quality of the project, as leftovers from previous projects can be used.

The main challenge for this project was the location of the small development area. It is located in the centre of Nieuwegein and is surrounded by infrastructure supporting different modes of transport as well as housing. As a result, the possibilities for storage of materials and a temporary work space are very limited. Furthermore, multiple activities will require the closing of the surrounding infrastructure and cause a nuisance for the people living in the neighbourhood (Provincie Utrecht, 2022). Currently the project is in the fourth phase of the Project Life Cycle, where it is being tested and the handover will take place.

This project is smaller than the other projects approached, however, it still exceeds the European procurement threshold of 5 million euros. Moreover, the project takes place in a volatile environment with a multitude of interfaces. Also the existing design which was taken as a starting point for the collaboration, might influence decision-making during the process. As the team works with a mirrored IPM-team, the project is suitable to analyse for this research.

### 5.3.4 Afsluitdijk

The last project that is approached for participation in this research is the Afsluitdijk. The Afsluitdijk connects the provinces of North-Holland and Friesland and closes off the IJsselmeer from the Waddenzee. Its main function, however, is the flood defence it provides for the inland of the Netherlands. The Afsluitdijk was delivered in 1933 and at present it is not able to fulfil these functions to modern standards. Therefore, Rijkswaterstaat initiated the task to renovate the Afsluitdijk in such a manner that it can once again fulfil its functions in a sustainable manner. To this end, four main themes are defined: water defence, accessibility for shipping, accessibility for road traffic and blowdown capacity of the dam (Invesis, 2018).

Rijkswaterstaat is the client who initiated the project, and it was procured with a DBFM contracting model with a maintenance period of 25 years. Since this was one of the major infrastructural projects on the market, multiple consortia entered the tender, which was ultimately won by Level, a combination of BAM, Van Oord and Rebel. The agreed contracting sum was 550 million euros. As Rijkswaterstaat is the client, the IPM-model was used for the organisation of the project team. However, as soon as the project entered the execution phase, problems arose. There were faults in the design for the blowdown capacity due to which the system could not be realised as designed. When evaluating the design it turned out Rijkswaterstaat had provided Level with incorrect information, resulting in a lawsuit and the termination of the collaboration (NOS, 2022).

Currently the lawsuit is being settled and the collaboration was resumed. Both the client and the contractor provided new management teams, enabling them to start with a clean slate. With the existing goals, but a new mindset, the Afsluitdijk is being renovated and the strengthening of the dam on the IJsselmeer-side has been realised.

This projects also works with a traditional contracting model and the mirrored project team. As this project experienced problems in their collaboration, it is suitable for this research, as this could identify if these troubles will influence their perception of the external environment.

#### 5.4 Data Gathering

During the interview some focus points should be kept in mind. To start, the explaining variables for the analysis should be retrieved from the respondent. When the perspectives of the respondents are accumulated and analysed, the variables project, role, organisation and function should be clear for each respondent and linked to their Q-sort. These insights will help to explain the perspectives. Further, the researcher should report the underlying motives and considerations of the respondent as well. The Q-method comprises both quantitative and qualitative aspects, with the former being retrieved by means of the Q-sort and the latter by means of the interview. These motives and considerations with regard to the statements can be useful to identify possible adaptations in collaboration or risk management that will help project teams experience less nuisance of external factors.

To complement the insight retrieved from the motives and considerations from the respondents, additional interview questions are prepared to further explore the impact and effects of external factors in the collaboration. These questions are asked after the Q-sort has been completed by the respondent and are meant to give the respondent the opportunity to express their feelings about how they experienced the collaboration during the project, how to signal disruptions, how to overcome adversity and which lessons can be learned for future projects.

A protocol for the interviews, with focus points during the Q-sort and the additional interview questions, is presented in appendix IV.

## 6. Identifying the Perspectives

In this chapter, the results of the analysis of the interviews is presented and interpreted. First, the chosen method for analysis will be elaborated. After that, the outcomes are presented, which contain the resulting factors. These factors are then labelled by reviewing their identifying Q-sorts and distinguishing statements. This is the first step of translating the factors into perspectives. Then they can be explained by reviewing the loading respondents for each factor and the labels can be verified, establishing the perspectives. The impact of these perspectives being present in a project team is discussed, and finally the statements about which all respondents are in consensus are reviewed.

### 6.1 Chosen Method for Analysis

To perform a factor analysis of Q-sorts, three approaches can be taken. These are Centroid Factor Analysis (CFA), Principal Component Analysis (PCA) and a manual approach. The Principal Component Analysis is the most used method during Q-study and the chosen approach for this research. This section will briefly describe this method to elaborate why it is the most suitable method for this research.

#### 6.1.1 Principal Component Analysis

Centroid Factor Analysis (CFA) and Principal Component Analysis (PCA) are the two standardised methods used for factor extraction during Q-studies. CFA can be performed following different methods: the “Brown Centroids” and the “Horst’s Centroid” method. The first was developed by Brown (1980) and suggests the ‘magical number’ of seven factors to extract. These seven factors to extract are based on extensive experience with Q-methodology, as it turns out to preserve a large part of the variance. The composition of the first one to three factors that are extracted does not depend on the number of extracted factors. This is not the case for the Horst’s Centroid method. This method aims to limit the level of residual correlations. Factor extraction is stopped as soon as the limiting level of residual correlations becomes smaller than the average correlation coefficient of the extracted factors one divided by the number of statements (Horst, 1965). Generally, CFA is not often used in statistical research outside of the Q-community (Schmolck, 2014).

With PCA, the mathematically optimal numbers are returned. Where CFA assumes correlation between factors, PCA transforms the set of correlated variables (Q-sorts) into uncorrelated variables (factors) (Landau & Everitt, 2004). The first factor that is extracted will explain the largest percentage of the variance and the later factors will explain variance in a decreasing manner. For this mathematical approach to factor extraction, the correlation matrix of the Q-sorts will be the input. Software that performs PCA will always initially extract 8 factors. For factor reduction, set rules such as a factor loading of higher than 0.5 on a significance level of 0.05 with at least three respondents loading on a factor will allow the reduction of the data. As this method automatically strives for the optimal explanation of variance, it is the default extraction method in most statistical packages. Explaining a large amount of the variance will allow for a clearer picture of the perception of external factors in reality. This will increase the possibilities for advice on how to reduce the felt impact of external factors in practice. Therefore, PCA is the chosen method for analysis.

When applying PCA, the factor scores will need to be rotated after extraction to reach a simple structure and improve the interpretability of the factors. The preferred rotation method in PCA is the varimax rotation, as this maximizes the level of variance explained by each factor (Van Exel & De Graaf, 2005). To

create this simple structure, the load of an individual Q-sort for a certain factor is maximised while decreasing the load on the other factors. This makes the extracted factors more distinguishable.

### 6.1.2 Steps of the Analysis

The analysis will be performed in QMethod Software. This is a paid tool for professionals performing Q-studies allowing for easy online interactions with respondents and with several built-in analysis methods. It derives a visual overview of the analysis as well. The principal component analysis in QMethod Software can be described in six steps.

The first step is the extraction of the 8 factors. This is done by means of the correlation matrix (see appendix VI.I) where the correlation between the Q-sorts of different respondents is calculated. Based on these correlations, clusters of individual Q-sorts in which a pattern is present can be composed. It thus brings respondents with a similar perception of the statement together. A factor is therefore the collection of statement scores over all presented 38 statements. For each factor, a respondent has a factor score, indicating the similarity between their Q-sort and the factor. The higher this score is, the higher the similarity between the respondent's perspective and the factor is. As PCA is selected as extracting method, initially 8 factors will be extracted (see appendix VI.II).

The second step concerns the data reduction for the analysis. The number of factors will be reduced based on existing selection criteria. For this research, at least three respondents need to have a factor score of above 0.5 with a 0.05 significance level in order to guarantee the existence of a group of people sharing the perspective, instead of a factor describing the views of an individual. When applying these criteria, four factors can be extracted, which combined explain almost half of the variance.

After these steps, the varimax rotation is applied to the factors to maximise the score of individual Q-sorts for one factor and improve the readability of the outcomes. In the simple structure it is visible which respondent loads onto the different factors (see appendix VI.VI).

For the fourth step the identification of defining variables is essential, as these will constitute the factor arrays. Defining Q-sorts are the ones which have a factor score of above 0.5 on a significance level of 0.05. As explained earlier, in each factor at least three of these respondents should be present. When a respondent has a factor score of 0.5, it shows that it loads more on this factor than the other three combined. This means the Q-sort is suitable to define the respective factor and is therefore called a defining Q-sort. Appendix VI.XI shows that factor 1 has 6 defining Q-sorts, factor 2 has 4, factor 3 has 6 and factor 4 has 4. The average of the statement scores of defining Q-sorts for each factor are used to construct four factor arrays. A factor array shows the Q-sort, the statement scores for all 38 statements, of a respondent who would load 100% on that factor. The four factor arrays are shown in section 6.2.

The fifth step is the interpretation of the four factors, which is performed in section 6.3 by reviewing the statistical outcomes of the analysis in-depth for each factor. By reviewing the distinguishing statements and the distribution of statements on the high-low impact scale, the factors can receive a label. This label will be formulated as an answer to the Q-question that was presented to respondents: "What has caused the most disruptive impact on the collaboration during the project". During this analysis, the domain from which statements originate is taken into account as well to find the appropriate label.

The final step is to explain the factors and thereby translate them into perspectives. By analyzing which respondents load onto every factor, the chosen labels can be verified and it becomes possible to see which

parameters of the respondent might influence their perception of external factors. This overview will indicate the implications of the difference in perception in practice.

A complete overview of the analysis with additional data on each step of the analysis is provided in appendix VI.

## 6.2 Statistical Outcomes of Analysis

Interpretation of the factors takes place by looking at the distinguishing and consensus statements. The distinguishing statements are those statements whose statement score on two factors, the respective ranking of that statement on each factor, differs more than the different score. The difference score is “the magnitude of difference between a statement’s score on any two factors that is required for it to be statistically significant”. Statements that are not distinguishing between any of the selected factors are called consensus statements (Van Exel & De Graaf, 2005)

So, the consensus statements show similarities in perspectives and the distinguishing statements show the differences. Additionally, the characterising statements are of importance as well. These are the statements that are ranked at the extremes of the factor exemplary Q-sorts (statement scores of -5 and +5) (Van Exel & De Graaf, 2005). These statements form the basis of the respective factor descriptions. This description is then extended by using the information from the respective distinguishing and consensus statements. The in-depth interviews with the respondents that load significantly on a certain factor are used as well to deliver the factor description. These factor descriptions result in the identification of a perspective on the factors that is present in the real life practice of the collaboration process.

Table 6.1 shows the factor arrays. These are the idealised statement scores for each factor. So, a respondent who would rank 100% on a factor, would rank the statements as shown in table 6.1. The distinguishing statements for each factor are coloured red, the consensus statements are coloured green, and the characterising statements for each factor are depicted in bold, italic and underlined. Appendix VII provides a visual overview of the Q-sorts described in the factor arrays.

#	STATEMENT	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
1	Increase in the prices of materials	-4	4	4	-2
2	Pressure on the budget due to economic recession	-3	0	1	-1
3	Insufficient available capacity	0	2	3	2
4	Increase in fuel prices	<u>-5</u>	2	0	-3
5	Uncertainty of supply of materials	-1	<u>5</u>	1	0
6	Implementation of new software systems at the parent organisations	-2	-2	-3	-4
7	Implementation of new building techniques	-2	-4	2	-3
8	Limited insight in the situation of the land	2	-4	0	0
9	Changes in the design due to innovation in building products	0	-1	-4	0
10	Changing legislation as regards project parameters	1	1	0	-2



11	Reorganisation of the civil service	-2	<u>-5</u>	-2	-4
12	Change of political colour in the project environment	0	-2	<u>-5</u>	<u>-5</u>
13	Difficult or impossible to obtain the required budget from the government	-3	0	2	1
14	Lack of project-relevant decision-making in politics	0	-1	0	0
15	High level of control from the client organisation	4	-1	1	1
16	Flaws in the reference design	2	0	0	-1
17	Changing project priority of the client	-4	-2	-2	2
18	Slow decision-making in the client organisation as regards project parameters	3	0	4	3
19	Unclear or changing project aim of the client organisation	-1	-1	-3	4
20	Scope changes from the client organisation	1	3	<u>5</u>	4
21	Work pressure due to an opportunistic tender by the client organisation	0	0	1	1
22	High staff turnover and flow of staff within the client organisation	-1	1	-1	2
23	Flaws in the offered design	3	1	2	1
24	Limited flexibility due to the profit motive of the client organisation	0	1	-1	2
25	Commercial goals set by the client organisation for the project	1	0	3	0
26	Difficulties in communicating with subcontractors	-1	-3	0	-1
27	Impending bankruptcy of subcontractors	-2	-3	-1	-1
28	Extension of the project due to mismatches between schedules of subcontractors	-1	-2	-1	<u>5</u>
29	Decline in quality because subcontractors fail to deliver the promised knowledge and expertise	0	-1	1	1
30	Disruptive planning of surrounding projects	2	2	-4	-2
31	Tightening of requirements under the national programme covering the project	-1	0	0	0
32	Incidents during the realisation of similar projects	2	0	-2	-2
33	Lengthy licensing process	<u>5</u>	-1	2	-1
34	Negative reporting in the media	0	1	-2	0
35	Late input of requirements and wishes from the local community	1	4	1	3
36	Objections from the local community against nuisance as a result of the project planning	4	2	0	1
37	Negative opinion of the local community towards the project	1	3	-1	0
38	Objections, complaints and proceedings by the local community	1	1	-1	-1

Table 6.1 – Factor Arrays

### 6.3 Labelling Factors

The first step of translating the factors into perspectives is to label the factors. These label will be formulated as an answer to the presented Q-question “What has caused the most disruptive impact on the collaboration during the project?” and thus start describing the perspective of respondents clustered within the factor regarding external factors. To formulate labels, four aspects are taken into account. First, the distinguishing statements, which differ the factor from the other three factors. Second, the distribution of statements on the high-low impact scale, and third, the domain of origin of each statement. These first three aspects have been combined in one table for each factor. In this table, the distinguishing statements are presented and divided by an orange line in 5 categories: disrupting (scores 3, 4 and 5), quite disrupting (scores 1, 2), medium (score 0), not really disrupting (scores -1, -2) and not disrupting (scores -3, -4 and -5). Furthermore, each statement is labeled with the domain of origin corresponding to the model of the project environment (see section 4.1.3). In addition to this information, the qualitative information retrieved from the interviews is used as well, as it might indicate how certain statements have been interpreted by respondents. The division of the respondents over the factors is presented in table 6.6 and visualized in figure 6.1.

#### 6.3.1 Factor 1

Table 6.2 shows the distinguishing statements for factor 1. Two things stand out in this table, the first being the not disrupting statements. The statements are related to the financial aspect of projects, meaning respondents loading on this factor experience little disruption due to financial influences in their collaboration. The second concerns the disrupting statements. Although they originate from different domains, they are easily linked together by the qualitative information gathered during the interviews. Statements 33, 15 and 32 are relatable to the asset owner who was involved in the project. This factor was not accounted for as a separate domain in the model of the external project environment. However, multiple respondents deemed the asset owner as a significant disrupting factor. Regarding statement 15 and 32 respondent CX3 explained “The asset-owner is very control-minded. Due to previously failed projects all decisions have to be proven in great detail” (Appendix V, p.35). While ranking statement respondent CY3 states “Receiving the right permits was clearly the most disrupting factor in our collaboration. Permits were not distributed as a consequence of the stiffness of the asset-owner.” (Appendix V, p.45). It shows that the involvement of the asset owner during the execution can change from project to project and each asset owner has different expectations from a project team. As these can be based on earlier experiences of the asset owner, they might not align with the expectations of the project team. Taking the Q-question into account, the following label is composed for this perspective: “The asset-owner disrupts the collaboration during projects”.

#	STATEMENT	RANK	EXTERNAL DOMAIN
33	Lengthy licensing process	Disrupting	Related Projects & Surroundings (7)
36	Objections from the local community against nuisance as a result of the project planning		Stakeholders (8)
15	High level of control from the client organisation		Internal Organisation Client (4)
32	Incidents during the realisation of similar projects	Quite disrupting	Related Projects & Surroundings (7)
8	Limited insight in the situation of the land		Technological Context (2)

12	Change of political colour in the project environment	Medium disrupting	Political Context (3)
13	Difficult or impossible to obtain the required budget from the government	Not disrupting	Political Context (3)
2	Pressure on the budget due to economic recession		Economical Context (1)
1	Increase in the prices of materials		Economical Context (1)
4	Increase in fuel prices		Economical Context (1)

Table 6.2 – Interpretation of Factor 1

### 6.3.2 Factor 2

An overview of the distinguishing statements of factor 2 is presented in table 6.3. It shows that the domain of stakeholders (8) is reflected in the disrupting and quite disrupting statements. On the not (really) disrupting part of the scale, the domains of sub-contractors and internal client organisation are present. When looking into the table 6.6 it shows that this factor is almost exclusively loaded by stakeholder managers. According to the interviewed stakeholder managers the uncertainty of materials highly influenced their collaboration due to the indirect effects this has on the communication with the surroundings. Respondent AX4 explains that “Uncertainty of the delivery of materials influenced the collaboration, as the uncertainty makes informing the surroundings difficult creating a negative opinion.” (Appendix V, p8). If materials are not delivered timely, a project might be delayed, causing additional nuisance to the surroundings which alters the perception of this environment. Respondent AY4 explains how some members of the project team remain to focused on the content of the project, leaving other aspect unspoken (Appendix V, p.17). Since other members of the IPM-team might value the opinion of- and relationships with the surroundings less, this can be the cause of frustration within a team. Therefore, this perspective is labelled as: “The surroundings disrupt the collaboration during projects”.

#	STATEMENT	RANK	EXTERNAL DOMAIN
5	Uncertainty of supply of materials	Disrupting	Economical Context (1)
37	Negative opinion of the local community towards the project		Stakeholders (8)
34	Negative reporting in the media	Quite disrupting	Stakeholders (8)
18	Slow decision-making in the client organisation as regards project parameters	Medium disrupting	Internal Organisation Client (4)
32	Incidents during the realisation of similar projects		Related Projects & Surroundings (7)
13	Difficult or impossible to obtain the required budget from the government		Political Context (3)
29	Decline in quality because subcontractors fail to deliver the promised knowledge and expertise	Not really disrupting	Sub-contractors (6)
15	High level of control from the client organisation		Internal Organisation Client (4)
26	Difficulties in communicating with subcontractors	Not disrupting	Sub-contractors (6)
8	Limited insight in the situation of the land		Technological Context (2)

Table 6.3 – Interpretation of Factor 2

### 6.3.3 Factor 3

The distinguishing statements of the third factor are presented in table 6.4. Although the statements in the disrupting and quite disrupting sections of the factor don't originate from the financial domain, they all affect the profitability of the project. Even the implementation of new building methods and long permit periods indirectly influence the profitability. When ranking statement 25 respondent BY3 says "If the financial feasibility of the project becomes endangered and losses occur, the collaboration can be disrupted" (Appendix V, p.30). Furthermore, three of the four not (really) disrupting statements originate from the stakeholders (8) and surroundings (7) domain. This perspective is thus more focused on the financial profitability of a project over the impact and quality of the project for the environment. Respondent CY2 explains how focus is applied to the progress of the project in relation to the costs (Appendix V, 42). During collaboration this perception of the external environment might not be in line with other members of the project team as they might strive for the best end-result in terms of quality, valuing the financial profitability less. Taking this into account the following label is chosen for the third factor: "Factors that endanger the financial feasibility of the project disrupt the collaboration".

#	STATEMENT	RANK	EXTERNAL DOMAIN
25	Commercial goals set by the client organisation for the project	Disrupting	Contractor Organisation (5)
13	Difficult or impossible to obtain the required budget from the government	Quite disrupting	Political Context (3)
33	Lengthy licensing process		Related Projects & Surroundings (7)
7	Implementation of new building techniques		Technological Context (2)
10	Changing legislation as regards project parameters	Medium disrupting	Political Context (3)
36	Objections from the local community against nuisance as a result of the project planning	Not really disrupting	Stakeholders (8)
37	Negative opinion of the local community towards the project		Stakeholders (8)
34	Negative reporting in the media		Stakeholders (8)
30	Disruptive planning of surrounding projects	Not disrupting	Related Projects & Surroundings (7)
9	Changes in the design due to innovation in building products		Technological Context (2)

Table 6.4 – Interpretation of Factor 3

### 6.3.4 Factor 4

In table 6.5 the distinguishing statements of factor 4 are shown. This factor has less distinguishing statements than the previous three, indicating a potentially less unique perspective. When reviewing the statements the internal client organisation (domain 4) is present in both the disrupting and quite disrupting part of the factor. Namely, the "unclear or changing project aim of the client organisation" and the "changing project priority of the client" statements. Another noticeable grouping is the presence of two financial statements (domain 1) in the not (really) disrupting part. Combining these observations, this might indicate a perspective where respondents value the quality of the project and process over the financial feasibility. During the interviews, respondent loading into this factor explained how the planning of the project was important for them. Respondent AX2: "The planning of the project is untouchable, all factors which disrupt the planning immediately hurt the collaboration" (Appendix V, p.4) and respondent AY3: "The planning influences the collaboration more than the budget." (Appendix V, 14). Respondent

DY1 explained how statement 17 can influence the planning of the project (Appendix V, p.54). The consensus among loading respondents is that reaching milestones is crucial to them, even if this would mean going over budget. Therefore, the fourth and last factor is labelled: “Uncertainties that influence the planning disrupt the collaboration during projects”.

#	STATEMENT	RANK	EXTERNAL DOMAIN
28	Extension of the project due to mismatches between schedules of subcontractors	Disrupting	Sub-contractors (6)
19	Unclear or changing project aim of the client organisation		Internal Organisation Client (4)
17	Changing project priority of the client	Quite disrupting	Internal Organisation Client (4)
13	Difficult or impossible to obtain the required budget from the government		Political Context (3)
30	Disruptive planning of surrounding projects	Not really disrupting	Related Projects & Surroundings (7)
10	Changing legislation as regards project parameters		Political Context (3)
1	Increase in the prices of materials		Economical Context (1)
4	Increase in fuel prices	Not disrupting	Economical Context (1)

Table 6.5 – Interpretation of Factor 4

## 6.4 From Factors to Perspectives

Now that the factors have been labelled, they can be translated into perspectives. First, this section will explain the perspectives based on the parameters of the loading respondents and their underlying motives. This will indicate the resulting dynamics of the perspectives co-existing in project teams. This dynamic is then further elaborated, searching for possibilities where flexibility is required for the different perspectives to co-exist. These are the points where measures should be implemented to reduce the impact of external factors.

### 6.4.1 Explanation of Perspectives

The aim of this research is to determine the influence of external factors on client-contractor collaboration. For this purpose respondents from different projects, with different roles from both the client and contractor side of the collaboration, have been selected to participate in the study. The study has shown that at least four different perspectives towards the influence of external factors are present. In reality more perspectives will be present, however, these have not been identified by this data-set. Since the identified perspectives are present further analysing the resulting dynamics of these perspectives is relevant to find measures to create resilient collaborations. Therefore, these four perspectives are taken into account in the further analysis. The next step is to analyse which respondents load onto different factors and if their organisation, role and project influence their perception of external factors. The distribution of the individual Q-sorts over the four perspectives is presented in table 6.6 and visualised in figure 6.1. The colour coding of the figure is explained in the legenda in figure 6.2. With this insight, the qualitative information of the interviews can be used to determine the origins of disruptions as a result of external factors during the project. Ultimately, the different roles and organisations will have to work together during projects as IPM-teams are designed to have a variety of expertise and personalities complementing each other. Identifying if the dynamic between these perspectives

influences the perception of external factors will be the starting point for measures to reduce the impact of external factors and create more resilient collaborations.

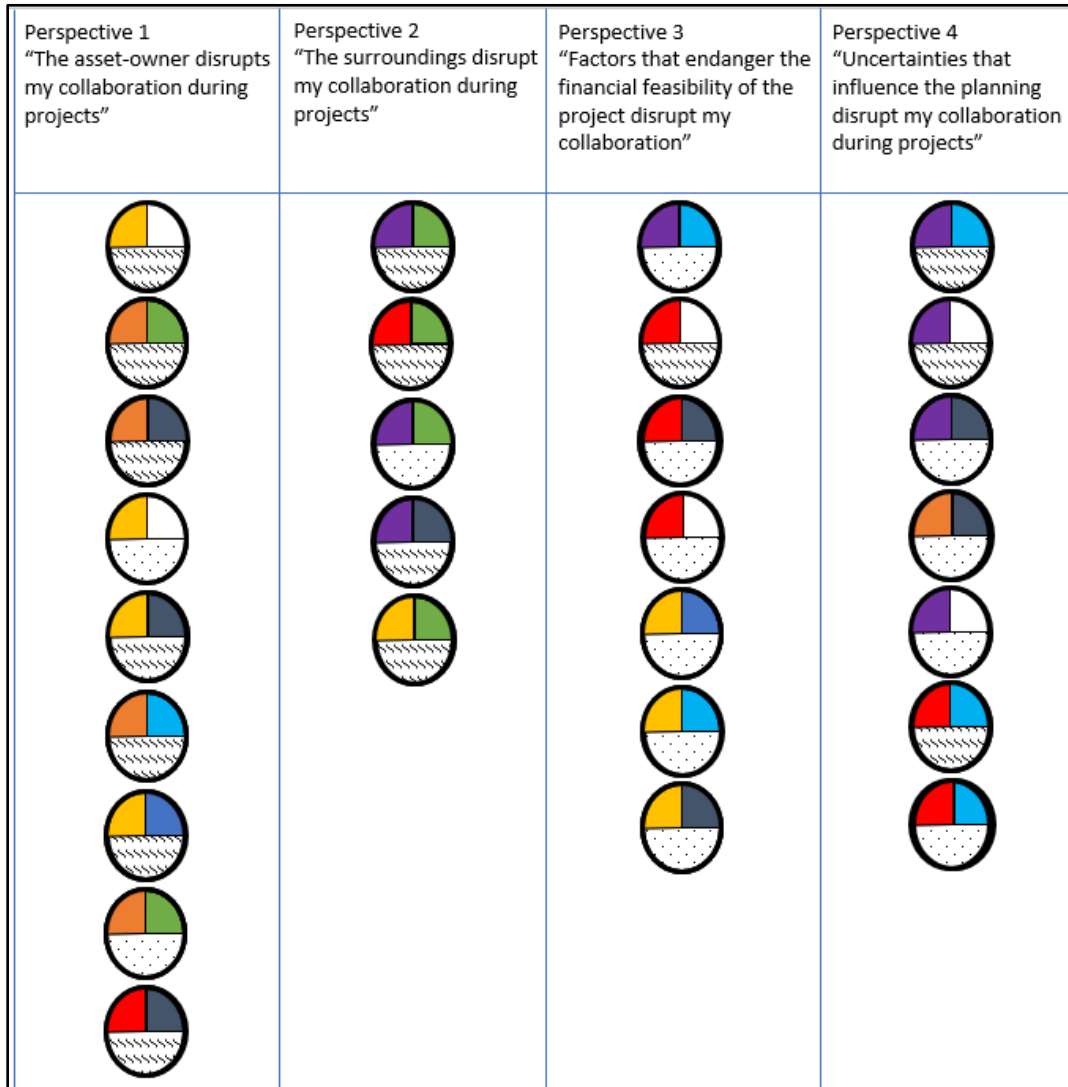


Figure 6.1 – Overview of loading respondents for each factor

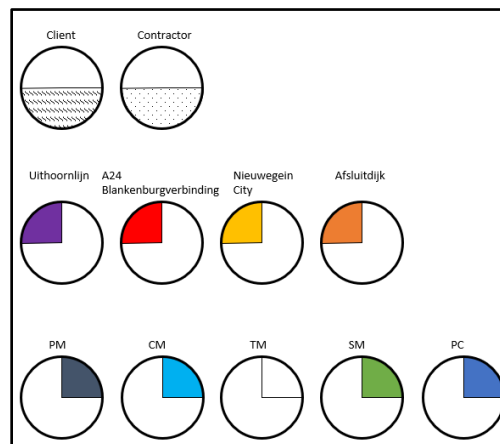


Figure 6.2 – Legend of figure 9.1

	PERSPECTIVE 1	PERSPECTIVE 2	PERSPECTIVE 3	PERSPECTIVE 4
CLIENT	7	4	1	3
CONTRACTOR	2	1	6	4
UITHOORNLIJN	0	3	1	4
A24 BLANKENBURGVERBINDING	1	1	3	2
NIEUWEGEIN CITY	4	1	3	0
AFSLUITDIJK	4	0	0	1
PM	3	1	2	2
CM	1	0	2	3
TM	2	0	2	2
SM	2	4	0	0
PRM	1	0	1	0

Table 6.6 – Overview of the distribution of respondents over the perspectives

First the loading respondents of perspective 1 are analysed. It can be seen that the majority of respondents are individuals working for client organisations. In terms of the roles within the project team there is no clear majority. However, it can be seen that 8 of the 9 loading respondents work in the Nieuwegein City and Afsluitdijk project. This confirms the problems with the asset owner, as respondents from both these projects indicate a rough relationship with the asset owner, which increased pressure on their collaboration. Respondent CY5: “The relational-triangle between client, contractor and asset-owner was under pressure during the project” (Appendix V, p.46) and respondent CY1: “The asset-owner took so long with distributing permits, that sub-projects have failed causing frustration within the team” (Appendix V, 40). Within perspective 2 there are two clear majorities present. The respondents loading onto this perspective are mostly working for client organisations and fulfil the role of stakeholder manager. This is in line with the experienced disruptions from stakeholders and the surroundings. One of the respondents (AX4) stated that “The stakeholder manager sometimes has to pause communication with the environment, for the contractor to resolve disruptions.” (Appendix V, p.9). The third perspective almost exclusively represents respondents working for contractor organisations. It shows that the traditional difference between client and contractors in terms of their motives, goals and responsibilities for project realisation (Bryde & Robinson, 2005) influences their perception of external factors as well. Respondent BY3 confirms this by stating “Disrupting factors are discussed weekly by the project team due to differences in goals between the client and contractor” (Appendix V, p.31). The last perspective is the least one-dimensional of the four. In neither of the three parameters a clear majority can be observed. However, what can be seen is that two couples of counterparts within projects (technical managers of the Uithoornlijn and contract managers of the Blankenburgverbinding) are present. Respondent AX3 explained how the counterparts managed to achieve a common goal where both were invested in the planning of the project, above other aspects (Appendix V, p.6). This indicates that the focus on planning can be turned into a culture within the project team, where counterparts share the same ambition towards these goals.

Reviewing these distributions it becomes clear that except for the stakeholder manager, the roles are distributed quite evenly over factors 1, 2 and 3. So except for the stakeholder manager, the role within the team has an insignificant influence on the perception of external influences. The difference between client and contractors is more present. Factor 1 represents clients, whereas factor 3 represents contractors. However, factor 4 proves that when counterparts are able to create a common goal regarding the content of the project, they might overcome their separated perspective to create a joint perception of the external environment. The next section will elaborate on the implications of the perspectives being brought together in a project team.



### 6.4.2 Consequences for Collaboration

By choosing to design a project team along the lines of the IPM-model variance in capacities and personalities of the different team members is stimulated to complement each other strengths and weaknesses. Therefore, it is to be expected that different perceptions of the external environment are present within project teams as well. The outcomes of this research confirm this differentiation as at least four perspectives of the external environment are present. As the differentiation of the roles within projects is deliberately made by clients and contractors the aim is not to reduce the impact of the perspectives but to help the team use each other's qualities to co-exist and deal with external influences. To do so, the dynamics between perspectives are elaborated.

As explained in the previous section, stakeholder managers are distributed separately. This indicates fundamental differences between the content of the work of stakeholder managers and the other IPM-roles. The remaining stakeholder managers who did not load onto perspective 2, loaded onto perspective 1 regarding the relationship with the asset owner, which is non-content-related as well. It indicates that the activities and personalities of the stakeholder manager differ enough from the remaining IPM-roles to experience different disruptions as well and even have an own perspective on external factors. The stakeholder managers can thus be used to help content-oriented colleagues whereas they require support on content-related issues. As perspectives 1 and 2 are relationship-oriented and factors 3 and 4 are more content-oriented the flexibility to provide this support is present within the team.

Within this data set, a difference in perception of the external environment between clients and contractors is present in perspective 1 and 3. The client and contractor management teams are both working on the same project, with the same events occurring. Despite this they perceive different disruptions within the collaboration. As a result, it can be concluded that there are still fundamental differences between members of the client team and the contractor team. The interviews showed that projects where clients and contractors pro-actively searched for possibilities to support each other the felt influences of these differences were less significant. Especially within perspective 4 it becomes clear that creating common goals allows individuals to deal with external influences.

As said, despite the differences in perception of the external factors due to roles and organisations within a project, these perspectives will have to co-exist. Using the strengths of team members to reduce the impact of external factors can avoid relationships deteriorating. The distribution of Q-sorts across the perspectives shows that the impact of specific project-related events is subordinate to the role and organisation of individuals, as every project has members of their team present in each perspective. This indicates the importance of the coordination and involvement of individuals.

## 6.5 Consensus between Perspectives

Even though the four perspectives express a different view on the external environment, distinctive on where the most impact from the external environment is felt during collaboration, they also show that there is consensus on a set of aspects that are considered important to incorporate in the collaboration process in a certain way. Three pure consensus statements are identified when applying the 0.01 significance level. A pure consensus statement implies that all perspectives have a similar ranking for an aspect. Statements that are not distinguishing between any of the selected factors are called consensus statements (Van Exel & De Graaf, 2005). These three statements are presented in table 6.7.

#	STATEMENT	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
21	Work pressure due to an opportunistic tender by the client organisation	0	0	1	1
27	Impending bankruptcy of subcontractors	-2	-3	-1	-1
31	Tightening of requirements under the national programme covering the project	-1	0	0	0

Table 6.7 – Consensus Statements

When reviewing the table it shows that all perspectives agree that the pressure of bankruptcy of subcontractors has a minor impact on the collaboration. This can be partly explained by the current state of the construction industry market in the Netherlands, where there is a shortage of manpower and no mass-bankruptcies. However, it can also be partly explained by the method of contracting, as the communication with sub-contractors is often explicably allocated to the technical and contract manager of the contractor. A larger disruptive impact is felt across all respondents by the workload due to opportunistic contracting and the tightening of requirements in the larger programme a contract is part of. Both are assessed to be within the medium disruptive range (average scores of 1 and 0 respectively), meaning it is a disruption to take into account. When presenting these problems to experts (appendix IX), they recognised this as ever-recurring problems during projects. However, they are difficult to deal with as they are examples of statements in which the market often defines one of the contracting parties responsible, causing a stalemate when it occurs. The experts approached to validate measure to create more resilient collaborations, where asked their opinion on these consensus statements as well. They confirmed that taking a pro-active approach, instead of a reactive approach as client or contractor when regarding each other's problems will enable more possibilities of providing each other with the required help and creates a culture in which problems are distributed over the project team (Appendix IX, p.128). To reach this situation transparency is required, which on its turn requires trust.

## 7 Improving Collaboration

From the analysis it has become clear that not all individuals who are taking part in project teams experience the same impact from the same external domains. Although the four perspectives described in the previous chapters are based on this particular set of respondents and additional perspectives might be present in the market, these four exist. And as section 6.4.2 shows, even having these four perspectives present in the project team will influence the dynamics and potentially cause problems, as some of the extreme values of the distinguishing factors do not align. Based on literature, the qualitative information from the interviews (see appendix V) and an expert session (see appendix IX) a framework for measures to make collaborations more resilient is composed. This chapter will specify the measures per category of the framework and which domains of external factors they address after which the feasibility of the implementation in the Project Life Cycle is discussed. The feasibility and applicability of measures are validated by means of an expert meeting.

### 7.1 Framework for Measures

The previous chapter described the potential dangers to the collaboration due to the existence of different perspectives with regard to external factors. To address these problems, a framework with measures to create more resilient collaborations is established (see figure 7.1). This framework is divided into three categories: preliminary organisation, creating flexibility and attention to soft side. The preliminary organisation allows the project team to anticipate influences from the domain of the internal client organisation, contractor organisations and the political domain including the asset-owner. Creating flexibility will provide room for the project team to react to influences from the domains of related projects & surroundings, stakeholders and the economical context. If, despite the efforts during conceptualisation and planning, the difference in perspectives would lead to friction within the project team during execution the last category of attention to the soft side enables the project team to better deal with this. This last category is used to support both previous categories as well.

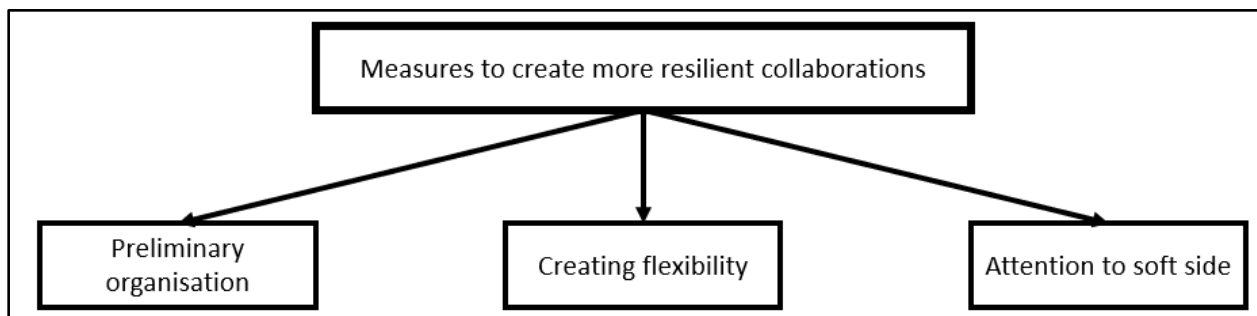


Figure 7.1 – Framework for measures to create more resilient collaborations

#### 7.1.1 Category 1: Preliminary Organisation

The first category of measures focuses on taking preventive measures before the execution, to reduce the impact of external factors later on in the process. Being unprepared for external factors will increase the impact felt, as there are no common expectations as to how to deal with them (Safapour & Kermanshachi, 2019). This category of measures will fit into the scope of the research with the focus on the structure side of the collaboration.

As explained in the previous chapter, in practice the relationship with the asset owner might put pressure on the collaboration between the client and the contractor. One of the reasons for this pressure is the

individual relationship the client as well as the contractor has with the asset owner. Not every infrastructural project is organised in such a way that there are regular meetings attended by the client, the contractor and the asset owner. This causes an information asymmetry within the collaboration, enabling a situation where scope changes from either side might be adopted without the other party knowing about it. In appendix V, p.35 a situation is described where the asset owner visits the construction site, asking the contractor to perform additional work without any confirmation of the client. When such a situation is addressed, this is detrimental for the collaboration, as both parties are caught off guard, while the costs have already been incurred. To counter these influences, two measures are proposed. A first measure would be for the client to create an additional code of conduct together with the asset owner, in which expectations with regard to work methods and involvement are agreed upon (Ma, Yu, Li, Wang, & Wu, 2019). In this manner, the project team is less likely to be caught off guard during the execution. Another measure to reduce these effects is the involvement of the asset owner in the design and planning phase. It is often the case that the asset owner becomes involved because they discover what they perceive as flaws in the design. By involving them more closely in this process, the amount and impact of requested changes on the scope can be reduced (Appendix V, p.46).

Furthermore, it became clear that within project teams the co-existence of individuals from client and contractor organisations make for the presence of different perspectives towards external factors. As explained in the first chapters, the motives and goals for projects traditionally differ between clients and contractors. Ignoring these differences might cause eruptions of frustrations during the execution when external influences occur. To prevent these eruptions, three measures are proposed. Each project team tries to design an appropriate PSU for their project team. Factors that might influence the content of the PSU are the size of the project, the background of team members and the available budget. However, in modern construction, a part focused on team-building should be integrated in the PSU. During this session the project team should be faced with pressure and adversity where no apparent solution is present. This will improve the internal processes, but mimics the situation that arises when external influences occur (Omar & Fayek, 2016). Some project teams are already adopting this strategy, but often generalised and hypothetical cases are used. The impact of such a session might be increased if the case is created specifically for this project. Lastly, a concrete recommendation for practice is to incorporate the external environment in the existing team assessment during procurement. During this process the client assesses the compatibility of the existing client team with the potential contractors in terms of collaboration. If a verified set of statements with external factors is created, all team members can be asked to fill out a Q-sort. Comparing these Q-sorts might provide critical relationships and divergent views, which can be taken into account during the selection process.

To address the special function of the stakeholder manager who has a more relationship-oriented role, as opposed to the more content-oriented roles, this incorporation of the Q-sorts is beneficial as well. The self-reflection it provides for individuals might increase the understanding of the difference between relationship-oriented and content-oriented management within the project team (Appendix IX, p.131). The last measure will help reduce the impact of the stakeholders and surroundings domains. The adaptation of early-stakeholder-involvement where stakeholders have the opportunity to make their wishes known and provide feedback on the project and its planning, will reduce the influence of stakeholders during execution.

### 7.1.2 Category 2: Creating Flexibility

The resilience of project teams can be improved by creating flexibility and providing room for the team to react and adapt to situations. During the interviews respondents stated that the moment where the collaboration derails, is when the team is under pressure and feel like they have no choice in how they react. Individuals will feel like they are forced into a certain direction and their opinion is not heard.

To improve the flexibility of the organisation in these situations, respondent AX1 (Appendix V, p.2) describes a measure taken by their team that has helped them address expectations. By having a part of the budget allocated to innovation, but not to specified activities, they created a buffer for potential opportunities. Now, this approach can be generalised to help organisations become more flexible. It can be used for opportunities, but it can also be used to counter disruptive events. Innovation is a logical starting point for this measure, as these are particularly difficult to predict. However, when this approach to budgeting is successful, it can be applied to scope changes and stakeholder management as well. The perspectives show that there is a difference in the perception of the influence of financial factors. When individuals with perspective 3 and for example 2 and 4 are put together in a project team, they will value financial impact versus impact on the quality differently. By applying this budgeting technique, both perspectives are given the room to compromise. This measure has similarities with a key characteristic of the 2-phase model which is currently researched, namely the deferred pricing method.

Three additional measures are proposed to increase the flexibility of the project team. The first measure involves a transparent log of the progress both internally and externally. The internal openness gives clients and contractors insight in each other's progress and enables to provide help. Instead of helping each other reactively when problems arise, it would become possible to warn each other and share experiences (Valente & Costa, 2014). The external progress log informs the stakeholders and surroundings, managing their opinion of the project. The latter can be combined with the second measure, a deadline to submit scope changes. This may seem counter-intuitive when creating flexibility. However, letting stakeholders know that there is a period of time in which they are free to express their ideas and opinions can create a common vision for the project, reducing the impact of stakeholders during execution.

The last measure was discussed during the expert meeting. Currently, when the collaboration during a project fails, the client and contractor team will participate in a process with coaching to 'save' the collaboration. However, some collaborations cannot be saved due to the gravity of the breach of trust, leading to unwillingness to cooperate. Especially in smaller projects with a short lifespan these situations might occur. Expert 2 proposed that having an exit opportunity in which client and contractor can terminate the collaboration, giving room for a fresh start might improve the willingness to save a collaboration (Appendix IX, p. 131). Both parties know that they can make every effort, without the risk of it not working out and having to continue together. However, it is undesirable that collaborations break down because of minor issues, so appropriate thresholds for the termination of collaborations should be researched.

### 7.1.3 Category 3: Attention to Soft Side

One of the most occurring quotes in the interviews and the expert session was: "it is still a man's job" (Appendix V, p.13, 29, 35 and 47). The market strongly believes that the success of the adaptation of any structure measures correlates to the attention paid to the soft side of a project. This research's main focus was applied to see if any structure-related measures could be taken to improve the resilience of

collaborations. However, considering the strong message from practice it would be unwise to not take the soft side measures into consideration.

Especially during the COVID-19 pandemic project teams experienced a fall-back in the soft side of their projects. It made them aware of the importance they attach to the human aspect of collaboration. The new work environment is often a hybrid one, where work is performed both from home and at the office. To improve the relationship between colleagues it is advised to create a guideline for the expectations of the division with regard to working from home and work from the office where individuals are expected to be present on location together from time to time (Appendix V, p.21). Having the entire team agree to this guideline will benefit the existing relationships and ensure that no one will drift off from the team. Moreover, it is important that the time spent together on the project location is taken advantage of. Normally, project teams have regularly scheduled formal meetings, in which the progress of the project and the present issues are discussed. If these are the only moments the management teams of the client and the contractor share, the human touch might get lost. If this occurs, individuals might grow frustrated because they feel like there is no possibility to influence the process and their voice is not heard. Therefore, it is just as important to have regular informal meetings without minutes. This would allow project teams to come together if external factors occur and see if their perception of the impact is aligned. When perspectives within the project team differ, it creates the opportunity for individuals to express their feelings regarding the situation.

The last part of the soft skills measures focus on the expectations for the project of the individuals involved. A common misconception is that applying soft skills means always being nice and constructive towards one another. However, Zuo et al. (2018) state that a major part of the soft skills required for a successful collaboration consists of understanding each other's motives. During a relationship you would strive to align your interests and goals, but that is not always possible. In that case, it is important to understand and respect each other's point of view. When a team is able to do so, they can continue the work with the same success as when the goals would be aligned. One of the tools to accomplish this would be to create a code of conduct that is signed by the entire team. This tool is already in use in practice and mostly comprises the standards and values of the project team (Ma, Yu, Li, Wang, & Wu, 2019). In this code of conduct a separate section addressing the reaction of the project team to external factors should be included. This would allow individuals to know what to expect from each other when their perspectives of an external event are different. This code of conduct is applied team-wide. However, the interviews indicate that for the progress and potential frustration of their own specific work, the relationship with their counterpart is crucial (Appendix V, p.45). Since both individuals fulfil the same role, they might expect to naturally understand each other. Yet in practice they might fulfil their role in different ways, causing misunderstandings. Investing time in this relationship and making known how you fulfil your role and what you expect from your counterpart can ensure that the entire department of the project organisation can operate as one unit, instead of a client and contractor part with different motives.

## 7.2 Overview of Measures

The proposed measures in the previous sections can be added to the framework for measures to create more resilient collaborations. By doing so an overview with the available measures is created. The elaborated framework is presented in figure 7.2. As previously explained the three categories address the domains which have proven to have the most impact on the collaboration in chapter 6. The preliminary organisation addresses the domains of the parent organisations and political influences and flexibility

helps the team anticipate influences from the surroundings, stakeholders and economical influences. The measures are not meant to unify the perspectives of all members of the project team, as their differentiation is a conscious choice. However, they will be able to reduce the felt impact of external factors for individuals who are more vulnerable to certain domains.

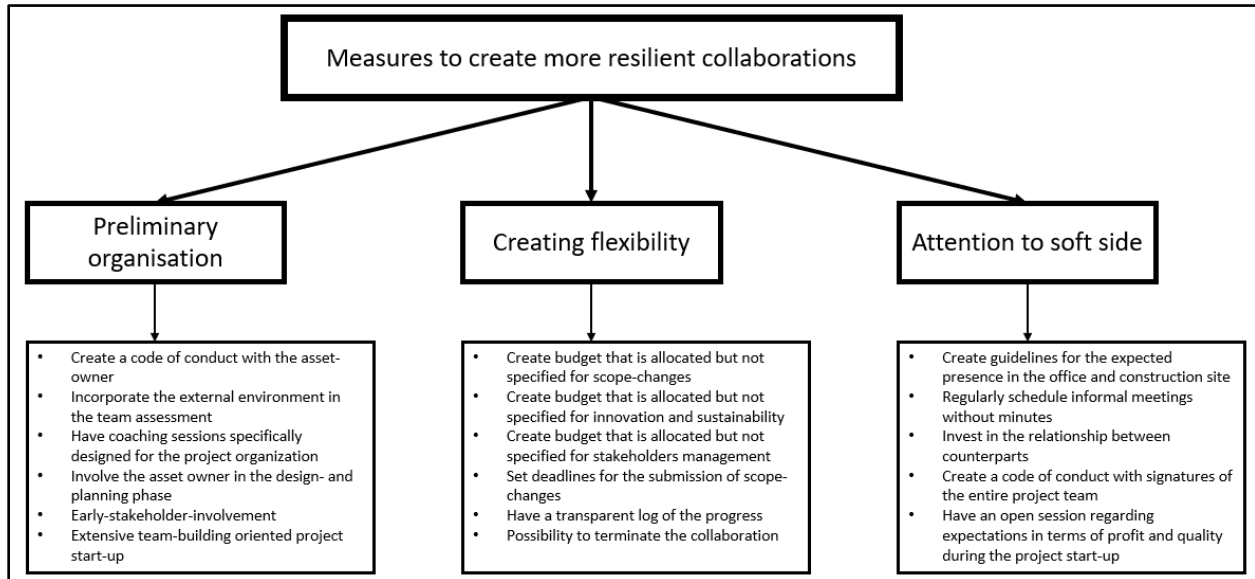


Figure 7.2 – Visualised overview of measure to create more resilient collaborations

### 7.3 Implementing Measures in Practice

The previous section elaborated on the three categories and specific measures that can be taken by clients and contractors to address the differences in perspectives towards external factors within project teams. This section describes how these measures can be implemented in the life cycle of a project and which party should take the initiative for implementation. This links the measures for external factors to the internal processes of collaboration. The implementation of measures is presented in figure 7.3.

The category 1, preliminary organisation, measures are mainly applied during the first phase of the Project Life Cycle, the conceptualization phase. This is the phase where the relationship with the asset owner can be designed. By creating agreements on the expected behaviour and demands and wishes, problems between the project organisation and the asset owner can be partly prevented. During the second phase, the planning phase, the implementation of agreements with regard to their demands and wishes should regularly be reported back. This will build the trust of the asset owner as regards the quality of methods and capabilities of the project team. This anchors the relationship, reducing the influence of the asset owner during the third and fourth phase. The same process goes for the preparation of the project in terms of the formation of a project team and the involvement of the stakeholders and surroundings. The assessment process and design of a suitable PSU which take the external environment into account will take place during phase 1 to kick-start the collaboration. During phase two these processes can be reviewed. Early stakeholder involvement starts in phase 1 as well, as it provides input for the design. For these measures the client has to take the initiative, as they will need to prepare the project (in collaboration with the asset owner) and design a tender. Part of this preparation is structuring relations in a manner which reduces the impact of external influences.



Flexibility is mostly created during the second phase, planning, of the project. At this point the contractor has joined the organisation and discussions regarding scope, planning and budget have started. By enabling the project team to build in flexibility, the project can be started in a relaxed manner. Normally relationships could be under pressure from the very start due to the uncertainty of individuals with regard to the feasibility of the design leading to fear for changes to the project. If this is achieved, changes can be approached in a content-related manner and potential solutions can be discussed freely. During the execution phase it is important that the built-in flexibility is guaranteed and that both client and contractor honour the agreement. For these measures the responsibility therefore lies with both the client and the contractor. However, to guarantee the flexibility transparency of the contractor is required with regard to the costs of additional work. Otherwise this might arouse the distrust of the client.

The soft side of projects runs across the entire lifespan of the project, but the suggested measures are especially important during the conceptualization, execution and closure phases of the project. During the first phase, the team is composed and expectations for the project are shared. In this phase the foundation for the atmosphere and project culture for the coming period is created. The team assessment and PSU with guidance of a coach will take place and a code of conduct is agreed upon. At the same time, the client is making an effort to align expectations with the asset owner, requiring a cooperative attitude as well. During this phase the client has the responsibility to increase the attention paid to the soft side. During the second phase, the team should remain in close contact and honour their agreements. However, there is less influence of the external environment which can potentially disrupt the collaboration, reducing the importance. During the third and fourth phase it will become particularly important to pay attention to the soft side of the project again. As soon as the execution phase starts, hard to reverse decisions and activities will take place, making the organisation and individuals vulnerable for external influences. By having the client and contractor share the responsibility to honour the guidelines and the code of conduct of their collaboration, the team can operate as a unity and counter external influences, reducing their impact.

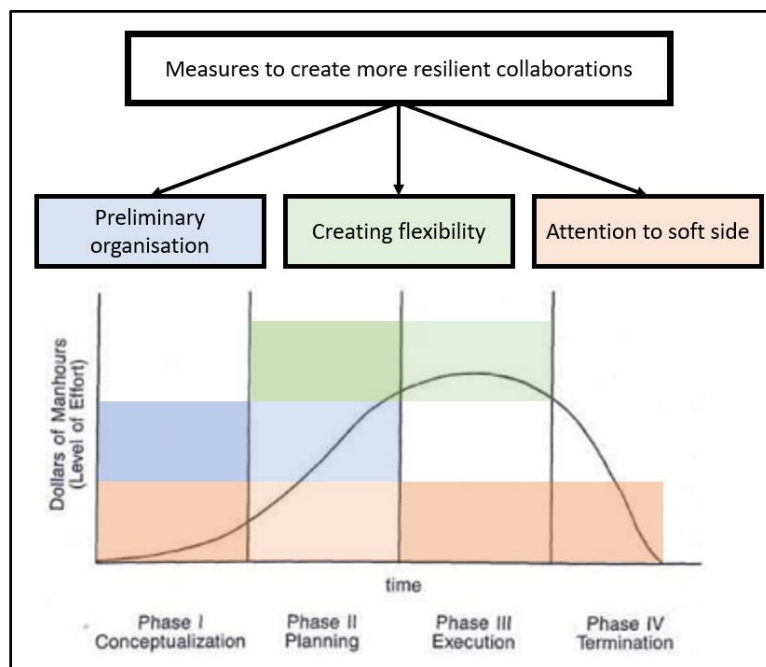


Figure 7.3 – Implementation of measures in the Project Life Cycle

## 7.4 Feasibility of Measures and Implementation: Expert Meeting

The framework of measures for creating more resilient collaborations and the implementation during the Project Life Cycle were presented to several experts active in the construction industry during an expert session at AT Osborne, with the aim to validate the feasibility of and need for certain measures. The experts are active in multiple projects and have experience as both client and contractor. The group of experts consisted of a contract manager, two managers project control, a program manager and a senior consultant. The feedback from these professionals is used to validate the feasibility and applicability of the advice provided to the market for reducing the influence of external factors. An extensive summary of the expert session is provided in appendix IX but the main take aways regarding the proposed measure are discussed below. The used citations can be found in this appendix as well.

When reviewing the preliminary organisation category, the experts pointed out the current development of the profession of asset owner. Expert 3 states: “The role of asset-owner is rapidly developing. Great efforts are made to get asset-owners and project teams closer to each other”. Therefore, he expects asset-owner to be willing to partake in these measures. Traditionally, the asset owner was a unilateral stakeholder, who provided their demands and wishes for the project and was unable to look past these. However, the profession is adapting to the more collaborative-oriented project teams that nowadays execute projects. Part of the asset owners are actively trying to establish a sound working relationship with the project team. It is expected that the proposed measures will accelerate this adaptation and that asset owners will be willing to participate in this increased collaboration. Expert 1 suggested the adoption of external influences in the team assessment: “Insight in my perspective on the external environment would benefit my self-consciousness and understanding for team members”. Self-reflection is perceived as an important tool to encourage change. By being confronted with the different perceptions, the individuals are expected to be more aware of the consequences of external influences.

During the review of the creating flexibility category, the experts explained how the budgeting approach as suggested is currently being adopted based on arbitrariness of specific project teams. Although this is not a standard working method, the experiences with having parts of the budget allocated in this manner are mainly positive. Expert 5 shared: “During projects the scope and contract which are initially designed always change during the process. This would make it easier to deal with these changes.” It was stressed that the budget reserved for each flexible post should be specified before entering the execution phase. This is done in the 2-phase model as well, as otherwise it will become impossible to have discussions about the contractual liability of both parties. Expert 2 is currently involved in a project where the collaboration has completely derailed. There is no communication at all between the client and the contractor, and both are striving for the final deadline. This expert was particularly intrigued by the option to terminate the collaboration. She expected that this would have benefitted the collaboration previously, as both client and contractor were afraid to show all their cards to save the collaboration, knowing they would have to continue the collaboration regardless of the outcome. The experts were in consensus that clear agreements for termination should be in place, as the threshold should not be too low. Otherwise partners could step out because of uncontrollable events such as recession.

Lastly, the topic of the application of soft skills during projects was discussed. This category of measures received particularly much acclaim. Expert 4 immediately pointed out “it is still a man’s job”. The success of the measures regarding preliminary organisations and creating flexibility are dependent on the attention paid to the soft side of the project. Expert 4 later states: “There is an important role for the

project manager to be a connector within the team”. The mindset and experience of the project manager are expected to be key to accomplish a well-organised soft side. The physical coming together of the project team being an important element in building relationships was confirmed by the experts, as all of them experienced a weakening of their relationship during the COVID-19 crisis. It is expected to be feasible for all project teams to accompany the physical presence with the proposed informal meetings where team members can share feelings and experiences.

## 8 Discussion

This chapter will discuss the limitations of the performed research, followed by a reflection on the research method and validity of the subsequent findings. By acknowledging the boundaries of the study, the findings will be put in the right academic perspective, improving the quality of the conclusions and recommendations.

### 8.1 Limitations Performed Research

This research focussed on the external project environment, to find out which influence these factors have on the collaboration. However, there is an interface between the internal and external environment, as the measures for dealing with external influences have to be implemented internally. Due to this scoping choice, this research did not explore the internal project environment and only moderately addressed the interface between the internal and external project environment. Potential adjustments in the internal organisation of the project team are not further explored. Furthermore, focus was applied to disruptive external factors with the aim of stabilizing collaborations. This means that potential opportunities for collaborations have not been addressed. However, during the interviews respondents stated that the external project environment provides a multitude of opportunities for the collaboration as well. This is noted for future research, but not explored within the scope of this research.

During the execution of the research 28 respondents from four different projects were interviewed. All four projects were contracted with a variation on the traditional Design & Build model and the project teams are organised according to the IPM-model. Consequently, the analysed collaborations are comparable and the only differentiation between respondents is their role, function and project. As the contracting model defines the allocation of risks and responsibilities between client and contractor, the findings might differ between contracting models. However, these have not been reviewed during this research, so no comments can be made about the influence of the contracting model on the perception of external influences.

Lastly, the research is based on the subjectivity of the respondents. The subjectivity of the respondents determines the findings of this research. The findings might be different with a different P-set. Even within the same P-set the results might differ slightly as during the interviewing process, respondents were noticeably trying to apply their own interpretations to the presented statements. If the researcher would allow this for each respondent, all resulting Q-sorts would be full of notes and the comparability of the Q-sorts would be reduced. With a larger respondent group this effect would be smaller. But as the Q-study is performed along the set guidelines this set of four perspectives exists in reality. However, it is not a comprehensive set of perspectives. More perspectives are present reality, but these were not present in the chosen P-set. When proposing measures to reduce the impact of external factors on collaboration, the details and effects of the suggestions are not further researched. The purpose and feasibility of the measures are described, creating a starting point for future research into the implementation of measures to deal with external factors.

### 8.2 Reflection on Research Method and Findings

First the research method used, the Q-methodology, will be discussed. This method is a tool that uses the subjectivity of individuals as input to produce clustered perspectives present within the respondent group. To this end, the opinions of individuals are translated into a numerical framework (Q-sort) that can be compared to that of other respondents. The resulting four perspectives are able to explain 49.5% of the

total variance (see appendix VI.IV) with respectively 6, 4, 6 and 4 defining Q-sorts for each perspective. Watts and Stenner (2005) describe these thresholds as a successful Q-study confirming the validity of the results. Each factor has multiple distinguishing statements as well, leaving room to interpret them and translate them to perspectives. The identified perspectives have different focus points as to what is perceived as disrupting. This was expected based on the qualitative data retrieved by the interviews, where respondents had varying arguments for the perception of specific factors. This finding is not unexpected, however, the academic proof of the existence of different perspectives regarding the external project environment will lower the barrier for addressing these factors in a structured manner. However, as the Q-sort of respondents can only be compared to Q-sorts within the same study, the results cannot immediately be extrapolated to the entire sector. To further increase the validity and applicability of the results an expert meeting was organized where 5 independent experts reviewed the results on feasibility and necessity.

When reviewing the findings of the research, the first notable topic of discussion is the role of the asset owner in the project environment. During the composition of the model of the project environment (see section 4.1.3) the role of this asset owner and especially the influence on the internal organisations seems to be underestimated. There is no clear domain housing the asset owner, but multiple respondents stated that the relationships that the client and the contractor manage to maintain with the asset owner can significantly influence the collaboration. Moreover, this research partly assumes that having a difference in perspective of the external environment is unwanted. However, clients and contractors purposely design their teams to have different capacities and personalities present. This raises the question if the influence of external factors on the collaboration should be reduced. It could provide opportunities for team members to create a common enemy as well, strengthening their bond. Currently the disruptions of collaborations which are at the root of the assumption that differentiation in perspective is detrimental for the collaboration differ significantly in magnitude. Project teams should critically revise whether a disruption is excessive or part of the work before addressing the issue. Some external events can be accepted with work continuing as well.

The proposed measures to reduce the influence of external factors on collaboration are either arbitrarily used by project teams, currently researched or currently used in other fields of work. However, having proven the differences in the perception of the external environment the need arises for a structured approach in which team members support each other in reducing the impact of external factors. The interviews show that the chosen approach to deal with external factors depends on parameters such as age and practical experience. Measures such as a code of conduct are currently being taught in universities and are therefore likely to be implemented more often in the future. Providing clients and contractors with a framework of measures suitable to address the difference in perception of external factors might lower the barrier to follow a structured approach to anticipate them.

## 9 Conclusions and Recommendations

In this chapter the performed analysis and findings will be used to address the sub-questions and main research question of this research. The first section will address sub-questions 1 and 2 regarding the external project environment in construction projects. The next section will address sub-questions 3 and 4, showing the present perspectives of the external environment in project teams. The subsequent section will answer the last sub-question, which searched for ways to reduce the impact of external influences on the collaboration. The combination of these sections answers the main research question: “What external factors are present during construction projects that influence the collaboration between client and contractors and how can the impact of these events be reduced up-front?”. This marks the end point of this research. However, this conclusion provides new leads for future research that will be recommended. Therefore, this chapter concludes with some final remarks from the researcher on the findings and the research process.

### 9.1 Defining the External Project Environment

First an answer to the first two sub questions was searched. These questions were: “What are the origins of external factors that disrupt collaboration?” and “What does the project environment in client-contractor collaboration look like?”. To answer these questions a literature review of the project environment has been performed.

A distinction between the internal and external environment can be made. The external project environment comprises of all elements which are not the specific object and project team. It can be influenced to a degree, but not completely as the occurrence of events is depending on other objects and organisations as well (Todorovic, Petrovic, Mihic, Obradovic, & Bushuyev, 2015). Since 1996 (Belassi & Tukel) academics are researching the external environment and the elements which are present within it. The level of detail for finding the origins of external factors varies a lot. The papers of Westerveld (2003) and Kanapeckiene et al. (2010) are defining a multitude of macro-level domains of external factors, whereas the IPAT (NETLIPSE, 2022) focusses on domains more directly linked to the project team. By finding overlap and differences between the existing models relevant domains of external influences within client-contractor collaboration are defined. The external domains answer sub question 1 regarding the origins of external factors during projects. These domains are: economical context, technological context, political context, internal client organisation, contractor organisation, sub-contractors, related projects & surroundings and stakeholders. Each of these domains is able to either directly or indirectly influence the collaboration.

To answer the second sub question the relationship between these external domains and the internal project environment is mapped into a model of the project environment (figure 9.1). This newly developed model enhances the IPAT with macro-domains and a distinction within the private sector of the collaboration. The project delivery organisation is defined as the internal project environment. It can be seen that the internal organisation receives direct influences from four sides. On the vertical axis the internal client organisation and contractor organisation (with the accompanying sub-contractors) influence the team as they provide the personnel and budget for the project. On the horizontal axis related projects and surroundings of the project and stakeholders will influence the decision-making within the project team. The former by means of planning and incidents and the latter through feedback sessions with requirements and wishes. The attitude and behaviour of these domains is subject to three macro-level domains. First politics will directly influence all domains due to their power in setting legislation. This

domain however, is also subject to the other two macro-level domains. The construction industry is highly depend on economic and technological factors. These influence all processes during the execution of a project. The resulting model in figure 9.1 is therefore the answer to the first two sub questions.

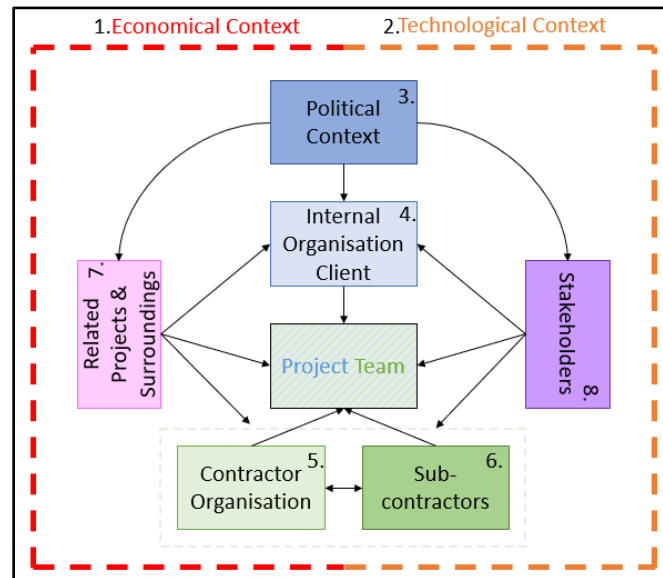


Figure 9.1 – Model of the Project Environment

## 9.2 Present Perspectives of External Factors

Having defined the project environment and the origins of external factor occurring in construction the next two sub questions which are addressed are: “Which disruptive external factors do project teams experience?” and “How do project teams currently feel the impact of external factors that disrupt collaboration in projects?”. To answer these questions a literature study of the external domains and the Q-study was performed.

By means of the literature review of the external project environment the concourse with statements of disruptive external factors are defined and sorted on relevancy and occurrence to form the Q-set (see appendix II). These statements were presented to the respondents and sorted in a Q-sort where respondents were asked “What has caused the most disruptive impact on the collaboration during the project?”. It can be concluded that there is a difference present within project teams in how team members will perceive external factors. This shows in the results of the analysis of the Q-sorts where four perspectives are retrieved. The perspectives are: “The asset-owner disrupts the collaboration during projects”, “The surroundings disrupt the collaboration during projects”, “Factors that endanger the financial feasibility of the project disrupt the collaboration” and “Uncertainties that influence the planning disrupt the collaboration during projects”. A significant difference is visible between two more process-oriented perspectives (1 and 2) and content-oriented perspectives (3 and 4). In the model of the project environment perspectives 1 and 2 would experience influences from the related project & surroundings domains whereas perspective 3 and 4 are more vulnerable for influences from politics and parent organisations. Reviewing the perspectives it can be concluded that project teams experience disruptions from the economical, political, client, contractor and stakeholder domains to answer sub question 3.

From the analysis of these perspectives it can be concluded that a difference between individuals working for client- or contractor organisations is present. Contractors are mainly content-oriented whereas client



respondents distribute over both process- and content-oriented perspectives. An exception to this division is the role of the stakeholder manager. Regardless of the organisation, these are all represented by the process-oriented perspectives indicating that the content of this role differs significantly from the others. The project where individuals work is less indicative as not a single perspective is represented by more than half of a project team. The influence of external factors is thus mostly felt when team members are not used in their strength and individuals distance from responsibilities, answering sub question 4. This asks for the project teams to create flexibility to deal with external factors to co-exist.

### 9.3 Recommended Approach to External Factors

Knowing that different perspectives of the external environment are present within project teams and what the implications for practice are, the last sub question is answered: “Which possibilities are available to the client and/or contractor to reduce the impact of external factors?” The qualitative output of the interviews and knowledge from the literature study are used to define measures to reduce the impact of external factors which are validated during an expert meeting.

The measures are split in three categories: preliminary organisation, creating flexibility and attention to soft side. The preliminary organisation category originates from the difference in perception between client and contractor organisations and the problems perceived with the asset owner and stakeholders. As was shown by sets of counterparts loading onto perspective four, the organisation of the project during the conceptualisation and planning phase can bring individuals together to focus on the content. Creating flexibility will address allow the team use the strength of individuals to resolve issues. If, despite the efforts during conceptualisation and planning, the difference in perspectives would lead to clashes during the execution, a flexible project team will be better prepared to absorb external influences without the collaboration derailing. The last category is used to support both previous categories.

The main conclusions are that increased involvement of the asset-owner at the start of the project is required, making the alignment of expectations possible. It also provides the asset-owner with a viable moment to express additional requirements and wishes reducing these during later phases of the project. Formally agreeing on the relationship by means of a code of conduct will increase the likelihood of both parties honouring the agreements. Moreover budgeting by allocating money without specifying it for parts of the project which are especially vulnerable for external influences will reduce the pressure on the project team when these events occur as they will have the means to take the time to design a suitable approach. Lastly, for the attention to the soft side the physical attendance of team members on location is valued highly. Agreements on this topic can be incorporated in the advised code of conduct for the project team. Additionally informal meeting are key for maintaining relationship during the lifespan of the project. This provides the team with opportunities to share problems and frustration in an early stage with a low barrier. In this way some frustrations might not only be reduced but even prevented from occurring at all.

The first category of measures is best implemented in phase 1 and 2 of the Project Life Cycle model, with a focus during phase 1 since the project scope for the tender and relationship with the asset-owner are designed during this phase. These measures address the external factors originating from the domain of the internal client organisation, contractor organisation and politics. Flexibility can be created during the second phase and requires guaranteeing during the third phase. These measures anticipate for disruptions from the macro-domains of economical, technological and political factors. During the planning phase the contractor has joined the collaboration and the flexibility measures can be discussed and agreed upon

with the entire project team. This is the only phase of the Project Life Cycle where no additional measures regarding the soft side of collaboration are implemented. With additional attention to the soft side during the conceptualization, execution and termination the current measures during the planning-phase should suffice. Mainly the first and third phase are important here, as during the former the collaboration is designed and the latter is subject to the volatile external project environment. These measures support the other categories and creates a more resilient project team. All three categories contribute to reducing the influence of factors originating from the stakeholders domain.

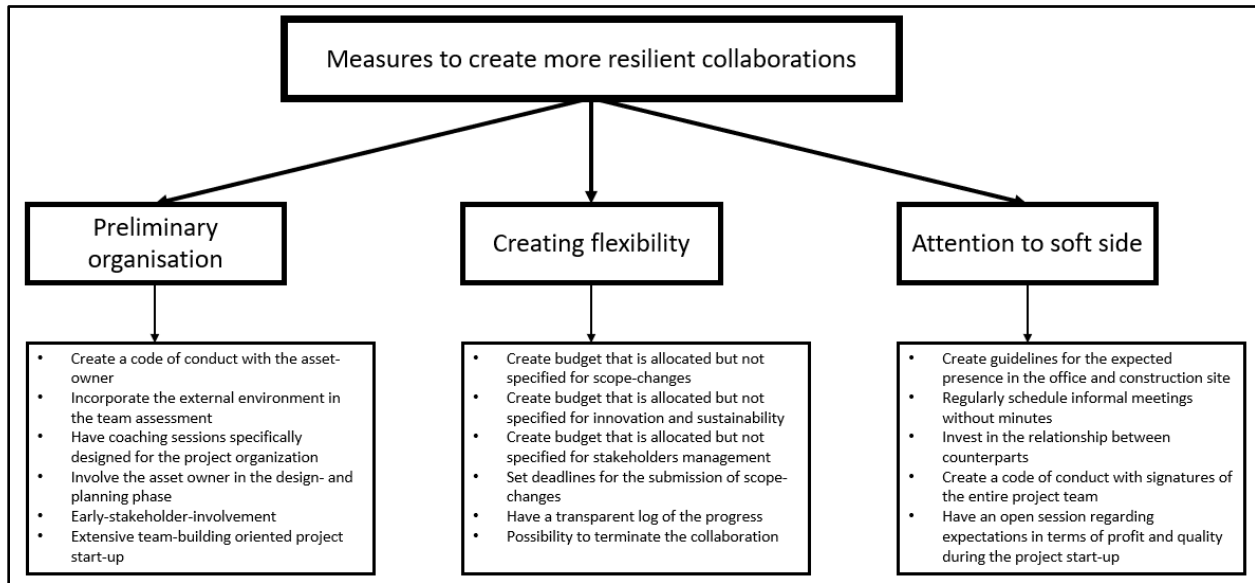


Figure 9.2 – Framework for measures to create more resilient collaborations

## 9.4 Recommendations for Future Research

The conclusions of this research provide recommendations for the execution of similar research in the future as well as a few leads for potential new research. Starting with the former, future research should take the role of the asset owner within client-contractor collaboration more into account. This has proven to be a significant factor which should be represented in the concourse and Q-set. This can be achieved by adding the asset-owner as a domain into the composed model of the project environment for future research. If a Q-study would then be performed this domain can be researched in a desk study and thus be incorporated in the concourse. Furthermore, it turned out to be difficult to find respondents willing to participate in a Q-study on a sensitive topic such as the disruption of collaboration. Due to the subjectivity involved with the research method and the financial stakes of large infrastructural projects, projects with problems are hesitant to participate. The constraint of interviewing project teams in their entirety makes this a difficult process. It is therefore recommended to explore different ways of composing a suitable P-set. The usage of a specifically designed software package such as QMethod Software, however, eases the interviews and provides flexibility in the planning. Respondents provided positive feedback on the possibility of having online interviews and they enjoyed filling out a Q-sort in a digital environment.

When recommending potential new leads for future research, mainly the scoping choices and the end point of this research are taken into account. During this research, attention was focused on disruptive external factors influencing collaboration. The qualitative output of the research has proven that opportunities as a result of external factors are present as well, but the market is unsure how to capitalize

on them. Research into opportunities as a result of external factors is therefore recommended. In addition, this research reviewed projects where the traditional design of collaboration was applied, a variation on the Design & Build contracting model in combination with the IPM-model. This was necessary, as setting these parameters allowed the comparison of perceptions between different organisations and roles. However, future research should explore whether different contracting models would provide different insights, as this could indicate that certain contracting models are particularly suitable for anticipating the external project environment. To conclude, the end point of this research was to propose methods for reducing the influence of external factors. An advice is provided on stimulating measures and how to implement them. However, in order to make the implementation and the implications of measures to create resilient project teams more tangible, additional research is required.

## 9.5 Final Remarks

This research addressed the influence of disruptive external factors within client-contractor collaboration. To analyse these effects, 28 respondents from different organisations with different roles were interviewed. As the Q-methodology relies heavily on the subjectivity of individuals, they were asked to be honest about their collaboration and relationships. Combining this openness with the negative load of disruptive external factors, inquiring about pressure and frustration within the team required a delicate approach. Most respondents weighted their words carefully and frequently asked to be able to speak off the record. Therefore, the transcripts have been processed as summaries, being encrypted with a code for each respondent. In this way, statements cannot be traced back to participating individuals, as this might endanger their position within the existing collaboration.

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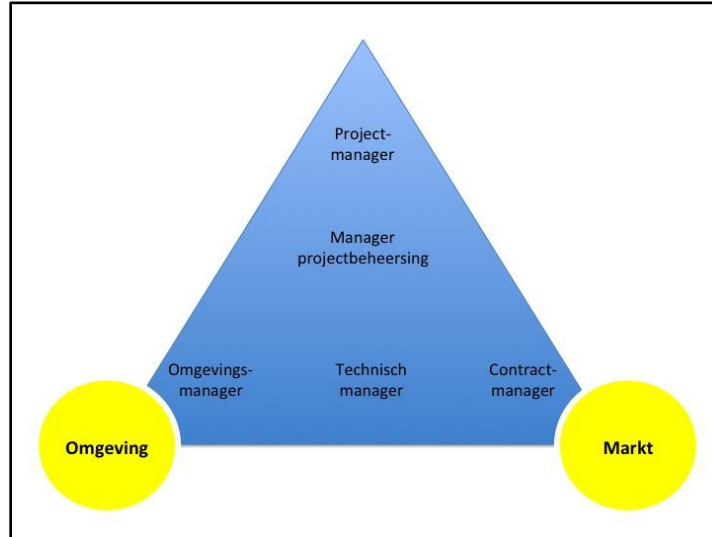
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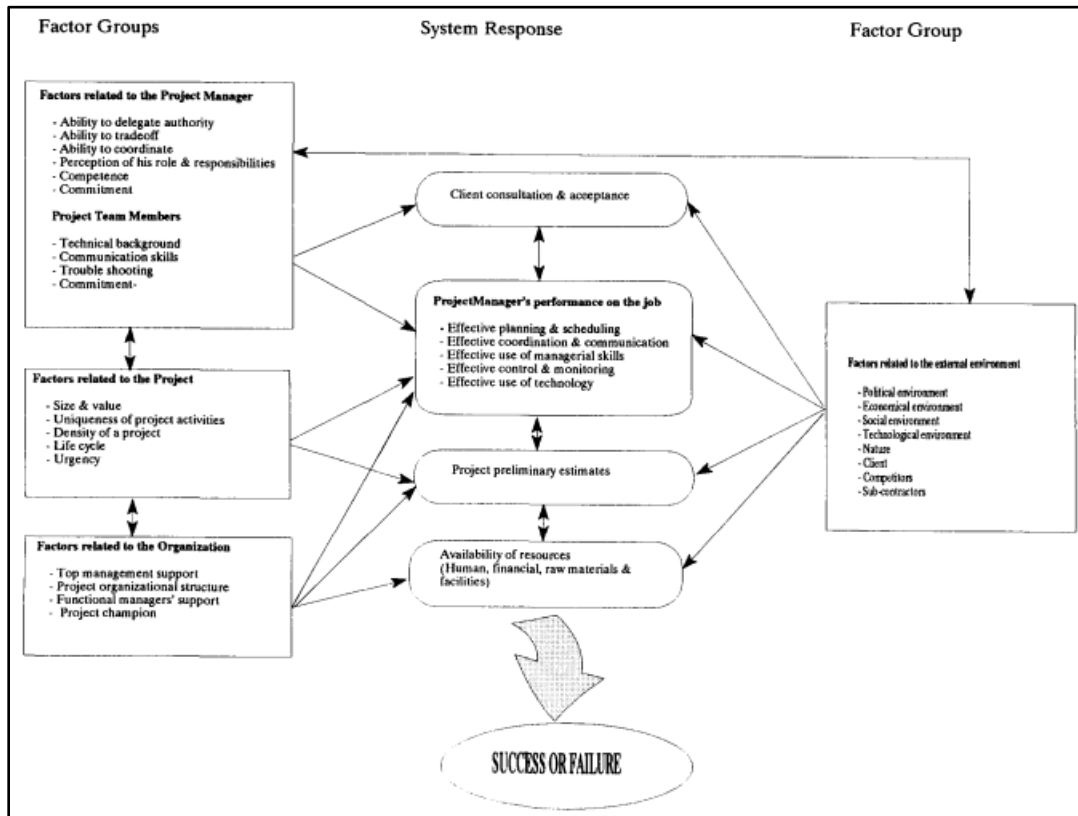
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# Appendix I – Models of the Project Environment

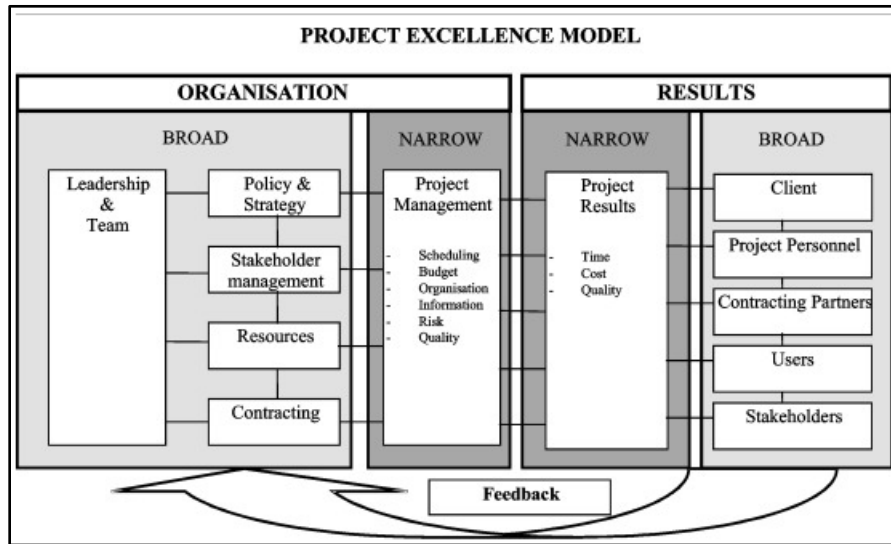
## Appendix I.I – IPM-model (Rijkswaterstaat, 2021)



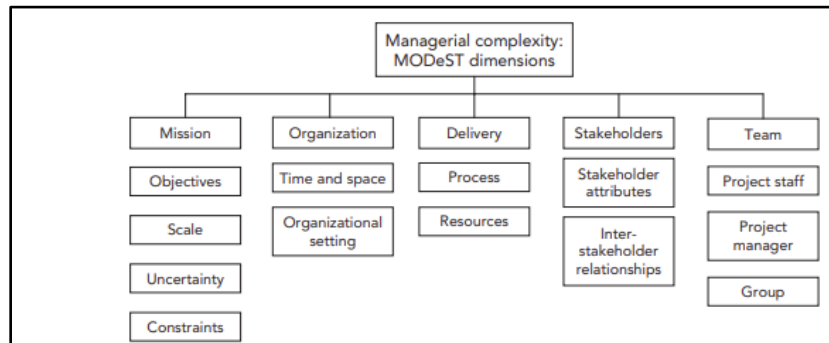
## Appendix I.II – Critical success/failure factors in projects (Belassi & Tukul, 1996)



Appendix I.III – Project Excellence Model (Westerveld, 2003)



Appendix I.IV – Dimensions of perceived managerial complexity (Maylor, Vidgen, & Carver, 2008)





# Appendix II – Concourse Literature

## II.I Economical Context

Nummer	Stellingen	Literatuur	Nieuws	Praktijk	Wel/Niet
1	Stijging van materiaalprijzen				
2	Stijging van het prijspeil				
3	Daling van beurskoersen van bouwfirmas				
4	Daling van de waarde van de Euro				
5	Onvoldoende beschikbare capaciteit				
6	Stijging van grondprijzen				
7	Stijging van brandstofprijzen				
8	Stijging van energieprijzen				
9	Druk op het budget als gevolg van economische recessie				

Literatuur	
Nieuws	
Praktijk	

Bronnenlijst APA Literatuur	URL Literatuur	APA Nieuws	URL Nieuws
1 haalbaarheidsruimte van "De Berg" door middel van fasering van de bouw." Bachelor's thesis, University of Twente, 2014.	<a href="http://essay.utwente.nl/64761/1/Hollander_Roel.pdf">http://essay.utwente.nl/64761/1/Hollander_Roel.pdf</a>	Platschorre, P. (2022, March 21). Grote zorgen om prijsstijgingen: 'Staalbedrijven zijn in paniek'. Retrieved from Cobouw: <a href="https://www.cobouw.nl/303769/grote-zorgen-om-prijsstijgingen-bouwmaterialen-staalbedrijven-zijn-in-paniek">https://www.cobouw.nl/303769/grote-zorgen-om-prijsstijgingen-bouwmaterialen-staalbedrijven-zijn-in-paniek</a>	<a href="https://www.cobouw.nl/303769/grote-zorgen-om-prijsstijgingen-bouwmaterialen-staalbedrijven-zijn-in-paniek">https://www.cobouw.nl/303769/grote-zorgen-om-prijsstijgingen-bouwmaterialen-staalbedrijven-zijn-in-paniek</a>
2 inflation in construction: a systematic review. In Proceedings of the International Conference on Civil, Offshore and Environmental Engineering (pp. 701-708). Springer, Singapore.	<a href="https://link.springer.com/chapter/10.1007/978-981-33-6311-3_80">https://link.springer.com/chapter/10.1007/978-981-33-6311-3_80</a>	maar niet af: sommige bouwmaterialen meer dan 25 procent duurder op amper twee maanden tijd. Retrieved from Business AM: <a href="https://businessam.be/inflatie-in-de-bouw-koelt-maar-niet-af-sommige-bouwmaterialen-meer-dan-25-procent-duurder-op-amper-twee-maanden-tijd/">https://businessam.be/inflatie-in-de-bouw-koelt-maar-niet-af-sommige-bouwmaterialen-meer-dan-25-procent-duurder-op-amper-twee-maanden-tijd/</a>	<a href="https://businessam.be/inflatie-in-de-bouw-koelt-maar-niet-af-sommige-bouwmaterialen-meer-dan-25-procent-duurder-op-amper-twee-maanden-tijd/">https://businessam.be/inflatie-in-de-bouw-koelt-maar-niet-af-sommige-bouwmaterialen-meer-dan-25-procent-duurder-op-amper-twee-maanden-tijd/</a>
3 Choi, J. (2014). Effects of contract announcements on the value of construction firms. Journal of Management in Engineering, 30(1), 86-96.	<a href="https://ascelibrary.org/doi/pdf/10.1061/(ASCE)ME.1943-5479.0000178?casa_token=H7KF_OuA_-AAAAA:29m9tIsOiz-6I2ZNZCAXkgYY3ow4ACA3AKSQChZ-ZOLHkgJ9zR-">https://ascelibrary.org/doi/pdf/10.1061/(ASCE)ME.1943-5479.0000178?casa_token=H7KF_OuA_-AAAAA:29m9tIsOiz-6I2ZNZCAXkgYY3ow4ACA3AKSQChZ-ZOLHkgJ9zR-</a>		
4 management in international construction ventures. Journal of Management in Engineering, 17(4), 186-191.	<a href="https://ascelibrary.org/doi/pdf/10.1061/(ASCE)0742-597X(2001)17%3A4(186)?casa_token=6Dpgc7kP5uUAAAAA:NvZGQ5jbYGwk-3pWBvRvD_B1pI7PUIhJEa4o4M-">https://ascelibrary.org/doi/pdf/10.1061/(ASCE)0742-597X(2001)17%3A4(186)?casa_token=6Dpgc7kP5uUAAAAA:NvZGQ5jbYGwk-3pWBvRvD_B1pI7PUIhJEa4o4M-</a>		
5		Doodeman, M. (2020, February 27). Personeelstekort in de	<a href="https://www.cobouw.nl/259475/personeelstekort-in-de">https://www.cobouw.nl/259475/personeelstekort-in-de</a>
6 Koekoek, M. (2010). Grondprijsbeleid van gemeenten (Doctoral dissertation).	<a href="https://fw.studenttheses.ub.rug.nl/491/1/Grondprijsbeleid_van_gemeenten_1.pdf">https://fw.studenttheses.ub.rug.nl/491/1/Grondprijsbeleid_van_gemeenten_1.pdf</a>		
7		Platschorre, P. (2022, March 14). Bouw ongerust over stijgende	<a href="https://www.cobouw.nl/303546/bouw-ongerust-over-">https://www.cobouw.nl/303546/bouw-ongerust-over-</a>
8 Papadopoulos, A. M. (2012). Energy cost and its impact on regulating building energy behaviour. In Advances in building energy research (pp. 105-122). Routledge.	<a href="https://www.researchgate.net/profile/Noel-Aquillina/publication/233230173_Typical_Weather_Years_and_the_Effect_of_Urban_Microclimate_on_the_Energy_Behavi">https://www.researchgate.net/profile/Noel-Aquillina/publication/233230173_Typical_Weather_Years_and_the_Effect_of_Urban_Microclimate_on_the_Energy_Behavi</a>	Platschorre, P. (2022, March 21). Grote zorgen om prijsstijgingen: 'Staalbedrijven zijn in paniek'. Retrieved from Cobouw: <a href="https://www.cobouw.nl/303769/grote-zorgen-om-prijsstijgingen-bouwmaterialen-staalbedrijven-zijn-in-paniek">https://www.cobouw.nl/303769/grote-zorgen-om-prijsstijgingen-bouwmaterialen-staalbedrijven-zijn-in-paniek</a>	<a href="https://www.cobouw.nl/303769/grote-zorgen-om-prijsstijgingen-bouwmaterialen-staalbedrijven-zijn-in-paniek">https://www.cobouw.nl/303769/grote-zorgen-om-prijsstijgingen-bouwmaterialen-staalbedrijven-zijn-in-paniek</a>
9 management in international construction ventures. Journal of Management in Engineering, 17(4), 186-191.	<a href="https://ascelibrary.org/doi/pdf/10.1061/(ASCE)0742-597X(2001)17%3A4(186)?casa_token=6Dpgc7kP5uUAAAAA:NvZGQ5jbYGwk-3pWBvRvD_B1pI7PUIhJEa4o4M-">https://ascelibrary.org/doi/pdf/10.1061/(ASCE)0742-597X(2001)17%3A4(186)?casa_token=6Dpgc7kP5uUAAAAA:NvZGQ5jbYGwk-3pWBvRvD_B1pI7PUIhJEa4o4M-</a>		

## II.II Technological Context

Nummer	Stellingen	Literatuur	Nieuws	Praktijk	Wel/Niet
1	Hogere eis in het detailniveau van het BIM-model				
2	Invoering van nieuwe softwaresystemen bij de moederorganisaties				
3	Verouderd gereedschap dat vervangen moet worden				
4	Het implementeren van nieuwe bouwtechnieken				
5	Beperkt inzicht in de toestand van het areaal				
6	Schaarste van benodigde materialen				
7	Veranderingen in het ontwerp door innovatie in bouwproducten				
8	Logistieke wijzigingen door gewenste uniformiteit areaal				
9	Logistieke veranderingen door innovatie in bouwmethoden				

Literatuur	Nieuws	Praktijk

Bronnenlijst	URL Literatuur	APA Nieuws	URL Nieuws
1 APA Literatuur	URL Literatuur	APA Nieuws	URL Nieuws
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2	Gonzalez-Barahona, J. M., Sherwood, P., Robles, G., & Izquierdo, D. (2017, May). Technical lag in software compilations: Measuring how outdated a software deployment is. In <i>IFIP International Conference on Open Source Systems</i> (pp. 182-192). Springer, Cham.	Thebaut, A. (2018, July 13). How to manage the renewal of your IT asset? Retrieved from Wisper: <a href="https://www.wisper.io/en/how-to-manage-the-renewal-of-your-it-equipment/">https://www.wisper.io/en/how-to-manage-the-renewal-of-your-it-equipment/</a>	<a href="https://www.wisper.io/en/how-to-manage-the-renewal-of-your-it-equipment/">https://www.wisper.io/en/how-to-manage-the-renewal-of-your-it-equipment/</a>
3	Khair, K., Mohamed, Z., Mohammad, R., Farouk, H., & Ahmed, M. E. (2018). A management framework to reduce delays in road construction projects in Sudan. <i>Arabian Journal for Science and Engineering</i> , 43(4), 1925-1940.		
4	Xue, X., Zhang, R., Yang, R., & Dai, J. (2014). Innovation in construction: a critical review and future research. <i>International Journal of Innovation</i>	Huinck, D., Veltman, M., & van Welzen, A. (2014). <i>marktaspecten wettelijke implementatie nieuwbouw</i>	<a href="https://www.rvo.nl/sites/default/files/2014/12/marktaspecten%20wettelijke%20implementatie%20nieuwbouw">https://www.rvo.nl/sites/default/files/2014/12/marktaspecten%20wettelijke%20implementatie%20nieuwbouw</a>
5		Waanders, A. (2022, February 16). Hengelo moet 467	<a href="https://www.1trente.nl/artikel/1241959/hengelo-moet-">https://www.1trente.nl/artikel/1241959/hengelo-moet-</a>
6		Platschorre, P. (2022, March 21). Grote zorgen om	<a href="https://www.cobouw.nl/303769/grote-zorgen-om-">https://www.cobouw.nl/303769/grote-zorgen-om-</a>
7	Xue, X., Zhang, R., Yang, R., & Dai, J. (2014). Innovation in construction: a critical review and future research. <i>International Journal of Innovation</i>	Wolf, C. (2022, March 9). Geopolitiek dwingt producent bouwmaterialen tot verduurzamen. Retrieved from	<a href="https://www.cobouw.nl/303429/geopolitiek-dwingt-producent-bouwmaterialen-tot-verduurzamen">https://www.cobouw.nl/303429/geopolitiek-dwingt-producent-bouwmaterialen-tot-verduurzamen</a>
8			
9			

### II.III Political Context

Nummer	Stellingen	Literatuur	Nieuws	Praktijk	Wel/Niet
1	De wisseling van wethouders				
2	Reorganisatie binnen het ambtelijk systeem				
3	Politieke agenda van individuele bestuursleden				
4	Verandering van politieke kleur in de projectomgeving				
5	Veranderende wetgeving met betrekking tot projectparameters				
6	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid				
7	Uitblijvende voor het project relevante besluitvorming in de politiek				
8	Aangescherpte eisen vanuit het Europese bestuur				
9	Beschikbaarheid van te ontwikkelen areaal				
10	Uitstel project vanwege stikstofeisen				
11	Wens tot innovatie vanuit de overheid				

Literatuur	
Nieuws	
Praktijk	

	Bronnenlijst APA Literatuur	URL Literatuur	APA Nieuws	URL Nieuws
1	Schulz, N. M. (2017). Integratie en samenwerking in complexe infrastructuurprojecten (Doctoral dissertation).	<a href="https://frw.studenttheses.ub.rug.nl/1978/1/N.M.Schulz_Masterthesis_EIP_in_1.pdf">https://frw.studenttheses.ub.rug.nl/1978/1/N.M.Schulz_Masterthesis_EIP_in_1.pdf</a>	du Nouska, S. (2021, March 5). Verkiezingsbeloften: wat beloven de partijen de bouw. Retrieved from Cobouw:	<a href="https://www.cobouw.nl/293135/analyse-de-verkiezingst">https://www.cobouw.nl/293135/analyse-de-verkiezingst</a>
2	Schulz, N. M. (2017). Integratie en samenwerking in complexe infrastructuurprojecten (Doctoral dissertation).	<a href="https://frw.studenttheses.ub.rug.nl/1978/1/N.M.Schulz_Masterthesis_EIP_in_1.pdf">https://frw.studenttheses.ub.rug.nl/1978/1/N.M.Schulz_Masterthesis_EIP_in_1.pdf</a>	du Nouska, S. (2021, March 5). Verkiezingsbeloften: wat beloven de partijen de bouw. Retrieved from Cobouw:	<a href="https://www.cobouw.nl/293135/analyse-de-verkiezingst">https://www.cobouw.nl/293135/analyse-de-verkiezingst</a>
3				
4			du Nouska, S. (2021, March 5). Verkiezingsbeloften: wat	<a href="https://www.cobouw.nl/293135/analyse-de-verkiezingst">https://www.cobouw.nl/293135/analyse-de-verkiezingst</a>
5	Razzaq, A., Thaheem, M. J., Maqsoom, A., & Gabriel, H. F. (2018). Critical external risks in international joint ventures for construction industry in Pakistan. <i>International Journal of Civil Engineering</i> , 16(2), 189-205.	<a href="https://www.researchgate.net/profile/Muhammad-Jamaluddin-Thaheem/publication/309704053_Critical_External_Risks_in">https://www.researchgate.net/profile/Muhammad-Jamaluddin-Thaheem/publication/309704053_Critical_External_Risks_in</a>		
6	Engels, A., & Sterken, C. (2007). Samenwerking loont, ook in de bouw. <i>Cement</i> , 36-41.	<a href="https://www.cementonline.nl/artikel/samenwerking-loont-ook-in-de-bouw">https://www.cementonline.nl/artikel/samenwerking-loont-ook-in-de-bouw</a>		
7	Razzaq, A., Thaheem, M. J., Maqsoom, A., & Gabriel, H. F. (2018). Critical external risks in international joint ventures for construction industry in Pakistan. <i>International Journal of Civil Engineering</i> , 16(2), 189-205.	<a href="https://www.researchgate.net/profile/Muhammad-Jamaluddin-Thaheem/publication/309704053_Critical_External_Risks_in">https://www.researchgate.net/profile/Muhammad-Jamaluddin-Thaheem/publication/309704053_Critical_External_Risks_in</a>	BouwendNederland. (2021). Stikstofproblematiek   juli 2021. Zoetermeer: BouwendNederland.	
8			Europa Nu. (2019, August 15). Raad van State blokkeert	<a href="https://www.europa-nu.nl/id/vl12cjdrtruv/nieuws/raad">https://www.europa-nu.nl/id/vl12cjdrtruv/nieuws/raad</a>
9			Sakkers, M. (2017, June 22). Bouwgrond raakt op,	<a href="https://www.ad.nl/economie/bouwgrond-raakt-op-won">https://www.ad.nl/economie/bouwgrond-raakt-op-won</a>
10			BouwendNederland. (2021). Stikstofproblematiek   juli	
11			Valk, H. (2021, August 16). Weg met het bouwbesluit?	<a href="https://www.cobouw.nl/298024/weg-met-het-bouwbesl">https://www.cobouw.nl/298024/weg-met-het-bouwbesl</a>

II.IV Internal Client Organisation

Nummer	Stellingen	Literatuur	Nieuws	Praktijk	Wei/Niet
1	Hoge mate van controle vanuit de opdrachtgeversorganisatie				
2	Micromanagement vanuit de opdrachtgeversorganisatie				
3	Vertraging in het proces door beperkte capaciteit binnen de opdrachtgeversorganisatie				
4	Inefficiënte interne procedures bij de opdrachtgeversorganisatie				
5	Wisselende project-prioriteit bij de opdrachtgever				
6	Langzame besluitvorming binnen de opdrachtgeversorganisatie met betrekking tot projectparameters				
7	Beperking op de projectbudgettering vanuit de opdrachtgeversorganisatie				
8	Onduidelijke of wijzigende KES-eisen vanuit de opdrachtgeversorganisatie				
9	Onduidelijke of wijzigende project-doelstelling vanuit de opdrachtgeversorganisatie				
10	Scopewijzigingen vanuit de opdrachtgeversorganisatie				
11	Scheve machtsverhouding tussen OG en ON				
12	Wens tot innovatie vanuit de opdrachtgever				
13	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie				
14	Veranderingen in de bedrijfscultuur van de opdrachtnemersorganisatie				
15	Fouten in het referentieontwerp				

Literatuur	
Nieuws	
Praktijk	

Bronnenlijst APA Literatuur	URL Literatuur	APA Nieuws	URL Nieuws
1	Gibb, A. G., & Isack, F. (2001). Client drivers for construction projects: implications for standardization. <i>Engineering, Construction and Architectural Management</i> . <a href="https://www.emerald.com/insight/content/doi/10.1108/eb021169/full/pdf?casa_token=EDvHtKjivlAAAAA:gFAvuoUAvfMUIId1eJajF4kib36YXo">https://www.emerald.com/insight/content/doi/10.1108/eb021169/full/pdf?casa_token=EDvHtKjivlAAAAA:gFAvuoUAvfMUIId1eJajF4kib36YXo</a>		
2	Gibb, A. G., & Isack, F. (2001). Client drivers for construction projects: implications for standardization. <i>Engineering, Construction and Architectural Management</i> . <a href="https://www.emerald.com/insight/content/doi/10.1108/eb021169/full/pdf?casa_token=EDvHtKjivlAAAAA:gFAvuoUAvfMUIId1eJajF4kib36YXo">https://www.emerald.com/insight/content/doi/10.1108/eb021169/full/pdf?casa_token=EDvHtKjivlAAAAA:gFAvuoUAvfMUIId1eJajF4kib36YXo</a>		
3	Boyd, D., & Chinyio, E. (2008). Understanding the construction client. John Wiley & Sons. <a href="https://wlv.openrepository.com/handle/2436/28872">https://wlv.openrepository.com/handle/2436/28872</a>		
4	Boyd, D., & Chinyio, E. (2008). Understanding the construction client. John Wiley & Sons. <a href="https://wlv.openrepository.com/handle/2436/28872">https://wlv.openrepository.com/handle/2436/28872</a>		
5	Cherns, A. B., & Bryant, D. T. (1984). Studying the client's role in construction management. <i>Construction management and economics</i> , 2(2), 177-184. <a href="https://www.tandfonline.com/doi/pdf/10.1080/01446198400000167?casa_token=92LM3_6wh70AAAAA:-">https://www.tandfonline.com/doi/pdf/10.1080/01446198400000167?casa_token=92LM3_6wh70AAAAA:-</a>	Markgraf, B. (2022). Prioritizing Techniques of Construction Project Management. Retrieved from	<a href="https://smallbusiness.chron.com/prioritizing-technique">https://smallbusiness.chron.com/prioritizing-technique</a>
6	Boyd, D., & Chinyio, E. (2008). Understanding the construction client. John Wiley & Sons. <a href="https://wlv.openrepository.com/handle/2436/28872">https://wlv.openrepository.com/handle/2436/28872</a>		
7		Platschorre, P. (2020). Bouwen gaat door, maar corona	<a href="https://www.cobouw.nl/291172/bouwen-gaat-door-maa">https://www.cobouw.nl/291172/bouwen-gaat-door-maa</a>
8	Cherns, A. B., & Bryant, D. T. (1984). Studying the client's role in construction management. <i>Construction management and economics</i> , 2(2), 177-184. <a href="https://www.tandfonline.com/doi/pdf/10.1080/01446198400000167?casa_token=92LM3_6wh70AAAAA:-">https://www.tandfonline.com/doi/pdf/10.1080/01446198400000167?casa_token=92LM3_6wh70AAAAA:-</a>		
9	Nahod, M. M. (2012). Scope control through managing changes in construction projects. <i>Organization, technology &amp; management in construction: an international journal</i> , 4(1), 438-447. <a href="https://hrcak.srce.hr/file/124696">https://hrcak.srce.hr/file/124696</a>	Koenen, I. (2014). Wijziging meestal afgehandeld als meerwerk. Retrieved from Cobouw:	<a href="https://www.cobouw.nl/72188/wijziging-meestal-afgehandeld-als-meerwerk">https://www.cobouw.nl/72188/wijziging-meestal-afgehandeld-als-meerwerk</a>
10	Gibb, A. G., & Isack, F. (2001). Client drivers for construction projects: implications for standardization. <i>Engineering, Construction and Architectural Management</i> . <a href="https://www.emerald.com/insight/content/doi/10.1108/eb021169/full/pdf?casa_token=EDvHtKjivlAAAAA:gFAvuoUAvfMUIId1eJajF4kib36YXo">https://www.emerald.com/insight/content/doi/10.1108/eb021169/full/pdf?casa_token=EDvHtKjivlAAAAA:gFAvuoUAvfMUIId1eJajF4kib36YXo</a>	Koenen, I. (2014). Wijziging meestal afgehandeld als meerwerk. Retrieved from Cobouw:	<a href="https://www.cobouw.nl/72188/wijziging-meestal-afgehandeld-als-meerwerk">www.cobouw.nl/72188/wijziging-meestal-afgehandeld-als-meerwerk</a>
11	Gibb, A. G., & Isack, F. (2001). Client drivers for construction projects: implications for standardization. <i>Engineering, Construction and Architectural Management</i> . <a href="https://www.emerald.com/insight/content/doi/10.1108/eb021169/full/pdf?casa_token=EDvHtKjivlAAAAA:gFAvuoUAvfMUIId1eJajF4kib36YXo">https://www.emerald.com/insight/content/doi/10.1108/eb021169/full/pdf?casa_token=EDvHtKjivlAAAAA:gFAvuoUAvfMUIId1eJajF4kib36YXo</a>		
12		Belzen, T. v. (2017). Aanbesteden én innoveren in één: Mick, A. (2021). Personeelsverloop van tien procent bij	<a href="https://www.cobouw.nl/251107/innoveren-en-aanbesteden">https://www.cobouw.nl/251107/innoveren-en-aanbesteden</a> <a href="https://brickton.presscloud.co/pers/personeelsverloop">https://brickton.presscloud.co/pers/personeelsverloop</a>
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14	Boyd, D., & Chinyio, E. (2008). Understanding the construction client. John Wiley & Sons. <a href="https://wlv.openrepository.com/handle/2436/28872">https://wlv.openrepository.com/handle/2436/28872</a>		
15		Schleurolts, R. (2022). Alleen maar bouwer. Retrieved from	<a href="https://www.cobouw.nl/304841/alleen-maar-bouwer">https://www.cobouw.nl/304841/alleen-maar-bouwer</a>

## II.V Contractor Organisation

Nummer	Stellingen	Literatuur	Nieuws	Praktijk	Wel/Niet
1	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie				
2	Gebrek aan capaciteit bij de opdrachtnemersorganisatie				
3	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie				
4	Veranderingen in de bedrijfscultuur van de opdrachtnemersorganisatie				
5	Fouten in het aanbiedingsontwerp				
6	Spanning in opdrachtnemers team door tegenvallende jaarresultaten van de firma				
7	Beperkte flexibiliteit als gevolg van het winsttoegmerk van de opdrachtnemersorganisatie				
8	Commerciële doelen van de opdrachtnemersorganisatie voor het project				

Literatuur	
Nieuws	
Praktijk	

Bronnenlijst	URL Literatuur	APA Nieuws	URL Nieuws
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2 Wood, G. D., & Ellis, R. C. (2005). Main contractor experiences of partnering relationships on UK construction projects. <i>Construction management and economics</i> , 23(3), 317-325.	<a href="https://www.tandfonline.com/doi/pdf/10.1080/0144619042000287714?casa_token=5WYoNXB2Z6UAAAAA:kXjYbIXbhN9XLV44">https://www.tandfonline.com/doi/pdf/10.1080/0144619042000287714?casa_token=5WYoNXB2Z6UAAAAA:kXjYbIXbhN9XLV44</a>		
3 Zavadskas, E. K., Turskis, Z., & Tamošaitiene, J. (2008). Contractor selection of construction in a competitive environment. <i>Journal of Business Economics and Management</i> , 9(3), 181-187.	<a href="https://www.tandfonline.com/doi/pdf/10.3846/1611-1699.2008.9.181-187">https://www.tandfonline.com/doi/pdf/10.3846/1611-1699.2008.9.181-187</a>	Mick, A. (2021). Personeelsverloop van tien procent bij bouwbedrijven na zomer. Retrieved from Brickton: Omnen, N. v. (2017). Hoe denken opdrachtgevers en Lohuizen, M. v. (2020). Valkuilen bij inschrijving op aanbestedingen. Retrieved from Dommerholt	<a href="https://brickton.presscloud.co/pers/personeelsverloop-omnen">https://brickton.presscloud.co/pers/personeelsverloop-omnen</a> <a href="https://www.crow.nl/blog/april-2017/hoedenken-opdr">https://www.crow.nl/blog/april-2017/hoedenken-opdr</a> <a href="https://www.dommerholt.nl/nieuws/valkuilen-bij-insch">https://www.dommerholt.nl/nieuws/valkuilen-bij-insch</a>
4			
5 Odeh, A. M., & Battaineh, H. T. (2002). Causes of construction delay: traditional contracts. <i>International journal of project management</i> , 20(1), 67-73.	<a href="https://www.sciencedirect.com/science/article/pii/S0263786300000375?casa_token=g9WIB1HmHIQAAAAA:9P2tM_BuISN3">https://www.sciencedirect.com/science/article/pii/S0263786300000375?casa_token=g9WIB1HmHIQAAAAA:9P2tM_BuISN3</a>		
6 Huang, X. (2011). An Analysis of the Selection of Project Contractor in the Construction Management Process. <i>International Journal of Business and Management</i> , 184-189	<a href="http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.466.324&amp;rep=rep1&amp;type=pdf">http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.466.324&amp;rep=rep1&amp;type=pdf</a>		
7 Zavadskas, E. K., Turskis, Z., & Tamošaitiene, J. (2008). Contractor selection of construction in a competitive environment. <i>Journal of Business Economics and Management</i> , 9(3), 181-187.	<a href="https://www.tandfonline.com/doi/pdf/10.3846/1611-1699.2008.9.181-187">https://www.tandfonline.com/doi/pdf/10.3846/1611-1699.2008.9.181-187</a>	RTV Noord. (2021). Aannemers kampen met prijsstijgingen: 'Mijn winst gaat richting de nul'.	<a href="https://www.rtvnoord.nl/nieuws/824035/aannemers-kar">https://www.rtvnoord.nl/nieuws/824035/aannemers-kar</a>
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II.VI Subcontractors

Nummer	Stellingen	Literatuur	Nieuws	Praktijk	Wel/Niet
1	Het niet nakomen van afspraken door onderaannemers				
2	Moeizame communicatie met onderaannemers				
3	Dreigend faillissement van onderaannemers				
4	Faillissement van onderaannemers				
5	Gesplitste verantwoordelijkheid van onderaannemers naar				
6	Gebrek aan betrokkenheid van de onderaannemer bij het project				
7	Uitloop van het project door niet aansluitende plannings van				
8	Beperkte aansprakelijkheid van de onderaannemer bij falen				
9	Ontdekking onjuiste grondmetingen door de onderaannemer				
10	Teruglopende kwaliteit omdat onderaannemers niet de beloofde				
11	Gebrek aan verantwoordelijkheid van de onderaannemer				

Bronnenlijst	URL Literatuur	APA Nieuws	URL Nieuws
1 Meijvogel, A. J. (2007). Hoofdaannemer en onderaannemer: Partners voor een consumentgericht bouwproces. Een lean model voor de samenwerking tussen hoofdaannemer en onderaannemer, gericht op de realisatie van een consumentgerichte woning.	<a href="https://repository.tudelft.nl/islandora/object/uuid:3e819b05-d362-4957-8321-77982bf7ecd7/datastream/OBJ/download">https://repository.tudelft.nl/islandora/object/uuid:3e819b05-d362-4957-8321-77982bf7ecd7/datastream/OBJ/download</a>	stond plots lijnrecht tegenover zijn onderaannemer. Retrieved from DAS: <a href="https://www.das.nl/ondernemer/magazine/overeenkomsten-en-contracten/deze-ondernemer-stond-plots-">https://www.das.nl/ondernemer/magazine/overeenkomsten-en-contracten/deze-ondernemer-stond-plots-</a>	<a href="https://www.das.nl/ondernemer/magazine/overeenkon">https://www.das.nl/ondernemer/magazine/overeenkon</a>
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3		Kuit, M. (2012, January 12). Bouw van brug vertraagd	<a href="https://www.cobouw.nl/54747/bouw-van-brug-vertraagd">https://www.cobouw.nl/54747/bouw-van-brug-vertraagd</a>
4		Kuit, M. (2012, January 12). Bouw van brug vertraagd	<a href="https://www.cobouw.nl/54747/bouw-van-brug-vertraagd">https://www.cobouw.nl/54747/bouw-van-brug-vertraagd</a>
5 Arnoldussen, J., Groot, P., Halman, J., & van Zwet, R. (2017). Innovatie in de bouw. Amsterdam: EIB.	<a href="https://www.eib.nl/pdf/Rapport_Innovatie_in_de_bouw_w_e_b.pdf">https://www.eib.nl/pdf/Rapport_Innovatie_in_de_bouw_w_e_b.pdf</a>		
6 Meijvogel, A. J. (2007). Hoofdaannemer en onderaannemer: Partners voor een consumentgericht bouwproces. Een lean model voor de samenwerking tussen hoofdaannemer en onderaannemer, gericht op de realisatie van een consumentgerichte woning.	<a href="https://repository.tudelft.nl/islandora/object/uuid:3e819b05-d362-4957-8321-77982bf7ecd7/datastream/OBJ/download">https://repository.tudelft.nl/islandora/object/uuid:3e819b05-d362-4957-8321-77982bf7ecd7/datastream/OBJ/download</a>		
7 Shayanfar, E., & Schonfeld, P. (2019). Selecting and scheduling interrelated road projects with uncertain demand. <i>Transportmetrica A: Transport Science</i> , 15(2), 1712-1733.	<a href="https://www.tandfonline.com/doi/pdf/10.1080/23249935.2019.1639083?casa_token=CQ6cXm6moQgAAAAA:JUPptK6VB2P2RQTnpQlqpeBn7nilyJAOTA_Frg6snQjaE0FjF9YNIHrTY2TUnXlpK51p">https://www.tandfonline.com/doi/pdf/10.1080/23249935.2019.1639083?casa_token=CQ6cXm6moQgAAAAA:JUPptK6VB2P2RQTnpQlqpeBn7nilyJAOTA_Frg6snQjaE0FjF9YNIHrTY2TUnXlpK51p</a>		
8		Detrixhe, M. (2018, December 13). Deze ondernemer	<a href="https://www.das.nl/ondernemer/magazine/overeenkon">https://www.das.nl/ondernemer/magazine/overeenkon</a>
9		Waanders, A. (2022, February 16). Hengelo moet 467	<a href="https://www.1twente.nl/artikel/1241959/hengelo-moet-">https://www.1twente.nl/artikel/1241959/hengelo-moet-</a>
10 Galloway, P. (2009). Design-build/EPC contractor's heightened	<a href="https://www.tandfonline.com/doi/pdf/10.1080/074081704904">https://www.tandfonline.com/doi/pdf/10.1080/074081704904</a>	Detrixhe, M. (2018, December 13). Deze ondernemer	<a href="https://www.das.nl/ondernemer/magazine/overeenkon">https://www.das.nl/ondernemer/magazine/overeenkon</a>
11 Meijvogel, A. J. (2007). Hoofdaannemer en onderaannemer: Partners voor een consumentgericht bouwproces. Een lean model voor de samenwerking tussen hoofdaannemer en onderaannemer, gericht op de realisatie van een consumentgerichte woning.	<a href="https://repository.tudelft.nl/islandora/object/uuid:3e819b05-d362-4957-8321-77982bf7ecd7/datastream/OBJ/download">https://repository.tudelft.nl/islandora/object/uuid:3e819b05-d362-4957-8321-77982bf7ecd7/datastream/OBJ/download</a>		

## II.VII Related Projects & Surroundings

Nummer	Stellingen	Literatuur	Nieuws	Praktijk	Wel/Niet
1	Verstorende planning van omliggende projecten				
2	Raakvlakken met buurprojecten komen te laat aan het licht				
3	Aanscherping van eisen binnen het landelijke programma waar het project				
4	Situaties tijdens de realisatie bij vergelijkbare projecten				
5	Clash met de logistieke organisatie van buurtprojecten				
6	Ontwerpaanpassing door verontreinigde grond				
7	Projecturgentie vervalt door omliggende projecten				
8	Langdurig vergunningsaanvraag proces				

Literatuur	
Nieuws	
Praktijk	

Bronnenlijst	URL Literatuur	APA Nieuws	URL Nieuws
1 Shayanfar, E., & Schonfeld, P. (2019). Selecting and scheduling interrelated road projects with uncertain demand. <i>Transportmetrica A: Transport Science</i> , 15(2), 1712-1733.	<a href="https://www.tandfonline.com/doi/pdf/10.1080/23249935.2019.1639083?casa_token=CQ6cXm6moQgAAAAA:jUPptK6VB2P2RQTnpQlqpeBn7niyLjAOTA_Frg6snQJaE0PjF9YNIHrnTY2TUnXlpK51">https://www.tandfonline.com/doi/pdf/10.1080/23249935.2019.1639083?casa_token=CQ6cXm6moQgAAAAA:jUPptK6VB2P2RQTnpQlqpeBn7niyLjAOTA_Frg6snQJaE0PjF9YNIHrnTY2TUnXlpK51</a>		
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4		Persbureau ANP. (2018, March 6). Bouwbedrijf verdacht	<a href="https://www.1limburg.nl/bouwbedrijf-verdacht-na-fataa">https://www.1limburg.nl/bouwbedrijf-verdacht-na-fataa</a>
5 Shayanfar, E., & Schonfeld, P. (2019). Selecting and scheduling interrelated road projects with uncertain demand. <i>Transportmetrica A: Transport Science</i> , 15(2), 1712-1733.	<a href="https://www.tandfonline.com/doi/pdf/10.1080/23249935.2019.1639083?casa_token=CQ6cXm6moQgAAAAA:jUPptK6VB2P2RQTnpQlqpeBn7niyLjAOTA_Frg6snQJaE0PjF9YNIHrnTY2TUnXlpK51">https://www.tandfonline.com/doi/pdf/10.1080/23249935.2019.1639083?casa_token=CQ6cXm6moQgAAAAA:jUPptK6VB2P2RQTnpQlqpeBn7niyLjAOTA_Frg6snQJaE0PjF9YNIHrnTY2TUnXlpK51</a>		
6		Waanders, A. (2022, February 16). Hengelo moet 467	<a href="https://www.1twente.nl/artikel/1241959/hengelo-moet-">https://www.1twente.nl/artikel/1241959/hengelo-moet-</a>
7 van Buuren, M. (2016). Samenwerken aan een veilige en mooie Maas: Deltaprogramma Maas. Alterra, Wageningen-UR.	<a href="https://library.wur.nl/WebQuery/wurpubs/fulltext/545211">https://library.wur.nl/WebQuery/wurpubs/fulltext/545211</a>		
8 Olander, S., & Landin, A. (2005). Evaluation of stakeholder influence in the implementation of construction projects. <i>International journal of project management</i> , 23(4), 321-328.	<a href="https://www.sciencedirect.com/science/article/pii/S0263786305000232?casa_token=K_UQ7r8la1wAAAAA:ifz3uTcszXZPEqjNRx7MZJF21XEDKkiw0gb_1GSkew-">https://www.sciencedirect.com/science/article/pii/S0263786305000232?casa_token=K_UQ7r8la1wAAAAA:ifz3uTcszXZPEqjNRx7MZJF21XEDKkiw0gb_1GSkew-</a>	Rijksdienst voor Ondernemend Nederland. (2021, March 29). "Uitstoot zwaar transport in de stad belangrijke drijfveer voor verduurzaming". Retrieved	<a href="https://www.rvo.nl/node/01071421">https://www.rvo.nl/node/01071421</a>



II.VIII Stakeholders

Nummer	Stellingen	Literatuur	Nieuws	Praktijk	Wel/Niet
1	Negatieve artikel(en) in de media				
2	Late inbreng van eisen en wensen vanuit de omgeving				
3	Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning				
4	Conflicterende visie tussen belangengroepen				
5	Bezwaar vanuit de omgeving tijdens de vergunningsprocedure				
6	Gebrek aan flexibiliteit bij de eind-gebruikers				
7	Morele onenigheid vanwege de blik van de samenleving op duurzaamheid				
8	Negatieve opinie van de omgeving ten aanzien van het project				
9	Langdurige onteigeningsprocedures vanwege grondeigenaren die niet willen verkopen				
10	Onredelijk sentiment van de omgeving ten aanzien van eerder moeizaam verlopen projecten				
11	Bezwaarschriften, klachten en procedures door de omgeving				

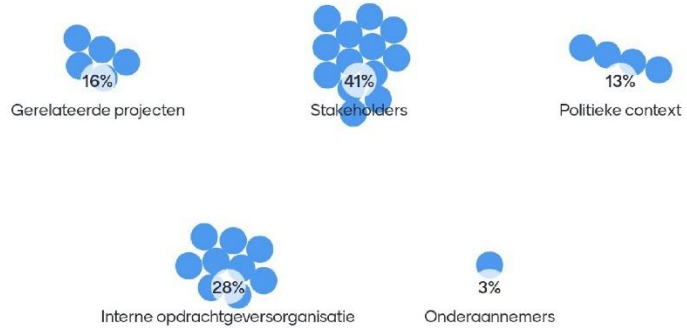
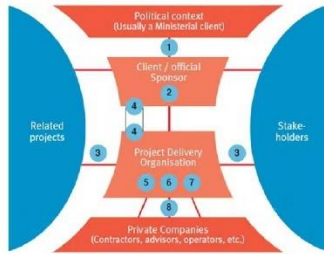
Literatuur	
Nieuws	
Praktijk	

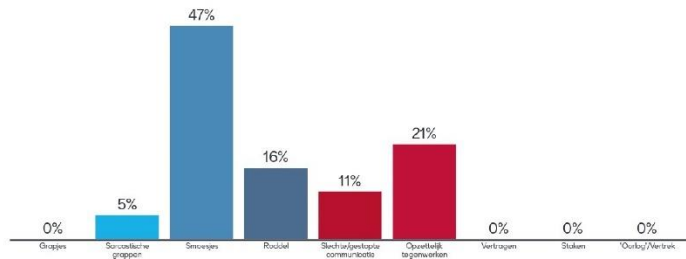
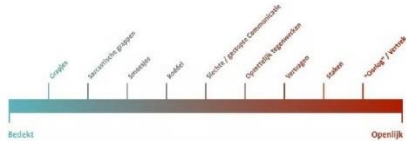
Bronnenlijst	URL Literatuur	APA Nieuws	URL Nieuws
1 Olander, S., & Landin, A. (2005). Evaluation of stakeholder influence in the implementation of construction projects. <i>International journal of project management</i> , 23(4), 321-328.	<a href="https://www.sciencedirect.com/science/article/pii/S0263786305000232?casa_token=K_UQ7r81a1wAAAAA:if3uTcszXZPEqjNRx7MZ">https://www.sciencedirect.com/science/article/pii/S0263786305000232?casa_token=K_UQ7r81a1wAAAAA:if3uTcszXZPEqjNRx7MZ</a>		
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3 Olander, S., & Landin, A. (2005). Evaluation of stakeholder influence in the implementation of construction projects. <i>International journal of project management</i> , 23(4), 321-328.	<a href="https://www.sciencedirect.com/science/article/pii/S0263786305000232?casa_token=K_UQ7r81a1wAAAAA:if3uTcszXZPEqjNRx7MZ">https://www.sciencedirect.com/science/article/pii/S0263786305000232?casa_token=K_UQ7r81a1wAAAAA:if3uTcszXZPEqjNRx7MZ</a>	van den Berg, A. (2022, March 3). Iets meer overlast bij werkzaamheden uitbreiding begraafplaats Sliedrecht.	<a href="https://www.ad.nl/dordrecht/iets-meer-overlast-bij-werkzaamheden-uitbreiding-begraafplaats-sliedrecht-">https://www.ad.nl/dordrecht/iets-meer-overlast-bij-werkzaamheden-uitbreiding-begraafplaats-sliedrecht-</a>
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8 Razaq, A., Thaheem, M. J., Maqsoom, A., & Gabriel, H. F. (2018). Critical external risks in international joint ventures for construction industry in Pakistan. <i>International Journal of Civil</i>	<a href="https://www.researchgate.net/profile/Muhammad-Jamaluddin-Thaheem/publication/309704053_Critical_External_Risks_in_International_Joint_Ventures_for_Construction_Industry_in_Pakistan">https://www.researchgate.net/profile/Muhammad-Jamaluddin-Thaheem/publication/309704053_Critical_External_Risks_in_International_Joint_Ventures_for_Construction_Industry_in_Pakistan</a>	du Saar, N. (2021, May 4). Niet in mijn achtertuin: lokale weerstand tegen flexwoningen. Retrieved from NOS. (2017, January 21). Rotterdam wil boer na 18 jaar	<a href="https://www.cobouw.nl/295219/niet-in-mijn-achtertuin-">https://www.cobouw.nl/295219/niet-in-mijn-achtertuin-</a> <a href="https://nos.nl/artikel/2154127-rotterdam-wil-boer-na-18-jaar-">https://nos.nl/artikel/2154127-rotterdam-wil-boer-na-18-</a>
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11 Olander, S., & Landin, A. (2005). Evaluation of stakeholder influence in the implementation of construction projects. <i>International journal of project management</i> , 23(4), 321-328.	<a href="https://www.sciencedirect.com/science/article/pii/S0263786305000232?casa_token=K_UQ7r81a1wAAAAA:if3uTcszXZPEqjNRx7MZ">https://www.sciencedirect.com/science/article/pii/S0263786305000232?casa_token=K_UQ7r81a1wAAAAA:if3uTcszXZPEqjNRx7MZ</a>	du Saar, N. (2021, May 4). Niet in mijn achtertuin: lokale weerstand tegen flexwoningen. Retrieved from	<a href="https://www.cobouw.nl/295219/niet-in-mijn-achtertuin-">https://www.cobouw.nl/295219/niet-in-mijn-achtertuin-</a> <a href="https://www.cobouw.nl/295219/niet-in-mijn-achtertuin-">https://www.cobouw.nl/295219/niet-in-mijn-achtertuin-</a>

## Appendix III – Summary Concourse Session (in Dutch)

Vanuit welk extern domein ervaar je de meeste impact op de samenwerking tussen opdrachtgever en opdrachtnemer tijdens projecten?



Waar trek jij de lijn voor een verstoorde samenwerking?



## Welke invloeden vanuit de politieke context ervaar je tijdens projecten die de samenwerking raken?

Verandering politieke kleur in colleg

Nieuwe wind in de politiek met nieuwe ambities voor het project

Raadsleden met eigen agenda

Geen keuzes maken door bestuurders

Een minister/ staatssecretaris die geen ruimte ziet om nieuwe inzichten te omarmen

Financiele tegenvallers die leiden tot politieke druk

Uitblijven/vertraging van bestuurlijke besluiten

Veranderende samenstelling van een Raad, Commissie, College etc.

Beslissing ambt/best OG

33



## Welke invloeden vanuit de politieke context ervaar je tijdens projecten die de samenwerking raken?

Uitstel van hoge besluitvorming tijdens lopende coalitievorming

Eigen agenda's wethouders

Raadsleden met persoonlijke belangen

Strakke aansturing, kaders die wijzigen

Wensen tot innovatie

raden van bestuur

Stikstofcrisis en daaropvolgend besluitvorming die lang op zich laat wachten

stafafdelingen moederorganisatie

Nieuwe wethouder met andere prioriteiten

33



## Welke invloeden vanuit de politieke context ervaar je tijdens projecten die de samenwerking raken?

Nieuwe politiek verantwoordelijke

budgettekort

Nieuwe tijden vragen om nieuwe oplossingen - politiek staat niet meer achter project

Uitblijven van financiering

berichten in de pers

Veranderende wetgeving (bv stikstof)

Budget aanvulling bestuurlijk toezeggen in maart 2020 en in januari 2022 nog steeds niet geregeld hebben

Lokale politici die achter hun bewoners gaan staan

Politieke context verandert sneller dan project duur

33



## Welke invloeden vanuit de politieke context ervaar je tijdens projecten die de samenwerking raken?

Persoonlijk belang wethouders boven projectbelang

Veel moet wijken voor politieke draagvlak en verantwoordingsdruk vanuit bestuur

Gewojzigde eisen

Stakeholders bedenken pas echt wat ze willen als het project tastbaarder wordt.

Nieuwe eisen

Sabotage van meetpunten

33



## Welke invloeden vanuit de omgeving ervaar je tijdens projecten die de samenwerking raken?

'Enthousiaste' belangengroepen

Stakeholders die pas na de ontwerpfase beginnen met nadenken over hun eisen/wensen

Gewijzigde eisen

belangen nevenaannemers

"vriendjespolitiek"

Bezwaar tijdens vergunningprocedure (vertraging)

Nieuwe eisen beheerder

Planningsclash met nevenproject

Pers kan samenwerking onder druk zetten



## Welke invloeden vanuit de omgeving ervaar je tijdens projecten die de samenwerking raken?

Laat inbrengen van eisen en wensen

belangen andere projecten

Tegengestelde belangen met omgeving

Imago/positionering

Stakeholders bedenken pas echt wat ze willen als het project tastbaarder wordt. Zorgt voor veranderende eisen en wensen en dus voor instabiele scope

Bewoners die hinder ervaren door werkzaamheden

Late bewustwording omgeving vd impact van project

Binnen programma afhankelijk van voortgang/keuzes van ander project. Raakt onze samenwerking direct

bezwaren vanuit omgeving



## Welke invloeden vanuit de omgeving ervaar je tijdens projecten die de samenwerking raken?

Vergunningprocedures

Onredelijke eisen ten aanzien van overlast

Complex raakvlak met buurproject doet zich pas laat aan

Stakeholders kunnen tempo project (organisatie) niet volgen.

Belangengroepen, bewonersverenigingen etc. met andere visie

Negatieve communicatie over het project

Financiële bijdragen vanuit stakeholders met randvoorwaarden (planning) die niet haalbaar zijn

Balans invloed omgeving on

Teveel mensen die betrokken willen zijn in besluitvorming

27

## Welke invloeden vanuit de opdrachtgeversorganisatie ervaar je tijdens projecten, die de samenwerking raken?

Problemen met inhuur van capaciteit

Interne procedures die niet altijd meewerken

Traag reageren op voorgestelde wijzigingen

Beleidskeuzes uitvechten over de rug van project

Vanuit portfolio komen andere prioriteiten en dus projecten die minder of meer prio krijgen

afdelingen die specifiek beleid moeten bewaken

Wisselend beleid

Wijzigende eisen, andere verwachtingen

Capaciteit

21

## Welke invloeden vanuit de opdrachtgeversorganisatie ervaar je tijdens projecten, die de samenwerking raken?

Teveel 'control' willen uitvoeren, op stoel projectmanager gaan zitten

Overrulen van PM met beperkte/ geen afstemming vooraf

Vertraging in het maken van keuzes

Enorme invloed. Je hebt hun steun nodig om de scope stabiel te kunnen houden.

Wijzigende eisen!!

afstand van stafafdeling van project

Onnodige Bemoelenis van stuurgroepen

Interne opdrachtgever drukt eigen wensen door rond aanbesteding en capaciteit

Micromanagement



## Welke invloeden vanuit de opdrachtgeversorganisatie ervaar je tijdens projecten, die de samenwerking raken?

Als ze traag besluitvormen

Leveren van capaciteit blijft uit

Bureaucratie die uitvoering project frustreert





## Welke invloed hebben onderaannemers op de samenwerking tussen opdrachtgever en opdrachtnemer?

Commerciële belangen

'mercedes met trekhaak' mentaliteit

Gemaakte afspraken worden niet nagekomen

Risicoverdeling niet helemaal duidelijk

Niet werken conform kaders afgesproken met hoofdaannemer

Inbouwen buffers in ramingen

Onenigheid tussen aannemer en onder aannemer

Contractvorming tussen oa en on (geld gedreven of samenwerking)

Slechte communicatie tussen on en onderaannemers



## Welke invloed hebben onderaannemers op de samenwerking tussen opdrachtgever en opdrachtnemer?

Planningen die niet goed op elkaar aansluiten

Niet-transparantie over aanbod

Planningen sluiten niet aan

Niet intrinsieke motivatie om project tot een mooi resultaat te brengen

Afspraken met opdrachtnemer worden niet doorgetrokken naar onderaannemers

Geen koepel voor integratie maar alleen deelcontracten

Geen invulling geven aan doorgecontracteerde proceseisen

Ze werken bijvoorbeeld niet volgens het V&G regime van ON. Leidt tot problemen.

Faillissement van een onderaannemer?





## Welke invloed hebben onderaannemers op de samenwerking tussen opdrachtgever en opdrachtnemer?

Alleen contractmanagers geen focus op uitvoering

Beschikbaarheid van onderaannemers, en andere cultuur binnen (kleinere) marktpartijen.



## Appendix IV – Interview Protocol (in Dutch)

### Interview Draaiboek

Welkom en bedankt voor uw deelname aan mijn onderzoek. Vind u het goed als ik het gesprek opneem om terug te kunnen kijken en transcriberen?

Bedankt. Mijn onderzoek is in het licht van mijn master thesis aan de TU Delft in samenwerking met AT Osborne. Ik onderzoek de invloed van externaliteiten op de samenwerking tussen de opdrachtgever en opdrachtnemer in projecten. Hiervoor maak ik gebruik van de Q-methodologie, een bestaande methode welke subjectiviteit gebruikt om inzichten te krijgen in perspectieven.

Dit onderzoek zal bestaan uit 3 delen. Ten eerste een kort stukje met persoonsgegevens. Hierna volgt een volgende stap waarin een voorselectie in stelling gemaakt wordt welke vervolgens in stap 3 gesorteerd worden. Deze twee stappen zal ik verder toelichten als we hier gekomen zijn.

In deze stap wordt u gevraagd om een voorselectie in de stellingen te maken. Het gaat hier om 38 stellingen, welke voorbeelden van externe factoren zijn. De vraag hierbij luidt: “Wat heeft de grootste versturende impact op uw samenwerking tijdens het project veroorzaakt?”. U gaat de stellingen over 3 ‘bakjes’ verdelen: meest versturend, neutraal en minst versturend. Deze zijn geïndiceerd met de icoontjes aan de onderzijde. In de Q-methodologie gaat het om uw eigen mening, er is dus geen goed- of fout. Zodoende wil ik u graag vragen de stellingen op uw eerste gevoel te beoordelen, in de volgende stap kunt er dieper op in gaan. Tijdens deze stap laat ik u dit rustig doen, zonder tussentijds vragen te stellen, zo kunt u zich goed concentreren. Indien u vragen heeft, of verdere toelichting nodig heeft over een stelling kunt u deze altijd vragen.

Dan nu de laatste en tevens belangrijkste stap van het onderzoek. De Q-Sort. U ziet hier de bakjes waarin u een voorselectie van de factoren gemaakt heeft. Daar onder is een quasi-normaal verdeling weergegeven met verschillende vakjes. Hier kunt u de stellingen gaan invullen. De rechterzijde van de verdeling betreft de meest versturende factoren en de linkerzijde de minst versturende factoren. Ook hierbij luidt de vraag weer: “Wat heeft de grootste versturende impact op uw samenwerking tijdens het project veroorzaakt?”. Nadat u een stelling in de verdeling geplaatst heeft zult u zien dat het lettertype erg klein wordt, middels de +/- knoppen aan de linkerzijde kunt u hierop inzoomen. U kunt de stellingen later altijd nog heen en weer schuiven en opnieuw bekijken om tot de gewenste verdeling te komen. Omdat voor mij de onderliggende motieven en redentaties voor het rangschikken van de vragen erg interessant is zou ik u willen vragen om hardop na te denken tijdens het rangschikken. Af en toe zal ik tussentijds een vraag stellen indien ik interessante aanknopingspunten in uw redentatielijn hoor.

Bedankt voor het invullen, misschien kunt u uw verdeling nog eenmaal nagaan om te controleren of hij naar wens ingevuld is?

Voordat u hem indient wil ik nog een aantal vragen met u doornemen:

1. Zijn de uitersten aan de linkerkant van uw verdeling stellingen die niet/beperkt van toepassing zijn, of die goed gemitigeerd zijn waardoor de impact laag gebleven is?
2. Hoe heeft u de impact van uw uitersten aan de rechterzijde gevoeld in de samenwerking? Waar en hoe wordt deze verstoring als eerste gemerkt tijdens het project?

3. Wat heeft het project team als mitigerende maatregelen toegepast om de impact te beperken en was dit naar uw mening effectief?
4. Welke lessen neemt u mee uit dit project naar de toekomst wat betreft de omgang met externe factoren en de samenwerking?
5. Hoe heeft u het ervaren om deel te nemen aan een interview in dit format?

Dan kunt u nu uw verdeling indienen en dan rest mij om u te bedanken voor uw deelname. Ik zal de opname nu stopzetten en u zult een samenvatting van ons gesprek via de mail ontvangen in de komende dagen, waarop u dan uw akkoord kunt geven. Een fijne dag gewenst!

## Appendix V – Transcripts of Interviews (in Dutch)

See document: *Appendix V – Transcripts of Interviews (in Dutch)*

# Appendix VI – Analysis of Q-Sorts

## VI.I Pearson Correlation Matrix

Respondent	0FWS	1G2W	1P12	2N9A	51MP	5E8C	BBLC	C4WM	DCBN	DZ63	EI6S	F3T4	F7O2	G9X8	GHTA	H4QN	HA47	I0T2	KIWC	ND9B	NTJ3	Q7GA	SUCC	T35X	XRZU	Y82K	YP9I	YZKX
0FWS	1.00	0.1649	0.1186	0.4794	0.2268	0.3557	0.2784	0.1237	0.1701	0.1186	0.0258	0.3351	0.0258	0.0619	0.0773	0.1598	0.2113	0.1959	-0.0722	0.0412	0.4175	-0.0825	0.4124	0.2474	0.2835	-0.0464	0.0619	0.1701
1G2W	0.1649	1.00	-0.0979	0.3711	-0.0361	0.134	0.2629	0.1907	0.1907	0.567	0.2062	0.2577	0.3557	0.2784	0.2577	-0.0206	0.1392	0.2887	0.1649	0.3814	0.2423	0.2526	0.1392	-0.2474	0.366	0.3918	0.2835	0.1959
1P12	0.1186	-0.0979	1.00	0.1031	0.0258	0.1443	0.0206	0.3866	-0.1907	0.00	0.1443	0.0206	0.2938	0.2062	0.0619	0.0825	0.3505	0.0515	0.1649	0.0206	0.0619	0.366	0.2526	0.0773	-0.0258	-0.1856	0.4845	0.2938
2N9A	0.4794	0.3711	0.1031	1.00	0.1649	0.3299	0.1804	0.268	0.4021	0.3918	-0.0412	0.0206	0.1856	0.1701	0.0258	0.0309	0.232	0.2887	-0.0773	0.1392	0.5567	-0.0155	0.3711	-0.0103	0.0619	0.3402	0.2216	0.3144
51MP	0.2268	-0.0361	0.0258	0.1649	1.00	0.3351	0.4021	0.1082	0.201	0.0979	0.2423	0.0464	0.0619	0.3041	0.3763	0.7062	0.0206	-0.0103	0.0722	0.0052	0.2062	0.3041	0.3093	0.2371	0.1959	0.0979	0.2887	0.2938
5E8C	0.3557	0.134	0.1443	0.3299	0.3351	1.00	0.067	0.0052	-0.2216	0.2423	0.2577	0.3093	0.0052	0.3814	0.2268	0.4794	0.3247	0.1701	-0.0773	-0.0619	0.0979	0.1753	0.4742	0.2371	0.4021	0.1959	0.3093	0.1753
BBLC	0.2784	0.2629	0.0206	0.1804	0.4021	0.067	1.00	0.1392	0.1907	0.0876	0.4588	0.2784	0.3763	0.3918	0.1804	0.0825	-0.0361	0.2288	0.4845	0.134	-0.0258	0.2474	0.3093	0.4433	0.2577	-0.0876	0.3557	0.201
C4WM	0.1237	0.1907	0.3866	0.268	0.1082	0.0052	0.1392	1.00	-0.0619	-0.0928	0.3196	0.0258	0.2938	0.3454	0.268	0.1443	0.2887	0.1443	0.1237	0.433	0.1959	0.3763	0.3247	0.0206	0.1082	0.0619	0.3763	0.3505
DCBN	0.1701	0.1907	-0.1907	0.4021	0.201	-0.2216	0.1907	-0.0619	1.00	0.3918	-0.1856	-0.1031	-0.0361	-0.0825	0.0361	-0.0412	-0.2938	0.3763	0.201	-0.0206	0.3144	-0.3402	0.1804	0.067	0.0258	0.1907	-0.0619	0.0567
DZ63	0.1186	0.567	0.00	0.3918	0.0979	0.2423	0.0876	-0.0928	0.3918	1.00	0.0928	0.1753	0.1959	0.1392	0.2113	-0.0206	0.0258	0.3711	0.067	0.2113	0.1701	0.0052	0.1031	-0.0309	0.2835	0.4381	0.2577	0.1907
EI6S	0.0258	0.2062	0.1443	-0.0412	0.2423	0.2577	0.4588	0.3196	-0.1856	0.0928	1.00	0.1907	0.2165	0.2268	0.1907	0.2526	0.0103	0.0928	0.2216	0.0103	-0.0412	0.4072	0.0979	0.0258	0.134	0.0103	0.3814	0.1753
F3T4	0.3351	0.2577	0.0206	0.0206	0.0464	0.3093	0.2784	0.0258	-0.1031	0.1753	0.1907	1.00	0.3144	0.4536	0.4639	0.1856	0.1186	0.4124	0.1495	0.3196	0.0979	-0.0052	0.3247	0.1753	0.4691	0.3557	-0.0052	0.1598
F7O2	0.0258	0.3557	0.2938	0.1856	0.0619	0.0052	0.3763	0.2938	-0.0361	0.1959	0.2165	0.3144	1.00	0.4794	0.3247	0.1598	0.1124	0.1804	0.3351	0.4433	-0.0773	0.1804	0.0825	-0.0052	0.4278	0.3041	0.3454	0.366
G9X8	0.0619	0.2784	0.2062	0.1701	0.3041	0.3814	0.3918	0.3454	-0.0825	0.1392	0.2268	0.4536	0.4794	1.00	0.3402	0.4021	0.2268	0.1753	0.1598	0.4536	0.0722	0.4175	0.3711	0.3402	0.4845	0.2526	0.4227	0.4124
GHTA	0.0773	0.2577	0.0619	0.0258	0.3763	0.2268	0.1804	0.268	0.0361	0.2113	0.1907	0.4639	0.3247	0.3402	1.00	0.4021	0.067	0.2526	0.3144	0.2165	0.0412	0.067	0.2216	0.0361	0.2887	0.2113	0.2371	0.3093
H4QN	0.1598	-0.0206	0.0825	0.0309	0.7062	0.4794	0.0825	0.1443	-0.0412	-0.0206	0.2526	0.1856	0.1598	0.4021	0.4021	1.00	0.1804	0.1186	0.067	0.0567	0.1804	0.3144	0.2732	0.2113	0.4021	0.2113	0.2577	0.3299
HA47	0.2113	0.1392	0.3505	0.232	0.0206	0.3247	-0.0361	0.2887	-0.2938	0.0258	0.0103	0.1186	0.1134	0.2268	0.067	0.1804	1.00	0.0773	-0.0567	0.1804	0.2629	0.1907	0.3196	0.1959	0.1443	0.0567	0.1082	0.3454
I0T2	0.1959	0.2887	0.0515	0.2887	-0.0103	0.1701	0.2268	0.1443	0.3763	0.3711	0.0928	0.4124	0.1804	0.1753	0.2526	0.1186	0.0773	1.00	0.232	0.1546	0.0928	-0.2062	0.366	0.2113	0.4021	0.1959	0.0979	0.3351
KIWC	-0.0722	0.1649	0.1649	-0.0773	0.0722	-0.0773	0.4845	0.1237	0.201	0.067	0.2216	0.1495	0.3351	0.1598	0.3144	0.067	-0.0567	0.232	1.00	0.0722	-0.134	0.0412	0.2629	0.2835	0.0567	-0.0567	0.3454	0.1495
ND9B	0.0412	0.3814	0.0206	0.1392	0.0052	-0.0619	0.134	0.433	-0.0206	0.2113	0.0103	0.3196	0.4433	0.4536	0.2165	0.0567	0.1804	0.1546	0.0722	1.00	-0.0412	0.2216	0.0928	-0.0876	0.2577	0.2526	0.1701	0.2371
NTJ3	0.4175	0.2423	0.0619	0.5567	0.2062	0.0979	-0.0258	0.1959	0.3144	0.1701	-0.0412	0.0979	-0.0773	0.0722	0.0412	0.1804	0.2629	0.0928	-0.134	-0.0412	1.00	0.0928	0.2887	0.0619	0.0361	0.3557	-0.0979	0.067
Q7GA	-0.0825	0.2526	0.366	-0.0155	0.3041	0.1753	0.2474	0.3763	-0.3402	0.0052	0.4072	-0.0052	0.1804	0.4175	0.067	0.3144	0.1907	-0.2062	0.0412	0.2216	0.0928	1.00	0.0309	-0.0103	0.1237	0.0619	0.3763	0.1495
SUCC	0.4124	0.1392	0.2526	0.3711	0.3093	0.4742	0.3093	0.3247	0.1804	0.1031	0.0979	0.3247	0.0825	0.3711	0.2216	0.2732	0.3196	0.366	0.2629	0.0928	0.2887	0.0309	1.00	0.5361	0.3608	-0.0052	0.3814	0.4794
T35X	0.2474	-0.2474	0.0773	-0.0103	0.2371	0.2371	0.4433	0.0206	0.067	-0.0309	0.0258	0.1753	-0.0052	0.3402	0.0361	0.2113	0.1959	0.2113	0.2835	-0.0876	0.0619	-0.0103	0.5361	1.00	0.2835	-0.2423	0.0876	0.1237
XRZU	0.2835	0.366	-0.0258	0.0619	0.1959	0.4021	0.2577	0.1082	0.0258	0.2835	0.134	0.4691	0.4278	0.4845	0.2887	0.4021	0.1443	0.4021	0.0567	0.2577	0.0361	0.1237	0.3608	0.2835	1.00	0.3247	0.2268	0.1495
Y82K	-0.0464	0.3918	-0.1856	0.3402	0.0979	0.1959	-0.0876	0.0619	0.1907	0.4381	0.0103	0.3557	0.3041	0.2526	0.2113	0.2113	0.0567	0.1959	-0.0567	0.2526	0.3557	0.0619	-0.0052	-0.2423	0.3247	1.00	-0.0206	-0.0825
YP9I	0.0619	0.2835	0.4845	0.2216	0.2887	0.3093	0.3557	0.3763	-0.0619	0.2577	0.3814	-0.0052	0.3454	0.4227	0.2371	0.2577	0.1082	0.0979	0.3454	0.1701	-0.0979	0.3763	0.3814	0.0876	0.2268	-0.0206	1.00	0.366
YZKX	0.1701	0.1959	0.2938	0.3144	0.2938	0.1753	0.201	0.3505	0.0567	0.1907	0.1753	0.1598	0.366	0.4124	0.3093	0.3299	0.3454	0.3351	0.1495	0.2371	0.067	0.1495	0.4794	0.1237	0.1495	-0.0825	0.366	1.00

## VI.II Extracted 8 Principal Components

Participant	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
0FWS	0.40728	0.29219	0.48831	-0.09671	-0.07139	-0.13047	-0.17455	0.28606
1G2W	0.50396	0.38361	-0.47842	-0.11937	-0.09832	0.10358	-0.28489	0.0757
1P12	0.31976	-0.44426	0.07664	-0.29456	-0.40343	-0.16143	-0.06448	-0.25492
2N9A	0.4586	0.51424	0.19043	-0.36207	-0.36008	0.13716	-0.06861	0.03949
51MP	0.48428	-0.137	0.35497	0.08347	0.23073	0.59364	0.27376	0.01573
5E8C	0.52859	-0.02587	0.36737	-0.20262	0.41315	-0.01811	-0.38997	-0.26518
BBLC	0.53363	-0.13552	0.02254	0.52243	-0.20923	0.18518	-0.21032	0.42941
C4WM	0.48225	-0.26641	-0.14336	-0.32305	-0.37145	-0.04864	0.29152	0.18254
DCBN	0.10991	0.65648	0.12067	0.32559	-0.35666	0.33602	0.23917	-0.01978
DZ63	0.40342	0.53528	-0.24489	-0.00303	-0.05081	0.17904	-0.30497	-0.33403
EI6S	0.40805	-0.373	-0.14812	0.10124	0.02806	0.32066	-0.36839	0.09652
F3T4	0.52858	0.16696	-0.1157	0.20316	0.39923	-0.42273	-0.0435	0.14875
F702	0.55706	-0.0918	-0.50271	0.09101	-0.09233	-0.13527	0.10807	0.03293
G9X8	0.72593	-0.20841	-0.13864	0.00015	0.18157	-0.10873	0.09854	0.14774
GHTA	0.53653	-0.01583	-0.16216	0.18719	0.2342	0.05343	0.34787	-0.24145
H4QN	0.52945	-0.21229	0.26769	-0.05664	0.48004	0.30641	0.31733	-0.15434
HA47	0.36718	-0.13027	0.2046	-0.50253	-0.05159	-0.40322	-0.00855	-0.02885
I0T2	0.4696	0.40702	0.01128	0.30156	-0.11722	-0.27406	0.0101	-0.25296
KIWC	0.33162	-0.17101	-0.1455	0.59009	-0.33105	0.03975	0.0392	-0.06509
ND9B	0.42112	0.0376	-0.51896	-0.13484	-0.03952	-0.25119	0.28339	0.24527
NTJ3	0.28158	0.45177	0.328	-0.43478	-0.0995	0.18965	0.13448	0.30982
Q7GA	0.37707	-0.51622	-0.20113	-0.34658	0.04785	0.32312	-0.14243	0.24676
SUCC	0.64876	0.03165	0.48497	0.07698	-0.17723	-0.20667	0.0135	-0.05853
T35X	0.32959	-0.16041	0.56177	0.42329	-0.00794	-0.24356	-0.02482	0.19821
XRZU	0.61208	0.13664	-0.06702	0.15556	0.40649	-0.21359	-0.1195	0.03384
Y82K	0.32824	0.51027	-0.36133	-0.23899	0.36551	0.14678	0.0798	0.01395
YP9I	0.58341	-0.35773	-0.10479	-0.01025	-0.29152	0.22269	-0.23461	-0.29757

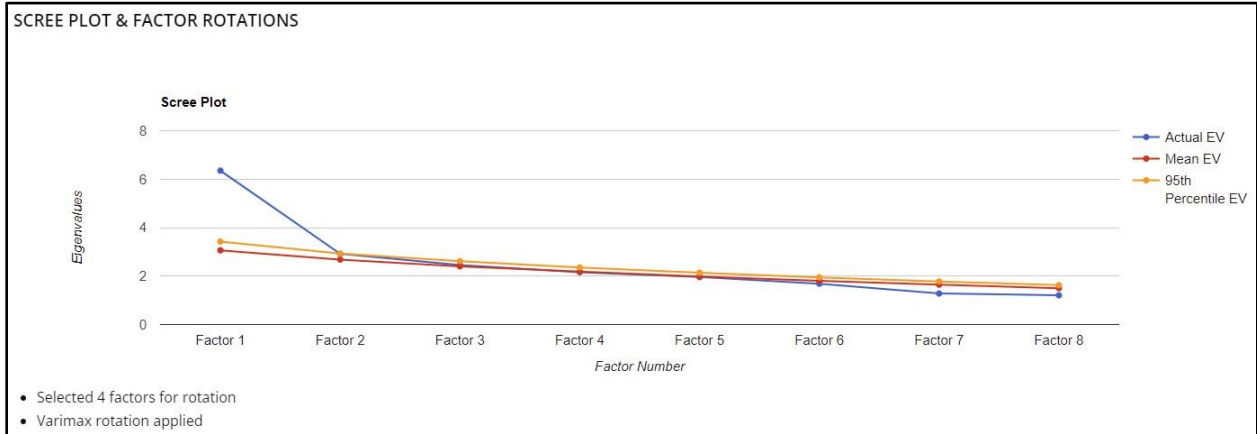
## VI.III Parallel Analysis

Factor	Actual EV	Mean EV	95th Percentile EV
1	6.35043	3.06309	3.42516
2	2.91714	2.68315	2.92604
3	2.45456	2.40171	2.61463
4	2.16205	2.18209	2.35574
5	1.95925	1.98233	2.1378
6	1.68591	1.80817	1.94867
7	1.27962	1.64703	1.77813
8	1.20676	1.4976	1.62447

### VI.IV Other Information

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
<b>Eigenvalue</b>	6.35043	2.91714	2.45456	2.16205	1.95925	1.68591	1.27962	1.20676
<b>% Explained Variance</b>	22.6801	10.41835	8.76628	7.72159	6.99733	6.02112	4.57007	4.30985
<b>Cumulative Variance</b>	22.6801	33.09845	41.86473	49.58632	56.58366	62.60478	67.17485	71.4847
<b>Humphrey's Rule</b>	0.47095	0.3514	0.29154	0.30828	0.19833	0.25095	0.14366	0.14344
<b>Standard Error</b>	0.18898	0.18898	0.18898	0.18898	0.18898	0.18898	0.18898	0.18898

### VI.V Scree Plot & Factor Rotations



### VI.VI Factor Loadings

No	Participant	Factor Group	Factor 1	CHNG	Factor 2	CHNG	Factor 3	CHNG	Factor 4	CHNG
1	0FWS	F-3-2	-0.08111	0.48839	0.08142	0.21077	0.69232	-0.20401	0.08089	-0.1776
2	1G2W	F-2-1	0.10678	0.39719	0.78387	-0.40025	0.04288	-0.5213	0.12879	-0.24816
3	1P12	F-1-3	0.59078	-0.27102	-0.10902	-0.33524	0.17411	-0.09747	0.03204	-0.3266
4	2N9A	F-3-4	-0.02322	0.48182	0.47669	0.03755	0.62894	-0.43852	-0.13702	-0.22505
5	51MP	F-3-6	0.19739	0.28689	-0.09581	-0.04119	0.45838	-0.1034	0.35779	-0.27432
6	5E8C	F-3-5	0.27797	0.25061	0.04146	-0.06732	0.59974	-0.23237	0.13197	-0.33459
7	BBLC	F-4-1	0.0672	0.46643	0.0454	-0.18092	0.115	-0.09246	0.74617	-0.22373
8	C4WM	F-1-2	0.59501	-0.11276	0.21508	-0.48149	0.15119	-0.29455	0.07279	-0.39583
9	DCBN	F-1-9	-0.60868	0.71859	0.3069	0.34958	0.25195	-0.13128	0.18829	0.1373
10	DZ63	F-2-3	-0.15249	0.55591	0.66122	-0.12594	0.18041	-0.42531	0.12747	-0.1305
11	EI6S	F-1-7	0.42728	-0.01924	0.03431	-0.4073	-0.03564	-0.11248	0.3909	-0.28966
12	F3T4	F-4-6	0.03667	0.4919	0.37527	-0.20831	0.18107	-0.29677	0.4324	-0.22924
13	F702	F-2-5	0.37021	0.18685	0.49418	-0.58598	-0.14239	-0.36032	0.42213	-0.33112
14	G9X8	F-1-5	0.49876	0.22716	0.29463	-0.50304	0.21162	-0.35026	0.45746	-0.45731
15	GHTA	F-4-4	0.18852	0.34801	0.30056	-0.31639	0.1012	-0.26336	0.46188	-0.27469
16	H4QN	F-3-7	0.35928	0.17017	-0.0383	-0.17399	0.43141	-0.16372	0.28911	-0.34575
17	HA47	F-1-6	0.46474	-0.09756	0.06494	-0.19521	0.44261	-0.23801	-0.17344	-0.32909
18	I0T2	F-4-7	-0.23652	0.70613	0.39466	0.01235	0.28997	-0.27869	0.42599	-0.12443
19	KIWC	F-4-2	0.00401	0.32761	0.02124	-0.19225	-0.1457	0.0002	0.69778	-0.10769
20	ND9B	F-2-4	0.33376	0.08736	0.56501	-0.52741	-0.12723	-0.39173	0.13943	-0.27427
21	NTJ3	F-3-3	-0.04883	0.33041	0.28684	0.16492	0.64251	-0.31451	-0.28726	-0.14752
22	Q7GA	F-1-1	0.75086	-0.3738	0.05627	-0.57249	-0.01349	-0.18765	0.04572	-0.3923
23	SUCC	F-3-1	0.12596	0.5228	0.00269	0.02897	0.69305	-0.20807	0.40844	-0.33146
24	T35X	F-4-3	-0.06681	0.39639	-0.37743	0.21702	0.43678	0.12499	0.53984	-0.11655
25	XRZU	F-4-5	0.10907	0.503	0.3749	-0.23826	0.26529	-0.33231	0.44629	-0.29073
26	Y82K	F-2-2	-0.0259	0.35414	0.73087	-0.22059	0.10912	-0.47044	-0.09513	-0.14386
27	YP9I	F-1-4	0.54076	0.04265	0.11995	-0.47767	0.12262	-0.22742	0.39696	-0.40722
28	YZKX	F-1-8	0.3681	0.21856	0.16454	-0.2859	0.34829	-0.27104	0.29437	-0.36967

### VI.VII Hyperplane percent by factor

Factor	Hyperplane Count	Hyperplane Percentage
Factor 1	8	28.571%
Factor 2	10	35.714%
Factor 3	3	10.714%
Factor 4	5	17.857%
Total	26	23.214%



### VI.VIII Covariance

Factor	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	0.08986	-0.02194	-0.02043	-0.00505
Factor 2	-0.02194	0.07534	-0.02197	-0.02085
Factor 3	-0.02043	-0.02197	0.06374	-0.02215
Factor 4	-0.00505	-0.02085	-0.02215	0.06587

### VI.IX Communalities

Participant	Communalities
0FWS	0.49905
1G2W	0.64428
1P12	0.39225
2N9A	0.64211
51MP	0.38627
5E8C	0.45609
BBLC	0.57657
C4WM	0.42845
DCBN	0.56361
DZ63	0.50926
E165	0.33782
F3T4	0.36193
F702	0.57974
G9X8	0.58962
GHTA	0.34946
H4QN	0.40025
HA47	0.44618
I0T2	0.47726
KIWC	0.50859
ND9B	0.46626
NTJ3	0.58
O7GA	0.56923
SUCC	0.66301
T35X	0.62912
XRZU	0.422
Y82K	0.55579
YP9I	0.47942
YZKX	0.37053

### VI.X Correlation Between Factors

	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	1.00	0.09659	0.14703	0.23081
Factor 2	0.09659	1.00	0.29293	0.24193
Factor 3	0.14703	0.29293	1.00	0.24966
Factor 4	0.23081	0.24193	0.24966	1.00

### VI.XI Factor Characteristics

	Factor 1	Factor 2	Factor 3	Factor 4
No. of Defining Variables	6.00	4.00	6.00	4.00
Avg. Rel. Coef.	0.80	0.80	0.80	0.80
Composite Reliability	0.96	0.94118	0.96	0.94118
S.E of Factor Z-Scores	0.20	0.24254	0.20	0.24254

### VI.XII Standard Error for Differences in Factor Z-scores

	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	0.28284	0.31436	0.28284	0.31436
Factor 2	0.31436	0.343	0.31436	0.343
Factor 3	0.28284	0.31436	0.28284	0.31436
Factor 4	0.31436	0.343	0.31436	0.343

# Appendix VII – Resulting Factors

## VII.I Factor 1

### VII.I.I Factor 1

-5	-4	-3	-2	-1	0	1	2	3	4	5
Minst verstorend			Neutraal					Meest verstorend		
Stijging van brandstofprijzen	Wisselende project-prioriteit bij de opdrachtgever	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid	Dreigend faillissement van onderaannemers	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie	Scopwijzigingen vanuit de opdrachtgeversorganisatie	Verstorende planning van omliggende projecten	Fouten in het aanbiedingsontwerp	Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning	Langdurig vergunningsaanvraag proces
	Stijging van materiaalprijzen	Druk op het budget als gevolg van economische recessie	Invoering van nieuwe softwaresystemen bij de moederorganisaties	Onzekerheid van materiaalleveranciers	Onvoldoende beschikbare capaciteit	Veranderende wetgeving met betrekking tot projectparameters	Incidenten tijdens de realisatie bij vergelijkbare projecten	Langzame besluitvorming binnen de opdrachtgeversorganisatie met betrekking tot projectparameters	Hoge mate van controle vanuit de opdrachtgeversorganisatie	
			Reorganisatie binnen het ambtelijk systeem	Aanscherping van eisen binnen het landelijke programma waar het project onder valt	Teruglopende kwaliteit omdat onderaannemers niet de beloofde kennis en expertise brengen	Commerciële doelen van de opdrachtnemersorganisatie voor het project	Beperkt inzicht in de toestand van het areaal			
			Het implementeren van nieuwe bouwtechnieken	Moeizame communicatie met onderaannemers	Negatiev(e) artikel(en) in de media	Late inbreng van eisen en wensen vanuit de omgeving	Fouten in het referentieontwerp			
				Uitloop van het project door niet aansluitende plannings van onderaannemers	Beperkte flexibiliteit als gevolg van het winstoogmerk van de opdrachtnemersorganisatie	Bezwaarschriften, klachten en procedures door de omgeving				
				Onduidelijke of wijzigende project-doelstelling vanuit de opdrachtgeversorganisatie	Verandering van politieke kleur in de projectomgeving	Negatieve opinie van de omgeving ten aanzien van het project				
					Uitblijvende voor het project relevante besluitvorming in de politiek					
					Veranderingen in het ontwerp door innovatie in bouwproducten					

## VII.I.II Factor 1: Z-scores, sort values

No	Statement	Factor 1	
		QSort Value	ZScore Value
33	Langdurig vergunningsaanvraag proces	5	2.4055 *
36	Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning	4	1.6786 *
15	Hoge mate van controle vanuit de opdrachtgeversorganisatie	4	1.6500 *
23	Fouten in het aanbiedingsontwerp	3	1.1720
18	Langzame besluitvorming binnen de opdrachtgeversorganisatie met betrekking tot projectparameters	3	0.9009
30	Verstorende planning van omliggende projecten	2	0.8914
32	Incidenten tijdens de realisatie bij vergelijkbare projecten	2	0.8680 *
8	Beperkt inzicht in de toestand van het areaal	2	0.8274 *
16	Fouten in het referentieontwerp	2	0.8179
20	Scopewijzigingen vanuit de opdrachtgeversorganisatie	1	0.7821
10	Veranderende wetgeving met betrekking tot projectparameters	1	0.7687
25	Commerciële doelen van de opdrachtnemersorganisatie voor het project	1	0.4997
35	Late inbreng van eisen en wensen vanuit de omgeving	1	0.3752
38	Bezwaarschriften, klachten en procedures door de omgeving	1	0.3578
37	Negatieve opinie van de omgeving ten aanzien van het project	1	0.2959
21	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie	0	0.2951
3	Onvoldoende beschikbare capaciteit	0	0.2428
29	Teruglopende kwaliteit omdat onderaannemers niet de beloofde kennis en expertise brengen	0	0.2406
34	Negativ(e) artikel(en) in de media	0	-0.1419
24	Beperkte flexibiliteit als gevolg van het winst oogmerk van de opdrachtnemersorganisatie	0	-0.1471
12	Verandering van politieke kleur in de projectomgeving	0	-0.2256 *
14	Uitblijvende voor het project relevante besluitvorming in de politiek	0	-0.2680
9	Veranderingen in het ontwerp door innovatie in bouwproducten	0	-0.2801
22	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie	-1	-0.3360
5	Onzekerheid van materiaalleveranciers	-1	-0.3732
31	Aanscherping van eisen binnen het landelijke programma waar het project onder valt	-1	-0.4377
26	Moeizame communicatie met onderaannemers	-1	-0.4617
28	Uitloop van het project door niet aansluitende plannen van onderaannemers	-1	-0.5296
19	Onduidelijke of wjzigende project-doelstelling vanuit de opdrachtgeversorganisatie	-1	-0.6402
27	Dreigend faillissement van onderaannemers	-2	-0.6551
6	Invoering van nieuwe softwaresystemen bij de moederorganisaties	-2	-0.6963
11	Reorganisatie binnen het ambtelijk systeem	-2	-0.8000
7	Het implementeren van nieuwe bouwtechnieken	-2	-0.8051
13	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid	-3	-1.2214 *
2	Druk op het budget als gevolg van economische recessie	-3	-1.2880 *
17	Wisselende project-prioriteit bij de opdrachtgever	-4	-1.3935
1	Stijging van materiaalprijzen	-4	-1.9155 *
4	Stijging van brandstofprijzen	-5	-2.4535 *

### VII.I.III Distinguishing Statements for Factor 1

No	Statement
33	Langdurig vergunningsaanvraag proces
36	Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning
15	Hoge mate van controle vanuit de opdrachtgeversorganisatie
32	Incidenten tijdens de realisatie bij vergelijkbare projecten
8	Beperkt inzicht in de toestand van het areaal
12	Verandering van politieke kleur in de projectomgeving
13	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid
2	Druk op het budget als gevolg van economische recessie
1	Stijging van materiaalprijzen
4	Stijging van brandstofprijzen

### VII.I.IV Consensus Statements for Factor 1

No	Statement
21	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie
14	Uitblijvende voor het project relevante besluitvorming in de politiek
31	Aanscherping van eisen binnen het landelijke programma waar het project onder valt
27	Dreigend faillissement van onderaannemers

### VII.I.V Most Characteristic

No	Statement
33	Langdurig vergunningsaanvraag proces
36	Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning
15	Hoge mate van controle vanuit de opdrachtgeversorganisatie
23	Fouten in het aanbiedingsontwerp
18	Langzame besluitvorming binnen de opdrachtgeversorganisatie met betrekking tot projectparameters

### VII.I.VI Most Uncharacteristic

No	Statement
13	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid
2	Druk op het budget als gevolg van economische recessie
17	Wisselende project-prioriteit bij de opdrachtgever
1	Stijging van materiaalprijzen
4	Stijging van brandstofprijzen

### VII.I.VII Quite Characteristic

No	Statement
30	Verstorende planning van omliggende projecten
32	Incidenten tijdens de realisatie bij vergelijkbare projecten
8	Beperkt inzicht in de toestand van het areaal
16	Fouten in het referentieontwerp
20	Scopewijzigingen vanuit de opdrachtgeversorganisatie
10	Veranderende wetgeving met betrekking tot projectparameters
25	Commerciële doelen van de opdrachtnemersorganisatie voor het project
35	Late inbreng van eisen en wensen vanuit de omgeving
38	Bezwaarschriften, klachten en procedures door de omgeving
37	Negatieve opinie van de omgeving ten aanzien van het project

### VII.I.VIII Quite Uncharacteristic

No	Statement
22	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie
5	Onzekerheid van materiaalleveranciers
31	Aanscherping van eisen binnen het landelijke programma waar het project onder valt
26	Moelzame communicatie met onderaannemers
28	Uitloop van het project door niet aansluitende plannings van onderaannemers
19	Onduidelijke of wijzigende project-doelstelling vanuit de opdrachtgeversorganisatie
27	Dreigend faillissement van onderaannemers
6	Invoering van nieuwe softwaresystemen bij de moederorganisaties
11	Reorganisatie binnen het ambtelijk systeem
7	Het implementeren van nieuwe bouwtechnieken

## VII.II Factor 2

### VII.II.I Factor 1

	-5	-4	-3	-2	-1	0	1	2	3	4	5
	Minst verstorend					Neutraal					Meest verstorend
Reorganisatie binnen het ambtelijk systeem		Het implementeren van nieuwe bouwtechnieken	Dreigend faillissement van onderaannemers	Invoering van nieuwe softwaresystemen bij de moederorganisaties	Langdurig vergunningsaanvraag proces	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie	Negatief(e) artikel(en) in de media	Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning	Negatieve opinie van de omgeving ten aanzien van het project.	Stijging van materiaalprizen	Onzekerheid van materiaalleveranciers
		Beperkt inzicht in de toestand van het areaal	Moelzame communicatie met onderaannemers	Wisselende project-prioriteit bij de opdrachtgever	Teruglopende kwaliteit omdat onderaannemers niet de beloofde kennis en expertise brengen	Commerciële doelen van de opdrachtnemersorganisatie voor het project	Veranderende wetgeving met betrekking tot projectparameters	Verstorende planning van omliggende projecten	Scopwijzigingen vanuit de opdrachtgeversorganisatie	Late inbreng van eisen en wensen vanuit de omgeving	
			Uitloop van het project door niet aansluitende planningen van onderaannemers	Onduidelijke of wijzigende project-doelstelling vanuit de opdrachtgeversorganisatie	Langzame besluitvorming binnen de opdrachtgeversorganisatie met betrekking tot projectparameters	Aanscherping van eisen binnen het landelijke programma waar het project onder valt.	Bezwaarschriften, klachten en procedures door de omgeving	Stijging van brandstofprizen			
			Verandering van politieke kleur in de projectomgeving	Veranderingen in het ontwerp door innovatie in bouwproducten	Druk op het budget als gevolg van economische recessie	Incidenten tijdens de realisatie bij vergelijkbare projecten	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie	Onvoldoende beschikbare capaciteit			
				Uitblijvende voor het project relevante besluitvorming in de politiek			Beperkte flexibiliteit als gevolg van het winstoogmerk van de opdrachtnemersorganisatie				
				Hoge mate van controle vanuit de opdrachtgeversorganisatie			Fouten in het aanbiedingsontwerp				
							Fouten in het referentieontwerp				
							Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid				



## VII.II.II Factor 1: Z-scores, sort values

No	Statement	Factor 2	
		QSort Value	ZScore Value
5	Onzekerheid van materiaalleverancies	5	2.3070 *
1	Stijging van materiaalprijzen	4	1.6408
35	Late inbreng van eisen en wensen vanuit de omgeving	4	1.6341
37	Negatieve opinie van de omgeving ten aanzien van het project	3	1.2553 *
20	Scopewijzigingen vanuit de opdrachtgeversorganisatie	3	1.2094
36	Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning	2	1.0357
30	Verstorende planning van omliggende projecten	2	0.9899
4	Stijging van brandstofprijzen	2	0.8539
3	Onvoldoende beschikbare capaciteit	2	0.7433
34	Negatief(e) artikel(en) in de media	1	0.7011 *
10	Veranderende wetgeving met betrekking tot projectparameters	1	0.6866
38	Bezwaarschriften, klachten en procedures door de omgeving	1	0.6182
22	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie	1	0.5346
24	Beperkte flexibiliteit als gevolg van het winsttoegmerk van de opdrachtnemersorganisatie	1	0.3992
23	Fouten in het aanbestedingsontwerp	1	0.2981
21	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie	0	0.2772
25	Commerciële doelen van de opdrachtnemersorganisatie voor het project	0	0.2415
18	Langzame besluitvorming binnen de opdrachtgeversorganisatie met betrekking tot projectparameters	0	0.2400 *
31	Aanscherping van eisen binnen het landelijke programma waar het project onder valt	0	0.0407
2	Druk op het budget als gevolg van economische recessie	0	0.0357
32	Incidenten tijdens de realisatie bij vergelijkbare projecten	0	-0.0313 *
16	Fouten in het referentieontwerp	0	-0.2518
13	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid	0	-0.3818 *
33	Langdurig vergunningsaanvraag proces	-1	-0.4051
29	Teruglopende kwaliteit omdat onderaannemers niet de beloofde kennis en expertise brengen	-1	-0.4102 *
19	Onduidelijke of wijzigende project-doelstelling vanuit de opdrachtgeversorganisatie	-1	-0.5869
9	Veranderingen in het ontwerp door innovatie in bouwproducten	-1	-0.7156
14	Uitblijvende voor het project relevante besluitvorming in de politiek	-1	-0.7368
15	Hoge mate van controle vanuit de opdrachtgeversorganisatie	-1	-0.8400 *
6	Invoering van nieuwe softwaresystemen bij de moederorganisaties	-2	-0.9062
17	Wisselende project-prioriteit bij de opdrachtgever	-2	-0.9142
28	Uitloop van het project door niet aansluitende plannings van onderaannemers	-2	-1.0633
12	Verandering van politieke kleur in de projectomgeving	-2	-1.0793
27	Dreigend faillissement van onderaannemers	-3	-1.1673
26	Moeizame communicatie met onderaannemers	-3	-1.3237 *
7	Het implementeren van nieuwe bouwtechnieken	-4	-1.4574
8	Beperkt inzicht in de toestand van het areaal	-4	-1.6961 *
11	Reorganisatie binnen het ambtelijk systeem	-5	-1.7754



### VII.II.III Distinguishing Statements for Factor 1

No	Statement
5	Onzekerheid van materiaalleveranciers
37	Negatieve opinie van de omgeving ten aanzien van het project
34	Negativ(e) artikel(en) in de media
18	Langzame besluitvorming binnen de opdrachtgeversorganisatie met betrekking tot projectparameters
32	Incidenten tijdens de realisatie bij vergelijkbare projecten
13	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid
29	Teruglopende kwaliteit omdat onderaannemers niet de beloofde kennis en expertise brengen
15	Hoge mate van controle vanuit de opdrachtgeversorganisatie
26	Moelzame communicatie met onderaannemers
8	Beperkt inzicht in de toestand van het areaal

### VII.II.IV Consensus Statements for Factor 1

No	Statement
3	Onvoldoende beschikbare capaciteit
21	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie
31	Aanscherping van eisen binnen het landelijke programma waar het project onder valt
27	Dreigend faillissement van onderaannemers

### VII.II.V Most Characteristic

No	Statement
5	Onzekerheid van materiaalleveranciers
1	Stijging van materiaalprijzen
35	Late inbreng van eisen en wensen vanuit de omgeving
37	Negatieve opinie van de omgeving ten aanzien van het project
20	Scopewijzigingen vanuit de opdrachtgeversorganisatie

### VII.II.VI Most Uncharacteristic

No	Statement
27	Dreigend faillissement van onderaannemers
26	Moelzame communicatie met onderaannemers
7	Het implementeren van nieuwe bouwtechnieken
8	Beperkt inzicht in de toestand van het areaal
11	Reorganisatie binnen het ambtelijk systeem

### VII.II.VII Quite Characteristic

No	Statement
36	Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning
30	Verstorende planning van omliggende projecten
4	Stijging van brandstofprijzen
3	Onvoldoende beschikbare capaciteit
34	Negativ(e) artikel(en) in de media
10	Veranderende wetgeving met betrekking tot projectparameters
38	Bezwaarschriften, klachten en procedures door de omgeving
22	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie
24	Bepaalde flexibiliteit als gevolg van het winstdoelmerk van de opdrachtnemersorganisatie
23	Fouten in het aanbiedingsontwerp

### VII.II.VIII Quite Uncharacteristic

No	Statement
33	Langdurig vergunningsaanvraag proces
29	Teruglopende kwaliteit omdat onderaannemers niet de beloofde kennis en expertise brengen
19	Onduidelijke of wijzigende project-doelstelling vanuit de opdrachtgeversorganisatie
9	Veranderingen in het ontwerp door innovatie in bouwproducten
14	Uitblijvende voor het project relevante besluitvorming in de politiek
15	Hoge mate van controle vanuit de opdrachtgeversorganisatie
6	Invoering van nieuwe softwaresystemen bij de moederorganisaties
17	Wisselende project-prioriteit bij de opdrachtgever
28	Uitloop van het project door niet aansluitende plannings van onderaannemers
12	Verandering van politieke kleur in de projectomgeving

### VII.III Factor 3

#### VII.III.I Factor 1

-5	-4	-3	-2	-1	0	1	2	3	4	5
Minst verstorend			Neutraal					Meest verstorend		
Verandering van politieke kleur in de projectomgeving	Verstorende planning van omliggende projecten	Onduidelijke of wijzigende project-doelstelling vanuit de opdrachtgeversorganisatie	Reorganisatie binnen het ambtelijk systeem	Bepaalde flexibiliteit als gevolg van het winstdoelmerk van de opdrachtnemersorganisatie	Stijging van brandstofprijzen	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid	Onvoldoende beschikbare capaciteit	Langzame besluitvorming binnen de opdrachtgeversorganisatie met betrekking tot projectparameters	Scopewijzigingen vanuit de opdrachtgeversorganisatie
	Veranderingen in het ontwerp door innovatie in bouwproducten	Invoering van nieuwe softwaresystemen bij de moederorganisaties	Wisselende project-prioriteit bij de opdrachtgever	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie	Fouten in het referentieontwerp	Onzekerheid van materiaalleveranciers	Langdurig vergunningsaanvraag proces	Commerciële doelen van de opdrachtnemersorganisatie voor het project	Stijging van materiaalprijzen	
			Incidenten tijdens de realisatie bij vergelijkbare projecten	Bezwaarschriften, klachten en procedures door de omgeving	Uitblijvende voor het project relevante besluitvorming in de politiek	Late inbreng van eisen en wensen vanuit de omgeving	Fouten in het aanbiedingsontwerp			
			Negatieve artikel(en) in de media	Dreigend faillissement van onderaannemers	Veranderende wetgeving met betrekking tot projectparameters	Hoge mate van controle vanuit de opdrachtgeversorganisatie	Het implementeren van nieuwe bouwtechnieken			
				Uitloop van het project door niet aansluitende planningen van onderaannemers	Aanscherping van eisen binnen het landelijke programma waar het project onder valt	Druk op het budget als gevolg van economische recessie				
				Negatieve opinie van de omgeving ten aanzien van het project	Moeizame communicatie met onderaannemers	Teruglopende kwaliteit omdat onderaannemers niet de beloofde kennis en expertise brengen				
					Beperkt inzicht in de toestand van het areaal					
					Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning					

## VII.III.II Factor 1: Z-scores, sort values

No	Statement	Factor 3	
		QSort Value	ZScore Value
20	Scopewijzigingen vanuit de opdrachtgeversorganisatie	5	1.9311
18	Langzame besluitvorming binnen de opdrachtgeversorganisatie met betrekking tot projectparameters	4	1.4854
1	Stijging van materiaalprijzen	4	1.4232
3	Onvoldoende beschikbare capaciteit	3	1.2978
25	Commerciële doelen van de opdrachtnemersorganisatie voor het project	3	1.2978 *
13	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid	2	1.2709 *
33	Langdurig vergunningsaanvraag proces	2	1.2675 *
23	Fouten in het aanbiedingsontwerp	2	1.1345
7	Het implementeren van nieuwe bouwtechnieken	2	1.1281 *
21	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie	1	0.8173
5	Onzekerheid van materiaalleveranciers	1	0.6214
35	Late inbreng van eisen en wensen vanuit de omgeving	1	0.5072
15	Hoge mate van controle vanuit de opdrachtgeversorganisatie	1	0.4264
2	Druk op het budget als gevolg van economische recessie	1	0.3814
29	Teruglopende kwaliteit omdat onderaannemers niet de beloofde kennis en expertise brengen	1	0.3802
4	Stijging van brandstofprijzen	0	0.3097
16	Fouten in het referentieontwerp	0	0.2642
14	Uitblijvende voor het project relevante besluitvorming in de politiek	0	0.2047
10	Veranderende wetgeving met betrekking tot projectparameters	0	0.0363 *
31	Aanscherping van eisen binnen het landelijke programma waar het project onder valt	0	-0.1292
26	Moelzame communicatie met onderaannemers	0	-0.1524
8	Beperkt inzicht in de toestand van het areaal	0	-0.1737
36	Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning	0	-0.4099 *
24	Beperkte flexibiliteit als gevolg van het winsttoogmerk van de opdrachtnemersorganisatie	-1	-0.4383
22	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie	-1	-0.5650
38	Bezwaarschriften, klachten en procedures door de omgeving	-1	-0.5758
27	Dreigend faillissement van onderaannemers	-1	-0.6542
28	Uitloop van het project door niet aansluitende plannings van onderaannemers	-1	-0.6684
37	Negatieve opinie van de omgeving ten aanzien van het project	-1	-0.9772 *
11	Reorganisatie binnen het ambtelijk systeem	-2	-0.9825
17	Wisselende project-prioriteit bij de opdrachtgever	-2	-1.1142
32	Incidenten tijdens de realisatie bij vergelijkbare projecten	-2	-1.1161
34	Negatiev(e) artikel(en) in de media	-2	-1.1382 *
19	Onduidelijke of wijzigende project-doelstelling vanuit de opdrachtgeversorganisatie	-3	-1.1606
6	Invoering van nieuwe softwaresystemen bij de moederorganisaties	-3	-1.2386
30	Verstorende planning van omliggende projecten	-4	-1.4460 *
9	Veranderingen in het ontwerp door innovatie in bouwproducten	-4	-1.5903 *
12	Verandering van politieke kleur in de projectomgeving	-5	-1.6543

### VII.III.III Distinguishing Statements for Factor 1

No	Statement
25	Commerciële doelen van de opdrachtnemersorganisatie voor het project
13	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid
33	Langdurig vergunningsaanvraag proces
7	Het implementeren van nieuwe bouwtechnieken
10	Veranderende wetgeving met betrekking tot projectparameters
36	Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning
37	Negatieve opinie van de omgeving ten aanzien van het project
34	Negatief(e) artikel(en) in de media
30	Verstorende planning van omliggende projecten
9	Veranderingen in het ontwerp door innovatie in bouwproducten

### VII.III.IV Consensus Statements for Factor 1

No	Statement
21	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie
16	Fouten in het referentieontwerp
31	Aanscherping van eisen binnen het landelijke programma waar het project onder valt
27	Dreigend faillissement van onderaannemers
6	Invoering van nieuwe softwaresystemen bij de moederorganisaties

### VII.III.V Most Characteristic

No	Statement
20	Scopwijzigingen vanuit de opdrachtgeversorganisatie
18	Langzame besluitvorming binnen de opdrachtgeversorganisatie met betrekking tot projectparameters
1	Stijging van materiaalprizen
3	Onvoldoende beschikbare capaciteit
25	Commerciële doelen van de opdrachtnemersorganisatie voor het project

### VII.III.VI Most Uncharacteristic

No	Statement
19	Onduidelijke of wijzigende project-doelstelling vanuit de opdrachtgeversorganisatie
6	Invoering van nieuwe softwaresystemen bij de moederorganisaties
30	Verstorende planning van omliggende projecten
9	Veranderingen in het ontwerp door innovatie in bouwproducten
12	Verandering van politieke kleur in de projectomgeving

### VII.III.VII Quite Characteristic

No	Statement
13	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid
33	Langdurig vergunningsaanvraag proces
23	Fouten in het aanbiedingsontwerp
7	Het implementeren van nieuwe bouwtechnieken
21	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie
5	Onzekerheid van materiaalleveranciers
35	Late inbreng van eisen en wensen vanuit de omgeving
15	Hoge mate van controle vanuit de opdrachtgeversorganisatie
2	Druk op het budget als gevolg van economische recessie
29	Teruglopende kwaliteit omdat onderaannemers niet de beloofde kennis en expertise brengen

### VII.III.VIII Quite Uncharacteristic

No	Statement
24	Beperkte flexibiliteit als gevolg van het winstdoelmerk van de opdrachtnemersorganisatie
22	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie
38	Bezwaarschriften, klachten en procedures door de omgeving
27	Dreigend faillissement van onderaannemers
28	Uitloop van het project door niet aansluitende plannings van onderaannemers
37	Negatieve opinie van de omgeving ten aanzien van het project
11	Reorganisatie binnen het ambtelijk systeem
17	Wisselende project-prioriteit bij de opdrachtgever
32	Incidenten tijdens de realisatie bij vergelijkbare projecten
34	Negativ(e) artikel(en) in de media

## VII.IV Factor 4

### VII.IV.I Factor 1

-5	-4	-3	-2	-1	0	1	2	3	4	5
Minst verstorend			Neutraal					Meest verstorend		
Verandering van politieke kleur in de projectomgeving	Reorganisatie binnen het ambtelijk systeem	Het implementeren van nieuwe bouwtechnieken	Verstorende planning van omliggende projecten	Bezuurschriften, klachten en procedures door de omgeving	Onzekerheid van materiaalleveranciers	Tengelopende kwaliteit omdat onderaannemers niet de beloofde kennis en expertise brengen	Onvoldoende beschikbare capaciteit	Late inbreng van eisen en wensen vanuit de omgeving	Scopewijzigingen vanuit de opdrachtgeversorganisatie	Uitloop van het project door niet aansluitende plannings van onderaannemers
	Invoering van nieuwe softwaresystemen bij de moederorganisaties	Stijging van brandstofprijzen	Incidenten tijdens de realisatie bij vergelijkbare projecten	Fouten in het referentieontwerp	Beperkt inzicht in de toestand van het areaal	Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie	Langzame besluitvorming binnen de opdrachtgeversorganisatie met betrekking tot projectparameters	Onduidelijke of wijzigende project-doelstelling vanuit de opdrachtgeversorganisatie	
			Veranderende wetgeving met betrekking tot projectparameters	Moeizame communicatie met onderaannemers	Veranderingen in het ontwerp door innovatie in bouwproducten	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie	Beperkte flexibiliteit als gevolg van het winsttoegmerk van de opdrachtnemersorganisatie			
			Stijging van materiaalprijzen	Langdurig vergunningsaanvraag proces	Aanscherping van eisen binnen het landelijke programma waar het project onder valt	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid	Wisselende project-prioriteit bij de opdrachtgever			
				Druk op het budget als gevolg van economische recessie	Uitblijvende voor het project relevante besluitvorming in de politiek	Hoge mate van controle vanuit de opdrachtgeversorganisatie				
				Dreigend faillissement van onderaannemers	Negatieve opinie van de omgeving ten aanzien van het project	Fouten in het aanbiedingsontwerp				
					Commerciële doelen van de opdrachtnemersorganisatie voor het project					
					Negativ(e) artikell(en) in de media					



## VII.IV.II Factor 1: Z-scores, sort values

No	Statement	Factor 4	
		QSort Value	ZScore Value
28	Uitloop van het project door niet aansluitende plannings van onderaannemers	5	1.9252 *
20	Scopewijzigingen vanuit de opdrachtgeversorganisatie	4	1.6731
19	Onduidelijke of wijzigende project-doelstelling vanuit de opdrachtgeversorganisatie	4	1.6607 *
35	Late inbreng van eisen en wensen vanuit de omgeving	3	1.6417
18	Langzame besluitvorming binnen de opdrachtgeversorganisatie met betrekking tot projectparameters	3	1.3121
3	Onvoldoende beschikbare capaciteit	2	1.1072
22	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie	2	1.0189
24	Beperkte flexibiliteit als gevolg van het winst oogmerk van de opdrachtnemersorganisatie	2	0.9517
17	Wisselende project-prioriteit bij de opdrachtgever	2	0.8277 *
29	Teruglopende kwaliteit omdat onderaannemers niet de beloofde kennis en expertise brengen	1	0.6210
36	Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning	1	0.5173
21	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie	1	0.4798
13	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid	1	0.4072 *
15	Hoge mate van controle vanuit de opdrachtgeversorganisatie	1	0.3118
23	Fouten in het aanbiedingsontwerp	1	0.2696
5	Onzekerheid van materiaalleveranciers	0	0.1859
8	Beperkt inzicht in de toestand van het areaal	0	0.0303
9	Veranderingen in het ontwerp door innovatie in bouwproducten	0	0.0204
31	Aanscherping van eisen binnen het landelijke programma waar het project onder valt	0	-0.0469
14	Uitblijvende voor het project relevante besluitvorming in de politiek	0	-0.1101
37	Negatieve opinie van de omgeving ten aanzien van het project	0	-0.1977
25	Commerciële doelen van de opdrachtnemersorganisatie voor het project	0	-0.2352
34	Negativ(e) artikel(en) in de media	0	-0.2702
38	Bezwaarschriften, klachten en procedures door de omgeving	-1	-0.2860
16	Fouten in het referentieontwerp	-1	-0.3046
26	Moeizame communicatie met onderaannemers	-1	-0.4745
33	Langdurig vergunningsaanvraag proces	-1	-0.4898
2	Druk op het budget als gevolg van economische recessie	-1	-0.4937
27	Dreigend faillissement van onderaannemers	-1	-0.5252
30	Verstorende planning van omliggende projecten	-2	-0.5470 *
32	Incidenten tijdens de realisatie bij vergelijkbare projecten	-2	-0.8173
10	Veranderende wetgeving met betrekking tot projectparameters	-2	-0.8423 *
1	Stijging van materiaalprijzen	-2	-1.0229 *
7	Het implementeren van nieuwe bouwtechnieken	-3	-1.2746
4	Stijging van brandstofprijzen	-3	-1.5027 *
11	Reorganisatie binnen het ambtelijk systeem	-4	-1.6646
6	Invoering van nieuwe softwaresystemen bij de moederorganisaties	-4	-1.7615
12	Verandering van politieke kleur in de projectomgeving	-5	-2.0950



### VII.IV.III Distinguishing Statements for Factor 1

No	Statement
28	Uitloop van het project door niet aansluitende plannings van onderaannemers
19	Onduidelijke of wijzigende project-doelstelling vanuit de opdrachtgeversorganisatie
17	Wisselende project-prioriteit bij de opdrachtgever
13	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid
30	Verstorende planning van omliggende projecten
10	Veranderende wetgeving met betrekking tot projectparameters
1	Stijging van materiaalprijzen
4	Stijging van brandstofprijzen

### VII.IV.IV Consensus Statements for Factor 1

No	Statement
21	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie
31	Aanscherping van eisen binnen het landelijke programma waar het project onder valt
14	Uitblijvende voor het project relevante besluitvorming in de politiek
27	Dreigend faillissement van onderaannemers

### VII.IV.V Most Characteristic

No	Statement
28	Uitloop van het project door niet aansluitende plannings van onderaannemers
20	Scopewijzigingen vanuit de opdrachtgeversorganisatie
19	Onduidelijke of wijzigende project-doelstelling vanuit de opdrachtgeversorganisatie
35	Late inbreng van eisen en wensen vanuit de omgeving
18	Langzame besluitvorming binnen de opdrachtgeversorganisatie met betrekking tot projectparameters

### VII.IV.VI Most Uncharacteristic

No	Statement
7	Het implementeren van nieuwe bouwtechnieken
4	Stijging van brandstofprijzen
11	Reorganisatie binnen het ambtelijk systeem
6	Invoering van nieuwe softwaresystemen bij de moederorganisaties
12	Verandering van politieke kleur in de projectomgeving

### VII.IV.VII Quite Characteristic

No	Statement
3	Onvoldoende beschikbare capaciteit
22	Hoog personeelsverloop en doorstroming binnen de opdrachtnemersorganisatie
24	Beperkte flexibiliteit als gevolg van het winstoogmerk van de opdrachtnemersorganisatie
17	Wisselende project-prioriteit bij de opdrachtgever
29	Teruglopende kwaliteit omdat onderaannemers niet de beloofde kennis en expertise brengen
36	Bezwaren vanuit de omgeving tegen hinder als gevolg van de projectplanning
21	Werkdruk als gevolg van een opportunistische inschrijving door de opdrachtnemersorganisatie
13	Niet of moeilijk verkrijgen van benodigde budget vanuit de overheid
15	Hoge mate van controle vanuit de opdrachtgeversorganisatie
23	Fouten in het aanbiedingsontwerp

### VII.IV.VIII Quite Uncharacteristic

No	Statement
38	Bezwaarschriften, klachten en procedures door de omgeving
16	Fouten in het referentieontwerp
26	Moeizame communicatie met onderaannemers
33	Langdurig vergunningsaanvraag proces
2	Druk op het budget als gevolg van economische recessie
27	Dreigend faillissement van onderaannemers
30	Verstorende planning van omliggende projecten
32	Incidenten tijdens de realisatie bij vergelijkbare projecten
10	Veranderende wetgeving met betrekking tot projectparameters
1	Stijging van materiaalprijzen

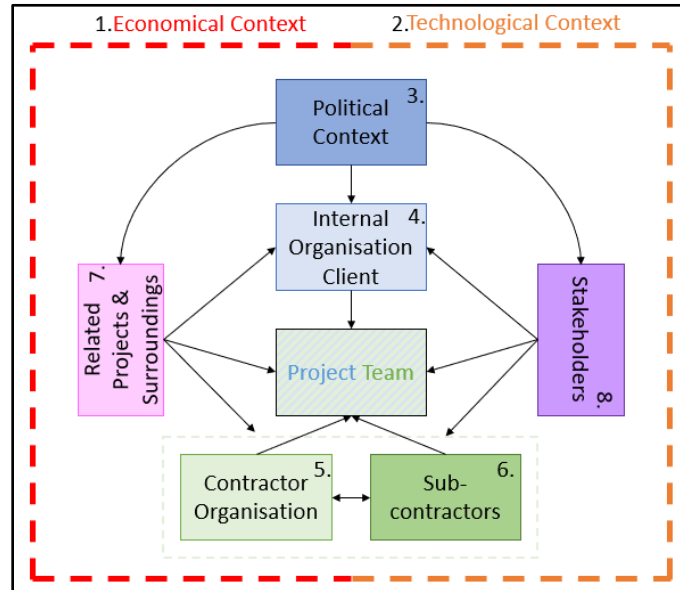
## Appendix VIII – Attachment of Expert Meeting (in Dutch)

### Bijlage Expert Sessie 22 juli 2022

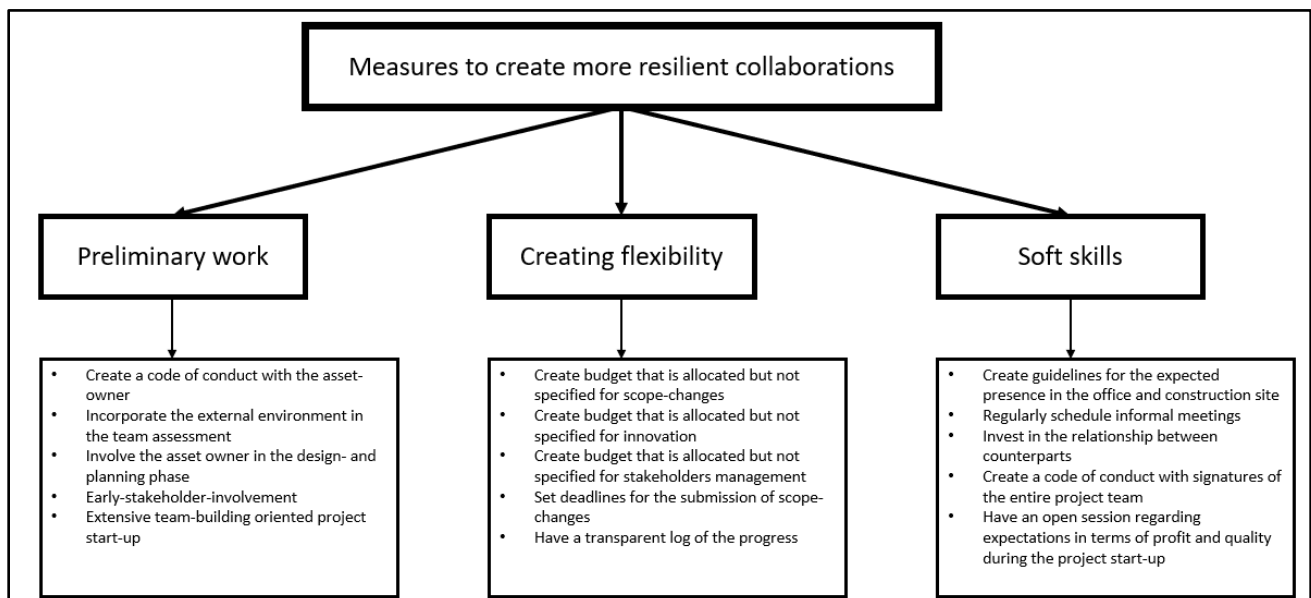
#### Hoofdvraag

“Welke externe factoren treden er op tijdens constructie projecten die de samenwerking tussen opdrachtgever en opdrachtnemer beïnvloeden en hoe kan de impact van deze factoren vooraf verlaagd worden?”

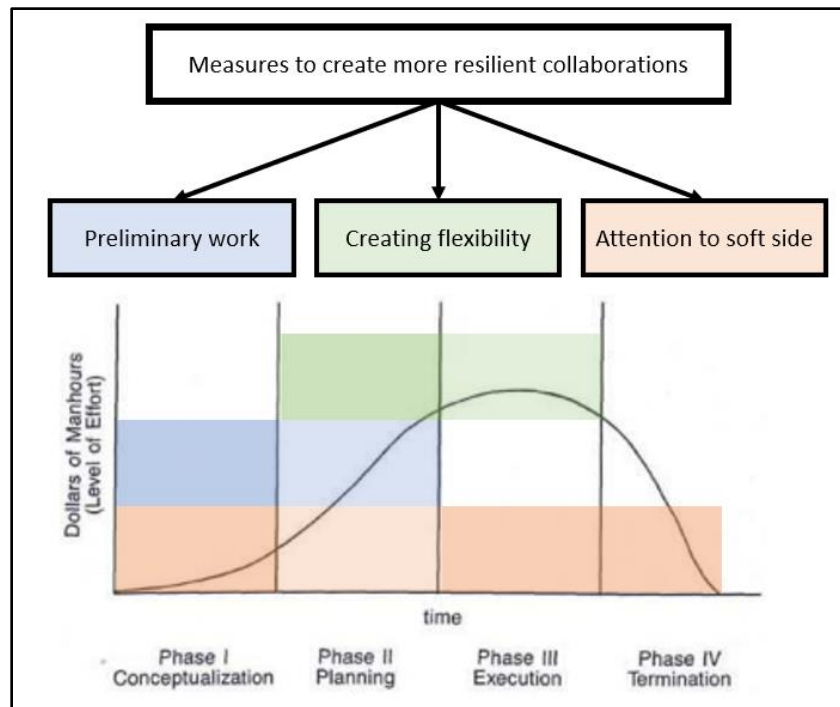
#### Model van de project omgeving



#### Raamwerk van maatregelen



### Implementatie van maatregelen



## Appendix IX – Summary of Expert Meeting (in Dutch)

### Expertsessie 22 juli, 2022

Voorzitter: Thijs van Splunder  
Deelnemers: Zie hoofdstuk 3.3

Datum: 22 juli, 2022  
Locatie: AT Osborne, Baarn

#### Agenda

1. Presentatie van resultaten
2. Consensus
3. Validatie van raamwerk met maatregels
4. Suggesties voor verbetering

#### Samenvatting

##### *Consensus*

De expert herkennen de drie consensus statements en geven aan dat deze regelmatig terugkeren binnen projecten. Expert 5 geeft aan dat de reden waarom het zo moeilijk is om een consequent succesvolle aanpak voor deze stelling te creëren is de verdeling van verantwoordelijkheden tussen opdrachtgever en opdrachtnemer bij deze drie stellingen specifiek. Omdat naar aanleiding van deze stellingen de druk bij ofwel het opdrachtgeversteam of opdrachtnemers toe meer toeneemt dan de druk op de hele organisatie is er minder sprake van een gezamenlijk probleem. Expert 3 voegt toe dat om hier mee om te gaan een projectorganisatie meer proactief kan handelen en investeren in elkaars problemen. Biedt elkaar hulp aan, in plaats van te wachten op een hulpvraag. Hoewel het minstens net zo belangrijk is dat je transparant bent en om hulp durft te vragen aan je partner indien nodig. Hier is vertrouwen voor nodig.

Expert 4 geeft aan dat vooral de aanscherping van eisen binnen het programma verstrekkende gevolgen kan hebben voor de consensus statements. Deze creëert een verschil in perceptie binnen het team en een verschil in perceptie leidt tot ergernis omdat je niet weet waar je aan toe bent qua budget en planning.

##### *Validatie van raamwerk met maatregels*

Expert 4 geeft aan dat in de praktijk verstoring van de samenwerking zijn te relateren aan de invloed die moederorganisaties uitoefenen op het project team. Als het project minder loopt probeert de moederorganisatie zichzelf in het managementteam te verplaatsen om de besluitvorming direct te kunnen bepalen. Hier is belangrijke rol voor de project manager weggelegd om te zorgen dat het team aan zet kan blijven. Op zo'n moment wordt het namelijk extra belangrijk dat de moederorganisaties hun specifieke rol pakken en vanuit daar de project organisatie steunen met middelen en capaciteit. Expert 1 geeft aan dat er dan vaak voor wordt gekozen om het verlies wat gedraaid wordt op een project hoog in de boom op te vangen, zodat op een lager niveau in de organisatie doorgewerkt kan worden. Als dit niet gedaan wordt kan een project team zijn motivatie verliezen om de hoogst haalbare kwaliteit te leveren en wordt er gewerkt om de verliezen zo veel mogelijk te beperken.

Expert 2 geeft onderstreept dat frustraties binnen de project organisatie ontstaan zodra het opdrachtgeversteam en opdrachtnemersteam een verschillende perceptie van dezelfde gebeurtenissen hebben. Ondanks dit, moet een project team niet nastreven een perfecte wereld te creëren. Dit valt altijd

tegen, juist vanwege de onvoorspelbaarheid van het externe domein. Wel is de maatregel om vooraf meer aandacht aan deze verschillen te besteden wat haar betreft erg nuttig om meer begrip te kweken. Expert 3 stelt de vraag: als alles goed gaat, is er dan wel sprake en/of behoefte aan samenwerking? Wijzigingen aan het project zijn over het algemeen de reden dat samenwerking nodig is.

Expert 4 is sterk van mening dat uiteindelijk de perceptie van een individu onderhevig is aan de rol die diegene vertegenwoordigd in een project, eerdere ervaringen en leeftijd. Alle experts verwachten dat omgaan met wijzigingen binnen een project als minder verstorend ervaren hoe ouder de desbetreffende persoon is (in ervaringsjaren). Een reden waarom het ondanks dit moeilijk blijft om, om te gaan met de asset-owner is het verschil in cultuur tussen de organisaties. De asset-owner houdt er over het algemeen een andere bedrijfscultuur op na. Expert 3 voegt hier wel aan toe dat de rol van asset-owner in ontwikkeling is. Waar dit traditioneel een heel ander beroep is met weinig begrip voor de project organisatie wordt er aan gewerkt om deze dichter bij elkaar te brengen. Zo begint het al in meer projecten gewoon te worden om periodiek gemeenschappelijk overleg te hebben waar opdrachtgever, opdrachtnemer en asset-owner samen komen. Hij acht de maatregelen op dit gebied dan ook zeker relevant.

Het lijkt alle experts erg gunstig om voordat de opdrachtnemer aan boord komt meer tijd te investeren in de afstemming met de beheerder. Expert 1 geeft aan dat momenteel deze betrokkenheid beperkt blijft tot de inhoud van het project maar ook het proces doorspreken kan interessante gevolgen hebben. Zo kunnen er afspraken gemaakt worden over het doorvoeren van wijzigingen en wordt de asset-owner eerder in het traject gestimuleerd na te denken over zijn eisen en wensen voor het eindproduct. Expert 4 raadt aan om de beheerder te betrekken in de verificatie en specificatie. Hij verwacht dat de opdrachtgever hierin verantwoordelijkheid moet nemen om het contact met de asset-owner vorm te geven. De verwachting is dat het schriftelijk vastleggen van de relatie met de asset-owner op zowel de inhoud als het proces haalbaar is, maar handhaven lastig kan blijken te zijn. Om de kans op naleving en mogelijkheden voor handhaving te verhogen moet dit document voor aanbesteding opgesteld en getekend zijn door beide partijen.

Het gepresenteerde flexibel budgetteren is een interessante optie. Expert 5 geeft aan dat tijdens project het contract en de scope welke initieel opgesteld is veranderd altijd nog gedurende het proces. Op deze manier kan hier makkelijker mee omgegaan worden. Expert 3 maakt wel de kanttekening gemaakt dat een hoge mate van vertrouwen en transparantie tussen opdrachtgever en opdrachtnemer nodig is om te voorkomen dat dit potjes met 'gratis' geld worden voor de opdrachtnemer.

Expert 2 verteld dat een communicatieplan en fasering al in gebruik zijn om de omgeving te managen en periodiek feedback te geven. In de praktijk wordt wel ervaren dat de omgevingsmanager bij de opdrachtnemer vaak geen mandaat heeft en een minder duidelijke positie binnen de organisatie vervult. Ze verwacht dat dit kan de mogelijkheden voor flexibiliteit verlagen, aangezien dit vaak proces gerichte mensen zijn. De experts zijn het er over eens dat omgevingsmanager vaak een ander type mens is dan de andere rolhouders en dat het een kracht is als teams de omgevingsmanager betrekken bij inhoudelijke discussies, omdat hier vaak een waardevol (ander geluid) vandaan komt.

Vanuit zijn achtergrond bij een aannemer deelt expert 4 dat hij het gevoel heeft dat het de opdrachtgever vaak ontbreekt aan begrip van- en voor de cashflow van de opdrachtnemer. Dit wordt als erg belangrijk gezien voor het rechte trekken van percepties binnen de project organisatie. Om dit tegen te gaan is een van de KPI's tijdens project een eerlijke (financiële) risico verdeling tussen opdrachtgever en

opdrachtnemer. Overigens is het ook zo dat de houding van de opdrachtgever richting de opdrachtnemer kan tot frustratie binnen de organisatie leiden. Een opdrachtgever kan zichzelf profileren als actief door met bijvoorbeeld vergunningskwesties de opdrachtnemer bij te staan. Opdrachtgever onderschat vaak welk signaal- en welke impact ze afgeven aan de opdrachtgever.

Expert 5 geeft als alternatief om tijdens de project start-up (PSU) hierover met elkaar in gesprek te gaan. Deze periode geeft de ideale gelegenheid om het met het projectteam te hebben over normen en waarden, verwachtingen en doelen. Gebruikelijk is om hier de zachte kant van de samenwerking aandacht te geven, maar financiële verwachtingen mogen hier best uitgesproken worden als dit bijdraagt aan het vormen van één organisatie. Dit kan begrip kweken voor de reactie die andere leden van het management team hebben naar aanleiding van externe gebeurtenissen. In algemene zin zou de PSU meer gebruikt moeten worden om het verwachtingspatroon met betrekking tot de eerder genoemde gespreksondewerpen gelijk te trekken. Expert 1 sluit zich hier bij aan.

Alle experts verwachten dat het opstellen van een code-of-conduct voor het projectteam het meeste effect heeft als dit gedaan wordt na het invullen van de rollen als het project de tenderfase voorbij is. Ondanks dat de invulling van de rollen nog kan veranderen, kan er een begin gemaakt worden aan de projectcultuur. Deze normen en waarden en leefregels kunnen doorgegeven worden aan nieuwe werknemers. Het creëren van deze projectcultuur wordt als heel waardevol beoordeeld, omdat dit zorgt voor een bepaald gedachtegoed waar je elkaar gedurende de looptijd van het project aan kunt houden en op kan reflecteren. Indien er bovenmatig veel personeelsverloop binnen de projectorganisatie plaats vindt wordt wel aangeraden de mogelijkheid in te bouwen dat dit document herzien kan worden.

Alle experts geven aan hele positieve ervaring te hebben met projectorganisaties waarin informele overleggen georganiseerd worden. De transparantie die hier aanwezig is beïnvloedt de onderlinge relaties op positieve wijze en het stelt individuen in staat om elkaar preventief/reactief te kunnen helpen. Expert 2 beveelt aan om expliciet om de samenwerking in zowel formele als informele overleggen onderwerp van gesprek te maken. In de huidige situatie zijn deze overleggen voornamelijk gefocust op de inhoud.

Expert 1 geeft aan dat er veel ruimte is om de coaching sessies te verbeteren door middel van meer project-specifieke aandacht. De andere experts sluiten zich hier bij aan. Hij noemt hiervoor als reden dat deze sessies vaak erg generiek zijn nemen niet alle leden van het management team deze even serieus nemen waardoor niet de volledige potentie uit deze trainingen gehaald wordt. Hij suggereert dat een vorm van dit onderzoek zelfs onderdeel kan zijn van de team-assessment. Dit biedt zelfreflectie voor je eigen onderliggende perspectief en dit wordt als een nuttig middel gezien. De experts geven aan tot dit moment nog niet actief stil gestaan te hebben bij hoe zij tegen de externe omgeving aankijken en of dit eventueel zou verschillen van hun teamgenoten. De verwachting is dat dit het onderlinge begrip en vooral de relatie tussen counterparts ten goede kan komen.

Expert 4 raadt concreet aan om de benaming van categorie 1 en 3 te veranderen. De huidige benaming dekt de lading maar beperkt.

### *Suggesties voor verbetering*

Expert 3 geeft aan dat externe factoren en vooral verstoringen traditioneel makkelijk weggezet als negatief. Echter geeft hij aan dat ondanks de lading van een gebeurtenis het een enorme kracht is van een projectorganisatie als er toch naar een kans gezocht kan worden. Het creëren van een window of

opportunity naar aanleiding van een externe gebeurtenis kan de samenwerking zeer ten goede komen. Het ondersteunen van elkaar in het creëren van kansen verhoogt het onderlinge vertrouwen en de welwillendheid om in de toekomst iets voor een ander te doen.

Expert 5 geeft aan dat het uitvergroten van elkaar fouten voor de meeste verstoring zorgt binnen de samenwerking. Als een team niet in staat is na een fout op gelijke basis verder te werken, maar continue terug refereert naar de fout zal het vertrouwen nooit herstellen. De partij die hier een fout begaan heeft wordt ook onwelwillend om extra inspanning te verrichten.

Expert 4 geeft aan dat in de praktijk wordt ervaren dat het moment van optreden van- en de communicatie omtrent een verstoring vaak een grotere invloed heeft op de samenwerking dan de inhoud van de verstoring. Hier licht een verbindende rol voor de projectmanager om het team scherp te houden. Zowel naar de interne organisatie, als externe omringende organisaties. Hij onderstreept hiermee zijn eerdere punt dat de soft-side erg belangrijk is.

Expert 2 deelt een ervaring uit haar huidige project op basis waarvan ze een relevante maatregel wilt voorstellen. Deze maatregel is de suggestie om een exit-clausule in te bouwen in het contract. Momenteel is zij werkzaam in een project waar de relatie tussen opdrachtgever en opdrachtnemer volledig ontspoord is en er sprake is van een gestaakte communicatie. Een exit-clausule kan helpen om het gesprek opnieuw aan te kunnen gaan. De kanttekening wordt direct gemaakt dat dit goed ontworpen moet worden omdat het niet te makkelijk gemaakt moet worden om uit een samenwerking/project te stappen. Een drempel ter activatie zou dus zeker ingebouwd moeten worden.