

Factors of Success in Dutch Infrastructure Projects: a Quantitative Analysis

MSc: Environmental and Infrastructure Planning

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Summary

Since the beginning of the 21st century, European public authorities award infrastructure projects based on the 'Most Economically Advantageous Tender' (MEAT), as defined in the EU public procurement directives. This is a tender that aims to award based on added value, instead of just lowest price. This value is added in the form of MEAT criteria. However, little is known about the actual realization of these criteria. Furthermore, what factors influence this realization is also unknown.

This thesis aims to find out to what extent MEAT criteria are realized, and what factors influence this realization. The results of this thesis indicate that MEAT criteria on average are realized to roughly 84%. Furthermore, sustainability criteria are realized to a greater extent than environmental hinder, management, or project-specific criteria. Lastly, a linear regression analysis found that, contrarily to relevant research, more contractor competition leads to lower MEAT criteria realization.

Preface

This is the part that I normally find a bit overly dramatic. All students thank everybody, including their grandmother and their pet. But now, after finishing this thesis, I find myself much more thankful to a lot of people than I initially imagined I would. Therefore, I think a thank you note is fitting for the following people in no particular order.

Stefan, your highly critical, yet constructive feedback, has helped me write a better thesis than I thought I could. Furthermore, I think it was maybe once that you weren't able to provide this feedback within 36 hours. I have no idea how you managed to do this, because the speed of your response definitely did not affect the quality of it. Also, there is no need to apologize if you aren't able to react within 24 hours. Most supervisors take days, if not weeks, to respond and provide feedback. Therefore, I feel very fortunate with such a professional and kind supervisor. I would also like to thank you for extending the time I was able to write this thesis. Without it, I would not have managed to finish it. I have learned a lot from you which I will use in my upcoming career.

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From Rijkswaterstaat I'd like to thank Max van der Heijst and Rob Peters for the opportunity to do this internship at ICG. Even greater, an extension of my internship was already offered before I had even asked. Lastly, I would like to thank Krijn Toet and Jan Oudejans who had to find, and provide me with far over a hundred documents. I know this took quite a bit of time and must not have been an enjoyable process, but it was crucial nonetheless. Furthermore, you were always interested in how I was doing, and were always there to help if necessary. That made the virtual distance between me and RWS much shorter.

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1. Introduction

1.1 Background

Realizing project goals in infrastructure projects is a difficult and complex challenge (Huang, 2011). However, there are many success stories available. Roads, bridges, railways and digital infrastructure have been successfully delivered according to pre-set project goals (Zhang, 2005; Osei-Kyei & Chan, 2015). At the same time, many projects have not lived up to expectations and ultimately failed (Hodge & Greve, 2007; Osei-Kyei & Chan, 2015; Verweij, 2015). This is not surprising as there are long lists of risks and uncertainties (Chan, 2010), many actors involved (Schepper et al., 2014), and multiple ways to implement large infrastructure projects (Koppenjan, 2005; Verweij et al., 2017). Despite this, governments all over the world are turning more and more towards long-term integrated contracts with private companies to implement infrastructure changes (Lenferink, 2013; Ciu et al., 2018).

The public party that procures such an infrastructure project is expected to achieve the highest value for the taxpayers' money. In the past, procurement methods were mostly based on the award criterion Lowest-Price. In many cases the results of these tenders were not satisfactory with a race to the bottom in terms of price and contractor performance (Rijt & Witteveen, 2011). In some cases this even led to fraudulent behaviour in the form of price fixing by contractors (Van Leeuwen, 2011). This is why Dutch public authorities nowadays often award infrastructural projects based on the award criterion 'Most Economically Advantageous Tender' (MEAT), as defined in the EU public procurement directives (2014), instead of just the Lowest-Price criterion. This entails that tender bids are appraised based on qualitative value (e.g. sustainability) in addition to price, with pre-specified criteria relating to price, performance and quality (EU, 2014; EFCA, 2019). This results in a tender where a contractor with the highest bid can still win, if they add the most value. Therefore, the race to the bottom is significantly reduced. However, this MEAT procurement would only lead to an improvement in value-for-money and infrastructure quality if these pre-specified criteria are actually met ex-post by the contractor. This is because the criteria do not (fully) deliver on their value-promise if they

are not (fully) realized. If not realized, a normal tender would have sufficed and would be cheaper because complex tenders are more expensive for the public party (Zhang, 2005). These MEAT criteria therefore provide an interesting opportunity to assess the success of a project based on ex-post realization of these criteria.

In The Netherlands, Rijkswaterstaat is responsible for the procurement and planning of infrastructure projects. It has to follow the Conference Proceedings European legislation on public works (EU, 2014). This entails that the tender process needs to be transparent and objective. It is important that realized projects get evaluated based on the criteria set in the tender, as this makes it possible to see whether Rijkswaterstaat made a just choice and all parties have been treated fairly during the tendering process. Furthermore, the payment of these private parties is done with funds that originate from tax payments. Therefore, it is relevant to know whether this money gets spent efficiently and no payments have been made for criteria that have not been realized.

Furthermore, this research could be beneficial for planners working in and with large infrastructure projects. As of yet, little follow-up research has been done at Rijkswaterstaat to assess whether contractors realize the ex-ante set MEAT criteria. Therefore, it is of practical and economic interest for Rijkswaterstaat to know whether their investments have met the pre-specified criteria. When certain factors influencing MEAT realization can be found, these can be taken into account during the tendering process, and during the actual project realization phase. This could improve MEAT criteria realization (i.e. meeting project goals). Lastly, the results of this thesis could improve contractor selection. For these reasons, this study could improve current procurement methods and therefore increase the effectiveness of spending taxpayers' money.

1.2 Scientific Relevance

As previously stated, this study will use ex-post MEAT criteria realization to assess infrastructure project success. A search for MEAT criteria realization and MEAT success

in scientific databases did not end with any relevant results¹. Instead, scientific MEAT research focuses on the tendering phase. For example, creating the right MEAT criteria, and selecting the right contractor are often researched (Parikka-Alhola & Nissinen, 2012; Lahdenpera, 2013; Bochenek, 2014; Marcarelli & Nappi, 2019). However, research does not focus on if these criteria are actually realized. Knowledge on this subject can help in accurately evaluating whether the right contractor has been selected ex-post. For these reasons, this thesis can both fill a gap, and add to existing literature.

Furthermore, MEAT criteria were introduced to increase the value of projects. Therefore, it is important to research when these criteria are realized ex-post, and what factors influence this realization. In other words, it is important to identify its success factors. A meta-analysis has identified a multitude of critical success factors, of which several relate to adequate communication between involved parties. Seeing as management style directly influences communication patterns in a project team, this seems like a fitting and interesting factor to study (Busscher et al., 2015; De Schepper et al., 2014; Verweij, 2015). Certain management styles could also lead to project scope changes during the project (Busscher et al., 2015) and could therefore be an influence on pre-set criteria. Furthermore, the importance of management style is often stressed in regards to realizing pre-determined goals in the realization phase (Edelenbos & Klijn, 2009). This is also the phase when MEAT criteria are realized. However, research is ambivalent as to which management style is best for realizing different goals and outcomes (Edelenbos & Klijn, 2009). Management styles could therefore not only have an impact on overall MEAT criteria realization, but also on different individual MEAT criteria. For these reasons, it is of interest to assess whether management style influences MEAT criteria realization. By doing so, this research adds to the scientific debate.

Next to management style, a meta-analysis of different studies on the topic has found that correct risk allocation is an essential component of infrastructure project success (Osei-Key & Chan, 2015). However, this factor has only been identified as a CSF in 13 of the 27 included studies. Therefore, it is interesting to include this factor in the

¹ Search terms include combinations of the following terms: Most Economically Advantageous Tender, MEAT, EMVI, BPKV, EMAT, criteria, success, performance, realization, outcome, evaluation, and results.

current analysis to assess whether this is also the case for MEAT criteria success. More importantly, integrated contracts and an increase in project goals in the form of MEAT criteria, have increased the risk for the private party (Rijkswaterstaat, 2019). It is therefore important to see how different risk allocations affect success in realizing these additional project goals.

Lastly, contractor competition, as measured by the amount of ex-ante bidders, will be included in the analysis. The change from lowest-price (LP) procurement to MEAT procurement also changed the competition structure between contractors (de Vrind, 2010). Instead of just bidding on price, contractors now also bid based on the value they can add. It is important to find out if a different amount of competition also influences the bidding and realization of MEAT criteria. This is because contractors could also promise to deliver “golden mountains” of MEAT criteria in order to secure the contract among competition, but then fail to actually realize these promises (Rijkswaterstaat, 2017). Furthermore, competition between contractors during procurement has been identified as a critical success factor in infrastructure projects (Osei-Key & Chan, 2015). For these reasons, it is of interest to assess if the amount of competition also has an effect on ex-post MEAT realization.

1.3 Research Problem

Authorities worldwide are turning more and more towards integrated contracts to develop infrastructure projects. Rijkswaterstaat also uses these contracts in combination with MEAT criteria. However, as of now, Rijkswaterstaat does not have overarching data on the realization of these criteria. There are concerns regarding underperformance of the realization of MEAT criteria (Rijkswaterstaat, 2017). A reason for this could be over-promising by contractors to deliver criteria in order to secure themselves a contract (Rijkswaterstaat, 2017). This leads to a distortion in competition with ‘good’ bidders unable to compete with the false promises of their competitors. Furthermore, this brings into question the validity of the tender if the unrealized value is not restored in some way. This is because unrealized value creates the possibility that a contractor with a better value-for-money bid should have been chosen (Rijkswaterstaat, 2017). Furthermore, it is important that these criteria are actually realized in order to guarantee efficient spending

of public tax money; a core objective of Rijkswaterstaat (Marktvisie, 2015). Lastly, the results of the statistical analysis could help Rijkswaterstaat to find the best risk allocation and management style for individual projects. For these reasons, it is important Rijkswaterstaat gains more insight on the realization of MEAT criteria. This thesis aims to fulfill that need. By doing so, this thesis could improve public procurement and increase the realization of MEAT criteria.

1.4 Research Goal and Question

The aim of this study is to find factors that influence project success, as measured by MEAT criteria realization, for infrastructure projects in the Netherlands. The main research question aiming to achieve this goal is:

Do management style, risk allocation, and contractor competition influence the realization of MEAT criteria in Public-Private Partnership for Dutch infrastructure projects?

The secondary questions aiming to help answer the main research question are as following:

- 1. To what extent are ex-ante MEAT criteria realized ex-post?*
- 2. Does management style, during implementation, influence MEAT criteria realization?*
- 3. Does risk allocation influence MEAT criteria realization?*
- 4. Does contractor competition influence MEAT criteria realization?*

Ex-ante in this case entails the MEAT criteria that are set up by the contracting authority before the tendering process has started. Furthermore, this refers to the amount of awarded points to the winning bid. These points are awarded by the public party in order to rank different bids. A bid that will offer more value will receive more MEAT points. These amount of points represent a certain fictive monetary value. This fictive value gets subtracted from the contractors bid. More MEAT points therefore increase a contractors' chances at winning the bid as this lowers their tender sum. For this reason,

the contractor is selected partly based on these points. Therefore, these ex-ante criteria are related to the projects tendering phase, before the implementation phase starts. Ex-post in this case references to the time after the project has been completed. Together this means: are the MEAT criteria set during the tendering phase actually realized as promised after the project is completed?

1.5 Research Design

For this research a database from Rijkswaterstaat has been made available and surveys have been sent to project leaders from Rijkswaterstaat. This data is strictly confidential, and has been used according to the VSNU standards. No connections to individual projects, companies or persons are able to be made from this thesis. The research has focused on analyzing the data with the use of statistical programs.

A survey has been made for project leaders of Rijkswaterstaat who have evaluated how much of the ex-ante MEAT criteria have been realized for their specific projects. This realization score has then been used as the dependent variable and formed the basis of the statistical analysis. Contractor competition, management style, risk allocation and project characteristics have been used as the independent variables. As MEAT criteria can differ substantially in subject-matter, this thesis will feature an additional explorative analysis. The MEAT criteria have been divided into four groups: sustainability, management, environmental hinder and project-specific criteria. Comparisons between the different MEAT categories have been made to see whether the aforementioned independent variables affect the realization of these differing criteria categories equally.

The quantitative nature of Rijkswaterstaat's MEAT criteria lend themselves well for statistical analysis. A quantitative analysis will therefore be the basis of this research.

1.6 Content of Thesis

In total this thesis consists of six sections. In this first section the background, relevance, research questions, and the thesis structure have been presented. In section two, an overview of the literature regarding MEAT criteria, project success, D&C contracts, management style, risk allocation, and contractor competition will be discussed. Furthermore, this section includes the conceptual model and hypotheses. In

section three, the methodology, data collection, and data analysis will be explained. In section four the results of the analysis are presented. In section five, the results are discussed, the research questions are answered, and the limitations of this research are stated. Lastly, in chapter six, the conclusion of this thesis will be presented.

2. Theoretical Framework

This chapter will provide an explanation and in-depth theoretical discussion on MEAT criteria, project success, D&C contracts, success factors, and other relevant definitions. Furthermore, the hypotheses and conceptual model are presented.

2.1 MEAT Criteria and Procurement

Recently, Dutch public authorities award infrastructural projects based on the award criterion ‘Most Economically Advantageous Tender’ (MEAT) as defined in the EU public procurement directives (EU, 2014). The EU procurement directives of 2004 which detail the MEAT procurement method received an update in 2014 to enforce the greater use of qualitative criteria when awarding public contracts. The reason for this update was a reliance on price as the main award criteria for infrastructure projects (EU, 2014; EFCA, 2019). The European Federation for Consulting Engineer Associations (2019) states the strong emphasis on price has often led to limited innovation. Furthermore, it encourages short-term solutions with little sustainability in mind, as sustainable projects are generally more expensive (EFCA, 2019). Increasing the emphasis on quality criteria into public procurement aims to tackle these problems (EU, 2014). The criteria aim to make sure qualitative environmental and social aspects are taken into account when evaluating bids (Uttam & Le Lann Roos, 2014). A study by Lenferink et al. (2013) states that these quality criteria can lead to broader, more socially relevant awarding of bids, as the criteria opened up possibilities for more cooperation with civil society. In the EU Directive for Public Procurement (2014) clients are now strongly advised to use the MEAT procurement method.

Rijkswaterstaat, a government body as assigned in the Public Procurement Directives has to follow these directives as well (EU, 2014). It is only allowed to award a project solely on price when they can extensively argue why there is no need to award based on MEAT. Rijkswaterstaat uses the ‘Beste Prijs Kwaliteit Verhouding’ (BPKV) as their MEAT criteria, formerly known as ‘Economisch Meest Voordelige Inschrijving’ (EMVI) (Rijkswaterstaat, 2017). Therefore, using BPKV is the norm according to the Dutch Public Procurement Act (2012).

The BPKV model specifies two main criteria (Rijkswaterstaat, 2017):

- Performance criteria: A performance criterion has the feature that the quality described in the tender can be directly quantified in the form of a “performance unit”. The quality value appears immediately (quantitatively) through the tenderer's statement in his bid. For example, the tenderer states to decrease the number of road closures by five days. There is no professional quality assessment required that this is more than a competitor who only offers a reduction of road closures by four. The amount of days the road is closed is assigned a performance value by the contracting entity. The quality value can easily be determined by multiplying the number of performance units offered by the corresponding performance unit value. For example, a tenderer gets one point for every two days of reduced road closures up to a maximum of ten points. A bid that reduces the amount of road closures by six would then have a quality value of three. Other examples of performance criteria are: the time that a road is available earlier than expected, the increased service life of the project, and less number of night closures.
- Quality criteria: A quality criterion has the characteristic that, contrary to a performance criterion, the quality described in the tender cannot be directly quantified. An assessment of the relevant criterion must first take place on the basis of professional skill by the public party. This results in a quality rating. That rating is then the basis for the added value. Examples of quality criteria are: aesthetics, risk management, and increased functionality. As said above, these are not directly measurable by numbers, however they do add value. Therefore, the quality criteria only becomes quantitative once the assessment has taken place, and a quality rating is formed.

By assigning value to criteria that are important to the contracting party, the tenderer can anticipate this and try to offer added value based on the criteria in their bids. This in turn allows the tenderer to achieve a better competitive position as they are more likely to win the bid. This process results in competition taking place on both price and quality (Uttam & Le Lann Roos, 2014).

In the end the MEAT scores are transformed into fictive euros, with a higher MEAT score leading to more fictive euros. These fictive euros are then subtracted from the tender bid, leading to the total added value of the bid. The private party with the lowest fictive bid wins the tender (price minus added value). This ensures that more expensive bids can win the tender if they offer more value. An example of this phenomenon is shown in Figure 2.1. In this figure, bid C offers the highest price, but still wins the bid as it also offers the most value (Dreschler, 2009).

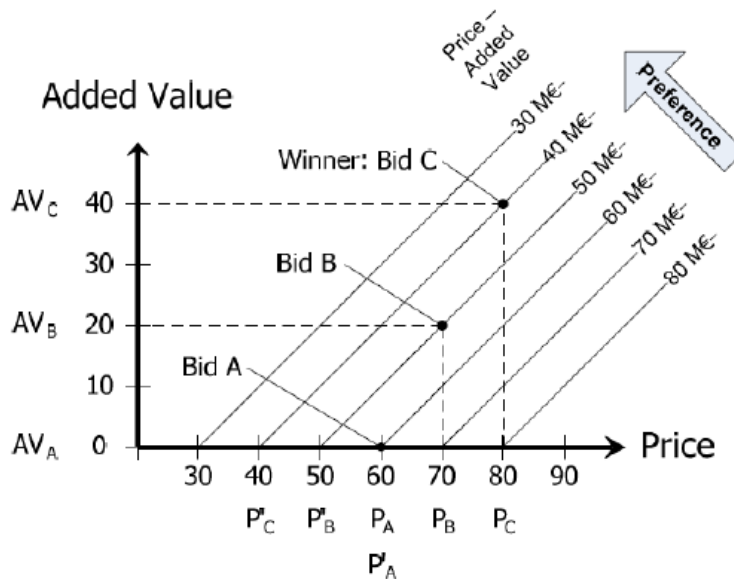


Figure 2.1. Comparison of three bids. Bid C offers the highest value (Dreschler, 2009).

2.1.1 MEAT Sanctions

If a tenderer promises a lot of added value in his tender, but does not deliver on this during implementation, competition will be distorted. After all, the tenderer has received a notional reduction of his tender sum based on the added value offered, and the added value must therefore actually be delivered. Therefore, Rijkswaterstaat utilizes a MEAT sanction (Rijkswaterstaat, 2017). The purpose of the MEAT sanction is to prevent registrants from promising “golden mountains” when registering to obtain the contract, and then not realizing it. By nature, a MEAT sanction can only be applied if the shortcoming can no longer be remedied, i.e. if the promised performance has not been delivered and it has also become impossible to deliver that performance (Rijkswaterstaat, 2017).

If the contractor does not meet the performance stated by him in his tender, he will remain in default and directly harm the client. The damage for the client is more than the MEAT value used (amount by which the registration is notionally reduced). The client's image is damaged because the promises made to the users and the environment have to be adjusted (Rijkswaterstaat, 2017). The total damage is therefore higher than that used by the client in the tender phase. Furthermore, effects will occur that can be regarded as distortions of competition. After all, the possibility arises that the contractor is actually no longer the most economically advantageous tender. Such sanctions are therefore also in place to restore the legal validity of the tender.

On balance, the fine must therefore be higher than the MEAT value used. The RWS policy is that the fine is 1,5 times as high as the used MEAT value (Rijkswaterstaat, 2017). Marques & Berg (2011) state that similar sanctions around Europe are rarely used. For example, in Portugal no sanction has been applied in over 15 years of concession contracts. The major explanation for the lack of sanctions is that the burden of proof is fully on the client side. Furthermore, the private party has to be fully accountable.

2.2 Project Success

The past decades integrated contracts have been on the rise and are increasingly used in large infrastructure projects (Hodge & Greve, 2011; Lenferink, 2013; Rijkswaterstaat, 2019). These projects are supposed to increase success and offer maximum value-for-money. However, how do we know when a project is actually successful or this is just a label put on by the government itself? Hodge and Greve (2011) state that governments are quick to categorize their projects as 'successful' if they have not been outright corrupt or incompetent disasters. When a clear basis for the measure of success is established one can find its success factors. This is important as these success factors allow us to try and replicate success and maximize the advantages of integrated infrastructure contracts and projects (Cheung et al., 2012). However, different scientific studies do not have one specific definition of success. This makes it hard to compare success and success factors between studies, as well as between projects. Another complication is that, like quality, success is often perceptual and perceptions can vary between different parties and stakeholders (Bannerman, 2008).

Oftentimes a project is deemed successful when it is on time, within budget and meets quality objectives (Bannerman, 2008). However, Cooke-Davies (2002) argued that cost, time and quality are actually performance indicators of project management success, and not project success. Project success should be seen as the degree to which overall project goals and expectations are met (Sanvido et al., 1992; Cooke-Davies, 2002; Ogunlana, 2010). This can include technical, educational, financial, social, and professional aspects (Sanvido et al., 1992). It is also important to note that as project success is measured against the overall goals of a project, this can only be evaluated after the project is finished, while project performance, or management success, can also be measured during the project (Sanvido et al., 1992). Jeffares et al. (2013) state other outcomes, besides meeting goals and expectations, should also be taken into account when determining whether a project is successful or not, for example the sustainability of a project. The combination of these different arguments come together in the form of MEAT criteria. These criteria are pre-determined goals and objectives set in the contract. Therefore, they can be used to measure success in the form of “achieving outcomes” (Hodge & Greve, 2011) and meeting project goals and expectations (Sanvido et al., 1992; Cooke-Davies., 2002). Furthermore, these criteria are very diverse and can include for example sustainability or project hindrance. Thereby, the combination of these criteria form multiple different outcomes per project when measuring success as recommended by Jeffares et al. (2013). Moreover, these criteria are only able to be evaluated after the project is finished, thereby meeting a requirement of defining project success, instead of project management success, i.e. performance (Sanvido et al., 1992). Moreover, assessing ex-post realization of these criteria aims to eliminate some form of perception, as MEAT criteria are pre-set during the contract phase, and are often quantitative criteria. The degree of perception necessary to evaluate the success will differ per criteria and cannot be totally eliminated. However, for some criteria there can be a truly objective measure of success. For example, a MEAT criterion could be a maximum amount of days a road is allowed to be closed during construction. The amount of days this road was closed off is directly measurable and unaffected by perception. The contractual MEAT objective would succeed or fail depending on whether the maximum amount of agreed upon closed-off days is reached or exceeded, regardless of perception.

For these reasons, these criteria can capture important elements of defining and measuring success, while eliminating some of the complications that arise when trying to analyze and research success in infrastructure projects. The realization of ex-ante, contractually established MEAT criteria can therefore be used as a measure of ex-post success. Concluding, the aforementioned MEAT criteria provide an interesting opportunity and a good basis to function as the dependent, partially objective, success variable in a scientific study.

2.3 D&C Contracts

In the late 1990's, New Public Management became prevalent all across Europe (Pollitt et al., 2007). This led to governments reassessing their ideals, and core working methods, resulting in more privatization across different sectors, including infrastructure planning (Pollitt et al., 2007). Overall, in Western countries, a trend towards more integrated contracts and projects was noticeable. This shift also took place in the Netherlands. Rijkswaterstaat used to control every aspect of infrastructure planning themselves, including plan making, design, management, construction and maintenance (van den Brink, 2009). In the tender phase, this meant RWS published a solution with detailed plans, including material and time requirements in the form of RAW specifications (Lenferink et al., 2013). Contractors bid on these tenders, with the lowest bid winning the contract. In the realization phase, they had to follow the exact descriptions of these detailed RAW specifications. However, this working method was changing due to the ongoing shift towards a more decentralized government. Instead of publishing all the technical details of the plan, contractors were supposed to include this aspect in their bidding. This resulted in a change in the standard of RWS managing all aspects of infrastructure development, towards RWS only managing the design and outcome (Lenferink et al., 2013). These contracts are called Engineering and Construct contracts. This shift further developed with RWS also letting go of the design phase. The tender now only included a problem with a desired outcome, but no pre-specified design. Private contractors were expected to create this design, including all the technical details, to solve the specified problem. The better the design and the lower the price, the higher the chance a private contractor would win the contract. The result of this process is called

a Design and Construct contract. Since 2008, these integrated D&C contracts have been the standard for infrastructure projects in the Netherlands (Rijkswaterstaat, 2008).

The shift towards contracts that are more integrated has further developed with DBFM contracts, which also includes financing and long-term maintenance for the private side. However, these fully integrated contracts are only used for the largest, most complex projects on a national level. As there are relatively little of these large projects, this thesis focuses on D&C contracts. As explained above, these are now the standard in infrastructure procurement in the Netherlands. These D&C contracts include more interaction and more actors than the traditional RAW contract (Lenferink, 2012). Furthermore, D&C contracts allow RWS to allocate more risks towards the private party, compared to its predecessors. In a RAW specification, a client prescribes almost exactly how the work must be realized. This limits the possibilities for the contractor to come up with creative solutions. D&C contracts, coupled with MEAT criteria, have allowed more ways for contractors to differentiate themselves and their design from their competitors.

2.4 Success Factors

With the belief that infrastructure project success is repeatable, researchers aim to identify certain factors that influence project success (Chan et al., 2001). These are called success factors (Cooke-Davies, 2002). A success factor can be seen as a feature in a system that will lead to project success (Cooke-Davies, 2002). Three of these factors, which are argued to be important in section 1.2, are featured in this thesis; management style, risk allocation, and contractor competition. These factors will individually be discussed below.

2.4.1 Management style

The type of stakeholder management is argued to be important, and is expected to have a positive effect or negative effect on the outcome of an infrastructure project (De Schepper et al., 2014; Verweij, 2015; Kort et al., 2016). Though, Verweij et al. (2017) argue that stakeholder management in the implementation phase has received little attention in research. Literature on project management mainly distinguishes two perspectives: project management and process management (Edelenbos & Teisman, 2008; Klijn et al., 2008; Edelenbos & Klijn, 2009; Busscher et al., 2015; Verweij, 2015).

- Project management is primarily focused on the project internally and less concerned with the external environment. Project management is focused on achieving predetermined goals, despite unforeseen circumstances (Edelenbos & Klijn, 2009; Verweij et al., 2017).
- Process management is primarily focused on the continuous involvement of actors and the inclusion of the external environment. Predetermined goals are less important, as these are subject to change during the span of the project (Edelenbos & Klijn, 2009; Verweij et al., 2017).

Process management is mostly suited for projects with a high complexity, many stakeholders, and a variety of problem definitions, whereas project management is more suited for projects with a clear focus and less uncertainty (Edelenbos & Klijn, 2009). Edelenbos & Klijn (2009) argue that process management leads to better outcomes than project management. However, the type of management should be related to the complexity of the project. Project management is generally assumed to be effective in smaller or less complex projects (Edelenbos & Klijn, 2009). Process management on the other hand is more suited for larger projects with high uncertainty and complexity (Edelenbos & Klijn, 2009). In infrastructure projects, projects that started with explicit, pre-determined objectives can turn into a more complex process with more vague goals (Busscher et al., 2015; De Bruijn et al., 2010). For example, this could happen due to increased stakeholder opposition. Influences like these are called external dynamics (De Bruijn et al., 2010). These dynamics can also have an effect on the project scope (Busscher et al., 2015). When the scope changes, the uncertainty of a project increases. In that case, the externally oriented focus of process management is better suited to deal with these changes as they happen.

Hypothetically, these scope changes could mean that the realization of MEAT criteria gets lost because of the changed goals and community interaction. The public procurer could put less emphasis on pressuring the private contractor to reach the MEAT criteria goals, in favour of an increased effort in stakeholder interaction. An example of this could be the traffic loss hours. Once the scope of the project changes and changes are

made in favour of nearby stakeholders for example, this could have an impact on construction, and thus the amount of traffic loss hours during the project. This would directly influence the amount of criteria that have been (partially) realized and thus the amount of success of the project. Especially when this is compared to project management which is predominantly goal-oriented. In project management, MEAT criteria could hypothetically be more important goals to reach and therefore receive greater attention during the implementation phase. Furthermore, there are generally less goals in project management and the goals are expected to experience less change compared to during process management (Edelenbos & Klijn, 2009; Busscher et al., 2015). Therefore, project management is expected to have more success in realizing MEAT criteria.

2.4.2 Risk allocation

Risk allocation involves identifying risks and appropriately sharing it among the public and the private party (Ke et al., 2010). This is considered to be one of the advantages of integrated contracts compared to its predecessors. During the contract and project negotiations, risks should be clearly defined and allocated to the party that have better mitigation techniques to manage (Ke et al., 2010). It is important for governments to refrain from the idea of transferring all project risk to the private sector, as this could affect the progress or future participation of private contractors in infrastructure projects. Studies have suggested that such improper risk allocation may lower project performance (Medda, 2007; Zhang et al., 2016). Furthermore, allocating too much risk to the private party could lower the cooperation of a contractor (Zhang et al., 2016). Moreover, in order for the partnership to be fair, the public partner must retain risks that obviously go beyond the control of the private sector. For these reasons, certain ‘guidelines’ have been created to allocate risks as efficiently as possible.

Firstly, Iossa et al. (2007) argue that the public sector should control risks that the private sector is not capable of. Secondly, the private party should control the risks that it is capable of controlling both the impact and occurrence chance of. Lastly, risks should be shared between the public and the private party if the private party is able to control the impact of a risk, but is not able to control the occurrence chance of a risk. However, the practical implementation of these guidelines is not clear-cut. Medda (2007) argues that it

is not always clear who is capable of controlling a certain risk. Moreover, the public party could argue that the private party *is* capable, while the private party could argue it is *not*. Therefore, this allocation also depends on the bargaining and negotiating power of involved parties (Medda, 2007). Risk allocation is therefore an uncertain task and it is hard to determine the ‘correct’ allocation. For these reasons, risk allocation differs from project to project. However, scholars still try to find ideal risk allocation models.

In order to analyze the effect of risk allocation on MEAT criteria realization in this thesis, a framework has to be established to correctly identify the risk-allocation per specific project. A framework has been created by Bing et al. (2005) in order to compare risk preference and allocation in infrastructure projects. This paper categorizes the risks in micro, meso and macro level risks (Bing et al., 2005). Macro level risks come from outside the project scope (Bing et al., 2005). These are national, or industry level risks. An example would be changing legislation, natural disaster, or the current COVID-19 crisis. In practice these types of risks are almost always allocated to the project owner, i.e. the public party (Medda, 2007; Zhang et al., 2016). Meso level risks are within the project scope itself. They often have to do with project finance, construction, design and operation (Bing et al., 2005). Lastly, micro level risks are relational risks and are often found in the procurement process. These form due to the differences between the public and the private sector in regards to contract management. Furthermore, public parties often have social responsibilities, while private parties are often mostly profit-driven. These micro level risks are also within the project scope, but they are party-related (relational) and not project-related as with meso level risks. The paper by Bing et al. (2005) state which risks should be allocated to what party, with some risks being project-specific. It therefore has created an ‘ideal’ risk allocation model.

The more the risk allocation of projects in this study resembles the risk allocation model of Bing et al. (2005), the higher project success is expected to be.

2.4.3 Contractor competition

Multiple studies identify competition as a critical success factor in public procurement (Babatunde et al., 2012; Osei-key & Chan, 2012; Zhang, 2005; Chan et al., 2010). With the changing of the procurement method from lowest-price to MEAT, this

allowed private parties to compete on other aspects than just price (EU, 2014; EFCA, 2019). When a private party scores high on the MEAT criteria, the chance that party gets chosen for the project increases (Rijkswaterstaat, 2017). It is therefore in private parties' best interest to score as high as possible on these criteria in order to outbid competitors. The more parties compete for a project, the more emphasis is put on MEAT criteria in order to add value and make the difference. However, does this actually lead to materialized MEAT criteria or do private parties present themselves better than they are in order to secure a contract?

Estache and Imi (2008) state that competition is crucial in order to keep public procurement costs low. International practices also suggest that a lack of competition can lead to sub-optimal value for money outcomes (Liu et al., 2013). Research indicates that competition causes private parties to increase their effort in terms of time and money in order to outbid competitors and win contracts (Blomqvist, 2002). As a result, more competition can lead to higher flexibility, variety, and cost efficiency of projects and its tendering processes (Blomqvist 2002; De Clerck, 2015). Therefore, research indicates that competition at the tendering stage is an important factor for increasing value for money in infrastructure projects (Liu et al., 2013).

On the other hand, a study by Sanderson (2008) found that too much competition could also have a negative effect on project outcome. As private parties differ in terms of knowledge, expertise and experience, these differences can dominate competition. This forces a focus on achieving the most cost-efficient bid, instead of the highest value-for-money bid (Sanderson, 2008). Thereby, private parties may disregard possibilities to add value to a project, for example through innovation. MEAT criteria are added to projects specifically in order to increase this focus on value. Furthermore, these MEAT criteria are added to stimulate competition by increasing the selection and awarding mechanisms (Lenferink et al., 2013). This should decrease the aforementioned pure price-bidding (Lenferink et al., 2013). However, this could also lead to an overemphasis on MEAT criteria in order to win the contract. Therefore, hypothetically, instead of a downward spiral of price-bidding, an upward spiral of MEAT promises could form due to high competition. Therefore, the proportion of actual realized criteria could be lower when the promises are higher, leading to lower project success.

A characteristic of a MEAT tender is that these criteria are realized during the implementation phase. While they are agreed upon in the tendering phase, they can only be evaluated when the project has been completed. Therefore, whether these criteria have been realized has to be evaluated ex-post, and only then can a fair comparison to other bids be made. On the other hand, with price bidding the winning tenders bid price is always directly noticeable before and during the implementation phase. As such, bid prices can easily be compared to other contractors. With MEAT criteria bidding, a contractor can secure a project by stating they will decrease CO₂ emissions by a certain amount. However, the realization of this promise can only be evaluated ex-post, after project completion. Therefore, if the contractor does not meet this goal, there is a possibility that a different contractor should have won the bid. Furthermore, this ex-post evaluation of MEAT criteria realization is currently lacking oversight from Rijkswaterstaat as stated by several persons within the organization. Therefore, as of now, it is unclear whether increased competition actually leads to increased materialized MEAT criteria. It could also be the case that contractors overstate their ability to realize MEAT criteria in order to secure the contract. However, in the first instance, contractors are expected to work ethically and bid fairly. Therefore, higher competition is expected to influence MEAT criteria realization positively.

Because of the aforementioned different dynamics between competition and value for money outcomes, it is interesting to find out what effect competition has on the realization of MEAT criteria.

2.5 Individual MEAT criteria realization

This thesis will perform an additional, explorative analysis on the realization of MEAT criteria categories, as it is unlikely that the aforementioned critical success factors influence different MEAT criteria equally. The MEAT criteria have therefore been categorized into four groups as will be explained in Chapter 3.1. The four groups are sustainability, environmental hinder (omgevingshinder), management and project-specific characteristics. However, when searching for these keywords in combination with success in online libraries, little results could be found. This will therefore mostly be explorative analysis by the researcher. The most important expected differences between

the different MEAT groups will be discussed below. The biggest differences are expected to be seen in the sustainability and environmental hinder groups.

Research by Edelenbos & Klijn (2009) indicates that project management is most suited for realizing clear, predetermined goals. For this reason, management style may be especially important for sustainability outcomes. This is because the vast majority of sustainability criteria in projects of Rijkswaterstaat are based around CO₂ emission reduction goals. These are often acquired in the form of a contract by the private party and can be seen as a clear goal that is not subject to change during the execution phase. Therefore, project management could have a higher effect on sustainability criteria than process management.

On the other hand, process management is expected to have a bigger effect on the realization of environmental disturbance MEAT criteria. This is because these disturbance MEAT criteria are often about engaging stakeholders and the environment. Process management has been indicated to work better in such project environments, as it naturally focuses more on communication and stakeholder engagement (Busscher et al., 2015). Furthermore, such goals are more likely to change and lead to scope changes (Busscher et al., 2015).

After the analysis, hypotheses will be formed for the factors influencing individual MEAT categories for other researchers to further investigate.

2.6 Hypotheses & Conceptual Model

From the theoretical framework the following hypotheses are formed:

1. Project management is expected to have a positive effect on MEAT criteria realization.
2. Contractor competition is expected to have a positive effect on MEAT criteria realization.
3. Risk allocation, close to the model created by Bing et al. (2005), is expected to positively influence MEAT criteria realization.

These hypotheses are visualized in the conceptual model in Figure 2.2 below. The model starts with ex-ante MEAT criteria. The project success (i.e. ex-post realization) of

these MEAT criteria is influenced by the success factors management style, contractor competition, and risk allocation. The expected relationship between these factors and project success is represented by a plus (+) or a minus (-). A positive relationship (+) means the more of this factor, the more MEAT criteria realization is expected. A negative relationship (-) entails that the more of this factor, the less MEAT criteria realization is expected. For example, project management shows a positive relation to MEAT criteria realization. Therefore, the more management style resembles project management, the more MEAT criteria are expected to be realized. Another example; a risk allocation far from the model presented by Bing et al. (2005) shows a negative relationship. Therefore, the more the risk allocation differs from the model, the less criteria are expected to be realized.

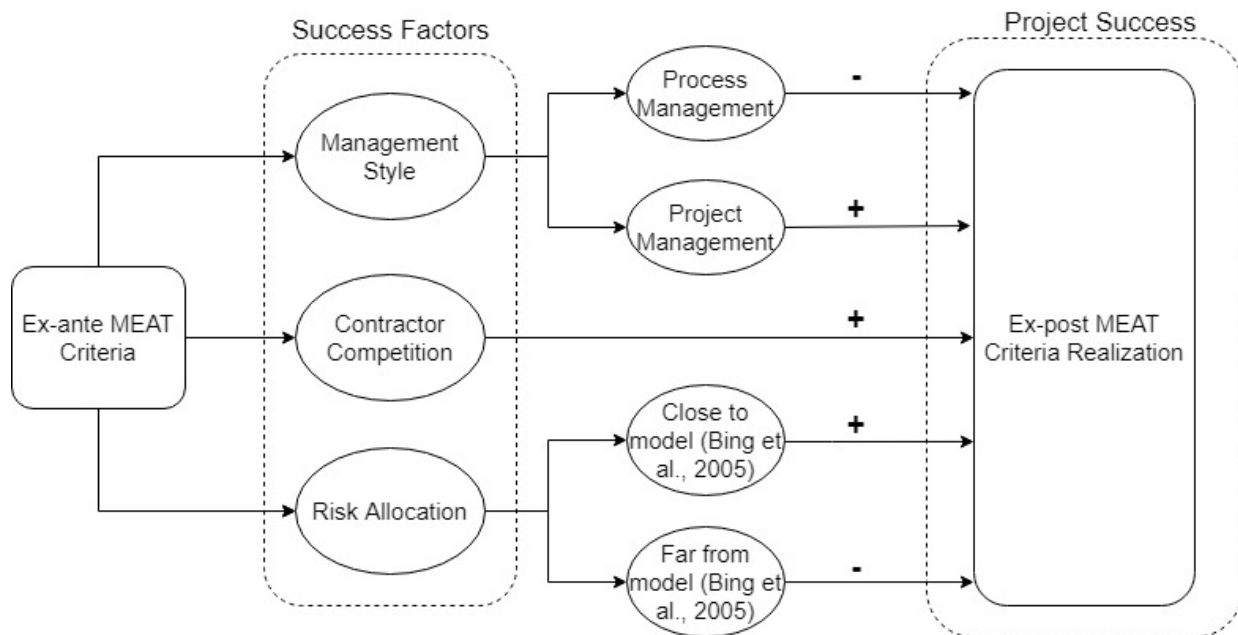


Figure 2.2. Conceptual model

3. Methodology

This chapter will provide information on data collection, the operationalization of the used variables, the research method, the statistical tests that have been used, and research ethics.

3.1 Data collection

This thesis will use primary and secondary data. The project database of Rijkswaterstaat will provide information on competition and project characteristics. A survey for project managers will provide information on missing variables in the project database that are necessary for this study. A full overview of the survey and its questions can be found in Appendix A.

3.1.1 Case selection

For this study, the initial cases used to be DBFM contracts. However, as there are little of these very large projects in the Netherlands, and even less that are finished, D&C contracts were chosen. After speaking with experts at Rijkswaterstaat, it was deemed necessary that the projects were delivered, and not still ongoing. This is because the realization of MEAT criteria can only properly be assessed and evaluated after the project is finished. Therefore, the cases need to be finished D&C projects, and a minimum of around 30 to meet the statistical requirements. A database from Rijkswaterstaat was made available in which all D&C contracts were visible over the last ten years. This database consisted of 151 projects, of which 101 were finished. In order to increase the statistical power of tests, the cases had to bear similarity to each other (Moore & McCabe, 2006). A budget between ten and twenty million was chosen to keep project size similar and in order to reduce outliers. After that, out of the 101 D&C contracts from 2010 to 2020, 60 were still eligible for this research. From these projects the ‘inschrijvings- en beoordelingsdocumenten’ (registration and assessment document) and other relevant documents were requested and granted. These documents were necessary to require the data needed to analyze them. However, not all projects still had these documents accessible, leading to a relatively small amount of leftover projects. In order to still reach 30 responses, the filter of 10-20 million was removed, and the full 101 D&C projects’ documents were requested. These documents contained information on project characteristics, project-specific MEAT criteria, and potential fines. Furthermore, these documents were used to source contact information of project managers, portfolio directors, contract managers and purchasing advisors. The projects’ budget was

controlled for later on in the statistical analysis to make sure this was not a hidden factor that influenced the outcome of the statistical tests.

From these 101 projects only 50 had a combination of the necessary documents, *and* still had employees working at Rijkswaterstaat who were available for contact. These 50 projects were selected for this research. This resulted in 86 relevant people available to contact and fill out the surveys. All these employees received an email with a request to answer the survey about their project. Out of these 50 projects, 31 were filled in to completion and received a valid response. Four projects received a double response; one by the contract manager and one by the project manager. The survey with the lowest amount of MEAT criteria realization was chosen for the statistical analysis. This is because there are reasons to believe criteria realization could be lower than stated in the surveys. This will be explained in chapter 5.1. Furthermore, the double responses were checked for agreement on the rest of the survey, and the answers were relatively similar. This is a good sign, as this either means the overall responses are relatively objective, or that professional practitioners agree with each other on the meaning of variables and their outcome in this study. In both cases, this improves the reliability of the analysis. With these double responses, a total 35 responses were gathered in four weeks. The research achieved a response rate of 62% with 31 out of 50 cases filled in. This is very high. Reason for this participation could be the general interest in the outcome of this study as there is very little known about the true realization of MEAT criteria, also within Rijkswaterstaat. Furthermore, respondents received an extensive mail with potential benefits of this study which can be read in Appendix B. After that, individuals who had not yet participated received weekly reminders. Moreover, respondents who stated that they were not interested or could not answer the survey, were asked to name someone who was interested or someone who could answer for that specific project. This increased the scope of the available network. Furthermore, many projects had multiple contacts, increasing the chance that one of them would fill out the unique project-specific survey. Lastly, some contract or project managers worked on multiple selected projects. Therefore, they also received multiple surveys to fill in. These persons received extra persuasion and encouragement to fill in their received surveys by a phone call. However, this was done in an ethical way, and not pushed. Some persons still declined to participate.

The selected projects, along with a short project description and budget, can be seen in Appendix C. An overview of project budget can be seen in chapter 4 (Table 4.4)

3.1.2 Survey

The data collection for the survey has been done online due to COVID-19 limiting contact between people. A location where the respondents feel at ease and familiar to their surroundings is beneficial to the honesty in which the survey will be answered (Clifford et al., 2010). Therefore, it can be beneficial for the research that respondents have answered the survey at home. This is most likely the case as during the time of this research all Rijkswaterstaat employees had to work from home, and there was a partial lockdown due to the ongoing pandemic. As the respondents had to answer questions about the success of their projects, a bias can be expected. The respondent has been guaranteed that his or her answers are anonymous, and that no direct link to individual projects can be made in order to reduce bias. Furthermore, project documentation has been reviewed whenever possible to find any conflicting statements and bias present in the survey. For example, in a couple of the project documents, some of the risks were already defined and allocated. These were reviewed and compared to the survey answers. In all cases, the direction (private or public) matched the survey answers and therefore the survey was deemed valid.

The survey contained questions on the management type and the risk allocation per specific project. The projects therefore form the unit of analysis. The questions in the survey mostly consist of closed questions in order to make them more easily comparable and analyzable. Certain open questions have been included in order for the respondent to share more details like ‘additional notes’ to a question or project specifics.

The survey was divided into four parts. The first part consisted of background questions about the respondent and project. This for example asked about the perceived project complexity and the amount of relevant work experience the respondent had when working on the project. The second part dealt with the realization of MEAT criteria and corresponding MEAT sanctions. Every survey was unique in the sense that the MEAT criteria that were used in a specific project were already filled in. As every project uses different MEAT criteria, every survey was different. The respondent therefore only had to

answer to what degree the individual criteria were realized, and if fines were imposed on those criteria. The third part investigated the used management style by asking ten management related questions. The fourth and final part investigated the allocation of different types of risks within the projects by asking the respondent to allocate 20 risks. The survey closed with a question evaluating the overall satisfaction of the collaboration with the private party on a scale of 1 to 10.

3.2 Operationalization

3.2.1 Success

The survey has been made for project leaders from Rijkswaterstaat who will evaluate how much of the ex-ante MEAT criteria have been realized for their projects. First, the ex-ante MEAT criteria have been taken from the research database from Rijkswaterstaat per specific project. Then, these criteria have been added to the survey. Thereafter, the project leader fills in the survey and evaluates how much of the ex-ante MEAT criteria have been met ex-post. This is done on a scale of 0 to 100. On this scale 0 means none of the pre-specified criteria have been realized as promised. A score of 100 means that the criteria have been fully realized as promised during the tendering phase.

A higher performance score equals more success in realizing the pre-set criteria and expectations for the private party, and thus more success. This success rate will then be used as the dependent variable and form the basis of the statistical analysis. As independent variables, and possible predictors, contractor competition, management style, and risk allocation will be used.

As MEAT criteria can differ substantially from each other, they have also been divided into subgroups. Dividing the MEAT criteria into subgroups allows for more accurate and specific analysis as independent variables could be more important for one MEAT group than another, as explained in chapter 2.5. Furthermore, it is interesting to see whether different MEAT criteria have different levels of success. If for example one MEAT criteria category scores substantially lower on realization, then that group could receive extra attention and monitoring in the implementation phase. For this research four groups (main categories) have been created:

1. Sustainability
2. Environmental hinder (omgevingshinder)
3. Management
4. Project-specific

These groups have been created based on a different dataset by Rijkswaterstaat, where many of the criteria were already divided in one of these groups. The project-specific group was created for criteria that were untransferable to other projects. For example, this could be a specific design element.

The individual MEAT criteria are placed into these four main categories. For example, an often used MEAT criteria is CO2 emission reduction. This MEAT criteria falls under the category ‘sustainability’. Environmental hinder can range from ‘traffic hinder reduction’ to creating an accepting environment by ‘environment management’. For a full overview of the used criteria and their category see Table 3.2.1.

Main categories	Sub criteria
Sustainability	Durability CO2 performance ladder MKI Dubo-Calc
Environmental hinder	Traffic hinder reduction Experience of hinder Minimal hinder road user Reduced slots (road usage) Environment management
Management	Process control Process approach Stakeholder management Performance Robust planning Plan of action Quality assurance
Project-specific	Added quality Design Added greenspace Guaranteed quality and durability

Table 3.1. MEAT criteria categories and corresponding sub criteria

3.2.2 Management Style

As explained in Chapter 2, this thesis uses two main management styles: project and process management. In order to find the management style of the selected projects, a multitude of project management related questions have been included in the survey. These questions are based on research by Edelenbos & Klijn (2009). This research has analyzed certain key differences between project and process management styles based on managerial choices (see table 3.2). It for example states that project management is more focused on realizing pre-determined goals, whereas process management has more fluid goals and is more focused on the road towards these goals, instead of the goals themselves (Edelenbos & Klijn, 2009). The survey included 10 questions with two statements with one of the statements leading towards project management and the other towards process management. The manager could then choose on a scale of one to five which of the statements more closely resembled the management choices during the project. The lower the score, the more the management style of the project resembled project management. The higher the score, the more the management style resembled process management. In the end an aggregated average score for each individual project was created based on the 10 answers of each survey. This score resembled the used management style.

Project management	Process management
Achieving fast results	Gaining support from actors
Focus on time and money	Focus on interaction with stakeholders
Reaching solid agreements in contracts	Building mutual trust
Internal orientation (project itself)	External orientation (external actors)
Actors are bounded to the rules project	Actors have freedom to maneuver
Project manager taking the initiative	Reacting to initiatives by others
Focus on detailed, clear goals	Focus on broad, fluid goals
Solutions were created by project team themselves	Solutions were created by initiative of stakeholders
Actions aimed toward results	Actions aimed at improving relationships
Focus on reaching clear goals	Focus on adjusting to circumstances

Table 3.2. Managerial choices based on research by Klijn & Edelenbos (2009).

3.2.3 Risk Allocation

Risk allocation questions have been included in the survey in order to find the risk allocation of the specific projects. The framework and survey of Bing et al. (2005) has been used to fit this purpose. This has been done based on a Likert scale of one to five, with one being risk fully for the private party and five being risk fully for the public party. A score of three meant both of the parties were equally responsible for the risk. The responses to the risk questions in the survey have been used to create two variables; overall risk allocation, and weighted risk allocation. See table 3.3 for the full overview of the risks that have been asked, and also for the ‘ideal’ risk allocation used to create variable two. For two projects not all risk questions were answered. Therefore, these projects did not receive risk variables.

The overall risk allocation variable was created to showcase the average risk allocation per project from private to public. This was done by adding all risk scores and then dividing by the number of risk questions. The lower the score, the more risks were allocated towards the private party. The higher the score, the higher the public parties' risk.

For the weighted risk variable, a weighted score can be given as Bing et al. (2005) and Molenaar et al. (2000) created an ‘ideal’ risk allocation framework to be used in PPPs, and Design and Build projects. Therefore, a ‘right’ amount of risk allocation could be aggregated by surveying the same risks that these papers used, and then comparing them to the ideal risk framework. These papers partly analyze the same risks, and come to the same conclusions regarding the ideal risk allocation. For example, Bing et al. (2005) and Molenaar et al. (2000) stated that shortcomings in design should be fully allocated towards the private party. If the response of the survey stated that this risk was fully allocated to the private party this would be seen as ideal risk allocation according to Bing et al., (2005) and Molenaar et al., (2000). If it stated that the risk was fully allocated to the public party, this was seen as unideal risk allocation. Good comparisons between the ‘ideal’ risk allocation and the actual risk allocation could be made as both the survey of Bing et al. (2005) and this research used the same 5 point Likert scale from “fully private” to “fully public”. If a certain risk was ideally “fully private” and the project’s allocation of that risk was “mostly private” one point would be allocated to the weighted score as it

deviated one point on the Likert scale from the ideal risk allocation. If the used risk was “equally shared” two points would be allocated to the weighted score as it deviated further from the ideal risk allocation. This was done for all risks and then an average was created. This resulted in a weighted risk scale of 0-4, as 4 was the maximum amount of points a risk could differ from the ideal (from fully private to fully public for example). A score of 0 means that the project allocated the risks exactly the same as the ideal risk framework. The higher the score, the further the project deviated from the ideal risk allocation as stated by Bing et al., (2005) and Molenaar et al., (2000). The project-specific risks were not used for this weighted risk score.

Risks	Ideal allocation
Design	
- Delay in approvals	Project-specific
- Delay in permits	Project-specific
- Errors in contract	Fully public party
- Shortcomings in design	Fully private party
Construction	
- Additional costs	Fully private party
- Construction delay	Fully private party
- Material shortages	Fully private party
- Staff shortages	Fully private party
- Late changes in design	Mostly private party
- Poorly delivered quality of work	Fully private party
- Deviations from contract	Project-specific
- Shortcomings of subcontractors	Fully private party
Operational	
- Additional costs due to extra scope	Project-specific
- Maintenance costs higher than expected	Mostly private party
- More frequent maintenance than expected	Mostly private party
Relationships	
- Organization and coordination	Mostly private party
- Shortcomings experience	Project-specific
- Deficient distribution	Equally shared
- Responsibility risks	Equally shared
- Difference in working methods between partners	Mostly private party
- Liabilities of third parties	Fully private party

Table 3.3. Risks used in survey based on survey by Bing et al., (2005).

3.2.4 Competition

Competition has been measured by the number of bidders on a project. The higher the number of bidders, the higher the competition. A study by Hong and Shum (2003) stated this to be the main indicator of competition in tender processes. This already is a continuous variable and therefore requires no extra modification. The amount of bidders have been added to the projects using the requested documents and the project database of Rijkswaterstaat. This allows for analysis of whether contractors overstate their ability to add value in order to secure the contract if there is high competition.

3.3 Quantitative Analysis

Quantitative data are more suited for discovering facts and assumes a fixed and measurable reality (Clifford et al., 2010). Qualitative data are more concerned with understanding the human behaviour from the informant (interviewee's) perspective and assumes a dynamic negotiated reality (Clifford et al., 2010). Therefore, quantitative research has been used to analyze the database and survey results.

This thesis aims to determine if certain independent variables have an influence on MEAT criteria realization. To achieve this goal, a linear regression is used. Regression analysis is used to quantify the strength between the relationship of the dependent variable and the explanatory variables (Moore & McCabe, 2006). Furthermore, regression analyses are used to determine whether an independent variable may have no relationship to the dependent variable at all (Moore & McCabe, 2006). As it is uncertain what factors influence MEAT criteria as of now, a regression analysis is the perfect tool to find out. An estimate for an accurate linear regression minimum sample size is approximately ten cases per explanatory variable (Moore & McCabe, 2006). Therefore, with three independent variables, the required amount of cases is 30. This amount was reached with 31 cases. However, this means multiple regression models were necessary to include control variables, for example project budget. Ideally, a single multivariate model would have been used, but this was not possible due to the limited amount of cases. Though, as said above the used regression models are fit for analysis, as the minimum requirement of 30 cases for strong and accurate analysis was met (Moore & McCabe, 2006).

Generally, Likert-type items are not fit for regression analysis. This is because the numbers that are attached to the responses of Likert items show a “greater than” relationship (Boone & Boone, 2012). Because how much greater is not implied, this creates an ordinal variable. Regression analysis requires interval or ratio variables (Moore & McCabe, 2006). In this thesis, both risk allocation and management style used a set of multiple Likert-type questions on the same subject with the same allowed answers. This makes it possible to create a Likert scale by calculating a composite score (mean or sum) (Sullivan & Artino, 2013; Boone & Boone, 2012). Likert scale items are seen as interval variables (Sullivan & Artino, 2013). Therefore, a comparison of means and standard deviations can be made. This is not possible with ordinal data (Sullivan & Artino, 2013; Boone & Boone, 2012). Therefore, as this thesis uses Likert-scale data and not Likert-type data, the management style and risk allocation Likert data can be used in parametric tests like ANOVA, t-tests, and regressions. However, a high level of internal consistency is required (Boone & Boone, 2012). This was measured using Cronbach's Alpha test. Both Likert-Scale items passed the test with a score between 0.70 and 0.80, which is defined as ‘acceptable’ (Table 3.3) (Boone & Boone, 2012).

	Management	Risks
Number of Items	10	20
Cronbach's Alpha	0.762	0.718
Result	Acceptable	Acceptable

Table 3.3 Cronbach’s Alpha Reliability Test on management and risk Likert data.

Lastly, descriptive statistics have been used to summarize the database, and visualize answers to the survey (Moore & McCabe, 2006).

3.4 Statistical Tests

Several tests have been used to make statements about the data. The tests are established based on the statistical characteristics of the variables. A confidence interval of 95% was used in all of the statistical tests ($\alpha = .05$). In preparation for the analyzes, the assumptions belonging to the statistical tests were checked. All statistical tests were performed using the Statistical Package for the Social Sciences (SPSS).

3.4.1 Regression Analysis

A linear regression analysis has been used to check for statistically significant relationships and correlations between MEAT realization and the independent variables management style, risk allocation and contractor competition. Ideally, a linear regression analysis uses an unbounded dependent variable. This thesis uses a proportion, namely a percentage score, which is bounded at 0 and 100. Therefore, a note has to be made regarding the analysis of the regression model. First, it cannot be used to predict values as the linear regression could predict outside of the bounded range, for example a score of 110%. This was not deemed to be problematic as the dataset only has 31 cases, and is unable to look at all the factors associated with MEAT performance. Therefore, predictions only based on management style, risk allocation, and contractor competition would offer no real world value, even if there was an unbounded dependent variable. Importantly, the regression model can still show significant relationships and correlation between the dependent and independent variable if the percentages are transformed using a logit transformation: $\ln(y/(1 - y))$ (Kieschnick & McCullough, 2003; Chen et al., 2017). This transforms the data from bounded to unbounded, but as said above, loses the power to predict values based on the independent variable coefficients (Chen et al., 2017). Another requirement for a linear regression analysis is that the variance is equally distributed. This was also deemed to be the case, as can be seen in the left plot in figure 3.1. Furthermore, the data were assumed to be homoscedastic (figure 3.1 right plot). And lastly, no multicollinearity was found. The VIF values were all around 1, and VIF values of around 4 are required for multicollinearity. The same requirements were also met for the regression analysis with overall satisfaction as the dependent variable.

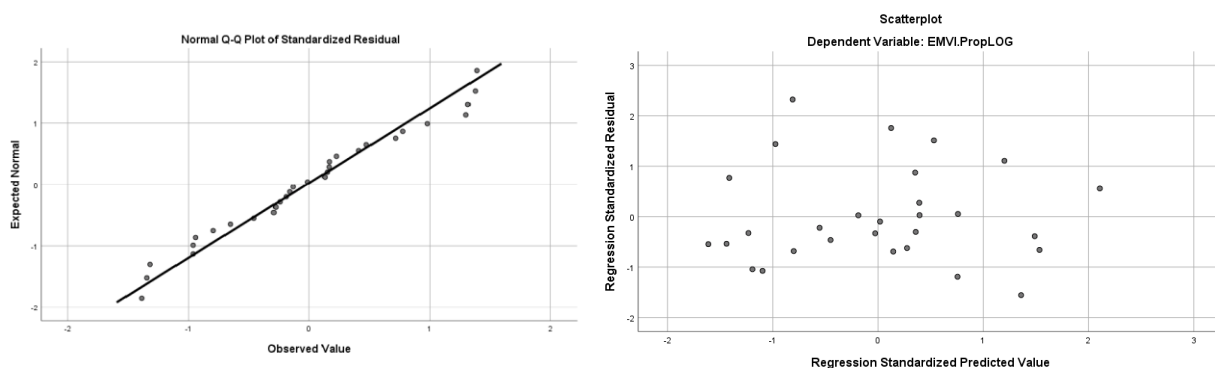


Figure 3.1. Q-Q Plot variance distribution (left) and homoscedasticity (right).

3.4.2 ANOVA

A one factor analysis of variance (ANOVA) has been used to test whether the performance of MEAT criteria differ per MEAT category explained in chapter 3.2.1. This test requires the assumption that the data are normally distributed. A Kolmogorov-Smirnova test was used to test for this (Allen & Bennett, 2010). The assumption regarding the normal distribution of the outcome variable MEAT realization appeared to be affected, so it was necessary to transform the data. This was done using a logit transformation as suggested by Kieschnick & McCullough (2003). Afterwards another Kolmogorov-Smirnova test was performed, and it showed the data to be normally distributed with a p-level of 0.2 (>0.05) (Table 3.4). Furthermore, an ANOVA is robust even with slight deviations from normality (Allen & Bennett, 2010) Therefore, the assumption of normality could be taken. A Levene's Test was run to check if the data's variance was equally distributed (i.e. homoscedastic). This test was insignificant, concluding that the data was homoscedastic (Moore & McCabe, 2006). Therefore, the assumptions for ANOVA were now met.

Tests of Normality	Kolmogorov-Smirnova Statistic	df	Sig.
MEAT Criteria	0,122	31	,200*

Table 3.4. Normality test MEAT performance

A significant ANOVA test only shows there is an overall difference in groups. To find out which specific groups differ from each other a Post-Hoc test is used (Field, 2009). In this case the Tukey HSD Post-Hoc analysis was used. This was allowed as the variances were equally distributed (Field, 2009).

3.5 Ethics

The data of Rijkswaterstaat are classified as it contains financial and strategic information about projects, and their private partners. Therefore, it is important that the data will be anonymized in this thesis, so that it cannot be linked to the individual projects. Also, during the thesis, the researcher has to take caution with confidential information. Research will only be done on a secure network without other people nearby.

Furthermore, the researcher has to comply with the confidentiality agreement (vertrouwensverklaring) between the University of Groningen and Rijkswaterstaat. Part of this agreement is the approval of Rijkswaterstaat on sharing project data before publishing and sharing the thesis with the University of Groningen. Only publicly available project data has been made available (Appendix C). The permission was granted, and no confidential information is stated in this thesis.

The research, the collection of data, and the usage of data have been conducted in an ethical manner, as beneficence and respect have been held in high regard (Clifford et al., 2010). Respondents were free, and have not been pushed to participate. Furthermore, their participation will remain anonymous. Emails have only been sent to participants from within the Rijkswaterstaat digital working space, to ensure a safe digital environment. Furthermore, the document with contact information on participants is password protected. Moreover, the survey has not asked participants for their name, but only their job title on the project. Therefore, no names are connected to the survey data that is stored in the university's digital working environment. This document is also password protected. Lastly, subjects could be identified by factors other than name alone, for example by combinations of information about an individual project. To ensure this does not happen, this thesis only reports aggregate findings, and not individual project-level data.

Moreover, it is important that the respondents did not feel personally responsible for the possibly negative result of their survey. Therefore, it was important they understood beforehand that the survey was not a tool to test their professional skill, but merely a tool to identify contractors' ability to meet the project goals. This has been made explicit in the corresponding email requesting participation.

4. Statistical Analysis & Results

4.1 Descriptive statistics

The 31 projects in this study have used a total of 86 individual MEAT criteria. The number of criteria used differed per project and ranged from two to four. On average a project used 2,84 MEAT criteria with a median of three criteria. Table 4.1 shows the distribution of the number of criteria per project. Management criteria were used most often with a total of 28 uses. Environment criteria were used 25 times, sustainability criteria 20 times and project-specific criteria 13 times (see 4.1).

Number of criteria	Project Frequency	Percent
2	12	38,7
3	12	38,7
4	7	22,6

Category	Criteria Frequency	Percent
Management	28	32,6
Environment	25	29,1
Project-specific	13	15,1
Sustainability	20	23,3

Table 4.1. Frequency of criteria category.

Overall the respondents rated most of the projects of normal complexity as seen in Table 4.2. The next most stated complexity was ‘Complex’ skewing the overall portfolio complexity towards more complex projects. The complexity of the projects was tested with numeral variables using a Kruskal Wallis test, but no significant results could be found. Therefore, complexity does not seem to have a relationship with any other variables, including management style.

Complexity	Frequency	Percent
Very simple	0	0
Simple	2	6,5
Normal complexity	20	64,5
Complex	8	25,8
Very complex	1	3,2

Table 4.2. Perceived complexity of the projects by respondents.

The overall satisfaction of the partnership between public and private party on a scale of one to ten is shown in the histogram below (Figure 4.1). The overall partnership satisfaction was on average 7,68. The most stated satisfaction score was an 8. Three project scored insufficient with a grade below six.

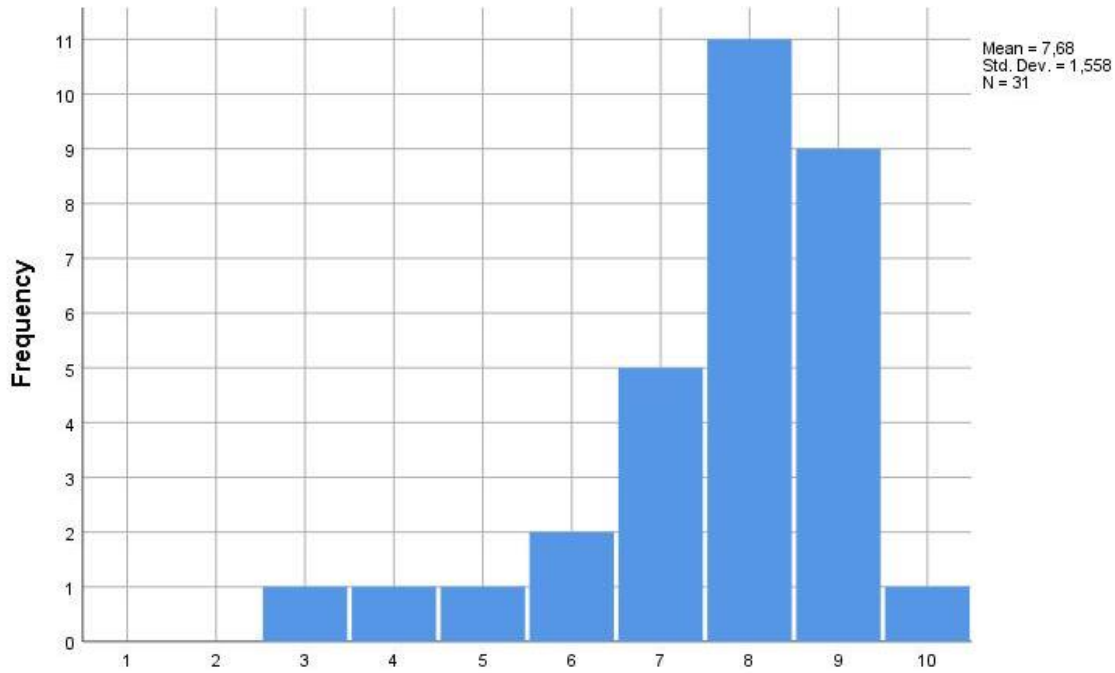


Figure 4.1 Histogram of overall partnership satisfaction on a scale of one to ten.

4.1.1 MEAT Sanctions

The survey also included questions on sanctions. Three of the 31 projects utilized such a sanction (Table 4.3). Four of the respondents did not answer the question or stated “do not remember”.

Fine applied	Frequency	Percent
Yes	3	9,7
No	24	77,4
Unanswered	4	12,9

Table 4.3. Survey response on MEAT criteria fines.

Respondents also had an option to state why a fine, or why no fine was given. The answers as to why no sanction was applied have been categorized. Twenty out of the 31 projects stated there was “no necessity”, because the contractor met the MEAT promises. And four times the MEAT criteria were changed during the implementation phase.

The answers as to why a fine was applied cannot be given due to project confidentiality, but this (logically) had to do with failing to meet MEAT promises. However, one project stated the contractor damaged part of the project area. This was not part of the MEAT criteria, and therefore this was not a MEAT sanction. This answer can be explained by a fault in the survey. The sanction question asked about applied fines in general, and did not specify MEAT fines were meant. The other two fines were related to MEAT criteria.

4.2 Ex-post MEAT criteria realization

On average the individual criterion realization was 84,06 percent with a standard deviation of 18,49 (Table 4.4). The lowest recorded score of a criterion was ten percent and the highest score was 100 percent. The average criteria realization per project was 84,67 with a standard deviation of 13,93 (Table 4.4). The lowest amount of average criteria realization a project achieved was 52,5 percent and the maximum is 100 percent. When the individual criteria are divided in the four groups as explained in Chapter 3, a trend becomes visible. What stands out in Table 4.4 is the high amount of average criteria realization of sustainability criteria. This is substantially higher than the other groups that achieved an average realization score of around 80 percent. The standard deviation of durability is also substantially lower than the standard deviation of the other groups (Table 4.4). Furthermore, the minimum score of the sustainability criteria is the highest of the four groups.

	N	Mean	Std. Deviation	Minimum	Maximum
Individual criteria realization	86	84,068	18,49	10	100
Project MEAT realization	31	84,670	13,93	52,5	100
Project budget in millions	31	14,4	16,1	2,4	81,4
MEAT Categories					
Management	28	81,07	17,91	20	100
Environment	25	80,8	17,77	40	100
Project-specific	13	80	25,81	10	100
Durability	20	95	9,45	70	100

Table 4.4. MEAT criteria realization statistics.

To determine whether there is a statistically significant difference in means between the groups, a one factor variance analysis was used. The null hypothesis for this test is: “in the population there is no difference in means between the realization percentage of management, environment, project-specific and durability MEAT criteria”. The one factor variance analysis shows a significant result with a p-value of 0,025 (Table 4.5). This allows us to reject the null hypothesis. Therefore, we can assume there is a difference in mean criteria realization between the four groups (Allen & Bennett, 2010).

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3123,72	3	1041,24	3,29	0,025
Within Groups	25951,85	82	316,48		
Total	29075,58	85			

Table 4.5. ANOVA Outcome Table for MEAT categories

To find out which of the groups significantly differ from the other groups we executed a post-hoc Tukey HSD test, as equal variances are assumed by the Levene’s test in Chapter 3. The results of the Tukey test are displayed in Table 4.6. It shows that the mean of the sustainability criteria differ significantly from the management and environment criteria with a p-value of respectively 0,44 and 0,45. The durability and project-specific criteria groups’ results remained insignificant. Therefore, no difference in means between these groups and the overall average can be assumed. By looking at the

higher average of the sustainability criteria we can assume that on average these criteria are realized to a greater extent than environment and management criteria.

MEAT Categories	MEAT Categories	Mean Difference	Std. Error	Sig.	95% CI	95% CI
					Lower Bound	Upper Bound
Management	Environment	0,27	4,8	1	-12,56	13,10
	Project-specific	1,07	5,97	0,998	-14,58	16,72
	Durability*	-13,92	5,20	0,044	-27,58	-0,26
Environment	Management	-0,27	4,89	1	-13,10	12,56
	Project-specific	0,8	6,08	0,999	-15,15	16,75
	Durability*	-14,20	5,33	0,045	-28,19	-0,20
Project-specific	Management	-1,07	5,97	0,998	-16,72	14,58
	Environment	-0,8	6,08	0,999	-16,75	15,15
	Durability	-15	6,33793	0,092	-31,62	1,62
Durability	Management*	13,92	5,20	0,044	0,26	27,56
	Environment*	14,20	5,33	0,045	0,20	28,14
	Project-specific	15	6,33	0,092	-1,62	31,62

Table 4.6. Tukey HSD Post-Hoc Analysis.

4.2.1 Management style, Risk Allocation and Competition

To see whether our independent variables management style, risk allocation and contractor competition influence the outcome variable (realized MEAT criteria) a regression analysis is used. The results of this regression analysis can be seen in Table 4.7. The overall model is significant with a p-value of 0,006 (>0,05). Therefore, we can reject the null hypothesis that there is no correlation between the variables. This means a relationship between the variables can be assumed. The model has an R of 0,62 which means there is a high amount of correlation in the model (62%) (Moore & McCabe, 2006). Furthermore, the model has an R Square of 0,384 which means the independent variables explain a moderate amount of variance (38,4%) in MEAT criteria realization (Moore & McCabe, 2006).

The p-value allows us to determine if the observed relationship in the sample also exists in the larger population. The p-values of each independent variable (IV) tests the

null hypothesis that there is no correlation between the IV and the DV. These are shown in Table 4.7. The outcome of the regression suggests that management style cannot significantly explain the differences in MEAT criteria realization as the p-value is 0,836 ($>0,05$). The same applies to risk allocation which has a p-value of 0,077 ($>0,05$). This means that there is no relationship between changes in management style, risk allocation, and the shifts in MEAT performance. In other words, there is no evidence to assume that there is an effect of these variables at the population level.

However, for competition the p-value is below the threshold of 0,05 (Table 4.7). That means there is enough evidence to assume competition has a significant effect on MEAT performance, as we can reject the null hypothesis that states there is no association. The coefficient is negative which leads us to assume that the more competition there is, the less MEAT criteria are realized.

	Sum of Squares	df	Mean Square	F	Sig.
Regression	,370	3	,123	5,198	,006
Residual	,574	25	,024		
Total	,964	28			

	B	Std. Error	Beta	t	Sig.
(Constant)	4,959	0,221		22,39	0,000
Competition*	-0,077	0,021	-0,587	-3,69	0,001
Risk Weight	-0,16	0,087	-0,292	-1,84	0,077
Management style	-0,012	0,058	0,033	0,20	0,836

R	,620
R square	,384

Table 4.7. Regression analysis outcome for MEAT criteria realization.

A different linear regression was used to see if any of the independent variables influence overall partnership satisfaction. The results are shown in table 4.8. Overall, the model is significant with a p-value of 0,006 ($<0,05$). Furthermore, competition and management style are significant. Again, competition shows a negative correlation

leading to the assumption that more competition leads to lower partnership satisfaction between the public and private party. The correlation coefficient for management style is positively correlated. This means that the more the management style resembles process management, the higher the overall partnership satisfaction between public and private party. The R Square is 0,391 which means the independent variables explain a moderate amount of variance (39,1%) of in overall partnership satisfaction.

	Sum of Squares	df	Mean Square	F	Sig.
Regression	28,231	3	9,41	5,35	,006
Residual	43,976	25	1,759		
Total	72,207	28			
	B	Std. Error	Beta	t	Sig.
(Constant)	6,251	1,905		3,281	0,003
Competition*	-,469	0,179	-0,415	-2,625	0,015
Risk Weight	-,95	0,745	-0,201	-1,274	0,214
Management style*	1,572	0,497	0,497	3,163	0,004
R	,625				
R Square	,391				

Table 4.8. Regression analysis outcome for partnership satisfaction.

4.2.2 Individual groups

The regression analysis was also executed for the individual MEAT groups as the dependent variable. The groups management, environment and project-specific had no significant outcome. However, the group durability did have a significant outcome with a p-value of 0.007 (Table 4.9). Just like the overall realization model, this model also showed competition to have a negative effect on the realization of the criteria with a p-value of 0.048 (Table 4.9). Therefore, the more competition there is, the less sustainability criteria are realized. However this model also showed another significant relationship. Namely, the model suggests management style is negatively correlated with the realization of sustainability criteria as it has a p-value of 0.048 (<0.05) (Table 4.9). A lower score of management style means that the management style was more focused as project management, and less as process management. Therefore, project management

seems to be better in realizing MEAT criteria classified as ‘durability’ criteria in this research.

R	R Square	Std. Error of the Estimate	R Square Change	F Change	Sig.
,754	0,568	0,12911	0,568	6,147	0,007

	B	Std. Error	Beta	t	Sig.
(Constant)	5,339	0,241		22,199	
Risk Weight	-0,079	0,108	-0,13	-0,731	0,477
Management style	-0,129	0,06	-0,38	-2,162	0,048
Competition	-0,069	0,019	-0,638	-3,587	0,003

Table 4.9. Regression model sustainability criteria

5. Discussion

The goal of this thesis was to determine how much of MEAT criteria are realized. Furthermore, this thesis aimed to find out whether management style, risk allocation and/or contractor competition has an effect on MEAT criteria realization. In this chapter the results of this thesis will be critically discussed, and compared to the current literature.

5.1 MEAT Criteria Realization

On average the included projects in this study have realized roughly 84 percent of set criteria. As these projects are paid for with taxpayer's money it is important to be critical. A score of 100 percent should be expected as that is what the tenderer has agreed on in the tender phase, and also won the contract on these promises. With a total project portfolio of almost 450 million euros, the 16% of unrealized criteria make up millions in unrealized fictive euros. Furthermore, it seems reasonable to assume that the actual realization is lower than the reported average in this research, due to the following reasons. Firstly, the general consensus was that 84% seemed higher than expected, when discussing the results with procurement and project experts at Rijkswaterstaat. Secondly, the survey respondents were responsible for the realization of the MEAT criteria on their projects. Therefore, they may have overstated the percentage of realized criteria of their project. Thirdly, some respondents stated that not all MEAT criteria are actively verified all the time. Therefore, the private party could have concealed their unkept promise(s). Lastly, the project leaders that did not respond to the survey could have had lower realization scores and therefore be afraid to participate in this survey study. These factors would have biased average realization upwards in the current study. It is therefore important to note that these results are not conclusive.

Only five out of the 31 projects realized an average of 100 percent on their MEAT criteria. That means 26 projects realized below expectations and should have used a sanction in order to restore some of the lost value. Furthermore, this sanction serves to restore legality of the tender (Rijkswaterstaat, 2017). If it is not used, a different contractor might have been chosen. Out of the 86 criteria, only 32 were realized as was

promised during the tender and had a score of 100 percent. That means that 54 were below expectations, which is almost 63 percent. A sanction has been applied to restore (some of) the lost value on only two of those 54 criteria. The reasons respondents gave most often for not utilizing the sanction is that “the contractor had maximum performance” or “no reason for a fine”. However this does not coincide with the MEAT criteria realization score the respondents gave the project. Therefore, there is a clear contradiction between these two answers. This could be because the respondents do not even expect their contractors to realize their promises to the full 100 percent, and/or respondents are content with a ‘close-enough’ realization score.

Other stated reasons for not utilizing the sanction were mostly based on preferring negotiation between the public and the private party. Applying a sanction would deteriorate the relationship between these parties, and make the overall partnership worse. Therefore, this could lead to even lower performance, including other project aspects than MEAT criteria. The ‘Market Vision’ (Marktvisie) was named multiple times as a reason not to impose a fine. When analyzing this document it does justify some of the arguments of the respondents. For example statements like: there is a need to go from “Acting on the basis of power and steering by contract” towards “Acting on the basis of strength and guiding attitude and behavior” (Marktvisie, 2015). Or from “Hierarchical client-contractor relationship” to “collaboration with equality and complementarity” (Marktvisie, 2015). Lastly the document states that because of too much focus on “contractual and financial aspects in our projects, the balance between content and management has become unbalanced.” (Marktvisie, 2015). These statements could also provide arguments for contractors whenever they underperform. They can refer to the document and say contracts are not that important, and dialogue is the way to fix this situation. Additionally, these statements give reason for contract managers of Rijkswaterstaat to forego the hassle of fining the private party. However, the notion should be made that there are also arguments in favour of fining the private party when underperforming. While the overall notion of the document is in line with more collaboration, more dialogue and less steering on contract, there are multiple statements which would give ample reason to apply a fine. For example, “value for your money” is a stated ambition (Marktvisie, 2015). Furthermore, a “focus on quality and performance”

is underscored (Marktvisie, 2015). And again, the focus on MEAT tendering is emphasized once more (Marktvisie, 2015). Therefore, there could still be reasons to apply a fine. A solution for Rijkswaterstaat could be to install or hire an independent team that manages the fining of private parties. That way, the project teams of Rijkswaterstaat could still maintain a good relationship with the contractor, while the benefits of a fine would also be obtained. Anyhow, more research in the concerns regarding the utilization of MEAT fines should be done. Furthermore, as project and contract managers are most often monitoring MEAT criteria realization throughout the project, it would be beneficial for Rijkswaterstaat to include the results of this monitoring in their project databases. This would allow for more analysis to be done, and more factors can be included to find out what influences MEAT criteria realization. Furthermore, this makes it possible to find out if a different contractor should have been chosen, by comparing it to the bids other contractors made in the tender phase.

Concluding, the Marktvisie (2015) document could give reason for managers to forgo a fine in favour of better cooperation. Theoretically, it could also help private parties in their arguments why a fine shouldn't be applied. According to Rijkswaterstaat's own documents (2017), this should not be the case as these sanctions should be used whenever contractors underperform on MEAT criteria realization. Furthermore, the fine is there in order to restore the legality of the tender if a contractor underperforms. To further investigate the reasons for, or against fining the private party, qualitative research is suggested as that is concerned with understanding human behaviour and assumes a dynamic negotiated reality (Clifford et al., 2010). That is exactly what seems to be at play here. Furthermore, the story of the private party should be investigated, as this thesis only has results from the public side.

5.2 Management Style

Literature states different management styles are fit for different complexities of projects (Edelenbos & Klijn, 2009). This thesis could find no significant relationship between the management style that was used during the project and the perceived complexity of the project according to the respondent. Therefore, it cannot be stated whether a process management style worked better in complex environments, and project

management worked better in simpler projects. However, multiple studies state that project management is better suited for reaching predetermined goals in comparison to process management (Busscher, 2015; Edelenbos & Klijn, 2009; De Bruijn et al., 2010). In the statistical analysis there was a negative relationship between management style and MEAT realization. This means the more the management style leaned towards project management, the more MEAT criteria were realized. This direction is in line with the hypothesis stated in chapter 2.6. However, while the overall model was significant, this specific relationship was not significant, and the conclusion that a project management style leads to better MEAT criteria realization can therefore not be made.

When analyzing the individual MEAT categories, a statistically significant relationship was found between management style and sustainability criteria realization. This was a negative association which entails that a project management style was better at realizing these criteria than more process orientated management styles. This corresponds with current literature and confirms the hypothesis made in the theoretical framework. This could be due to the fact that many of the sustainability criteria have a clear focus on reaching CO₂ emission goals, and are better suited for environments with less uncertainty. This is because contractors often use CO₂ certificates which state they adhere to certain CO₂ goals. Furthermore, these emission goals are unlikely to change during the project, so if management is focused on achieving these predetermined goals, they are more likely to succeed in comparison to a process oriented management style. Lastly, these CO₂ criteria require regular updates from the private party. Project management is more focused on realizing such goals, while process management acts more on the basis of mutual trust. Therefore, when a process management style is used, these updates might have been given less than with project management. This would then result in a lower score.

It is important to state that this regression only analyzed MEAT criteria realization and not overall project performance which includes many more factors. Overall project performance could also be favoring process management as discussed in literature (Edelenbos & Klijn, 2009; Busscher et al., 2015). This hypothesis can be assumed as the regression analysis in which the satisfaction of the overall partnership between private and public party had a positive correlation with management style. The way this

independent variable was set up tells us that the more the management style resembled process management, the higher the satisfaction score was. This may be explained by an increased amount of stakeholder interaction and focus on communication (Edelenbos & Klijn, 2009). It makes sense that this style leads to a better relationship between the private and public party as compared to being stricter on meeting project's goals and objectives (Edelenbos & Klijn, 2009; Busscher, 2015). Therefore, this result is in line with management style research.

Overall, management style has no significant relationship with overall MEAT criteria realization, but it does correlate with sustainability MEAT criteria performance. Durability MEAT criteria are realized to a greater extent with project management compared to process management. Process management however leads to higher partnership satisfaction scores.

5.3 Risk Allocation

Medda (2007) and Zhang et al (2016) state that improper risk allocation may lower project performance. Furthermore, allocating too much risk to the private party could lower the cooperation of a contractor leading to less goal realization. Therefore, the public party should control the risks that the private party is not capable of controlling. This was deemed to be the case with Rijkswaterstaat as they bear all the macro level risks detailed in Chapter 2. Bing et al. (2005) created a framework for the 'correct' allocation of risks between the private and public party in PPPs (including D&B contracts). Molenaar et al. (2000) also found roughly the same 'appropriate' risk allocation for Design & Build projects in their research. When applying this framework to the realization of MEAT criteria, a negative correlation was found in the regression analysis. This would mean that projects with a risk allocation closer to the 'ideal', as suggested by Bing et al. (2005), performed better than projects that were further off from this allocation. However the strength of this relationship in the analysis is not statistically strong enough (i.e. significant) to draw conclusions on.

A separate regression which did use the weighted risk variable, but instead used the average risk allocation from private to public was run. This also showed a negative

relationship, meaning that the more risks the private party bore, the less criteria were realized during the implementation phase. This coincides with literature by Zhang et al. (2016) who state project performance could be lower when the private party bears more risk. However, the relationship found in this regression was again not strong enough to confirm this hypothesis.

The reason no significant result for risk allocation could be found in the regression could be because according to Medda (2007) risk allocation is project-specific, contradicting the ideal risk models by Bing et al. (2005) and Molenaar et al. (2000). This would entail that for every case that was studied in this research, a different 'ideal' risk allocation existed. Therefore, the standardized applied ideal risk model in this thesis would not apply. Though, some criteria were not weighted as these were deemed project-specific in Bing et al. (2005) their framework as well. These results bring into question whether the ideal risk allocation models add value to the literary discussion on risk allocation. However, the reason no significant results were found could also be due to the design of this study and its selected cases. In general, the risk allocation was relatively similar across the different projects. This makes it harder to get a statistically significant result as this also lowers the variance. Theoretically, if all projects used the same 'ideal' risk allocation, statistically this would not affect the results of MEAT criteria realization. Though, for some projects this allocation might not have been 'ideal' at all and affected the outcome, or the other way around. Therefore, more specific research is necessary to investigate whether such ideal models work and add value, or not. Note: this extreme example was not the case in this analysis. It was given to show that it could be a hidden factor partly influencing the results of the statistical analysis, as it is not known what the *real* 'ideal' risk allocation was per project, and how much the used allocation differed from that.

Overall the hypothesis in Chapter 2.6, which states that improper risk allocation negatively influences project results, could not be confirmed in regards to MEAT criteria realization. The hypothesis that more risk bearing by the public party increases project performance could also not be confirmed in regards to MEAT criteria.

5.4 Contractor Competition

Contractor competition has been identified as a critical success factor in public procurement by multiple studies (Babatunde et al., 2012; Osei-key & Chan, 2012; Zhang, 2005; Chan et al., 2010). It is in private parties' best interest to score as high as possible on MEAT criteria to increase the chance of being selected as the contractor (Rijkswaterstaat, 2017). In the regression analysis run in Chapter 4, the competition, measured by number of bidders, is negatively related to MEAT performance. This means that the more competition, the less MEAT criteria are realized. This directly contradicts research by Liu et al. (2013) who state that a lack of competition can lead to sub-optimal value-for-money outcomes. It is likely that private parties know whether a project will have a higher amount of competition. Though, it is unknown to what degree a party would have promised to realize criteria under a lower amount of competition. As the performance score of the realized MEAT criteria is a proportion of the promised criteria, it could mean that the private party has overstated their ability to realize MEAT criteria in order to secure the contract. That does not have to mean that overall less absolute criteria have been realized, or that more total value would have been realized if competition was lower. Nonetheless, there is still a factor of contract breach by the private party. Furthermore, competition distortion arises when not all MEAT promises are kept as other contractors could have been chosen in the tender (Rijkswaterstaat, 2017).

Sanderson (2008) states that too much competition could also have a negative effect on project outcome. This forces a focus on achieving the most cost-efficient bid instead of the highest-value for money bid. As MEAT criteria are specifically added in order to increase the value for money, it could be the case that a high amount of competition shifts the focus towards the MEAT criteria by too much of a margin. In order to win the bid, MEAT criteria become *too* important, and contractors know they have to promise more than they can deliver. Instead of the so-called downward price-bidding spiral that leads to reduced quality, the opposite effect could take place in which MEAT criteria get over emphasized as this does not cost the private party anything *yet*. They might know that Rijkswaterstaat is much more likely to negotiate about underperforming MEAT criteria, instead of place sanctions (which is discussed in chapter 5.1). Therefore, this over-promising would not lead to negative effects for the private party. Contrarily,

this would actually have positive effects in the form of monetary gain by winning a contract, and thereafter not spending the necessary resources to (fully) realize their contractual obligations. Another reason for this overpromising could be that most contractors have special tender teams, whose sole focus is on securing contracts. These teams are also the persons who make the MEAT promises. When the contract is secured, these promises become the responsibility of the realization team. This team might not be able to realize all the promises the tender team made in order to secure the contract in high competition. Therefore, while the tender team would be successful in their job by securing a contract, the realization team would have to face the consequences. By then, it is already too late to change these promises. For this reason, research into the private perspective of the tender and realization phase is suggested.

In order to be sure that this competition was not a proxy for the project's budget, a regression analysis was run with project budget and amount of bidders as independent variables, and this model showed budget to have no effect on the amount of realized MEAT criteria, while amount of bidders was still significant. Therefore, the idea that a higher price was the *actual* factor behind lower MEAT criteria realization can be refuted. Furthermore, the difference between a public tender (openbare aanbesteding) and a restricted invitation to tender (niet-openbare aanbesteding) was analyzed. This was added as a dummy variable (0 or 1) and did not affect the outcome of the regression. Both tender procedures also had the same median amount of bidders (five) and the average amount of bidders only differed 0,21 per procedure. Therefore, the difference between public, and restricted invitation to tender is not assumed to affect competition.

Regardless of the reasons behind the lower realization with higher competition, it is important for Rijkswaterstaat to know this. Extra care should be taken when evaluating tenders when competition becomes higher. Also it should be noted that due to the nature of a linear regression analysis, there is not one point at which this phenomenon takes place. Instead, this effect is seen with *higher* competition, and there is not a certain number of bidders that could signal a warning. Though, in this analysis the amount of bidders ranged from three to eight, with a median of five. Therefore, a suggestion can be made that extra caution is required when evaluating bids from five to eight bidders. In these tenders it might be extra important to make sure contractors bids are realistic and

no 'golden mountains' of MEAT criteria are promised. However, this is purely interpretation, and not statistically proven. As said, the phenomenon takes place on the whole scale of three to eight bidders in this project portfolio. Lastly, there could be other (hidden) factors at play that were not even in this analysis. Therefore, to find the reasons behind this phenomenon, more research is suggested.

Concluding, a higher number of bidders, often labeled as competition (Hong & Shum, 2003), seems to lead to lower MEAT criteria realization, contradicting the hypothesis stated in chapter 2.6. The current hypothesis proposed by this paper is that the more bidders there are, the more emphasis will be placed on MEAT criteria. This leads to contractors overpromising their ability and/or willingness to realize MEAT criteria. Afterwards, they are not able to fulfill these promises in the realization phase. More research is necessary to substantiate and investigate this claim.

6. Conclusion

To conclude, this thesis has achieved multiple goals. It has filled a research gap by finding out how much of the ‘most economically advantageous tender’ criteria are being realized. On average, a MEAT criterion gets realized to 84 percent of its promised worth. Though, there are reasons to assume that actual realization is lower. This research also found that sustainability criteria are realized to a statistically significant greater extent than other criteria.

Furthermore, the results of the analysis in this thesis indicate that MEAT criteria realization is not influenced by risk allocation, and management style. Overall partnership satisfaction between public and private parties is positively influenced by a process oriented management style. Most importantly, this thesis indicates that contractor competition, measured by the amount of bidders, influences MEAT criteria realization. The more competition on a project, the less of the stated criteria are realized. A hypothesis was constructed for this phenomenon:

Contractors who bid on projects know how much competition they will face in the tender phase. Therefore, they feel the need to increase MEAT promises when there is more competition in order to secure the contract. These promises are actually overly optimistic, and the contractor is not able to realize these MEAT criteria to their full extent in the realization phase of the project.

Additionally, this research has concluded that MEAT sanctions are sparingly applied. Contractors in this study have only been fined twotimes out of the 54 times where a MEAT sanction theoretically should have been applied according to Rijkswaterstaat their MEAT policy. Due to the lower realization than promised, there is a high chance that some form of competition distortion has taken place. Furthermore, the validity of the MEAT tender cannot be fully guaranteed anymore, as there is a possibility that another contractor should have been chosen.

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Appendix A - Questionnaire

Project Name

Zaak_ID

Voorwoord

U doet mee aan een afstudeeronderzoek van een masterstudent van de Rijksuniversiteit Groningen. Uw antwoorden zijn anoniem en zullen niet tot u te herleiden zijn. Ook zullen de resultaten in het onderzoek niet tot individuele projecten te herleiden zijn. U kunt op elk moment stoppen met de enquête. Geeft u toestemming om de antwoorden van deze enquête te laten gebruiken voor onderzoeksdoeleinden?

Ik geef toestemming

Ik geef geen toestemming

1. Achtergrondinformatie

Welke rol heeft u vervuld tijdens dit project?

Projectleider

Projectmanager

Portfoliomanager

Contractmanager

Inkoop Adviseur

Anders, namelijk...

Hoeveel relevante jaren werkervaring met projecten had u al voordat u aan dit project begon?

Slider 1-50

Hoe heeft u de complexiteit van het project ervaren?

Zeer complex - Complex - Gemiddeld - Eenvoudig - Zeer eenvoudig

Weet ik niet

Bent u gedurende het hele project betrokken gebleven?

Gedurende een klein deel van het project.

Gedurende een ongeveer de helft van het project

Gedurende het merendeel van het project.

Gedurende het hele project.

Weet ik niet meer.

2. EMVI/BPKV criteria realisatie

Het project waar u bij betrokken was heeft verschillende EMVI criteria vastgesteld in de aanbestedingsfase. Deze verschillende criteria staan hieronder. Geef aan in welke mate de criteria door de opdrachtnemer zijn gerealiseerd zoals door haar beloofd is tijdens de aanbesteding.

Een score van 100% geeft aan dat de criteria volledig is gerealiseerd zoals de opdrachtnemer beloofd heeft. Een score van 0% geeft aan dat er niks van de belofte is nagekomen.

2A. Criteria A - Project beheersing (Maximale beschikbaarheid afmeervoorziening)

In welke mate was dit criterium gerealiseerd bij afronding van het project?

Slider 0 - 100

2B. Criteria B - Publieksgericht werken (stremming veerdienst, geluidshinder, parkeerhinder)

In welke mate was dit criterium gerealiseerd bij afronding van het project?

Slider 0 - 100

2C. Criteria C - Co2 Ambitie Niveau

In welke mate was dit criterium gerealiseerd bij afronding van het project?

Slider 0 - 100

(1X. Criteria D, E etc...)

Bent u over het algemeen tevreden over de realisatie van de EMVI criteria?

Zeer ontevreden - Enigszins ontevreden - Neutraal - Enigszins tevreden - Zeer tevreden

Weet ik niet

Werd de voortgang van de EMVI criteria actief gecontroleerd en bijgehouden tijdens het project?

Ja

Nee

Gedeeltelijk

Weet ik niet

Heeft u verder nog opmerkingen over de realisatie van de toegepaste EMVI criteria?

Open antwoord

3. Boetes

3.1. Bestond de contractuele mogelijkheid om boetes op te leggen?

Ja (>**3.2**)

Nee (>**4**)

Weet ik niet

3.2. Zo ja, is hier gebruik van gemaakt?

Ja (>**3.3**)

Nee (>**3.4**)

Weet ik niet

3.3.A Zo ja, waarom was dit nodig?

3.3.B Op welk criterium?

3.3.C Wat was de hoogte ten opzichte van het contractueel maximum?

Open antwoord

3.4.A Zo niet, waarom niet?

3.4.B Heeft ON maximaal gepresteerd of heeft contractmanager zijn discretionaire bevoegdheid toegepast om niet op te leggen?

Open antwoord

4. Risico verdeling van het project

Geef voor de volgende risico's van dit project aan tot welke partij deze risico's behoorden.

1 = Helemaal voor de private partij

2 = Voornamelijk voor de private partij

3 = Gedeeld door private partij en RWS

4 = Voornamelijk voor RWS

5 = Helemaal voor RWS

Project Niveau	Design	
	Vertraging in goedkeuringen	(Privaat) 1 2 3 4 5 (RWS)
	Vertraging in vergunningen	(Privaat) 1 2 3 4 5 (RWS)
	Fouten in contract	(Privaat) 1 2 3 4 5 (RWS)
	Tekortkomingen in ontwerp	(Privaat) 1 2 3 4 5 (RWS)
	Bouw	
	Bouw meerkosten	(Privaat) 1 2 3 4 5 (RWS)
	Bouwvertraging	(Privaat) 1 2 3 4 5 (RWS)
	Materiaal tekorten	(Privaat) 1 2 3 4 5 (RWS)
	Personeelstekorten	(Privaat) 1 2 3 4 5 (RWS)
	Late veranderingen in design	(Privaat) 1 2 3 4 5 (RWS)
	Slecht afgeleverde kwaliteit van het werk	(Privaat) 1 2 3 4 5 (RWS)
	Afwijkingen van contract	(Privaat) 1 2 3 4 5 (RWS)
	Tekortkomingen onderaannemers	(Privaat) 1 2 3 4 5 (RWS)
	Operationeel	
	Meerkosten door extra scope	(Privaat) 1 2 3 4 5 (RWS)
	Onderhoudskosten hoger dan verwacht	(Privaat) 1 2 3 4 5 (RWS)
	Onderhoud frequenter nodig dan verwacht	(Privaat) 1 2 3 4 5 (RWS)
Partijge relateerd	Relaties	
	Organisatie en coördinatie	(Privaat) 1 2 3 4 5 (RWS)
	Tekortkomingen ervaring	(Privaat) 1 2 3 4 5 (RWS)
	Tekortkomende verdeling verantwoordelijkheid en risico's	(Privaat) 1 2 3 4 5 (RWS)
	Verschil in werkmethodes tussen partners	(Privaat) 1 2 3 4 5 (RWS)
	Derden	
	Aansprakelijkheid van derden	(Privaat) 1 2 3 4 5 (RWS)

5. Management stijl

Voor de volgende vragen zijn er steeds twee punten. Geef aan welk punt belangrijker was voor het projectmanagementteam van Rijkswaterstaat tijdens dit project. Er zijn geen goede of foute antwoorden. Het gaat enkel om uw afweging van de verdeling van deze punten.

1. Het behalen van snelle resultaten.

2. Het verwerven van steun van andere actoren.

Snelle resultaten waren veel belangrijker. (1)

Snelle resultaten waren iets belangrijker. (2)

Beide punten waren even belangrijk. (3)

Steun van andere actoren was iets belangrijker. (4)

Steun van andere actoren was veel belangrijker. (5)

Weet ik niet/NVT (6)

1. Focus op tijd en geld.

2. Focus gericht op het betrekken van stakeholders.

Tijd en geld was veel belangrijker. (1)

Tijd en geld was iets belangrijker. (2)

Beide punten waren even belangrijk. (3)

Betrekken van stakeholders was iets belangrijker. (4)

Betrekken van stakeholders was veel belangrijker. (5)

Weet ik niet/NVT (6)

1. Interactie gericht op bereiken van solide afspraken in contracten.

2. Interactie gericht op het bouwen van wederzijds vertrouwen.

Solide afspraken in contracten waren veel belangrijker. (1)

Solide afspraken in contracten waren iets belangrijker. (2)

Beide punten waren even belangrijk. (3)

Bouwen van wederzijds vertrouwen was iets belangrijker. (4)

Bouwen van wederzijds vertrouwen was veel belangrijker. (5)

Weet ik niet/NVT (6)

1. Acties gericht op het behalen van resultaten.

2. Acties gericht op het aangaan van goede relaties.

Resultaten waren veel belangrijker. (1)

Resultaten waren iets belangrijker. (2)

Beide punten waren even belangrijk. (3)

Goede relaties waren iets belangrijker. (4)

Goede relaties waren veel belangrijker. (5)

Weet ik niet/NVT (6)

1. Interne oriëntatie (project organisatie zelf)

2. Externe oriëntatie (betrekken van andere actoren).

Interne oriëntatie was veel belangrijker. (1)

Interne oriëntatie was iets belangrijker. (2)

Beide punten waren even belangrijk. (3)

Externe oriëntatie was iets belangrijker. (4)

Externe oriëntatie was veel belangrijker. (5)

Weet ik niet/NVT (6)

1. Focus van de projectmanager op het behalen van duidelijke doelen.

2. Focus van de projectmanager op het aanpassen aan nieuwe omstandigheden.

Behalen van duidelijke doelen was veel belangrijker. (1)

Behalen van duidelijke doelen was iets belangrijker. (2)

Beide punten waren even belangrijk. (3)

Aanpassen aan nieuwe omstandigheden was iets belangrijker. (4)

Aanpassen aan nieuwe omstandigheden was iets belangrijker. (5)

Weet ik niet/NVT (6)

1. Actoren waren strikt gebonden aan de regels binnen het project.

2. Actoren kregen vrijheid om te manoeuvreren.

Strikte binding aan de regels binnen het project was veel belangrijker. (1)

Strikte binding aan de regels binnen het project was iets belangrijker. (2)

Beide punten waren even belangrijk. (3)

Vrijheid om te manoeuvreren was iets belangrijker. (4)

Vrijheid om te manoeuvreren was veel belangrijker. (5)

Weet ik niet/NVT (6)

1. De projectmanager nam zelf het initiatief.

2. De project manager reageerde op andere initiatieven.

Zelf het initiatief nemen was veel belangrijker. (1)

Zelf het initiatief nemen was iets belangrijker. (2)

Beide punten waren even belangrijk. (3)

Reageren op andere initiatieven was iets belangrijker. (4)

Reageren op andere initiatieven was veel belangrijker. (5)

Weet ik niet/NVT (6)

1. Het creëren van gedetailleerde doelen.

2. Het creëren van bredere doelen.

Het creëren van gedetailleerde doelen was veel belangrijker. (1)

Het creëren van gedetailleerde doelen was iets belangrijker. (2)

Beide punten waren even belangrijk. (3)

Het creëren van bredere doelen was iets belangrijker. (4)

Het creëren van bredere doelen was veel belangrijker. (5)

Weet ik niet/NVT (6)

1. Oplossingen werden gezocht door zelf veranderingen aan te geven.

2. Oplossingen werden gezocht door interactie met belanghebbenden in het proces.

Zelf veranderingen aangeven was veel belangrijker. (1)

Zelf veranderingen aangeven was iets belangrijker. (2)

Beide punten waren even belangrijk. (3)

Belanghebbenden in het proces waren iets belangrijker. (4)

Belanghebbenden in het proces waren veel belangrijker. (5)

Weet ik niet/NVT (6)

Slotvragen

Welk cijfer zou u de algehele samenwerking tussen Rijkswaterstaat en de private partij geven voor dit project?

1 2 3 4 5 6 7 8 9 10

Appendix B – Letter to respondents

Geachte <Naam>,

Voor mijn Masterscriptie voor de studie Environmental & Infrastructure Planning aan de Rijksuniversiteit Groningen, doe ik onderzoek naar de realisatie van EMVI/BPKV criteria binnen D&C projecten van Rijkswaterstaat. Dit onderzoek voer ik uit als stagiair binnen het Inkoopcentrum Grond- Weg- en Waterbouw van GPO van Rijkswaterstaat.

In de wetenschappelijke literatuur en binnen Rijkswaterstaat is er nog weinig overkoepelende informatie beschikbaar over de gerealiseerde EMVI criteria na afronding van het project. Vanwege de rol die EMVI criteria spelen in de aanbestedingsfase is het belangrijk dat we ook meer te weten komen over de daadwerkelijke realisatie van deze criteria en welke factoren daar invloed op hebben. Dat is het doel van mijn afstudeerscriptie. De verschillende factoren die ik onderzoek zijn projectmanagementstijl, risicoverdeling en aannemers concurrentie. Wanneer dit doel bereikt kunnen aanbevelingen opgesteld worden om aannemers beter aan hun beloftes te laten houden.

U ontvangt deze enquête omdat u bij het project <projectnaam> betrokken was. Dit project heb ik samen met ongeveer 60 andere projecten geselecteerd voor mijn onderzoek en onderzocht aan de hand van I&B documenten, inkoopplannen en verscheidene andere documenten. Ik verzamel nieuwe informatie over de uitvoeringsfase van het project aan de hand van een enquête zodat ik en het team binnen ICG meer inzicht krijgen in de daadwerkelijke realisatie van EMVI criteria.

U wordt gevraagd onderstaande enquête in te vullen. De enquête is voor elk individueel project apart gemaakt met de juiste EMVI criteria erin. De enquête bevat enkele vragen over de gerealiseerde EMVI criteria na afronding van het project, eventuele EMVI boetes/sancties, de toegepaste managementstijl en de gebruikte risicoverdeling tussen RWS en de private partij.

<Link naar survey>

De informatie uit de enquête zal vertrouwelijk worden behandeld. Daarnaast is de enquête volledig anoniem. Er zal geen verband kunnen worden gemaakt naar u, of het project waar u aan heeft gewerkt in de resultaten van de thesis. De enquête wordt enkel gebruikt om een statistische analyse uit te voeren om meer te weten te komen over EMVI beloftes en aanbevelingen op te stellen voor Rijkswaterstaat.

Ik hoop dat u de enquête voor 14 oktober in kan vullen. U zou mij en het ICG-team daarmee ontzettend helpen. Ik zie uit naar uw reactie.

Met vriendelijke groet,

Ruben Adriaanse

Stagiair ICG van Grote Projecten en Onderhoud (Rijkswaterstaat)

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Appendix C – Project portfolio

Date	Project description	Budget
07-apr.-11	A1 en A10 - ontwerp en uitvoering van capaciteitsuitbreiding	€ 84.100.000
19-apr.-13	A15 - ontwerpen en vervangen van 2 viaducten over de rijksweg	€ 4.595.000
01-mrt.-11	A20 RW - uitvoeren van variabel onderhoud asfalt/kunstwerken	€ 9.682.000
10-dec.-14	A27 Almere - reconstructie van de tussen Stichtse brug en knooppunt	€ 31.523.000
14-apr.-14	A59 Drongelens Kanaal - uitvoeren van vervangen kunstwerken	€ 11.440.000
29-aug.-13	A6 Lelystad - optimaliseren van de capaciteit van de aansluiting 10	€ 3.735.000
29-nov.-13	A67, aansl. Someren - ontwerpen en uitvoeren verlengen invoegstrook	€ 2.987.000
27-sep.-11	A76/A79 - uitvoeren van de reconstructie knooppunt Kunderberg	€ 5.544.000
16-feb.-15	Ameland - reconstructie van de veerdam	€ 6.661.000
13-feb.-13	Amsterdam-Rijnkanaal - realiseren en herstellen van damwanden	€ 30.850.000
06-sep.-11	Beatrixhaven, Langshaven Julianakanaal - onderhoud vaarwegen	€ 3.800.000
27-jan.-14	Dr. Deelenlaan GOVA 4b - uitvoeren van sloop en nieuwbouw brug	€ 3.570.000
11-nov.-11	Driel, Amerongen - uitvoeren LVO aan sluisstuwcomplexen	€ 3.252.800
16-apr.-13	GOVA fase 4a - uitvoeren oever-, baggerwerk en ecologische vz.	€ 16.200.000
05-nov.13	Hemelrijkse Waard - uitvoeren van het natuurontwikkelingsproject	€ 4.960.000
05-sep.-13	Kanaal Gent - Terneuzen en handelshaven Breskens - renovatie oevers	€ 19.150.000
13-feb.-14	Koninginnensluis, Emmabrug en Wilhelminabrug Nieuwegein - renovatie	€ 5.393.000
01-nov.-12	Krabbenkreekdam - aanleg doorlaatmiddel t.b.v. getij Rammegors	€ 6.400.000
23-okt.-12	Maasbrug Roermond - groot onderhoud en versterking	€ 6.512.000
16-feb.-12	N61 Hoek-Schoondijke - ontwerpen en uitvoeren van de reconstructie	€ 49.822.000
21-mrt.-11	Neder-Rijn - uitvoeren 4 maatregelen in uiterwaarden	€ 12.339.000
16-jul.-12	Oevers en Uiterwaarden - uitvoeren van Kaderrichtlijn Water(KRW)	€ 7.155.000

08-mei-12	RW 73 - uitvoeren van ombouw van aansluiting Koninginnelaan	€ 2.375.000
06-sep.-11	Tilburg, Weert - groot onderhoud vaarwegen (GOVa)-oeverwerken	€ 8.555.000
04-jul.-12	Veerhaven Den Helder - vervangen lange fuikwand + aanleg noodaanland.	€ 3.128.500
16-apr.-13	Veghel - Eindhoven GOVA fase 4a - opwaarderen van de vaarroute	€ 4.428.000
02-mrt.-11	Waal fase 2 - het ontwerpen en uitvoeren van kribverlaging Midden-Waal	€ 3.530.000
18-jun.-12	Waal fase 3 - kribverlaging en langsdammen Wamel-Ophemert	€ 49.950.000
06-sep.-12	Zeeburg - verwijderen restant sluseiland en aanleg natuurvriendelijke oever	€ 6.432.000
31-aug.-15	Zuid-Nederland - ontwerpen en uitvoeren van Variabel onderhoud , p.1 dist.West	€ 21.330.000
31-aug.-15	Zuid-Nederland - ontwerpen en uitvoeren van Variabel onderhoud., dist.Midden	€ 17.049.335