

# The effects of soft management on ex-post transaction costs in Dutch DBFM infrastructure projects

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## **Abstract**

Public-Private Partnerships are ever more considered for the public procurement of large infrastructure projects. Ex-post transaction costs can threaten the promise of Value for Money, which defines the advantage of a PPP over a conventional procurement. However the cause of these costs, unexpected events, cannot fully be accounted for by a contract. Recently there has been a shift of focus from the hard contractual side of management, to a softer more relational style of management. This paper examines to what extent this soft management influences the occurrence of ex-post transaction costs. A survey was held under managers active in Dutch infrastructure projects that made use of DBFM-contracts. Empirical research was done using non-parametric statistical tests. A significant relationship between ex-post transaction costs and soft management couldn't be established. Involved parties acting with the best intentions are important in preventing conflicts. Trust seems to be the fundamental building block on which a successful PPP is build.

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# 1. Introduction

## 1.1 Background

In the last two decades, Public-Private Partnerships (PPP's) have become an ever more popular governance model to provide public service or to realize large infrastructure projects (Warsen et al., 2018). A conventional procurement form usually sees the public sector writing out a tender, on which interested construction companies can submit a bid. Within the tender all features of the project are fixed and are usually non-negotiable during the process. The procurer must have a clear vision on what it desires, design and construction wise, and the tender is binding for the winning private actor (Carbonara, 2016).

In contrast, within a PPP style of procurement, the public procurer works together with the private sector to reach agreement on project features. The winning private partner, consisting out of several companies combined in a consortium, gets full responsibility over the project. The length of an infrastructure PPP contract, in The Netherlands, is typically 20 to 30 years (Rijksoverheid, 2020). This includes the design, build, finance, maintenance and operation of the project. Hence the contract resulting from a PPP tender is called a DBFM(O)-contract. By making use of the knowledge and expertise of the private sector, and shifting full project responsibility towards them, projects should improve in terms of quality, price and delivery times in the short run (Hueskes et al., 2019; Verweij, 2015a). These aspects of PPP contracts should eventually result in the ultimate promise of PPPs, a greater Value for Money in the long run (Verweij, 2015a). Value for Money is created when a PPP leads to a higher productive efficiency and allocative efficiency, than in a conventional procurement (Välilä, 2005).

The initial bidding phase for a PPP is usually a long one, which cost both the public body and private partner considerable amounts of resources and more so than in conventional tenders (Carbonara et al., 2016). Therefore, PPPs are usually only considered for projects of a certain size. In The Netherlands, DBFM(O)s are only considered for projects with a minimum size of €60 million (Hueskes et al., 2019). A study done in 2007 by the British National Audit Office (NAO) found out that the average length of the tender phase for British PPPs is 33 months (Soliño and de Santos, 2016). Despite this lengthy process, the eventual contracts cannot account for all unforeseen events that might occur during the implementation phase of a PPP project, and can therefore be regarded as incomplete (Soliño and de Santos, 2016; Warsen, Klijn & Koppenjan, 2019).

Such unforeseen events may result in additional costs that are not accounted for within the contract. Costs occurring after the contract has been signed, are regarded as *ex-post* transaction costs. Contrary to *ex-post* transaction cost, *ex-ante* transaction costs that are made in order to reach a contract deal. *Ex-post* transaction costs can jeopardize the promise of Value for Money if they continue to stack up, or are not dealt with the right way.

## 1.2 Research problem

A lot of research has been done on the aforementioned *ex-ante* transaction costs in the bidding phase of a PPP tender (see: Soliño and de Santos, 2010; Bajari et al., 2014; Carbonara et al., 2015; Soliño and de Santos, 2016; Thomassen, 2016). The Soliño and de Santos (2016) research concludes that the height of the *ex-ante* transaction costs depend on the type of tender (open or negotiated) and that there is a trade-off between *ex-ante* and *ex-post* transaction costs. *Ex-ante* transaction costs are usually lower in open tender procedures, whereas negotiated tender procedures should diminish the risk of high *ex-post* transaction costs given these contracts are more complete and cover more unforeseen contingencies. In 2019 Hueskes et al. conducted a study on recent dissertations on PPP projects in The Netherlands and Belgium. With this study they tried to form a holistic overview on

the current state, trends and challenges of PPPs. They inter alia concluded that, although contracts and other institutional arrangements are indeed important to reduce transaction costs, the way in which contract arrangements are managed and treated by all stakeholders within the project is crucial for the performance of PPP's. Here they lay a focus on 'soft management'. This means that management should focus on the relational aspects of project management such as trust, collaborative behavior, informal relationships and interaction processes. This is also identified by other scholars, who researched the effects of soft management and relational aspects on the performance of PPPs (e.g. Poppo & Zenger, 2002; Warsen et al., 2018a & 2018b; and Verweij, 2018).

Instead of focusing on the performance of PPPs this research will look at the effects of the characteristics of soft management on ex-post transaction costs within PPP projects, hereby addressing a gap in the literature where the focus is primarily on performance. To see what the effects are, Dutch infrastructure projects making use of DBFM-contracts will be studied. This results in the following research question: *To what extent does 'soft-management' impact ex-post transaction costs in PPP projects?*

### 1.3 Structure of thesis

The paper is structured as follows. In the second part the theoretical framework is established on which the research is based on and will set the hypothesis. The third part is used to explain the research method that was used to answer the research question. Furthermore it clarifies the ways data was collected and analyzed. Part four consist of the analysis of the collected data and present the findings of the research. This is followed by a conclusion, a discussion and a recommendation for policy implications regarding ex-post transaction costs in PPPs.

## 2. Theoretical framework

### 2.1 Transaction costs in PPP-projects

PPP contracts are usually large and complex ones. Their lifetimes span typically over 20 years, which means that these contracts are subject to great uncertainty (Soliño and de Santos, 2016). In order to mitigate this uncertainty and its resulting risks, the public procurer and the private partner will negotiate about scenarios that might occur during the contracts lifetime. This requires a lot of resources from the public procurer and the private partner and, when these negotiation costs get to high proportionally to the contract's value, can eventually jeopardize the promise of a higher 'Value for Money' (Välilä, 2005). Soliño and de Santos (2016) conclude that in spite of all these detailed specifications negotiated within the contract, contracts will always contain holes that do not (or not specific enough) account for certain events that were not foreseen. Parker and Hartley (2003) add that it is hard to write *'complete contingent contracts (allowing for uncertain events) especially where contracts are cover a lengthy period of time, technologies and costs are inherently uncertain or the economic environment is in a state of flux.'* The contracts are so to say 'incomplete'. The costs that are made to negotiate, reinforce and monitor the contracts are called 'transaction costs' (Williamson, 1979; Reeves, 2008) These cost can be spilt up into costs made before the contract is signed (ex-ante), and after it is signed (ex-post) (Soliño and de Santos, 2016).

A reoccurring notion in the literature as to why transaction costs arise has to do with asymmetric information, bounded rationality and opportunistic behavior (Reeves, 2008; Soliño and de Santos, 2016). Both parties acting within a PPP project have to deal with an information backlog. The public body and private partner both have their own expertise and thus their own specific set of knowledge that is more extensive than that of the other actor. This knowledge advantage of one player with respect to the other player is a form of asymmetric information. Bounded rationality does recognize

the fact that humans and thus organizations are unable to know and foresee everything perfectly, no matter how much information is processed (Reeves, 2008; Verweij et al., 2017; Warsen et al., 2018). These limits on knowledge and the ability to predict the future may result in opportunistic behavior from the private party. Opportunism in the case of contracting means that one party will purposefully mislead and take advantage of the other party. Imperfect or asymmetric information and bounded rationality pave the way for opportunistic behavior to exploit one's knowledge advantage to one's own benefit (Parker and Hartley, 2003). This can happen ex-ante or ex-post the contract agreement and can therefore increase transaction costs (Reeves, 2008).

Dyer (1997) distinguishes 4 different types of transaction costs. (1) Searching costs. These costs are made for gathering information about and evaluating different potential partners. (2) Contracting costs. Costs for contracting come in the form of writing and negotiating about a contract. These two type of costs are ex-ante costs as referred to by Soliño and de Santos (2016). The costs associated with searching and contracting can be quite high. They form a threat to the efficiency of the project and eventually to the promise of Value for Money (Välilä, 2005). When the costs of entering and bidding for a project are too high, proportionally to the contract value, interested private parties might refrain from bidding at all, weakening the competition within the market in the long run.

The ex-post transaction costs, as distinguished by Dyer (1997), are (3) monitoring costs and (4) enforcement costs. The costs for monitoring are associated with ensuring actors stick to and fulfill its part of the predetermined set of obligations. Enforcement costs are made in sanctioning actors who do not perform as they should, according to the agreement.

### 2.3 Ex-post transaction costs

As mentioned before PPP contracts can be considered 'incomplete' because they don't account for all risks for both parties. A certain event may cause both parties to reconsider the contract and sign partially or completely new contracts to account for the unanticipated event. Verweij et al. (2017) describe the occurrence of events as follows: "*Events can originate from physical sources, like unstable ground conditions. They can also originate from social sources, such as dissatisfied stakeholders (e.g., citizens, municipalities, or other governmental organizations) or changing laws and regulations*". The costs of alterations in contracts after they have been signed are ex-post transaction costs, or adjustment costs (Reeves, 2008; Bajari et al, 2014). A study conducted by Verweij et al. (2015b) show that contract adjustments form a major reason for cost overruns in Dutch infrastructure building projects. On average 62.31 contract adjustments per project occurred. Of these contract adjustments, most were rooted in changes in technical or physical conditions or an extended scope of the project. However a large part of the adjustments had to be made, in order to deal with conflicting contractual statements, inaccuracies and incompleteness of the contracts. The additional costs resulting from an adaptation can't be anticipated for in the procurement phase, therefore they aren't included in the total expected costs of the contract.

Bajari et al. (2014) discern between two types of adjustment costs: *direct adaptation costs* and *indirect adaptation costs*. Direct adaptation costs are the costs made when, for example, a project takes a longer time to complete than expected. A changing factor can impact the efficiency of work, and can therefore result in higher labor and capital costs. To renegotiate the actual contract or to solve a dispute between both parties as a result from the additional costs, extra resources are needed. These costs can be in the form of costs of legal advisors or in the most extreme case a lawsuit (Bajari et al., 2014; Soliño and de Santos, 2016). Costs like these that arise, that don't have an actual work related source, can be considered *indirect adaptation costs*. These indirect adaptation costs are the dependent variables in this research, and will be used for this research and be elaborated on further in part three.

## 2.4 Soft management

Relationships within a PPP are considered typical principal-agent relationships (Hueskes et al., 2019). The agent, in this case the private partner, will pursue its own goals, which is usually making profit as a mean to ensure its continued existence (Reeves, 2008). The goal of the public procurer is to provide a social service for society (Verweij, 2018). The most typical way to align these diverging goals and interests and to take away to a certain extent the information backlog of the principal, is in the form of contracts and sanctions (Dyer, 1997; Huxham & Vangen, 2003). By including incentives for the private partner to stick to the contract and therefore mitigate the effects of opportunistic behavior, the different interest should be aligned. These incentives come in the form of periodic payments based on the pre-established performance obligations of a project. The public actor can discount these payments when the private partner doesn't reach the set performance obligation, and can therefore control the agent (Verweij, 2018).

To make sure both parties comply with the agreed contract and its terms and conditions, contract management is needed. Huekes et al. (2019) even argue that the way contracts are managed are crucial for the performance of PPP projects and the reduction of transaction costs. They come to this conclusion after an extensive literature review of recently conducted research into the field of PPP performance. The authors stress that the focus is shifting from 'hard' side of PPP management, such as strict contracts and institutional arrangements, to the 'soft' or relational side of the PPP project management. Verweij (2018) argues that, although formal contracts are the basis on which a PPP is built and tackle to an extent opportunistic behavior, relational aspects are important for the success of a PPP too. These relational aspects are necessary to agree on, inevitable, contract adjustments in a constructive way. The shift towards, and the growing importance of, relational aspects is in accordance to Boivard's (2004) statements on this topic:

*“Relational contracts rely on trust (rather than the purely economic incentives in traditional or ‘transactional’ contracts) and form the basis for long-term relationships. (...) It (an analysis of Williamson (1975)) suggested a new partnership-based approach to contracting, in which both parties would find it advantageous to find ways of helping each other to be more successful.”*

Relational management can be seen as making the stakeholders involved the project comply with the contract by focusing on the norms of flexibility, solidarity and information exchange and less so via the more traditional way of contracts and sanctions (Poppo & Zenger, 2002). They describe relational management as a combination of the factors *open communication, trust, cooperation, sharing of information* and *dependence*. For this research, this definition of relational management will be used on build upon further. The following two sections will elaborate on the factors 'trust' and 'collaborative behavior' in more detail.

### 2.4.1 Trust

It is commonly shared in the literature that trust plays a major role in the success of PPPs and large projects in general, and is of importance for reducing transaction costs (Poppo & Zenger, 2002; Warsen, Klijn & Koppenjan, 2019). Klijn et al. (2015) describe trust as a positive perception about intentions between actors. They argue that, when one actors trusts the other actor, they take the risk of being vulnerable to opportunistic behavior. However, this trust implies that the actors will refrain from opportunistic behavior, even when the chance is there. Huxham and Vangen (2003) also address this rather paradoxical phenomenon, where one bears a risk to reduce risk. Smyth and Edkins (2007) argue that a trustworthy relationship between partners is necessary to improve the effectiveness and efficiency of a PPP, due to the length of a concession. This line of thought is backed by Warsen, Klijn & Koppenjan (2019), who state that trust can be seen as a mean of coping with

unexpected events, external shocks and the complexity of the project. They found that trust is indeed vital for a highly successful PPP, however it can never be the sole reason for it. High levels of trust, in combination with other relational aspects, are the main factors for a successful PPP. This outcome consolidates the importance of trust in PPPs, that is stressed by the literature.

Understandably, trust doesn't naturally form, nor perpetuate itself. Many scholars argue that trust forms gradually and is a result of both parties acting trustworthy and the expectation that they will do so in the future (Klijn et al., 2015; Warsen et al., 2018). Therefore, repeated interaction seems to be pivotal for the trust building process. More interaction between actors can lead to a more trustworthy relationship between them, which on its turn leads to more interaction. This 'trust cycle' implies that each time when an intended outcome of an interaction meets the expectation, the trustworthy relationship is reinforced (Huxham and Vangen, 2003; Huxham and Vangen, 2004). Once partners find mutual trustworthiness in each other, they assume the partner will behave trustworthy in future as well. Obtaining the reputation of being trustworthy (or not) is being rewarded or punished by the other parties, and therefore there's an incentive for stakeholders to act on good terms (Poppo & Zenger, 2002). The increased trust will take away the risk for future interactions. However, without interaction, trust will diminish and must therefore be nurtured on a continuous and permanent basis, by both parties. (Klijn et al. 2015; Huxham and Vangen, 2003; Huxham and Vangen, 2004).

Trust reduces transaction costs by "*replacing contracts with handshakes*" (Poppo & Zenger, 2002). The rationale behind this is that when parties trust each other, there's no need to specify certain actions contractually. When there's mutual trust between stakeholders, incentives to behave opportunistic are mitigated and partners won't be taking advantage of each other. In addition to the mitigation of opportunistic behavior, trust facilitates the flow of information and functions as a stimulus for partners to actively invest in the project, hereby reducing uncertainty (Klijn, 2015; Warsen, Klijn & Koppenjan, 2019).

#### 2.4.2 Collaborative Behavior

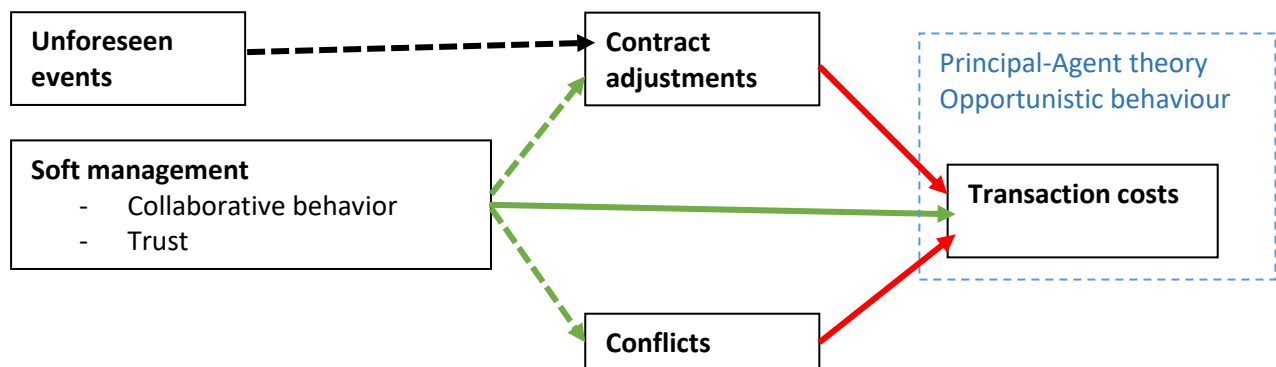
As demonstrated by the previous paragraph, trust can be seen as the root of successful collaboration in projects and therefore soft management. However, actors do have to behave accordingly to actually achieve a satisfactory collaboration. A collaborative stance towards one and other XX. This collaborative behavior occurs through the norms of information sharing and flexibility (Poppo & Zenger, 2002). Sharing of information implies that actors inform each other on their long and short term goals, which facilitates problem solving and adaptation between them. Flexibility also facilitates adaptation to unforeseen events (Poppo & Zenger, 2002). When actors commit to these norms, their relationship will be characterized by cooperation and exchange (Poppo & Zenger, 2002).

According to the transaction cost literature, transaction costs decrease when there is an increase in the quality of available information for both actors (Parker & Hartley, 2003). Therefore the sharing of information is crucial in facilitating this high quality information. In a partnership, which is characterized by a network between actors, this information should flow freely between partners. The, established, mutual dependency between actors leads to mitigation of transaction costs (Parker & Hartley, 2003).

Verweij (2018) argues that a solid relational basis is highly important to successfully agree on adaptations that need to be made to contracts. This is realized with personal communication, discussion between parties and getting to know and learn of different interests within the project. However, despite high levels of trust or detailed contracts, conflicts are likely to occur due to different interest of the actors (Warsen et al., 2018). When in case of a conflict, contract adaptation

have to be made, these adaptations can result in ‘fight contracts’, which on their turn have a negative impact on transaction costs, usually in the form of legal costs (Verweij, 2018). Conflict management implies that actors know who to act on and mitigate conflicts beyond juridical processes that are costly and time-consuming by bringing actors together and bridging the different interests through interaction and mediation (Warsen et al., 2018). This also means that managers should proactively react to possible conflicts and should deal with them before emotion takes the upper hand and escalates different interest into conflicts. Poppo & Zinger (2002) agree with this stating that soft management becomes important to complement the adaptive limits of contracts in the case of change and conflict, either internally or externally.

## 2.5 Conceptual model



## 2.6 Hypotheses

Regarding the theoretical framework set out above, 2 hypotheses were formed

1. Soft management can mitigate the occurrence of contract adjustments, and therefore ex-post transaction costs.
2. Soft management can prevent conflicts causing ex-post transaction costs by focusing on trust between both parties.

## 3. Methodology

### 3.1 Data gathering

To empirically test the hypothesis, a quantitative approach was opted for. To establish whether there is a relationship between soft management and ex-post transaction costs, a survey would be best suited. A survey is a commonly used research method, that is well suited to obtain people’s attitudes and perceptions towards certain phenomena. More importantly it’s a valuable method to get an insight in complex behaviors and social interactions (Clifford et al., 2016), which lay at the core of soft management. Adding to that, surveys allow to gather data that is not available from public sources. Previous research has shown that survey based research can give valuable results when speaking about relationship between relational aspects and PPP performance (see: Poppo & Zenger, 2002; Warsen et al., 2018 and Klijn et al., 2015), whereas case reviews are better suited to get a more comprehensive view on the actual workings of a relationship within a project (see: Verweij, 2017).

The data used in this paper stems from a survey which has been held from April 2020 till June 2020. The targeted group were managers within Dutch PPP infrastructure projects that made use of



DBMF(O)-contracts. The projects had to be in the realization or exploitation phase (the Built, Maintain or Operate phase of a DBFM(O)-contract), considering ex-post transaction costs only occur once a contract is signed. Although collaboration between the public and private partners might be less once the physical aspect of the project has been realized, managers can reflect back on collaboration processes. The surveyed managers were project managers, contract managers, technical managers, stakeholder managers and managers responsible for project control. Within their respective roles, all managers are responsible for the cooperation and communication with their public or private counterparts and were therefore asked to participate in this research. In order to identify these managers a list was compiled with recent infrastructure projects that were either in the realization or exploitation phase of the DBMF(O)-contract in The Netherlands. For this, online databases of the National Government (Rijksoverheid), the executive agency of the Ministry of Infrastructure and Water Management (Rijkswaterstaat), PPS Netwerk Nederland and Neerlands Diep were used. This resulted in a list of 10 infrastructure projects. Of the 10 identified projects, 8 projects were highway related. The remaining 2 were water infrastructure projects. The small number of projects has to do with the fact that they had to be in the realization or exploitation phase of the project. In all cases, Rijkswaterstaat was the public procurer within the project. Names of the managers, whom are active within these 10 projects, were then found in online sources, newspaper articles, official documents and via LinkedIn.

The survey was made and could be filled out online, making use of Qualtrics. The surveys were spread among the managers via email primarily. When in case an email-address couldn't be retrieved, a direct message was sent on LinkedIn. A first round of invitations to fill out the survey was sent to a 7 the identified managers in the first week of May, to assess whether the chosen approach would boast a sufficient response and whether the survey questions were appropriate. This resulted in 2 valid responses. After the first round of invitations a second round followed on a larger scale., the last week of May. In the second round 32 managers were approached of which 7 invitations bounced because the email-addresses were not correct. A week later a reminder, which was announced in the previous invitation, was sent to the 25 managers of which the email-address was correct. Additionally, a general invitation message was shared within a dedicated PPP group on LinkedIn, named 'PPS Netwerk Rijkswaterstaat'. This is a closed group, meaning one needs permission of the group moderator to be enrolled. Therefore only people who are, in one way or another, affiliated with PPPs at Rijkswaterstaat can be member of this group. The moderator gave the permission to enroll, for the purpose of this research. The group has 527 members, whom are active in a myriad of roles in the field of PPPs.

Next to this direct approach, an indirect approach was used. For this approach, Dr. Stefan Verweij of the University of Groningen, acted as a gatekeeper. His research on PPP-projects has given him an extensive network in the field. Several actors within his network were asked to fill out and spread the survey further within their organization and/or network. Several of them granted cooperation to further distribute the survey. This however means that it is not possible to determine a response rate for the survey, because of the simple fact that it is unclear how many managers received the survey. In the end, 20 sufficiently filled out responses were retrieved. All the surveyed managers belonged to the public side of the project, therefore making the research one dimensional. Due to the subjective nature of the survey questions, hard conclusions on the actual relationship between ex-post transaction costs and relational management should not be drawn. This research forms an indication on a relationship as such. Further research could be done including a bigger sample (preferably all Dutch PPP-projects), also including managers from the private consortia executing the project to form a more holistic overview.

## 3.2 Measurement

The survey consisted of 17 questions, who were subdivided into 4 categories. Each category will be discussed briefly in the following part. Apart from the introduction and control questions, all questions make use of 5-point Likert-Scale for answering. The options ranged from *'Fully agree'* till *'Fully disagree'*, with an option *'Neutral'* in the middle. Fixed Likert scales are often used in survey research because the fixed answer options form a guide for the respondents, making answering (and subsequently analyzing) the question easier (Clifford et al., 2016). An odd number of response options, enables respondents to answer neutral. Therefore they are not forced to give an answer, suggesting strong feelings either way, when they don't have them (Clifford et al., 2016). One note is that the research focusses on Dutch infrastructure PPP-projects. The majority of the managers active within these projects has a Dutch background, and Dutch as their native language. Therefore it was decided that the survey questions and answer options would be in Dutch. For the sake of this paper the indicators have been translated into English. The survey, as it was sent to the respondents, can be found in appendix A. It was recognized that the survey questions may regard to sensitive issues. Therefore, to ensure full anonymity of the respondents, the survey was designed in such a way that it isn't possible to retrieve the identity of the respondent based on their given answers. Following this and feedback after the first round of invitations, the question *'Regarding which project do you fill out this questionnaire?'* was omitted from the survey. This decision was made to raise the response rate by getting rid of questions that could potentially make respondents refrain from filling out the survey due to sensitive issues. However, the consequence of this is that it is unknown how many responses per project were retrieved.

The statistical analysis was conducted with the use of IBM SPSS Statistics 26. The initial research design was to analyze the relationship between ex-post transaction costs and soft management by conducting a binary logistic regression. However the sample size didn't allow for this. Therefore non-parametric Mann-Whitney tests were carried out. Non-parametric tests are typically used when the distribution of a variable is not normal and the number of cases is small (Burt et al., 2009). The latter being the reason for opting for a non-parametric test. A Mann-Whitney test, tests whether the median of two populations are equal (Burt et al., 2009). For this research, it will be assessed whether the valuation of soft management aspects differed between projects with or without extra costs for contract adjustments or contract resolving. Additionally a correlation analysis was conducted to assess the relationship between trust and collaborative behavior. A correlation coefficient measures the direction and strength of a linear relationship between variables (Burt et al., 2009). The coefficient takes a value between -1 and 1, where a negative value describes a negative relationship between variables and a positive value a positive relationship. From the literature, it can be expected that there is positive relationship between collaborative behavior and trust.

### 3.2.1 Control variables

To control for certain exogenous traits of the PPP projects, and to gather more contextual data, additional question are asked. Contract complexity can impact transaction costs as we learned from Soliño and de Santos (2016). The contract complexity can be determined by the amount of stakeholders involved, in this case the amount of firms in the private consortia (Q1.2). Next to contractual complexity, technical complexity can also play role in the occurrence of transaction costs. This was examined by question 1.3, asking the respondents their view on the technical complexity ranging from *'Not complex at all'* to *'Very complex'* on a 5-point Likert-scale. This follows directly from Warsen et al. (2018), who argue that it is possible that respondents experience cooperation more difficult, the more technical complex a project gets. A note hereby has to made that experiencing something as technical complex is very subjective and is also dependent on the background of the respondent (Warsen et al. 2018a).

*Table 1: Control/introduction indicators*

	<b>Indicator</b>	<b>Term</b>	<b>Answer type</b>
Q1.1	Public or private partner	POP	Public – Private
Q1.2	Size of private consortium	SIZ	Fill in
Q1.3	Technical complexity	TCH	5-point Likert
Q1.4	Total worth of project in Euros	WTH	Fill in

### 3.2.2 Transaction costs

In this part the presence of ex-post transaction costs will be examined in the form of contract adaptations and costs for conflict solving. Following contract complexity theory stating that contracts are per default incomplete (Williamson, 1979; Poppo and Zenger, 2002; Soliño and de Santos, 2016; Verweij, 2018; Hueskes et al., 2019) it's expected that some contract adaptations, or at least extra costs by unforeseen events, will occur naturally. Question 2.3 and question 2.5 function as the dependent variables that will be used to conduct the main analysis of the research. This follows research from Bajari et al. (2014) and Soliño and de Santos (2016) and their notions on indirect adaptation costs, and thus ex-post transaction costs, which are not related to physical aspects of the project but more so the contractual and social aspects.

*Table 2: Transaction costs indicators*

	<b>Indicator</b>	<b>Term</b>	<b>Answer type</b>
Q2.1	Occurrence of unexpected events	UNE	Yes – No
Q2.2	Contract adjustments	ADJ	Yes – No
*Q2.3	Extra costs due to contract adjustments	EXA	Yes – No
Q2.4	Conflicts between parties	CON	Yes – No
*Q2.5	Extra costs due to conflicts	EXC	Yes – No

\* Only displayed if Q2.2 or Q2.4 = Yes

### 3.2.3 Collaborative behavior

Following the notions of Poppo and Zenger (2002) on the nature of relational governance, being rooted in flexibility, solidarity and information exchange, 5 sub-variables are formed. Combined with the 3 crucial factors stressed by Verweij (2018), informality, relatedness and transparency, questions Q3.1 – Q3.5 form an overview on the relational management aspects within the PPP projects of the respondents. Questions were answered on a 5-point Likert-scale.

*Table 3: Collaborative behavior indicators*

	<b>Indicator</b>	<b>Term</b>	<b>Answer type</b>
Q3.1	Communication between parties	COM	5-point Likert
Q3.2	Sharing of knowledge between parties	SHR	5-point Likert
Q3.3	Collaboration in problem solving	COL	5-point Likert
Q3.4	All interests included in decision process	DEC	5-point Likert
Q3.5	All interests satisfied by solutions	SOL	5-point Likert

### 3.2.4 Trust

As consequently mentioned in the relational management literature, trust between actors forms the basis of successful relationships within projects (Poppo and Zenger, 2002). In a similar vein, Parker and Hartley (2003) argue that, where there is trust, there is less need for formal and detailed contracting. Trust forms out of repeated exchange, and the expectation of partners acting in a trustful manner now, as well as in the future (Q4.3). This implies that partners stick to made

agreements that are contractually reinforced or informally formed (Q4.1). Without trust, opportunistic behavior is tempting to benefits ones one. Opportunistic behavior can therefore have a negative impact on transaction costs (Reeves, 2008) and be a catalyst for further non-relational factors, which on their turn can lead to friction resulting in fight contracts (Verweij, 2018) (Q4.2). Questions were answered on a 5-point Likert-scale.

Table 4: Trust indicators

	Indicator	Term	Answer type
Q4.1	Commitment to agreements	AGR	5-point Likert
Q4.2	Parties act with best intentions	INT	5-point Likert
Q4.3	Parties will act with the best intentions in the future	FUT	5-point Likert

## 4. Results

### 4.1 Transaction costs

Regarding unexpected events that were not accounted for within the contract, 19 respondents indicated that these were indeed present during the construction or exploitation phase of their project. In only 1 case this did not lead to a contract adjustment, whereas in the remaining 18 cases this unexpected event deemed a contract adjustment necessary. In all cases these contract adjustments resulted in extra unexpected costs on top of the initial budget. Out of the 21 cases, 10 needed conflict resolving that lead to extra costs. In 9 out of 10 cases where conflict resolving was needed, contract adjustments also needed to be made.

Table 5: Results transaction costs indicators (n=20)

		UNE	ADJ	EXA	CON	EXC
No	Count	2	3	0	11	0
Yes	Count	19	18	18	10	10
Did not show	Count	0	0	3	0	11

### 4.2 Soft management

The indicators of soft management are divided into 2 groups, *collaborative behavior* and *trust*. The mean score for the indicator of collaborative behavior is 4,24 (SD = 0,694). This indicates that the respondents are positive about the collaboration between the public and private parties, regarding their project. For the indicator trust, the mean score is 3,44 (SD = 0,882). At a first glance the respondents were more positive on the collaborative behavior between the public and private parties within the project, than they were positive about the actual trust between them. Out of all indicators 'Communication between parties' and 'Sharing of knowledge between parties' got the highest overall averages and the lowest standard deviations. On the other side of the spectrum, the indicator 'Commitment to agreements' received the lowest overall average, although still not being a negative indication, with an average of 3.10 (SD = 0,910). Interestingly, the indicator with the lowest average, and the highest standard deviation within the with the Collaborative Behavior set is 'All interests included in decision processes'. This could mean that, when decisions are made, that do not

included the interests of all parties, the willingness of sticking to these decisions or agreements is less. Therefore ‘*commitment to agreements*’ might be valued less high as a result of this.

*Table 6: Averages collaborative behavior indicators*

Indicator	Average	SD	Indicator	Average	SD
COM	4,57	0,507	AGR	3,10	0,995
SHR	4,57	0,507	INT	3,86	0,910
COL	4,24	0,539	FUT	3,38	0,740
DEC	3,84	1,021			
SOL	4,00	0,894			
Total	4,24	0,694	Total	3,44	0,882

This poses the question whether *Trust* and *Collaborative behavior* influence each other, in that more collaborative behavior, follows from trust between partners. To assess this, a correlation analysis was conducted between the total average scores of the subsets *Trust* and *Collaborative behavior*, for all respondents. Given the scatterplot (appendix D), a general trend can already be seen where a higher average of the indicators *Trust*, result in a higher average of the indicators *Collaborative behavior*. The associated Pearson Correlation coefficient indicates a positive relationship between the variables within the sample ( $\rho = 0,609$ ). The correlation is significant at a 0.01 level 2-tailed ( $p = 0.003$ ). Despite the small amount of cases, we can see a relationship between the indicators *Trust* and *Collaborative behavior*. The positive sign of the  $\rho$  coefficient indeed indicates that an increase in the valuation of trust, leads to an increase in the valuation of collaborative behavior in the sample.

*Table 7: Correlation between Trust and Collaborative Behavior*

		CB average	Trust average
CB average	Pearson Correlation	1	,609**
	Sig. (2-tailed)		,003
	N	21	21
Trust average	Pearson Correlation	,609**	1
	Sig. (2-tailed)	,003	
	N	21	21

\*\* . Correlation is significant at the 0.01 level (2-tailed).

### 4.3 The effects of soft management on transaction costs

As presented under *results transaction costs*, every project that needed an adjustment to the contract in the realization or exploitation phase also made extra costs to do so. This result on itself demonstrates that contracts are indeed incomplete and that contract adjustments are nearly inevitable. This result has as a consequence that it is not possible to assess which indicators have a significant influence on the occurrence of extra costs due to contract adjustments because the group where this was not the case is too small.

In all instances where there were conflicts between the public and private partner, extra costs had to be made to resolve these conflicts. To research the effects of soft management on the extra costs for conflict resolving, a non-parametric Mann-Whitney test was conducted. This allows to see whether the evaluation of indicators are lower in the case of a conflict, or higher in the case of no conflict. First, the total averages of the *trust* and *collaborative behavior* sets were taken as variables. For these variables both Mann-Whitney tests were not significant ( $p = 0,413$  &  $p = 0,209$ ), meaning there is no difference in the overall averages of both variables between projects where conflicts occurred and projects where conflicts didn't occur (appendix B). To further examine this result, an additional Mann-Whitney test was conducted on the separate indicator level to see whether a single indicator would have a significant impact on extra costs due to conflicts. As displayed by appendix C no indicator belonging to *collaborative behavior* boasted a significant result. Table 8 shows the Mann-Whitney results for the *trust* indicators. From this it can be interfered that '*Parties act with the best intentions*' does have a significant relationship with the occurrence of conflicts at a 0.05 level 2-tailed ( $p = 0.031$ ).

Table 8: Mann-Whitney test results

	Commitment to agreements	Parties act with best intentions	Parties will act with best intentions in the future
Mann-Whitney U	53,000	27,000	35,000
Wilcoxon W	108,000	82,000	90,000
Z	-,152	-2,111	-1,539
Asymp. Sig. (2-tailed)	,880	,035	,124
Exact Sig. [2*(1-tailed Sig.)]	,918 <sup>b</sup>	,051 <sup>b</sup>	,173 <sup>b</sup>

a. Grouping Variable: Conflict between parties

b. Not corrected for ties.

## 5. Conclusion

Public-Private Partnership have become an ever more interesting and opted for form of public procurement in the last decades. Contrary to a conventional procurement procedure, a PPP promises more Value for Money by being more efficient. This efficiency is gained by shifting all responsibilities towards the private party within the project. In combination with the length of the contracts, the private party is forced to make smart decisions and work as efficiently as possible, for their own sake.

However contracts and agreements cannot cover all risks and unexpected events that arise during the project. Contract adjustments or conflict resolving might be needed to ensure the continuation of the project. These adjustments can result in extra unexpected costs, which were not part of the initial budget. This is a form of ex-post transaction costs. In this article, the relationship between these ex-post transaction costs and soft management aspects are examined.

Despite its limitations, primarily rooted in the amount of usable data, some interesting results were found nonetheless. There is no reason to assume that soft management influences ex-post transaction costs in Dutch DBFM(O) infrastructure projects. The hypothesis that relational management can have a positive influence on ex-post transaction costs cannot be confirmed. From the sample, consisting of managers active in Dutch infrastructure projects making use of a DBFM-contract, no significant relationships between the occurrence of ex-post transaction costs and soft management aspects were found. In 18 out of 18 cases where contract adjustments were made, they also led to extra costs. Therefore it is not possible to analyze if, and which, soft management aspects influence this outcome.

Out of 21 respondents, 10 reported conflicts between the public and private partner. In all instances this led to extra costs made to resolve the conflict. To see whether respondents, whom did not report conflicts, had higher average scores for soft management indicators, a Mann-Whitney test was conducted. As a result of this test, it cannot be concluded that the valuation of soft management is higher in the instance of no conflicts. Therefore the hypothesis that soft management has a positive impact on the occurrence of conflicts is not accepted. However on a separate indicator it was found that the aspect '*Parties act with the best intentions*' is significantly related to conflicts in PPP-projects. This implicates that the underlying notions of trust between parties and acting on right intentions are important in making sure both parties stay on good terms, more so than soft management itself.

A correlation between the average scores of trust and collaborative behavior, indeed resulted in a significant positive relationship, meaning more trust between parties is reflected in the valuation of collaborative behavior. Collaborative behavior can be seen as something that follows from this trust and isn't a strategy to mitigate ex-post transaction costs in its own right. This confirms the findings of Poppo & Zenger (2002), Warsen et al. (2018a; 2018b) and Verweij (2018), in that it proves that there is an interplay between soft management aspects and trust and that they can't be seen as separate. Additionally this would add to the theory of a 'trust cycle' as posed by Huxham and Vangen (2003; 2004). A collaborative stance between actors might result in more trust between them, which on its turn leads to more collaborative behavior, as the positive relationship indicates..

## 6. Discussion

The theory that contracts cannot cover all unforeseen events and are per default incomplete (see: Soliño and de Santos, 2016 and Parker and Hartley, 2003) are backed by this research. In the majority of the projects, unforeseen events occurred and led to contract adjustments. These contract adjustments on their turn, resulted in extra costs that needed to be made.

The findings of this research are in line with the findings of Poppo and Zenger (2002), Boivard (2004) Verweij et al. (2017), Verweij (2018), Hueskes et al. (2019). As demonstrated by these researches, trust between parties form the foundations on which a successful PPP-project is built. Because collaborative behavior is positively correlated to trust, we may assume that this also works the other way around.

The theory that conflicts will arise due to different interest between actors, as posed by Warsen et al. (2018b), seem to hold. The low valuation of the '*All interests included in decision processes*' indicator, compared to the other indicators of collaborative behavior, seem to consolidate this theory. Although the corresponding Mann-Whitney test didn't result in a significant difference for this indicator with respect to conflicts occurring or not, the low average seems to point in this direction nonetheless. Further research could be conducted, comparing projects characterized by a lot, and projects with a small amount of conflicts between actors on their decision making processes. According to this research trust between the public and private parties is paramount in preventing and dealing with conflicts.

The notions of Verweij et al. (2017) that a solid relational basis can prevent conflicts escalating in fight contracts is in accordance with this research and should be one of the focus points in PPP management. However according to this research, trust, and more in particular the expectation that the other actor acts with the best intentions, has proven vital in mitigating conflicts. This falls back to the definition of trust by Klijn et al. (2015), in that trust can be described by expecting the other actor to refrain from opportunistic behavior.

Further research can be done taking a bigger sample that is more representative for the population. Data collection proved to be a struggle throughout the research process. Due to the COVID-19 pandemic it was not possible to survey in person. For following research, surveying in person could increase the response rate and also allows managers to give a reflection on their answers. A bigger sample would also mean that more sophisticated statistical analysis can be done, not relying only on non-parametric tests. A different, more in-depth, research design could further examine the effect of soft management on extra costs due to contract adjustments in particular. This research only assessed whether extra costs were made in binary fashion. A logistical regression would be preferred to examine which aspects do have an impact on contract adjustment costs. To analyze the actual amounts of extra costs would give a better overview of the workings of soft management. In addition to that, this research has shown that contract adjustments are needed in virtually every PPP-project. An interesting study that could follow this up would be as to how design contracts, so they better account for unforeseen events or how to respond to those without making extra costs. Hereby working against the premise that contracts are incomplete per default.



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## Appendix A. Survey

### Introductie

Bent u werkzaam voor de publieke of de private partner in het project?

*Publiek/Privaat*

Hoeveel private partners zijn er betrokken bij het project?

...

Hoe technisch complex is het project?

*Helemaal niet complex*      *o*    *o*    *o*    *o*    *o*    *Helemaal zeer complex*

Wat is de totale waarde (Maintain & Operate meegenomen wanneer van toepassing), als overeengekomen in het contract, van het project in euro's?

...

### Transactie kosten

Hebben er zich, tijdens de realisatie/exploitatie fase, onverwachte gebeurtenissen voorgedaan?

*Ja/Nee*

Zijn er, tijdens de realisatie/exploitatie fase, aanpassingen aan het contract gedaan?

*Ja/Nee*

➔ Zijn er voor deze contract aanpassingen extra kosten gemaakt?

*Ja/Nee*

Zijn er, tijdens de realisatie/exploitatie fase, conflicten geweest tussen beide partners?

*Ja/Nee*

➔ Zijn er, om het conflict op te lossen, extra kosten gemaakt?

*Ja/Nee*

### Samenwerking

Tijdens de realisatie/exploitatie fase is er genoeg ruimte geweest voor communicatie tussen de partijen

*Helemaal niet mee eens*      *o*    *o*    *o*    *o*    *o*    *Helemaal mee eens*

Tijdens de realisatie/exploitatie fase is er regelmatig uitwisseling van kennis en meningen geweest tussen de partijen

*Helemaal niet mee eens*      *o*    *o*    *o*    *o*    *o*    *Helemaal mee eens*

Tijdens de realisatie/exploitatie fase werken beide partijen samen om problemen op te lossen

*Helemaal niet mee eens*      *o*    *o*    *o*    *o*    *o*    *Helemaal mee eens*

Tijdens de realisatie/exploitatie fase zijn de meningen van alle partijen meegenomen in besluitvormingsprocessen

*Helemaal niet mee eens*      0      0      0      0      0      *Helemaal mee eens*

Tijdens de realisatie/exploitatie fase zijn er, ten tijde van interne meningsverschillen, oplossingen gevonden die de belangen van alle partijen tegemoetkomen

*Helemaal niet mee eens*      0      0      0      0      0      *Helemaal mee eens*

### **Vertrouwen**

Tijdens de realisatie/exploitatie fase houden alle partijen zich aan de afspraken

*Helemaal niet mee eens*      0      0      0      0      0      *Helemaal mee eens*

Tijdens de realisatie/exploitatie fase handelen alle partijen met de beste intenties

*Helemaal niet mee eens*      0      0      0      0      0      *Helemaal mee eens*

In de toekomst zullen alle partijen betrouwbaar blijven handelen

*Helemaal niet mee eens*      0      0      0      0      0      *Helemaal mee eens*

## Appendix B. Mann-Whitney test results *Trust and Collaborative behaviour*

### **Test Statistics<sup>a</sup>**

	CB average	Trust average
Mann-Whitney U	43,500	37,500
Wilcoxon W	98,500	92,500
Z	-,819	-1,260
Asymp. Sig. (2-tailed)	,413	,208
Exact Sig. [2*(1-tailed Sig.)]	,426 <sup>b</sup>	,223 <sup>b</sup>

a. Grouping Variable: Conflict between parties

b. Not corrected for ties.

## Appendix C. Mann-Whitney test results Collaborative behaviour indicators

**Test Statistics<sup>a</sup>**

	Communication between parties	Sharing of knowledge	Collaboration in problem solving	All interests included included in decision process	All interests satisfied by solutions
Mann-Whitney U	41,500	47,500	42,500	39,000	31,500
Wilcoxon W	107,500	102,500	97,500	84,000	91,500
Z	-1,108	-,615	-1,066	-,851	-1,127
Asymp. Sig. (2-tailed)	,268	,538	,286	,395	,154
Exact Sig. [2*(1-tailed Sig.)]	,349 <sup>b</sup>	,605 <sup>b</sup>	,387 <sup>b</sup>	,456 <sup>b</sup>	,197 <sup>b</sup>

a. Grouping Variable: Conflict between parties

b. Not corrected for ties.

Appendix D. Scatterplot and trend line of the collaborative behaviour and trust averages

