

# Explaining cost overrun in Dutch infrastructure projects by the influence of boundary spanning activities

*A comparative case based analysis of the A12 Lunetten - Veenendaal  
& N18 Varsseveld - Enschede*



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## Colophon

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## **Abstract**

A DBFM contract gives private organizations much room for design and own interpretation to the contract. Boundary spanners must function as a builder between boundaries. They must attempt to break the boundaries when building trust, and simultaneously protect their own interests. This research looks beyond the formal contractual agreements and tries to find out how certain activities of boundary spanners might influence cost overrun in PPP projects. Two Dutch DBFM infrastructure projects are compared, and within these projects, in-depth interviews of public and private actors are conducted. The data that is acquired will be laid against already existing literature, which will attempt to answer the main research question. Getting a better understanding of these complex social interactions might improve the relationship between the private and public sector in future PPP projects, potentially improving collaboration and the feeling of trust within the design and building phase of a PPP project, resulting in less conflicts and a higher level of performance overall. An increase in collaboration and trust will not only be valuable in completing a project in time, which is one of the main factors when it comes to costs, but also in creative problem solving throughout the building phase of a PPP project.

## **Keywords:**

*Public-Private Partnership, Boundary spanner, DBFM, Cost overrun, Infrastructure projects*

## **1. Introduction**

### **1.1 Background to the study**

Within Public-Private Partnerships (PPPs), the emphasis of the overarching theme is on boundary spanners and how they can contribute to the achievement of good outcomes in PPPs. A good outcome of a project is highly contextual and can be defined in multiple ways. According to Ullah et al., (2018) completing construction projects within the originally planned budget is one of the most important points when evaluating the success of a project but, cost overrun still remains a recurring phenomenon in many construction projects. Dutch large scale infrastructure projects have a average cost overrun of 16,5% (Cantarelli, Molin, van Wee and Flyvbjerg, 2012). For this study the focus will be on DBFM contracts where a boundary spanner could play a significant role as basis of a DBFM contract is on Public-Private parties collaborating. It is therefore important to get a clear understanding of what a boundary spanner is, and what a boundary spanner can do to reduce cost overrun as they could play an important role in cost reduction within DBFM contracts

### **1.2 Theoretical relevance**

Boundary spanners have been found to be instrumental in increasing the success of the collaborative process in inter-organizational relationships (Williams, 2002), as well as being essential to the establishment and maintenance of trust and commitment in collaborative relationships (Perrone et al., 2003). Boundary spanners can be considered as the bridge between different organizations. Robert Jones and Gary Noble (2008) explain that this is often the case between similar organizational relationships, namely private-private or public-public. However, in the case of public-private partnerships, there are different motivations, roles in the economy, governance mechanisms, and organizational cultures to be considered (Klijn and Teisman, 2003). In the past few years literature on boundary spanning has increased, and most of this literature is focused on the various effects of boundary spanning behavior (van Meerkerk and Edelenbos, 2017). In existing literature, different causes for cost overrun are identified. There is however little research on how boundary spanners are of influence on this relationship. In the research of Van Meerkerk and Edelenbos (2014), the effect of boundary spanners on trust and performance is discussed, but no explicit link is made with regard to cost overrun, and how performance may reduce costs. According to Flyvbjerg et al., (2018) overrun is caused by underestimation, which often happens years before the actual overrun is established. It is in this stage that boundary spanners could be present and possibly influence decision making, which could later result in cost overrun. It is therefore interesting to identify boundary spanners in this stage of decision making, find out if there is a relationship between boundary spanners and cost overrun, and if so, how this relationship can be used to reduce cost overrun.

### **1.3 Societal relevance**

There is a wide variety among academics with regard to the measures of success of a project. According to Trujillo et al., (2018), a good outcome or "success" of an infrastructure project can be distinguished by four types of "success variables" namely: (lack of) cost overruns, (lack of) time delays, level of traffic, and (generated) revenues. Grimsey and Lewis (2002) find it obvious that there is assurance for the public sector regarding value-for-money. However, this seems not always to be the case as PPP projects are likely to be prone to budget overruns and delays (Trujillo et al., 2018). There is substantial budget underestimation found in the strategic decision-making process of both PPP and non-PPP models of project delivery (Zhang, Chen and Yuan, 2019). Potential cost reduction could be achieved by explaining if there is a possible relationship between boundary spanners and the cost overrun of a project. Reducing costs is particularly relevant for people who take final responsibility for a project, as cost overrun can be identified as one of the factors that will make a project a success or a failure. Lower cost will make a project more appealing for decision makers to approve a project, and these lower costing projects will acquire a competitive advantage in contrast to projects without this

knowledge. In this paper, the emphasis is only on the cost overrun, and how boundary spanners are of influence to this variable, as this paper is not comprehensive to discuss all the different measures of success and costs being the most relevant for society, given that not only private but also public money is spend on PPP projects.

#### **1.4 Research problem**

The aim of this research is to explain to which extend boundary spanners and their activities influence the cost overrun of road infrastructure PPP projects. This will be done by conducting a qualitative comparative case analysis of the N18 Varsseveld - Enschede, and the A12 Lunetten - Veenendaal. These cases represents the situation of, on the one hand boundary spanning activities, and on the other hand some form of cost overrun. Both cases are similar projects, being large infrastructure projects with a CAPEX of more than 100 million euros and similar in contract duration and date of contract close.

This will be done by the following research question:

*“How do boundary spanning activities influence the cost overrun of road infrastructure PPP projects in the Netherlands?”*

Consequently, the questions that are derived from the main research question are:

- 1. How can the type of PPP be defined in the case of the N18 Varsseveld - Enschede & the A12 Lunetten-Veenendaal?*
- 2. What kind of boundary spanning activities can be distinguished when comparing the cases of N18 Varsseveld – Ensched & the A12 Lunetten – Veenendaal?*
- 3. Which boundary spanning activities can be distinguished with relation to cost overrun when comparing the cases of N18 Varsseveld - Enschede & the A12 Lunetten-Veenendaal?*

#### **1.5 Structure**

This thesis is further structured as follows: In chapter two the core concepts will be defined on the basis of existing literature. The third chapter elaborates on the research method, case selection and data collection. Chapter four discusses the results obtained by the studying the cases of the N18 and the A12. In chapter five conclusions are made and recommendations are being offered. Chapter 6 will consist of a discussion about the findings followed by a reflection of the study.

## 2. Theoretical framework

### 2.1 Defining cost overrun

Within the literature there are numerous definitions regarding the performance, or success of a projects. This is also the same for cost overrun. As cost overrun is being viewed in this paper as the definition for the level of success and/or performance of a project, a clear definition is necessary. Cantarelli, Molin, van Wee and Flyvbjerg (2012) find that the two most important data for cost overrun are actual costs and estimated costs. Actual costs are the cost of the year of completion, so when the construction phase is completed. The estimated cost are defined as costs at the time of formal Decision to build. According to Flyvbjerg et al., (2018) cost overrun can be measured in an absolute way, which is the actual cost minus the estimated cost or in a relative way, which is either the actual cost as a percentage of estimated cost, or the ratio is taken of actual cost divided by the estimated cost. Flyvbjerg et al., (2018) argues that a more accurate comparison across investments, geographies, and time periods can be made when the cost is indicated in relative terms. To make the most accurate comparison between cases, the cost overrun will be measured over the construction phase in a relative way. This equals out the differences in capital size and differences at the time of cost estimations. In this study the focus will be on the project as a whole in terms of cost overruns.

### 2.2 Defining PPP projects

Public-Private partnerships, or PPP's are defined by Savas (2000) as an arrangement between the government, which has a desire to effectuate a project, and a private entity. Within this partnership there are different degrees regarding the integrality of a contract. There are up to six different phases that can be integrated in one contract namely: designing, building, financing, maintaining, operating and owning (Savas, 2000). Each phase making the partnership more integrated. Klijn and Teisman (2003) define a PPP in a broader term where there is a durable cooperation between public and private actors involving common risks, costs and profits.

#### 2.2.1 Defining structure DBFM

There are multiple partners involved within a DBFM contract. These main parties can be subdivided into smaller groups. The contractor consist of a consortium which is called the "Special Purpose Company" (SPC). The SPC has subcontractors which are for example in charge of the maintenance, design and construction of the project. The public party is the client, and will close a contract with this SPC. The SPC has also the task to attract financial capital for the realization and construction of the project. This can be partially equity or outside capital (Hamdan et al, 2014 ; Koppenjan et al., 2020). A schematical representation of this DBFM(O) organizational structure is given in figure 2.1

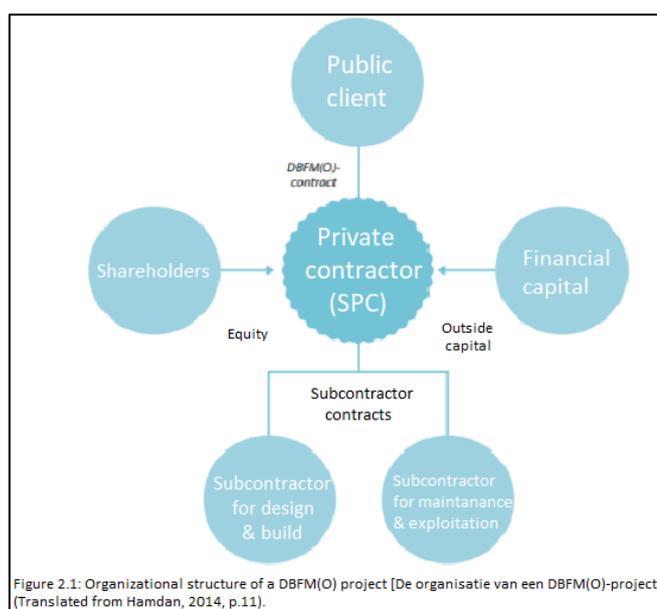


Figure 2.1: Organizational structure of a DBFM(O) project [De organisatie van een DBFM(O)-project] (Translated from Hamdan, 2014, p.11).

## **2.3 Boundary spanning activities**

### **2.3.1 Defining boundary spanning activities**

Williams (2002) discusses what defines the profile of a competent boundary spanner. Boundary spanners must function as a builder between boundaries. They must attempt to break the boundaries when building trust, and simultaneously protect their own interests (Bacharach et al., 2000). They must find common ground, as Ansell and Gash (2007) point out that in the course of the collaboration between the different parties, a shared belief of achievement must emerge. This is an ongoing balance between whether to include or isolate and to be more dependent on other parties involved, or strive for a more independent approach (Williams, 2002). Additional to these different roles, several themes and perspectives on boundary spanners, according to existing literature, are identified. The article identifies and categorizes boundary spanning to get a better understanding of the competencies that result in an effective collaborative behavior. The dimensions by which a boundary spanner is characterized and how this may influence cost overrun is further elaborated below.

### **2.4 Different roles of a boundary spanner**

In this research, a combination of the three different roles and their characteristics will be expected in defining boundary spanners and their activities in relation to cost overrun.

#### **2.4.1 The boundary spanner as entrepreneur and innovator**

Williams (2002) couples this role of a boundary spanner to problems where traditional approaches appear to be insufficient. He states that this role should not be professional and organizational by nature, and would therefore be more suitable for complex public policy problems. These type of boundary spanners can be seen as "rule-breakers" with characteristics of creativity and flexibility (Challis, 1998). The focus will not be specifically on the boundary spanner as entrepreneur and innovator, as the emphasis of this research is on Public-Private relationships, and not on complex public policy problems. However, this does not mean that some of the characteristics discussed above could be present in the boundary spanners that are being studied.

#### **2.4.2 The boundary spanner as a leader**

There is a distinction being made between modern and postmodern leadership. A modern leadership style characterizes itself by a more hierarchical basis, where one takes the lead in an organization and drives their followers in one direction. Postmodern leadership is based on a non-hierarchical and inter-organizational structure where collaboration, agreements and collective actions are central (Luke, 1998). Looking at the period of time of development of the A12 and N18, characterizations of postmodern leadership can be expected in these projects.

#### **2.4.3 The boundary spanner as reticulist**

Webb (1991) defines reticulists as individuals who are exceptionally responsive and especially capable in building bridges between interests, professions, and organizations. Degeling (1995) identifies reticulists as individuals who have a clear understanding of coupling, interdependencies, and disagreements in players who are strategically allocated. Klijn and Koppenjan (2016) say that for understanding performance within a PPP correctly, we must see beyond the formal rules and contracts of PPPs. Trist (1983) describes reticulists as individuals which basis of communication is more socially than institutionally by nature. This could have a positive or negative influence on the trust between different organizations as Ring and Van de Ven (1994) see this bonding process on a more social level as a positive influence when it comes to sharing values and increasing trust between

organizations. LGMB (1997) on the other hand states that there are potential downsides of informal and personal type of relationships. Tensions between organizations could emerge regarding responsibility and the distinctive vulnerability of personal relationships could quickly be damaged which will negatively influence the trust between organizations.

## **2.6 Trust**

Several definitions of trust are being given in the literature. Rousseau, Sitkin, Burt and Camerer (1998) define trust as a psychological state with the goal of acceptance towards vulnerability established by positive expectations of a different person. Smyth and Edkins (2007) argue that this psychological definition is too specific with regards to projects and define trust in a more general way. In this more generic definition trust can be seen as a position of willingness, vulnerability and relying upon other parties involved, potentially resulting in collaboration between these parties. According to Williams (2002) trust can be seen as one of the most important factors when looking at interorganizational relationships. Each time expectations are met, trust between both parties is increased. This will subsequently increase the positive expectations about future projects (Vangen and Huxham, 1998). Warsen et al., (2018) state what with the absence of trust, it will be very difficult for a partnership to perform accordingly, as the actors that are involved in this partnership will probably not participate in risk taking actions. In addition to this, trust is found to function as an important part in combining formal contracts with additional informal socially oriented processes. Furthermore, a high level of trust seems to be positively associated with collaboration between different parties and the perceived performance of a PPP project according to Warsen et al., (2018).

## **2.7 Collaboration**

Skelcher and Sullivan (2008) see collaboration as a gain in mutual benefits for the parties involved, which would otherwise not be present. Warsen et al., (2018) concludes that good collaboration between different parties positively correlates with performance in PPP projects. Past conflicts will create an endless loop of suspicion and mistrust unless actions are taken to restore this. On the contrary however could successes in the past result in an effectively functioning social network of relationships among different parties and high levels of trust. This produces an endless loop of collaboration (Ansell and Gash, 2007). These claims are reinforced by the theory of interdependency. Koppenjan and Klijn (2004) state herein that collaboration emerges as a result of interdependencies between different parties. Collaboration is in this theory the standard, whereas conflict will deviate from this norm as a result of inadequate adherence to the rules and insufficient institutional design.

## 2.8 Conceptual model

In figure 2.1 a visual representation is given of how it is expected that the combined characteristics of a boundary spanner and its activities related to the level of trust and collaboration. Inadequate boundary spanning activity might cause conflicts which will negatively influence trust. Without trust there will be less collaboration expected resulting in a decrease of performance and an increase in costs, resulting in cost overrun. If high levels of trust and collaboration are achieved by boundary spanning activities, less conflicts will emerge, collective action will be taken and time delays could be prevented, contributing to the absence of cost overrun.

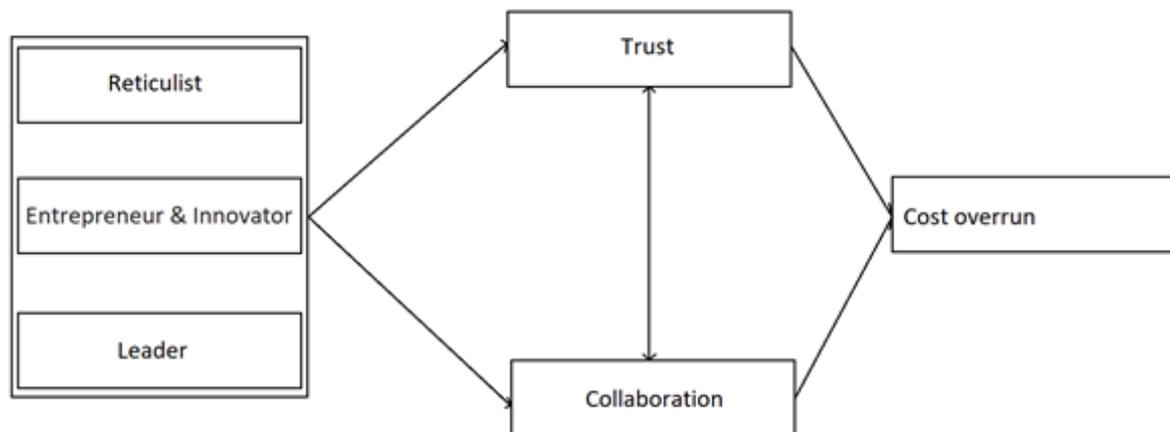


Figure 2.1: conceptual model (Author, 2021)

### **3. Methodology**

#### **3.1 Comparative case based method**

Specific quantitative data with regard to costs of PPP projects is very difficult to acquire due to privacy reasons. Therefore, a comparative case based study approach is chosen. One case will have while have indicators of successful performance, while the other case achieved this to a lesser extent. This comparative case based approach of two cases will make it possible to answer the research problem, without the necessity of any specific quantitative data.

#### **3.2 Case descriptions**

##### **3.2.1 N18 Varsseveld - Enschede**

The main adjustment that is made concerning the N18 between Varsseveld and Enschede is the completion of a new 27 kilometers super two road, addition of new bridges, viaducts and bike tunnels. The building contract was between 2016 and 2018 and was carried out by Rijkswaterstaat. The contractor is a consortium under the name "Noarber18".



Map 3.1: Trajectory of the N18 Varsseveld-Enschede (Mobiliteitsplatform, 2018)

##### **3.2.2 A12 Lunetten-Veenendaal**

The expansion of the A12 concerns the addition of extra traffic lanes on both sides of the road. In the process, the A12 was subjected to a complete reconstruction (BAM Infra Nederland, 2018). The duration of the building contract was between 2010 and 2012, and it was carried out for Rijkswaterstaat Dienst Infrastructuur. The contractor in the case of the A12 was Bam Poort van Bunnink.



Map 3.2: Trajectory of the A12 Lunetten-Veenendaal (Verbreiding A12 Utrecht Lunetten – Veenendaal, 2009)

### 3.2.3 Case selection

The selection of the cases is based on indicators of media and additional document, which show to which extend a project was successful or not. These indicators are: initial costs compared to cost at the completion of the projects, time, and overall performance. The N18 can be considered less successful. Whereas the initial costs were estimated at 299 million the total construction costs was approximately 320 million (DPG Media Privacy Gate, 2019 ; de Gelderlander, 2018). For the second case, the A12, the way of collaboration was awarded with the “Nederlandse bouwpluim 2013” (Persbericht Rijkswaterstaat, 2013). The A12 distinguishes oneself by showing mutual flexibility and quick decision making. The completion was therefore two years earlier than originally planned (Duurzaamgebouwd, 2013). Therefore can the A12 be seen as a project which was successful. The cases are also selected based on similar characteristics. Both cases are on the basis of a DBFM contract, have similar contract durations respectively twenty and twenty five years, and are constructed in the same duration of two years.

### 3.3 Data collection

Multiple methods and different sources of information are used to maximize the understanding of the research question. For this research, data is collected in the form of a qualitative case-based approach by conducting semi-structured in-dept interviews.

In the first stage of the data collection, primary qualitative data was gathered. This was done by conducting semi-structured in-dept interviews with private and public parties which were involved in the A12 and N18 projects. The amount of respondent between the public and private sector is close to equal, as the projects are a result of Public-Private-Partnership. Semi-structured interviews will give some form of established order while at the same time provides questions which are arranged in a flexible manner (Dunn 2005). The semi-structured interviews are informal of nature, and allow for open answers instead of a simple one word closed response (Clifford et al., 2016). This interview method will make it possible to further elaborate on specific boundary spanning activities, different perspectives on collaboration and trust and the underlying effects that have possibly occurred during the realization phase of the projects, whereas structured interviews would not give the possibility to dive into these effects and give meaning to these relationships. The interviews were conducted by phone, Microsoft teams or Google Meet. The interviews by phone were recorded by a program called “Voice recorder”. A detailed list of the interviews is given in table 3.1 and 3.2

NAME	ORGANIZATION	ROLE/FUNCTION	DATE	MEDIUM	DURATION
<b>RESPONDENT 1 (R1)</b>	BAM infra bv (Private)	EPC manager	26/5/2021	Phone	33 min
<b>RESPONDENT 2 (R2)</b>	Rijkswaterstaat (Public)	Technical manager	2/6/2021	Google Meet	49 min
<b>RESPONDENT 3(R3)</b>	BAM infra bv (Private)	SPC manager	3/6/2021	Microsoft Teams	45 min
<b>RESPONDENT 4(R4)</b>	Rijkswaterstaat (Public)	Environment manager	16/6/2021	Google Meet	37 min

Table 3.1: list of details interviews A12

NAME	ORGANIZATION	ROLE/FUNCTION	DATE	MEDIUM	DURATION
<b>RESPONDENT 5 (R5)</b>	KWS/Noaber18 (Private)	GWW/EPC Project manager	8/6/2021	Google Meet	31 min
<b>RESPONDENT 6 (R6)</b>	Rijkswaterstaat (Public)	Technical manager	9/6/2021	Google Meet	37 min
<b>RESPONDENT 7 (R7)</b>	Rijkswaterstaat (Public)	Project control manager	9/6/2021	Google Meet	44 min P
<b>RESPONDENT 8 (R8)</b>	Rijkswaterstaat (Public)	Project manager	10/6/2021	Google Meet	51 min

Table 3.2: list of details interviews N18

### 3.4 Data analysis

The online recordings have been transcribed using a transcribing program 'Amberscript'. These transcripts were manually checked and altered, as the quality level was not sufficient enough for coding. For the coding of the transcriptions, the coding program 'ATLAS.ti' was used. The data was coded using the deductive codes gathered from the literature (appendix 3). Subsequently, an inductive coding scheme was developed for a deeper and more complete understanding of the boundary spanning activities in reducing cost overrun. These activities, which were not covered by the literature, would otherwise not be revealed, and could therefore give more insights in the answering the sub questions.

### 3.5 Ethical considerations

A consent document is signed by the respondent that were interviewed. As interviewees gave insight in privacy and personal relations between them and other parties involved, the option was given for different levels of anonymity, ranging from an alias being fully anonymous, or being referred to with name and/or surname and/or function. Participants were given the right to stop the interview at any time and to refuse certain questions. The transcripts will only be used for this research, and the transcripts will be send to the respondent if they desire so. A full overview of all the rights and privacy options that the respondent were given is listed in the consent document in Appendix 2. All the data that was collected is stored on a computer database which can only be accessed by the researcher himself.

## **4 Results**

Within this chapter the data that has been collected and analyzed will be discussed. This chapter is structured in sub-sections and in each section different aspects of the theoretical framework will be discussed in the light of answering the different sub-questions.

### **4.1 Structure of the PPP projects**

The N18 and A12 are both outsourced in a DBFM contracts by Rijkswaterstaat, and with a maintenance phase of 20 years. A characterization of this DBFM contract is that the contractor self finds financiers for the projects instead of the client. The client, in both cases Rijkswaterstaat, pay repayment in the form of rent for the duration of 20 years. For the A12 BAM was the only contractor, consisting of multiple intern BAM sub-contractors. BAM financed the project with equity and a combination of external investors. The N18 was outsourced to Volkerwessel in the form of a consortium under the name 'Noarber18', which also involved KWS, who was in charge of the road, and Hattum van Blankevoort who did the viaducts and tunnels. Within Rijkswaterstaat, the combination of five managers make the project management team namely: project manager, projects control, technical manager, environment manager and a contract manager.

### **4.2 Different roles of a boundary spanner**

#### **4.2.1 The boundary spanner as entrepreneur and innovator**

It can be seen that a boundary spanner establishes oneself as a flexible actor, especially within a DBFM contract. A DBFM contract gives more room for own interpretation as R2 states: *"you hear people say that you have to give room to design task, this will give the contractor more possibilities to give substance to this task"* (R2, 2021). For some problems, where traditional approaches seemed insufficient, an alternative way of thinking was necessary (R3, 2021). However, there is a downside to this as R2 admits that this open interpretation will make a design less concrete (R2, 2021).

#### **4.2.2 The boundary spanner as a leader**

At the start of the N18 it seemed that there was a lack of collective action across the different actors. This is confirmed by R7 who states that: *"at the start I found the collaboration rusty"* (R7, 2021) This may be due to the fact that a form of collective action was missing as the different stakeholder dug their heels in the sand (R8, 2021).

#### **4.2.3 The boundary spanner as reticulist**

A distinction can be seen on the basis of communication as respondents state that the formal way of communication strictly speaking goes through the contract manager (R2, R3, R4, R7, 2021). The relationship with the investors is also on a formal basis (R1, 2021). This overall form of communication between other actors was more socially by nature, but there was always a formal basis of communication in the form of a contract. Before the formal basis is formulated in the form of a contract, 80 percent so to speak, is already aligned by means of informal communication between actors (R2, 2021). However, if there was no such formal basis, conflicts could emerge as R7 noticed: *"a sidetrack emerged besides the contract, but this always needs to be a reflection of the contractual agreements. Sometimes this was missing, and at some points it resulted in disagreement about these issues"* (R7,2021).

## 4.3 Building and breaking down boundaries

### 4.3.1 Level of dependency

There was a high level of dependency between the different parties involved, according to all respondents. However, the reason for this feeling of dependency seems to be different between the two projects. According to the actors involved in the A12 this is due to the fact that collaboration between different fields of expertise is necessary to solve issues that emerge during the project (R1, R2, R3, R4). At the N18 on the other hand, the feeling of being dependent on other actors was more a design issue with the stakeholders, rather than the necessary feeling of combining forces (R5, R8, 2021).

### 4.3.2 Feeling of a common goal

All respondents acknowledge the feeling of a common goal. This common goal differs between respondents. Multiple respondents see the financial and delivery date as the main common goal (R3, R4, R5, R6, R7, R8, 2021). Respondents of the A12 find that there are more ambitious common goals with regard to public interests and environment, in addition to these financial and delivery goals. They seek for a common goal that inspires (R2, R3, R4, 2021). This is described by R3: *“that was beautiful with the A12, we had ambition with that project. Satisfied customer, stakeholder, road user. This was always our starting point of the project”* (R3, 2021). Between some parties, there is no common goal to be found, as R1 states: *“some environment parties don’t want a highway at all. Than you don’t have a common goal obviously”*. In the end the goal orientation of the private sector is more profit related, as they find that the most important thing (R2, R6, R7, 2021).

## 4.4 Trust

### 4.4.1 Positively influence on trust

The feeling of trust between different parties is something that is easily damaged, and which is rather hard to gain (R3, 2021). Making promises and committing to that promise will increase trust (R3, R8, 2021). The level of trust is also increased when actors have the feeling of being treated fairly (R3, 2021). When problems occurred and aid was being offered in solving it together, even if that was not formulated as such in the contract, trust increased. R1 describes such a situation of looking beyond the formal contract: *“ Instead of looking at the contract in black and white and saying ‘BAM it is your problem, solve it’, Rijkswaterstaat helped us and did not let us down. This gave us a boost in trust because you know that, when something gets difficult they are there for you”* (R1, 2021). Effort alone in building trust can be a contribution in restoring trust, if that effort is being noticed (R3, R6, 2021). If someone is experienced in the field and knows what to do, a feeling of a good outcome and an increase in trust can be perceived (R3, R8, 2021). Also, the type of contract seems to give confidence in trust as R2 states: *“I have personally more trust in parties that build it and also have to maintain it themselves, instead of a situation where person A builds it and person B does the maintenance”* (R2, 2021).

### 4.4.2 Negatively influencing trust

Sometimes agreements were being violated. This had a negative impact on trust (R7, 2021) A domino effect can be seen when trust was damaged. R7 describes it as a wave effect and R3 explains that it can escalate very rapidly in the wrong direction (R3, R7, 2021). It costs a lot of time and energy to restore this feeling of trust, once it has been damaged (R7, 2021). R7 acknowledges that *“it is always*

*good to listen to both sides of the story. Than you notice sometimes: they have interpreted it differently” (R7, 2021).*

#### **4.5 Collaboration**

All the respondents of the A12 had confidence in future collaboration. This was more related to the actual people they collaborated with than the company itself. At the N18 there was less confidence as R5 describes the relationship with the stakeholders as follows: *“with half of all the stakeholder the relationship was just very bad” (R5, 2021).* While the N18 was a DBFM type of contract, some people were still holding on to old ‘RAW type’ of contract thinking. These different perspectives of implementation of the contract were not conducive to the collaborative process. (R7, 2021). It can be seen that experiences with the contract type and previous lessons learnt from other projects are beneficial for the collaboration in these projects (R1, R3, R7, 2021).

#### **4.6 Comparing the A12 and N18**

At the start of the N18 there was a low level of collectivity. This was not the case with the A12 as BAM came with a great EMVI plan from the beginning, which gave a lot of trust (R4, 2021). R5, R8 both see the importance of collaboration at the start of a project, but acknowledge that this was missing at the start of the N18 (R5, R8, 2021). This resulted in unnecessary changes in the design which did increase costs. This was sometimes necessary to accommodate for wishes of the stakeholders (R5, R6, 2021). When comparing the A12 and N18, it can be seen that this was more often the case with the N18 than with the A12. Finding out what the needs and wishes are in an early stage of the process will prevent these extra design costs. Close collaboration is also acknowledged as a way to reduce costs as a respondent stated that: *“we knew that, the closer we worked together, the more we would succeed in reducing the costs” (R8, 2021).* Cost overrun of the N18 was also traced back to a low price estimation, underestimation of risks, errors in assumptions that were made due to little time and not enough exploration in available data (R7, R8, 2021). At the A12 this was happening to a much lesser extent.

## **5 Conclusion & Recommendations**

This chapter will try to answer the three sub-questions stated at the beginning of this paper. This is done by linking the already existing literature in chapter two, and the findings of the N18 and A12. First, the sub-questions will be answered in the same order as stated in chapter 1. Lastly, the main research question will be answered with the help of these sub-questions.

### **5.1 Sub-questions**

1. *How can the type of PPP be defined in the case of the N18 Varsseveld - Enschede & the A12 Lunetten-Veenendaal?*

The PPP of the A12 and N18 consists of Rijkswaterstaat, which is part of the Ministry of Infrastructure and Water Management of the Netherlands, and private actors which are BAM and Noarber18 respectively. This PPP is described by Savas (2000) as the government and private entities, or in broader terms, the cooperation between public and private actors (Klijn and Teisman, 2003). Both the projects fit in the organizational structure of a DBFM project provided by Hamdan et al, (2014), as respondents, both of the private and public sector of the N18 and A12, describe this form of structure as the theoretical basis of their organizational structure and partnership.

2. *What kind of boundary spanning activities can be distinguished when comparing the cases of N18 Varsseveld – Enschede & the A12 Lunetten – Veenendaal?*

Within the projects, different types of boundary spanners can be seen, as well as the activities they perform accordingly. Some respondent show characteristics of creativity and flexibility (R2, R3, 2021 ; Challis, 1998). With the N18, respondents explain that there is a lack of leadership at the beginning due to the fact that a form of collective action was missing (R7, R8, 2021). Luke (1998) argues that collective action indeed should be central in postmodern leadership. An absence could therefore result in this lack of leadership. Almost all respondents acknowledge that the form of communication is more socially than institutionally by nature, this emphasis of informality is described by Trist (1983) as a characteristic of a reticulist. R7 (2021) state that conflicts and disagreements emerged if there was not enough formal contractual basis to rely on. This can be seen as the potential downside of relying too much on informal and personal relationships, which could negatively influence trust between actors (LGMB, 1997).

3. *Which boundary spanning activities can be distinguished with relation to cost overrun when comparing the cases of N18 Varsseveld - Enschede & the A12 Lunetten-Veenendaal?*

When comparing the boundary spanning activities of the two cases, one thing that stood out is that, with the A12, there was a higher level of collectivity and inclusion of all the different actors at the beginning of the project. This was not the case with the N18, as R5 (2021) says that this feeling of trust and collective collaboration across different actors was absent at the start. It was therefore very difficult to achieve a high level of performance (Warsen et al., 2018). For the N18 this poor level of performance could have resulted in time delays, resulting in cost overrun. The projects did finish in time however, and it is therefore interesting to see what the reason was behind this. R8 (2021) state that this is partly because of the pro-active attitude, listening to the different stakeholders and working towards solutions while simultaneously involving other actors. This endless loop of mistrust and lack of collaboration (Ansell and Gash, 2007), was by doing so broken.

## **5.2 Main research question**

*“How do boundary spanning activities influence the cost overrun of road infrastructure PPP projects in the Netherlands?”*

Boundary spanning activities that result in a high level of collectivity, collaboration and trust between private and public actors throughout a PPP project have a positive influence on the performance during the design and building phase. If this is not the case right from the beginning, it will take a lot of energy and time to achieve this later on. Williams (2002) state that trust is one of the most important factors with regard to interorganizational relationships. It can be concluded that with conflicts, relationships are damaged and collaboration will be less. This will seep through during the whole duration of the project. It is hard to restore trust, once it has been damaged. Preventing these conflicts in advance by conducting adequate boundary spanning is therefore the better option. So, if there is a lack of boundary spanning activities, extra costs may occur within a project, potentially resulting in cost overrun.

## **5.3 Recommendations**

The public client should give more attention to the feasibility of the tender and the risk assessment which a private party makes. This will prevent unforeseen costs and issues later on in the project when the design is already made. Also, preventing conflicts will later cause less harm to the quality of the relationships between different actors, consequently increasing performance. Public and private parties should acknowledge their differences, but at the same time focus on what binds them, which is completing the project as a success.

## **6 Discussion & Reflection**

### **6.1 Reflection on the outcome of the study**

Every project is on its own. As this research is a case study of only two cases, the findings can be seen as specific for these cases and may not apply in other contexts. As this research is on boundary spanning activities with regard to cost overrun, it should be acknowledged that there are more factors influencing cost overrun, and that boundary spanning is only one of them. Finally, cost overrun is only one of multiple factors that determine if a project can be considered a success. Future research could study how boundary spanning activities may influence these additional factors.

### **6.2 Limitations of the study**

The main limitations of this study was the lack of qualitative data. Without this data it was not really possible to allocate specific activities to specific costs. The recognition of some of the events perceived by the respondents were a bit blurry, as the projects were a long time ago. Also, only one contract type was being studied, namely DBFM. Additional research comparing other types of contracts and how boundary spanning activities differ between these different contract types could therefore be conducted.

### **6.3 Reflection on own research process**

Finding the right respondents was very time consuming, and due to COVID-19 an even bigger challenge. When looking back at the data collection phase this was underestimated. Major challenges emerged after hearing that nobody within the government actually knew where the MIRT documents before 2016 were being stored. These would have contained the actual and estimated costs of infrastructure projects in the Netherlands. Creative solutions were needed to work around this problem. Previous courses were very useful in preparation of this research. Doing research individually was sometimes perceived as difficult. Therefore, consultation meetings were very useful in terms of feedback on the research process, and provided an alternative point of view when needed.

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## Appendices

### Appendix 1.

#### Interview guide (questions in Dutch)

##### Introduction (10 min)

0. Bedanken voor zijn/haar tijd / vragen of het interview mag worden opgenomen / het verloop van het interview uitleggen / mijzelf en mijn onderzoek introduceren
1. Kunt u mij wat vertellen over uzelf en de organisatie waarin u werkt?
  - a. Wat is precies u functie binnen deze organisatie?
2. Hoe was u organisatie precies betrokken in dit project?
3. Wat was u specifieke rol precies binnen dit project?

##### Boundary spanning activities (10 min)

- Boundary spanner activities
4. Hoe zou u het karakter van de werkrelatie omschrijven met de personen van andere partijen/bedrijven met wie u heeft samengewerkt aan dit project?
    - a. Hoe was binnen deze werkrelatie de manier van communiceren met deze andere partijen/bedrijven?
    - b. Kunt u hier voorbeelden van noemen?
  - Building and breaking down boundaries
  5. Kunt u omschrijven in hoeverre u afhankelijk was van andere partijen/bedrijven?
  6. Had u het gevoel dat u samen aan het streven was voor een collectief doel?
    - a. Kunt u uitleggen wat dat doel precies was?

##### Trust (15 min)

7. Kunt u een gebeurtenis herinneren die een positieve invloed heeft gehad op het vertrouwen tussen uzelf en bepaalde partijen/bedrijven waar u mee te maken had?
  - a. Zo ja, wat heeft dat in uw ogen gedaan met betrekking tot de onderlinge samenwerking en het vertrouwen tussen beide partijen?
  - b. Zo ja bij 7, hebben er meer van deze gebeurtenissen plaats gevonden?
  - c. Zo ja bij b, hoeveel soortgelijke gebeurtenissen kunt u zich herinneren?
8. Kunt u een gebeurtenis herinneren die een negatieve invloed heeft gehad op het vertrouwen tussen uzelf en bepaalde partijen/bedrijven waar u mee te maken had?
  - a. Zo ja, wat heeft dat in uw ogen gedaan met betrekking tot de onderlinge samenwerking en het vertrouwen tussen beide partijen?
  - b. Zo ja, wat heeft u gedaan om die vertrouwensbreuk weer te herstellen?
  - c. Zo ja bij 8, hebben er meer van deze gebeurtenissen plaats gevonden?
  - d. Zo ja bij c, hoeveel soortgelijke gebeurtenissen kunt u zich herinneren?
9. In hoeverre had u vertrouwen in toekomstige samenwerkingen met deze partijen?

##### Collaboration (15 min)

10. Had u al eerder met sommige partijen/bedrijven samengewerkt die bij dit project ook weer betrokken waren?

- a. Zo nee, wat is precies de reden voor het niet meer betrekken van deze partijen in dit project?

De volgende vragen slaan allemaal terug als vraag 10 is beantwoord met ja

- b. Kunt u de namen van deze partijen/bedrijven opnoemen?
- c. Hoe was die samenwerking toen?
- d. Was de samenwerking %zoals u had verwacht?
- e. Kunt u zich in het verleden behaalde successen herinneren die een positieve invloed hebben gehad op de verdere samenwerking binnen het project?
- f. Zo ja, kunt u daar een voorbeeld van geven?
- g. Kunt u zich conflicten herinneren die een negatieve invloed hebben gehad op de verdere samenwerking binnen het project?
- h. Zo ja, kunt u daar een voorbeeld van geven?

Conclusion (5 min)

11. Had u eventueel verdere vragen aan mij?
12. Wilt u nog iets toevoegen omtrent eerder besproken vragen?
13. Heeft u wellicht nog suggesties voor mensen die ik eventueel in de toekomst kan benaderen?

*Bedankt voor het interview / de te ontvangen transcripties / vragen of diegene eventueel definitieve versie wil ontvangen / kan contacteren voor eventuele vragen*

## Appendix 2.

### Toestemmingsformulier

*Het doel van het onderzoek is om inzicht te krijgen hoe de activiteiten van bepaalde betrokkenen invloed hebben gehad op de kosten van infrastructuur projecten. Binnen dit onderzoek wordt er specifiek gekeken naar projecten die behoren tot de Nederlandse wegen, en die tot stand zijn gekomen door Publieke-Private samenwerkingen.*

Geachte heer/mevrouw

Allereest bedankt dat u mij te woord wilt staan om mij verder te helpen in mijn onderzoek. Met dit toestemmingsformulier wil ik u graag verder informeren over het interview dat zal worden afgenomen.

Door de huidige situatie zal het niet mogelijk zijn om fysiek dit interview af te nemen. De alternatieve vorm zal gaan via een online platform, of via telefonisch contact. U heeft op elk moment de mogelijkheid om het interview stop te zetten. Wanneer u een vraag niet wilt beantwoorden heeft u tevens de keuze om deze op elk moment van het interview te weigeren. Het interview zal tussen de 30 en 60 minuten duren.

De transcripties van dit interview worden uitsluitend gebruikt voor het onderzoek en door de interviewer. In andere gevallen zal ik u om uw toestemming vragen alvorens dit met derden partijen te delen. Het uitgewerkte transcript van het interview zal naar u worden toegestuurd zodat u de mogelijkheid heeft om deze te corrigeren op eventuele feitelijke onjuistheden. De respondent heeft de keuze tot volledige anonimiteit indien hij/zij dat wenst. Naam en toenaam zijn wel bekend bij onderzoeker

Door het ondertekenen van dit toestemmingsformulier verklaar ik dat:

- Ik begrijp dat de deelname aan dit interview op vrijwillige basis is.
- Ik akkoord ga met het opnemen, transcriberen en coderen van dit interview
- Ik volledig anoniem blijf indien ik dat wil.
- Ik het recht heb om eventuele vragen te weigeren
- Ik het recht heb om op elk moment het interview stop te zetten
- Ik de mogelijkheid heb om de uitgewerkte transcript van het interview te corrigeren op eventuele feitelijke onjuistheden.
- Ik begrijp dat er vertrouwelijk wordt omgegaan met de transcripties van dit interview
- De transcripties van dit interview mogen worden gebruikt voor bovengenoemd onderzoek
- Dit onderzoek gepubliceerd mag worden door de Rijksuniversiteit Groningen

#### Anonimiteit

1. Ik wens volledig anoniem te blijven JA/NEE

#### Bij vraag 1 JA:

- Ik mag vernoemd worden onder een andere naam JA/NEE

#### Bij vraag 1 NEE:

- Ik mag genoemd worden onder mijn voornaam JA/NEE

- Ik mag genoemd worden onder mijn voornaam plus achternaam JA/NEE

- Ik mag genoemd worden onder mijn voornaam, achternaam en functie JA/NEE

Naam respondent.....

Datum.....

Handtekening.....

### Appendix 3.

#### Deductive coding

Variable	Sub variable	Codes
Boundary spanning activities	BSA1: Reticulist BSA2: Entrepreneur/innovator BSA3: Leader BSA4: Breaking & building boundaries	BSA1: Type of relationship BSA1: Basis of communication BSA2: Level of creativity BSA2: Level of flexibility BSA3: Agreements BSA3: Level of collective action BSA4: Level of dependency on other parties involved BSA4: Feeling of a common goal
Trust	-	T1: Amount of events influencing trust T2: Negative influencing events T3: Positively influencing events T4: Expectations are met T5: Confidence in future collaboration
Collaboration	-	C1: Previous collaboration with other parties C2: Conflicts in the past C3: Successes in the past

#### Inductive coding

Variable	Sub variable	Codes
PPP	P1: General information P2: Organizational structure P3: Other parties	P1: Duration of contract P1: Type of contract P2: Contacts P2: Relationship P2: Division of labor P2: Financers P2: Hierarchy P3: Other