Witteveen + Bos

UNIVERSITY OF TWENTE.

Realising sustainability policy goals through green public procurement

BSC THESIS OF THOMAS HAZEWINDUS

16TH OF APRIL 2021

Preface

Dear reader,

In front of you lies the bachelor thesis *"Realising sustainability policy goals through green public procurement"*. This study has been performed at Witteveen+Bos in Deventer as final assignment for my bachelor Industrial Engineering & Management.

Before I started my bachelor thesis, I was looking forward to experiencing what it is like to work in the office of a real company. Unfortunately, I only got to see the office of Witteveen+Bos once in the months that I wrote my thesis due to the Covid-19 pandemic. Nevertheless, I was positively surprised by the digital working atmosphere that Witteveen+Bos offers. I found the employees of Witteveen+Bos very helpful, they were always available to answer my questions whenever I had any.

A special thanks goes out to my Witteveen+Bos supervisor Floris Oosterhof, whose expertise on procurement and feedback on my work made my life as graduation student without much knowledge on procurement a lot easier. His experience in supervising graduate students was very helpful for me in the sense that he often alerted me about potential pitfalls before I saw them myself.

I also want to thank Guido van Capelleveen for his supervision on behalf of the university during my thesis. His knowledge of and experience with research methodology was very helpful to me whenever I felt stuck in my research and did not know what to do.

Besides this, I would like to thank my friends whose experience with graduating was very helpful to me. Last, a special thanks goes out to my roommates who helped me through some tougher times during my graduation process. During the lockdown, the good atmosphere in the house was vital for me to stay motivated for my thesis.

The topic of my thesis is not a very conventional IEM topic, but I very much enjoyed the process of learning about procurement and getting to know the company and the people at Witteveen+Bos. I hope my findings are useful for them.

Enjoy reading!

Thomas Hazewindus

Enschede, 3 April 2021

Management summary

This bachelor thesis is conducted at Witteveen+Bos. Witteveen+Bos is an engineering and consultancy firm. They work on projects in the fields of infrastructure, water, the environment and construction. This thesis is about sustainable procurement. In recent years, the public organisations that are responsible for infrastructure in the Netherlands have committed themselves to achieving a circular building economy in the Netherlands by 2050. Therefore, the action problem that this research aims to contribute to a solution to is:

"By 2050, the percentage of construction projects in the Netherlands that is circular needs to raise from the current level, which is 24,5% to 100%. "

To solve this problem, several steps have to be taken. One of them is getting knowledge, experience and instruments on sustainability in our built environment, and to communicate these with of the right people in the construction supply chain. This research aims to improve this for the contract preparation and procurement phase of works. To achieve this, the following main research question has to be answered:

"How and where in the contract preparation and procurement phase should sustainability policy ambitions be embedded, in order to make sure that they are realised in the project?"

The current procurement process of works in which Witteveen+Bos is involved

There are several types of procurement procedures. Every procurement procedure has its own characteristics, but there are certain similarities they all share. Some procedures have a selection phase to bring down the number of bidders, whilst others only have an award phase in which the winning bidder is chosen. Regardless of which procedure is chosen, the client has to follow European and national procurement laws and judge bidders in an objective manner. Witteveen+Bos typically acts as advisor their client, which most often are public organisations that act as contracting party.

Embedding sustainability into the contract preparation and procurement process

Sustainability considerations can be embedded into the contract preparation and procurement phase of works in the Netherlands in several ways. These are technical process specifications, technical system specifications, award criteria, selection criteria, exclusion criteria and provisional sums.

The realisation of sustainability ambitions in past project of Witteveen+Bos

A survey was conducted to identify what ambitions clients of Witteveen+Bos had in past projects, to identify the methods that were used to embed these ambitions in the contract preparation and procurement phase, to measure the degree to which sustainability ambitions of clients were realised in past projects of Witteveen+Bos and to identify factors that are of influence in successfully realising the sustainability ambitions.

Most clients had ambitions on environmental sustainability, such as energy and CO2 and materials. Many clients had ambitions on social sustainability, especially connectivity. Far fewer clients had ambitions on financial sustainability.

In most cases, award criteria are used to embed sustainable ambitions into the contract preparation and procurement phase, followed by technical system specifications and technical process requirements. Selection criteria, exclusion criteria and provisional sums are used less frequent.

In less than half of the contracts, ambitions were converted to quantitively measurable agreements. In most cases, the ambitions did not change during the contract preparation and procurement phase. Interestingly, apart from some exceptions, the respondents experienced the conversion of the ambitions as successful.

Nevertheless, the respondents also indicated that there are certain aspects that can be improved. These points of improvement only considered the position of the client, and not that of the contractor. Several respondents reported that the clients could get more out of their sustainability ambitions by improving their communication and offering more clarity about their ambitions. Some indicated that improvements could be made by giving more priority to and making more funds available for sustainability.

Categorisation of past projects

The projects on which data was gathered have been categorised in several categories. An overview of this categorisation can be found in figure 1 below. These categories serve as input for the multi-criteria decision model which is the next step of the research.

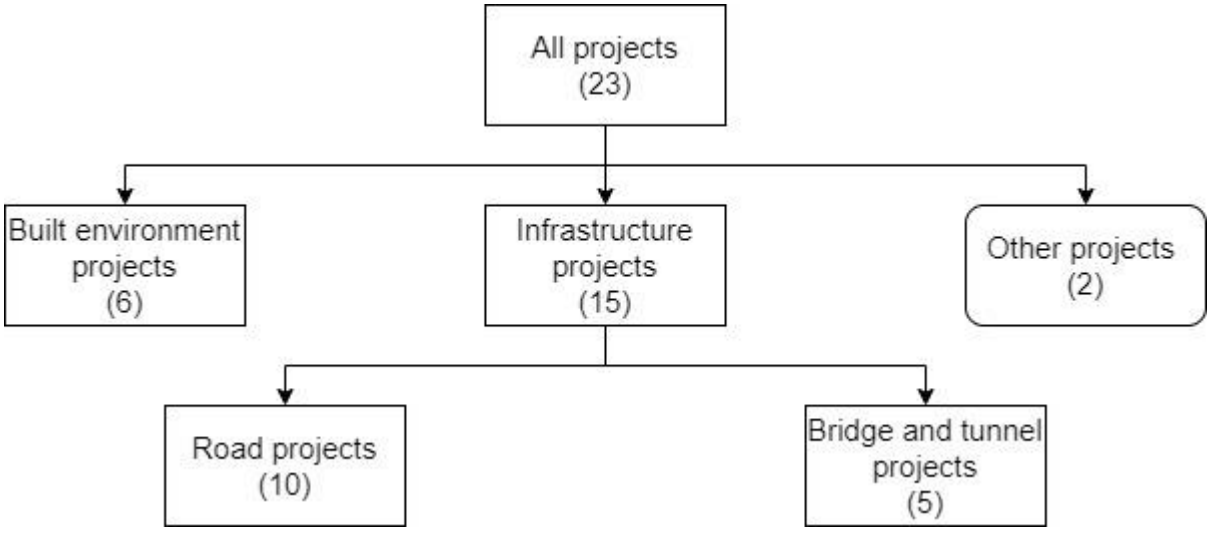

Figure 1: Categorisation of projects. In brackets, the number of projects per category are displayed.

Multi-criteria decision making model

To measure the suitability of the six methods of embedding sustainability into the contract preparation and procurement process, the Simple Multi Attribute Rating Technique (SMART) has been applied. The results of this application can be seen in table 1.

Table 1: Results of SMART per category. In brackets, the suitability of a method on a 0-100 scale is displayed

Category	#1	#2	#3	#4	#5	#6
All projects	Award criteria *(71,48)*	Technical process requirements *(71,38)*	Technical system requirements *(65,46)*	Selection criteria *(25,47)*	Provisional sums *(14,30)*	Exclusion criteria *(10,78)*
Infrastructure projects	Award criteria *(74,57)*	Technical process requirements *(71,49)*	Technical system requirements *(67,85)*	Provisional sums *(37,64)*	Selection criteria *(15,79)*	Exclusion criteria *(14,57)*
Built environment projects	Award criteria *(81,27)*	Technical system requirements *(69,95)*	Technical process requirements *(37,23)*	Provisional sums *(36,68)*	*	*
Road projects	Technical process requirements *(72,37)*	Award criteria *(69,72)*	Technical system requirements *(65,43)*	Selection criteria *(18,42)*	**	**
Bridge and tunnel projects	Award criteria *(74,09)*	Technical system requirements *(51,48)*	Technical process requirements *(49,39)*	Provisional sums *(41,23)*	Selection criteria *(39,03)*	Exclusion criteria *(11,82)*

*None of the built environment projects made use of selection criteria and exclusion criteria, so no score could be given to these methods in the multi-criteria decision analysis
**None of the road projects in the infrastructure category made use of exclusion criteria and provisional sums, so no score could be given to these methods in the multi-criteria decision analysis.

Recommendations to Witteveen+Bos

The following recommendations for the company are done:

1. Combine technical specifications with award criteria in tender procedures.

The SMART analysis shows that award criteria and technical process requirements are the most effective methods to integrate sustainability into the contract preparation and procurement phase, closely followed by technical system requirements. Clients have the opportunity to combine these three methods. They can convert their minimum ambitions into technical specifications and embed their more ambitious goals into award criteria. If a client is looking for a solution which is not yet in the market, they can make use of provisional sums to develop a solution together with the contractor or use functional specifications instead of detailed technical specifications.

2. Use functional specifications instead of detailed specifications.

When a client only specifies how a finished work should function, and some boundary conditions within which it should, contractors are encouraged to come up with a creative solution. Contractors are able to take advantage of their strengths, which allows them to come up with solutions that are either better or cheaper than the solution a client would get if they described every single detail of their work in the technical specifications.

3. Offer more guidance to clients in their formulation and communication of sustainability goals.

Ambitions of clients are often lost in the contract preparation or procurement phase. This sometimes happens because of poor communication between the client and bidders, or because the sustainability goals of the client are not formulated properly. Progress can be made by setting the sustainability goals of the client as early as possible in the project, and by formulating these in a SMART way. As soon as these goals are finalised, they should be communicated to the potential bidders. It is important that the goals are clearly formulated. This way, the risk that bidders misinterpret what the client wants is minimised.

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1. Introduction

This chapter serves as introduction to the thesis. Throughout the chapter, the company at which this thesis is done is introduced and the motivation and problem context of the problem is discussed. Subsequently, the problem which this thesis aims to provide a solution for is introduced.

1.1 About Witteveen+Bos

This bachelor thesis is conducted at Witteveen+Bos. Witteveen+Bos is an engineering and consultancy firm. They work on projects in the fields of infrastructure, water, the environment and construction. Witteveen+Bos has 22 offices in multiple countries and employs over 1200 people. Their headquarters are located in Deventer (Witteveen+Bos. (n.d.).

Most clients of Witteveen+Bos are public organisations such as (inter)national governments, provinces, municipalities and regional water authorities. Examples of recent large projects in which Witteveen+Bos was involved include the redevelopment and transformation of the area around the central station in Utrecht, the Oosterweel link in Antwerp, the Zuidasdok in Amsterdam and the development of an earthquake-resistant airport in Mexico City (Witteveen+Bos, 2020a).

Witteveen+Bos is structured in Product-Market Combinations (PMCs) PMCs are organisational units which range from 20 to 50 employees. In total, Witteveen+Bos has over 30 PMCs, clustered in four business lines. These four business lines are Infrastructure and Mobility, Built environment, Deltas Coasts and Rivers and Energy Water and Environment (Witteveen+Bos, 2020b).

This thesis is conducted within the Relational Contracting PMC, which is part of the Infrastructure and Mobility Business Line. This PMC in turn consists of four groups, and the thesis is conducted within the group “Risicogestuurd contracteren” (Risk-based contracting).

Until the 31st of December 2020, the PMC Relational Contracting was part of the PMC Construction Management, which was tasked primary with the monitoring and controlling of construction costs on complex projects. Besides this, they focussed on (strategic) procurement advice, tendering, building contracts, Systems Engineering, risk management, building costs and building information (BIM). By using cost databases of construction projects of the past, they strive to derive the maximum value to a client from their available budget (Witteveen+Bos, 2020c).

This thesis is about sustainable procurement. Witteveen+Bos highly values sustainability and has developed seven sustainable design principles, based on the Sustainable Development Goals of the United Nations. The seven principles are: nature-based design, flexible design, circular design, multi-functional design, participatory design, trias and socially responsible design. By using these principles, they aim to make every design sustainable in environmental, social and economic terms (Witteveen+Bos, 2020d).

1.2 Problem Background

In recent years, the public organisations that are responsible for infrastructure in the Netherlands have committed themselves to achieving a circular building economy in the Netherlands by 2050. This is an ambitious, but necessary goal to contest further climate change and exhaustion of our planet. The ultimate goal is that, by 2050, our built environment consists entirely out of materials that are either reusable or materials that are biobased. This way, CO_2-emissions from the building sector will go down to zero in 2050. There is no time for involved stakeholders to delay this process, because the involved parties have agreed to cut down on the CO_2-emissions by 50% in 2030. By 2023, all procurements processes started by Dutch governmental organisations should be circular, unless this is not (fully) possible. In 2020, the Dutch economy was 24,5% circular. (Circle Economy, 2020) The first stage of the

three-stage plan is getting to a so called “base camp”, which is described as getting all stakeholders on the same page and getting over all of the obstacles that exist to create a market for sustainable construction. One of the requirements to get to the base camp is getting knowledge, experience and instruments, and to communicate these with of the right people in the total construction supply chain. (Ministerie van Infrastructuur en Waterstaat, 2018).

At European level, the European green Deal is a growth strategy that aims to decrease the net emissions of greenhouse gasses to zero in 2050. Its goals are similar to those in the Dutch transition agenda (European Commission, 2019a) .

Witteveen+Bos has noticed that clients often struggle to convert sustainability policy ambitions into concrete project goals. Besides, converting general project goals to concrete measures for a particular project is perceived as difficult by clients. Often, a trade-off has to be made between two sustainability policy ambitions, one of the reasons for this is that sustainability policy ambitions can be contradictory when they are implemented in a project. It is for example possible that a sturdier construction is in line with the ambition to create a circular building economy, but in contrast with the ambition to reduce the number of materials used in construction projects. Another problem which often occurs is that clients lower or sometimes even completely drop the sustainability project goals in the project preparation stage.

The project preparation and procurement phases play an important role in converting sustainability policy ambitions into project goals. There are several stages in these phases in which agreements about sustainability can be made between the client and the contractor that build the infrastructure. Since every project is unique in a certain way, there is not one best way to integrate sustainability agreements into the process. The goal of this research is therefore to create a decision-making framework that supports Witteveen+Bos and their clients in the project preparation and procurement phase to integrate the sustainability goals for different types of projects.

The procurement process can be characterised as the steps taken in order to find a partner within the context of works. Public organisations (the state, provinces, municipalities, regional water authorities and other public institutions such as hospitals and schools) are obliged to follow the procurement procedure (Rijksoverheid, 2019**).** There are two types of procurement procedures: European procurement processes and national procurement processes. Whenever the estimated value of the work exceeds the European threshold, organisations have to use the European procurement process. Right now, the threshold value lies at €5.350.000,- for works (European commission, 2019b). There are two types of European processes: The European restricted procedure and the European public procedure. For works below the threshold of €5.350.000.-, the national procurement process can be used.
In that case, there are four options for the public organisation. These four options are the Single limited tendering procedure, Multiple limited tendering procedure, National public procedure and National restricted procedure Extensive descriptions of the European and National procedures can be found in chapter 2.1.

Besides these procedures, client can also choose to sign a framework agreement with one or more contractors. The purpose of a framework agreement is to establish terms up front for multiple projects to make sure that they do not have to be established during an extensive procurement procedure for every separate project. The advantage of this is that it can save the client a lot of time (PIANOo, n.d.-q).

1.3 Problem identification

When solving managerial problems, problems in an organisation form a problem cluster with causal relationships (Winden & Heerkens, 2012). In order to solve the "large" problem, the problem that needs to be solved is the problem that causes the other problems. This is called the core problem. The "large" problem, that needs to be solved is called the action problem. An action problem is defined as a discrepancy between norm (the level at which the situation should be) and reality (the level at which the situation actually is). When looking at the problem cluster, there are problems that have no cause, these are the (candidate) core problems.

The action problem that Witteveen+Bos, as well as other organisations in the public sector face is:

"By 2050, the percentage of construction projects in the Netherlands that is circular needs to raise from the current level, which is 24,5% to 100%. "

In this action problem, it is assumed that the circularity of the Dutch building economy is similar to that of the economy as a whole.

Even though this thesis is conducted within Witteveen+Bos, this company is not perceived as the problem owner for this action problem. Since the Dutch government has initiated the transition towards a sustainable building economy and is considered the main stakeholder in this transition, they are.

The problem cluster for this action problem is depicted in figure 2 below.

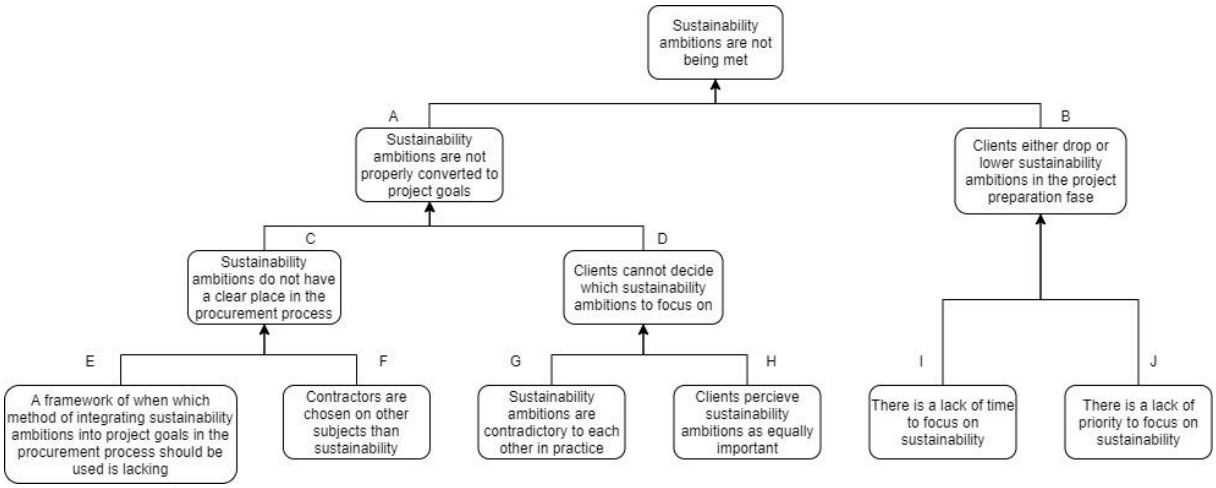

Figure 2: Problem cluster

The relationships between the problems are indicated with arrows and a letter. Each causational relationship is shortly explained below.

A. The sustainability policy ambitions set by the transition agenda (Ministerie van Infrastructuur en Waterstaat, 2018) on the built environment need to be transferred to project goals before they can be implemented in a project.
B. For various reasons, clients do not put as much emphasis on realising the sustainability policy ambitions in the project preparation phase as is necessary, resulting in poorer performance on sustainability.
C. When choosing a contractor, clients´ sustainability policy ambitions are not communicated to contractors in such a way that the focus of the contractors lies on sustainability. Besides, contractors have other incentives than the sustainability goals of the client.

D. In many cases, a decision needs to be made between two or more sustainability policy ambitions to focus on in a project. Clients struggle with this.
E. In order to convert sustainability policy ambitions to project goals, a decision needs to be made about where in the project process agreements are made between the client and construction company about how sustainability in a project is guaranteed.
F. In some cases, clients decide to not judge bids of contractors on sustainability, but on other aspects, such as price.
G. Sometimes, focussing on one sustainability policy ambition decreases the performance of the project on another ambition. An example of such a contradiction is provided in chapter 1.2.
H. Clients have no priority list for the sustainability policy ambitions, and therefore have no framework to decide on which sustainability policy ambition to focus.
I. Due to deadlines in the project preparation face, there is not enough time to pay sufficient attention to the sustainability policy ambitions.
J. Due to the perception that there are more important aspects to consider in the project preparation face, such as costs, safety, speed of construction, etc., sustainability does not get as much attention as planned.

Problems E to J have no cause in the cluster. They are therefore potential core problems. The core problem that this thesis will address is problem E: "A framework of when which method of integrating sustainability policy ambitions into project goals in the procurement process should be used is lacking". The reason for this is that this is the only problem in the problem cluster where Witteveen+Bos is in control. Problem F is already largely taken care of in the transition agenda, because by 2023 all procurement processes initiated by the Dutch governmental organisations should be circular. Problems G and H are a result of the choices made by the client, and problems I and J are also beyond the direct control of Witteveen+Bos.

1.4 Scope

This thesis will focus on sustainability in the project preparation and procurement phase of works in the Netherlands. The term sustainability policy ambitions refers to goals and ambitions following from or derived by the transition agenda set by the government of the Netherlands (Ministerie van Infrastructuur en Waterstaat, 2018).

1.5 Stakeholders

There are several stakeholders involved in this research. They will be addressed below.

1.5.1 Witteveen+Bos

The ultimate goal of this thesis is to contribute to the transition towards a circular building economy. This matches Witteveen+Bos their interest. In their annual report, Witteveen+Bos states that devising sustainable solutions to complex challenges in the fields of water, infrastructure, the environment and construction is one of the most important aspects of the company's mission (Witteveen+Bos, 2020e). This thesis also aims to improve the knowledge of Witteveen+Bos on how to conduct projects in a sustainable fashion. This knowledge makes Witteveen+Bos more attractive to potential clients, which has a positive impact on the company's revenue.

1.5.2 Clients

Clients of Witteveen+Bos are mostly public organisations such as municipalities, regional water authorities, provinces and governments. Besides this, there are also some private parties that Witteveen+Bos works with. The outcome of this research is especially relevant for the public parties, because the Dutch cabinet took the initiative in setting the ambition towards a circular economy when

they developed nationwide program “Netherlands Circular in 2050” (Ministerie van Infrastructuur en Waterstaat, 2018).

Private parties are also interested in a more sustainable building economy, some of the reasons for this are that they want to contribute to this from a corporate social responsibility perspective, or that it is financially attractive for them because governing bodies have reserved funds for circular initiatives in the private sector (Ministerie van Infrastructuur en Waterstaat, 2020) .

Clients of Witteveen+Bos have the largest say in the design of the contract preparation and procurement phase and are considered problem owner in this research.

1.5.3 Contractors

Contractors (mostly construction companies) play a vital part in realising the projects of the clients. They are responsible for building the bridges, subway tunnels, roads and other structures that the clients want. They operate in a competitive environment, and, in order to “win” a job, they have to be chosen by the clients. In order to win, they have to show the client that they can realise what the client wants to see. Since the clients want to have sustainable constructions, construction companies should make sure that they are capable of delivering sustainable constructions. Their main interest is therefore clarity about the procurement process, so they know where to focus their efforts on in order to win a project.

2 Theoretical Framework

In this chapter, the theoretical background of this research is elaborated upon. First, the current procurement procedure of works is explained. After that, the concept of green public procurement is explained at three levels, and the literature on this is analysed by investigating how green public procurement can be applied in the contract preparation and procurement phase of works in the Netherlands.

2.1 The current procurement process of works in the Netherlands

There are different types of procurement procedures in the Netherlands. For works above the threshold of €5.350.000.-, a European procedure has to be followed. For works below this threshold, a national procedure can be followed. If the client wants to involve the European market, it can also choose for a European procedure. In this chapter, the procedures that were studied in this research are discussed. Besides these procedures, other procedures exist, but they are used less often and therefore not included in the scope of this thesis. Regardless of which procedure is chosen, the client has to follow European regulations and has to keep six principles in mind (Chao-Duivis et al, 2013):

- The principle of equality
- The principle of transparency
- The principle or proportionality
- The principle of competition
- The obligation to state reasons
- The protection of legitimate expectations

European restricted procedure

This procedure starts with an announcement on a European tender platform, for example TenderNed and/or Tenders Electronic Daily (TED). As a result of the procurement law of 2012 (Rijksoverheid, 2019) TenderNed is the publication module that must be used for announcing new works, decisions on awards of works and the outcomes of procurement processes to the European Commission for all works with an estimated value that is higher than the threshold (PIANOo, n.d.-a).

The second step of this process is called responding. In this stage, bidders hand in a request to participate at the client. Bidders have to make sure they meet the exclusion criteria set by the client (PIANOo, n.d.-b).

The third phase is the selection phase. In this phase, the bidders that do not meet the exclusion criteria are excluded. After this, the number of potential bidders is limited to a pre-determined number (usually 5) which are invited to register. This limiting is based on which bidders fit the selection criteria best (PIANOo, n.d.-s). The client can also choose to limit the number on bidders by using a random draw, or to let all bidders continue to the next phase. When he chooses the latter, the benefit of limiting the number of bidders is lost.

In the fourth phase, registering, the companies that came through the third phase are sent an invitation to register. The invited bidders can then register on TenderNed. As attachments to their registrations, they add an offer in which they describe for how much money they can do the work, as well as other documents that can be asked by the client (PIANOo, n.d.-j).

The fifth phase is the awarding phase. In this phase, the client determines which bidder has made the best offer. This is done by using award criteria. The award criterium is most often quality for money, unless the client motivates why it chooses for another criterium, such as lowest price. Quality in this context can mean many different aspects, such as: innovative, sustainable, social, fast, well-

functioning, aesthetic, a high capacity, low disturbance for people living in the environment, etc (PIANOo, n.d.-h). Which of these qualities are valued as important and their corresponding weights is stated in the award guidelines (PIANOo, n.d.-i). It is important that these award criteria are formulated in such a way that they cannot be misinterpreted by bidders and that the client can judge the offers in an objective manner. The client is not allowed to change the award criteria during the procurement process (PIANOo, n.d.-g).

The last phase is the finishing of the procurement procedure. In this phase, the client draws up and signs a contract together with the contractor that is chosen as winning bidder in the awarding phase. Most important aspects of the contract have already been determined in earlier phases, but some (mostly administrative or organisational) agreements are discussed in this stage. It is not allowed to negotiate any of the aspects that were agreed on in any of the previous phases. When the contract is signed, the outcome of the procurement procedure is posted on TenderNed. After this, the procurement process is finished (PIANOo, n.d.-c).

The European public procedure

The European public procedure is similar in many phases to the European restricted procedure. The largest difference is that the procedure only has one round in which all potential bidders can register, without the need for an invite resulting from a selection procedure. The awarding phase of the public procedure is more complex than the awarding phase of the restricted procedure, because the client needs to judge bidders on not only their performance with respect to the award criteria, but also on whether or not they meet the minimum suitability requirements and do not meet any of the exclusion criteria (PIANOo, n.d.-f).

Competitive dialogue

The beginning competitive dialogue closely resembles the restricted procedure. After the selection phase, the client will start a dialogue with three to five bidders. These bidders are then asked to draw up a solution for the problem of the client. The bidders that come up with a solution that the client thinks is suitable move to the awarding phase. In the awarding phase, the remaining contractors will be judged using the award criteria of the best price to quality ratio (PIANOo, n.d.-d).

National procedures

For works below the threshold of €5.350.000.-, the national procurement process can be used. In that case, there are four options for the public organisation. These four options are:

1. Single limited tendering procedure

In this case, the client asks one potential partner to draw up an offer. Some of the benefits of this is that the procedure is short, that the costs of the procedure are low and that there is room for negotiation. Some of the downsides of this option is that there is no competition, and therefore there is no guarantee that the client will work with the party that offers the most value for money, the level of transparency is low and there is a risk of conflict of interest in case there is a close relationship between the client and a partner (PIANOo, n.d.-l).

2. Multiple limited tendering procedure

With this option, the client asks a few market parties to make an offer on a work. The client should choose these parties based on objective grounds. The party with the economically most profitable offer wins the procedure. The benefits of this option are similar to those of the single limited tendering procedure, the main difference is that it is not formally possible to negotiate with partners. The downside of this option is that the client only approaches a small party of the market, which results

that there is no guarantee that the "winning" party will offer the best value for money. This option also carries the risk of conflict of interest (PIANOo, n.d.-m).

3. National public procedure

In non-limited procedures, the client approaches the entire market for a work. A public procedure consists of one round. Every interested party has the opportunity to draw up an offer for a work. The client can set exclusion criteria for parties in order to be considered for the work. Awarding the work occurs on basis of registration. There is no room for negotiation. This procedure is mostly used in markets with a limited number of parties. A benefit of this procedure is that it is relatively short. The process takes approximately eight weeks, which is short compared to European procedures (PIANOo, n.d.-o).

4. National restricted procedure

A restricted procedure consists of two rounds. In the first round, all interested parties in the market can register as a potential party. The client will then invite a pre-determined number of parties to round two. All of these parties should match the selection criteria. In the second round, the work is awarded to one party based on registration. There is no room for negotiation. The minimum number of parties that should be invited is five. This procedure is mostly used in markets with a large number of parties. Out of the four procedures listed in this chapter, this one takes the longest. In total, the procedure takes approximately 15 weeks. Still, this is much shorter than European procedures (PIANOo, n.d.-n).

2.2 Green public procurement

In order to reach the goals, set in the transition agenda and the European Green Deal, Green Public Procurement can play a role in changing unsustainable consumption and production patterns (Cheng et al., 2018). According to Evans et al (2010), the basic concept of Green Public Procurement (GPP) relies on integrating environmental criteria for public products and services procurement. The European commission defines GPP as "a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured" (European Commission, 2020). In this framework, the literature on GPP will be analysed at three levels: the global level, the organisation level and the project level. At the global level, the perspective of (cooperation of) governments on GPP are analysed. At organisation level, the literature of implementations of GPP at the level of client and bidders is analysed. Lastly, at project level, the literature on integrating GPP into projects is analysed.

2.2.1 Global level

Traditionally, the success of a business only depended on one metric: Financial performance. If company A made a larger profit than company B, company A was more successful, regardless of the footprint the companies had on society. Elkington (1998) challenged this single bottom line approach when he introduced the triple bottom line of sustainable development in 1998. He argues that firms should measure their performance not just on profit, but also on a social and environmental bottom line.

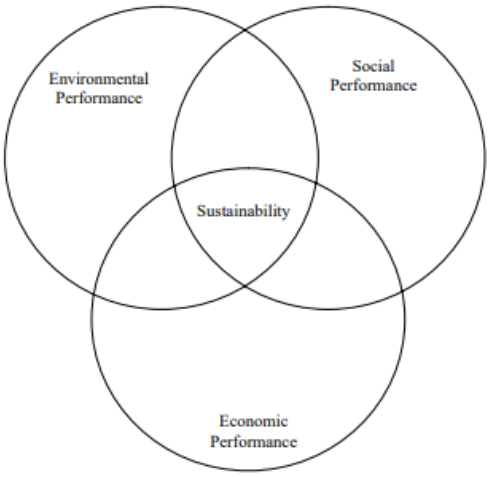

Figure 3: The Triple bottom line of sustainable development (Carter & Rogers, 2008)

The economic bottom line refers to profit, also known as the economic value, created by the organisation.
The social bottom line refers to the impact of a firm on social ethical or cultural issues. Elkington uses the term social capital, which comprises of human capital, in the form of public health, skills and education, but also wider measures of society's health and wealth creation potential. Lastly, the environmental bottom line is measured by a firm's ecological footprint. A sustainable company aims to reduce its ecological footprint by for example reducing the waste in its processes and minimizing its energy consumption (Elkington, 1998).

In 2015, all of the United Nations Member States adopted the 2030 Agenda for Sustainable Development. The agenda provides 17 Sustainable Development Goals (SDGs) which need to be reached in order to guarantee peace and prosperity for people and planet, now and into the future (United Nations, 2015).

PIANOo, the expertise centre for procurement of the Dutch Ministry of Economic Affairs and Climate Policy (PIANOo, n.d.-p) has set seven themes of societal responsible procurement: International Social Terms (ISV), Social Return on Investment (SROI), Environment, Biobased, Circular, Innovation and small and medium-sized enterprises (MKB). These are called MVI themes. By using these themes, organisations can maximise their sustainable value in their procurements.

2.2.2 Organisation level

At organisation level, many of the efforts made by organisations such as the UN are being implemented. According to the Sustainable Business Trends Report of 2019, 71% of companies state that the Sustainable Development Goals are integrated into their business strategies (Ethical Corporation, 2019).

There are also initiatives by organisations to help reach these goals. One of these is the CO_2 performance ladder, which was developed by the Dutch railway company ProRail in 2009. (SKAO, 2020). The CO_2 performance ladder is a sustainability instrument which aims to increase the CO_2 reduction of companies. The CO_2 performance ladder has 5 levels. For every level, minimal requirements are defined for the CO_2 performance of a company and its projects (SKAO, 2015). The CO_2 performance ladder can be used by client in procurement processes. It is often used as an award criterion or as a (minimum) selection criterion (Bouwend Nederland, 2019).

The total CO_2 emissions of the companies that participate in the scheme have decreased significantly and can therefore significantly contribute to reaching sustainability policy goals (Rietbergen & Blok, 2013).

Another initiative developed at organisation level is the Public Procurement for Innovations (PPI). Charles Edquist (2015) defines PPI as "a demand-side innovation policy instrument in the form of an order, placed by a public organization, for a new or improved product to fulfil its particular needs" (Edquist et al., 2015). The European Union defines PPI as using public budgets and government's demand to purposefully enact and diffuse sought innovations in society (European Commission, 2020). Van Winden and Carvalho (2019) describe an application in Amsterdam. In 2017, the city defined six challenges, ranging from coming up with innovations to motivate citizens to get physically active to innovative solutions that help Amsterdam's public places to become part of the circular economy.

2.2.3 Project level

According to Appolini et al (2019), green public procurement can be implemented in different ways in a tender process: Technical specifications, selection criteria, award criteria and contract performance clauses.

There are conflicting views on which method of implementing is best. Table 2 provides an overview of three different articles on this topic. Their results are very different; therefore, no conclusion can be drawn about which method is best.

Table 2: Overview of articles on the performances of methods of integrating Green Public Procurement, 1 is the best method, 4 is the worst method.

Country	Source	Method	Technical specifications	Selection criteria	Award criteria	Contract performance clauses
Nigeria	Babatunde et al. (2020)	Survey in which procurement professionals are asked to rank sustainability drivers	4	3	2	1
Bangladesh	Rahman & Islam (2017)	Semi-structured questionnaire in which respondents from public sector organisations were asked to score methods of integrating sustainability issues.	1	2	4	3
Italy	Testa et al. (2015)	Content analysis on tender documents	1	4	2	3

Due to their membership of the European Union, the research on Italy is most likely to be representative of the situation in the Netherlands. Nevertheless, all of the articles below assume that there is one best way of implementing green public procurement in a tender process. Rosell (2021)

states that there are many factors which impact the success of implementation of Green Public Procurement, such as GDP per capita, government size, contract value, level of government, contract type and sector. Following this reasoning, it does not make sense to recommend one method of integrating sustainability into tender processes.

Two studies were conducted in which statistical information was gathered about green public procurement in the Netherlands. PwC (2009) and Prenen (2008) show that only in a limited number of cases, sustainability was taken up into tender criteria. The study of PwC shows that the construction sector had a far lower percentage of projects in which green criteria were used in the procurement process.

In early stages of a project, when a decision has to be made about which ambitions should be prioritised in a project, clients often make use of the ambition web. The ambition web is used to visualize the ambitions of a client. Environmental, social and economic sustainability are split into twelve themes (Pianoo, n.d.-t). A template for the ambition web can be found in figure 4. The ambitions on energy, materials, soil, water and ecology concern environmental sustainability. The ambitions on use of space, special quality, wellbeing, social relevance and connectivity concern social sustainability. The ambitions on investments and business climate concern financial sustainability.

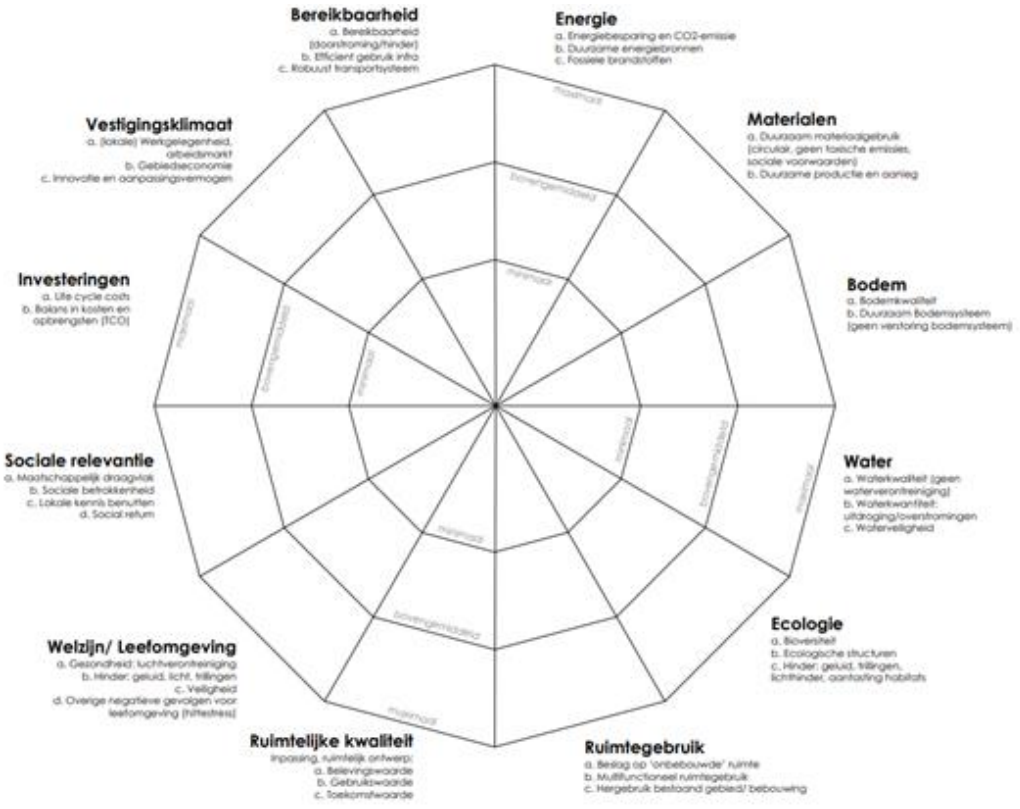

Figure 4: The ambition web

Besides judging bids on the costs of realising a project, clients also have the option to judge bidders on the costs of the total life cycle of a work. According to Woodward (1997) life cycle costing is concerned with optimising value for money in the ownership of physical assets by taking into consideration all the cost factors relating to the asset during its operational life. For works, this means that a client not only takes into account the costs of designing and building a work, but also the costs of maintaining the work and discarding it at the end of its life cycle. Costs of maintaining and discarding works are often

high and have a negative impact on the sustainability of a work. Life cycle costing takes these costs into account and can therefore help clients in choosing a work that is more sustainable.

2.3 Integrating sustainability into contract preparation and procurement process

As mentioned earlier, Appolini states that green public procurement can be embedded in technical specifications, selection criteria, award criteria and contract performance clauses. Appolini's research, as well as other sources are based on a European context. By talking to experts within Witteveen+Bos, the methods of embedding green public procurement have changed slightly to match with the context of this research. Within the Netherlands, the following methods exist: Technical process specifications, Technical system specifications, exclusion criteria, selection criteria, award criteria and provisional sums. Technical process specifications and technical system specifications make up the technical specifications in Appolini's research. Selection criteria in Appolini's research can be divided in exclusion criteria and selection criteria. Award criteria in the Netherlands are similar to award criteria in Appolini's research. Provisional sums make up the contract performance clauses in this research.

Technical process specifications are requirements set by the client on what the contractor should do in the process of realising a project. An example of a technical process specification is that the client requires an independent third party to make measurements of buildings in the direct surroundings of the building site of a project.

Technical system specifications are requirements set by the client on the result of a project. An example of a system specification is that a certain type of cement needs to be used.

Exclusion criteria are grounds of exclusion and minimum suitability requirements that are used in a procurement process to determine which contractors are suitable for performing a certain project. An example of an exclusion criteria is that a client demands that a bidder has to have experience with a similar project in the past five years.

Selection criteria are used to bring down the number of bidders who advance from the selection phase after the exclusion criteria have been applied. Unlike exclusion criteria, selection criteria are non-binary. Bidders are scored based on how well they perform on each criterion. After multiplying the scores with the weight of each selection criterion, a ranking will be established.

Award criteria are applied in the awarding phase. Like selection criteria, each award criteria has a weight and bidders are scored on each criterion using an interval scale. The weight is determined by the client. After multiplying the scores with the weights, the bidder with the highest score is awarded the work. In the Netherlands, award criteria are often used to give a fictive discount to the offer price of the bidder, the bidder with the lowest corrected offer price is awarded the work in that case.

Provisional sums are estimates of an element of a work in a tender document. When used for green public procurement, they are often a reservation for a green initiative. At the time of setting the provisional sum, it is not yet determined what this green initiative will be. Using a provisional sum allows for delaying the decision on where to allocate funds for sustainability goals.

2.3.1 Technical process and system specifications in literature

In literature, no distinction is made between technical process and technical system specifications. Therefore, they are treated as one in this chapter and are called technical specifications.

According to Appolini et Al, technical specifications are used in the pre-award phase and can be considered as minimum compliance criteria that can lead bidders to come up with unsuitable offers in case they are not specified correctly or at the right level of detail. When they are correctly specified, the client can be fairly certain that their minimum ambitions are met. In some cases, the minimum

level of performance on environmental criteria is described in the technical specifications in the pre-award phase, and additional points are awarded to bidders who perform better than the minimum specifications in the award phase. Client can use technical specifications to prescribe a wide range of characteristics of the work.

According to the Buying Green Handbook of the European Commission (European commission, 2016), clients can specify materials and production methods to be used in technical specifications at a very high level of detail, but the client can also choose to use performance-based or functional specifications. Such a performance-based approach has the benefit over specifying materials and production methods that it allows more scope for innovation. Assessing and comparing tenders is harder in this case, however.

In general, Rainville (2016) states that standards intended as knock-out criteria are often presented as technical requirements. However, she also states that clients that want to stimulate incremental innovation should consider embedding standards in technical specifications. She also states that products or services that are already in the market, procures can better rely on functional specification than detailed technical specifications.

2.3.2 Award criteria in literature

According to Rainville (2016), award criteria help in stimulating performance improvements of tenders. Purchasing parties that aim for incremental innovation should consider placing their standards in award criteria. She also states that award criteria can be combined with technical requirements, where technical requirements act as minimum requirements and award criteria are used to reward tenders that outperform their competition.

The buying green handbook of the European Commission confirms Rainville's point. It also states that technical requirements are good for a minimum level of performance, and award criteria can be used to allocate extra points for bidders that outperform their competitors. Besides this, award criteria can be applied when the client is uncertain about the cost or market availability of works which meet the green ambitions of the client. By including green factors into award criteria, client can weigh these criteria against cost and other factors they find important.

Award criteria allow client to judge bids on either price or a combination of price and quality. The latter is called the most economically advantageous tender (MEAT). When MEAT is used, it is possible that a client receives an abnormally low bid. It is therefore important that, if MEAT is used, a proper procurement system is in place to identify why a bid is abnormally low and reject it is this is necessary. In case a bid is solely judged on price, there is no room for green award criteria. (Appolini, 2019) In the Netherlands, a client must use MEAT. A client is only allowed to use another method such as lowest price if he can motivate why he chooses for this.

2.3.3 Selection criteria and exclusion criteria in literature

The terminology used in literature differs slightly from the terminology which is used in this research. In this research and within the context of the Netherlands, selection criteria can only be used in restricted procedures. Exclusion criteria are grounds of exclusion and minimum requirements that can be used in public and restricted procedures. In international literature, minimum requirements set by the client and the criteria that are used to bring down the number of candidates in a restricted procedure are both called selection criteria. The term selection criteria in this research refers to the criteria that can only be used in the restricted procedure. For the selection criteria in open procedures, the term exclusion criteria is used.

Selection criteria mostly relate to technical and professional ability (European commission, 2016). They help to establish whether or not a bidder is suitable to carry out a contract. In terms of sustainability, this means that they do not prescribe that a bidder has to realise a certain level of sustainability in a work, but only that they have to show that they are able to realise a work at (or just below) the desired level of sustainability. In restricted procedures, selection criteria are often used to bring down the number bidders to limit the tender costs. Typically, this number lies at 3 or 5. If the total number of bidders is lower than this number, selection criteria will not be applied. Embedding sustainability ambitions into selection criteria therefore carries the risk that the ambitions will be lost when the number of bidders is low. When the number of bidders is high enough, however, bidders that perform better on the selection criteria than their competitors will move on to the award phase, whilst those that perform worse will not. Client do not find the use of selection criteria for green public procurement attractive, as shown by research in Italy (Testa, 2015).

Exclusion criteria are used in situations where a bidder has certain characteristics that cause the client not to want to do business with it. In the context of sustainability, exclusion criteria mostly concern non-compliance with environmental law or performance under contractually agreed terms in past projects (European commission, 2016).

2.3.4 Provisional sums in literature

Very little is written about using provisional sums for green public procurement in literature. In content analysis and market research on which methods are used the most, the use of provisional sums is not mentioned (Testa, Rahman, Batabunde). Using provisional sums for sustainability has the benefit that the decision on which sustainable measures are taken is delayed, allowing the contractor and client to cooperate after the award phase to get the most out of the sustainability ambitions. Appolini has written about green public procurement in the post-award phase. He does not explicitly mention provisional sums, but he does mention the benefit of having more discretion in introducing sustainable considerations. This increased cooperation can lead to more innovation. Such an innovation partnership reduces the risk, because the risk is shared between the client and the contractor (Rainville, 2016). This is only the case, however, when the contractor has a (financial) interest in successfully realising the sustainability ambitions of the client using provisional sums. The risk of a contractor's non-compliance should be taken into account when allocating green public procurement to the post-award phase (Appolini).

3 Research design

In chapter 1.3, the action problem that this thesis intends to solve was identified and explained. This chapter discusses the research that needs to be done in order to solve the action problem. The main question that needs to be answered in order to solve the core problem is:

"How and where in the contract preparation and procurement phase should sustainability policy ambitions be embedded, in order to make sure that they are realised in the project?"

This main question cannot be answered at once, there are several research questions that need to be answered. These research questions are:

1. What does the procurement process of projects in which Witteveen+Bos is involved currently look like?

Before any process improvements can be suggested, it is important to become acquainted with the way the procurement process works. To answer this question, sources from stakeholders in the building economy in the Netherlands, as well as academic sources were analysed.

2. What ways of embedding sustainability policy ambitions in the procurement process are there?

By looking at sources from stakeholders in the Dutch building economy as well as academic sources, methods of integrating sustainability policy ambitions into the procurement process of a construction have been identified. The following sub-question is set up:

   - What are the positive and negative aspects of each way of embedding, according to literature?

3. Which factors of sustainability goal anchoring in the contracting phase influenced the realization of sustainability policy ambitions in past projects in which Witteveen+Bos was involved?

By conducting a survey among employees of Witteveen+Bos that were involved in past projects, we gathered data on what efforts were made on realising sustainability policy ambitions, and how successful these efforts were. The main focus hereby lied on the effect of the chosen way of anchoring the sustainability policy ambition, but we also researched whether there are other factors that influenced the result. This research question can be divided into four questions:

   1. Which ambitions did clients have in past projects?
   2. How were the ambitions integrated into the contract preparation and procurement phase?
   3. To what extent were the ambitions of the client realised?
   4. Which factors are of influence in successfully realising the sustainability ambitions of clients?

4. Which categorisation of projects in which Witteveen+Bos is involved is suitable to analyse the success of the implementation of green public procurement in the contract preparation and procurement phase?

By using the results from the survey, several categories in which projects of Witteveen+Bos can be divided have been determined. The characteristics on which these categories have been set up is determined by speaking to people at Witteveen+Bos, as well as by looking at the projects that the

respondents of the survey worked on. The way in which sustainability policy ambitions are embedded in projects was not a characteristic on which the categories were created. Examples of criteria on which the categorization took place are size, location, client and type of work (e.g., road/railway or a dyke project).

5. Which type of embedding suits best to which type of situation?

For each category that was set up in sub-question 3, we have ranked the anchoring methods from sub-question 2 from most to least suitable. We have used the Simple Multi Attribute Ranking Technique (SMART) (Edwards, 1997).

The criteria that were used were divided into two categories. The first category of criteria is based on the experiences within Witteveen+Bos, so they followed from conversations with employees of Witteveen+Bos. The second category consisted of criteria based on the results of sub-question 2, so they followed from (academic) sources.

The weights of each of the criteria will the determined by interviewing the decision maker. The group leader of the group Risk-based contracting is considered as decision maker.

4 Results

In this chapter, results of the survey, the categorisation and the multi-criteria decision analysis are discussed.

4.1 Survey

To gather data about sustainability in the contract preparation and procurement phase, a survey was conducted amongst employees of Witteveen+Bos. The goal of the survey was to collect data with respect to the following four aspects:

1. Sustainability ambitions of clients in past projects
2. The use of integration methods of sustainability ambitions into the contract preparation and procurement phase
3. The extent to which the ambitions of the client were realised
4. Factors that are of influence in successfully realising the sustainability ambitions of clients

A survey was set up in which respondents were asked to give information about the project in general, as well as the contract preparation and procurement phase. The complete survey can be found in appendix 1. Respondents could choose a project in which they were involved. If they were involved in multiple projects, they could fill out the survey multiple times. Most questions were multiple choice questions in which a Likert scale was used. Respondents specified the degree to which they agreed or disagreed with a certain statement on a symmetric scale (Likert, 1932). For some questions, respondents were asked to explain their choice via an open question. The survey finished with an open question about which factors influence the success of realising sustainability ambitions of clients. The open questions were optional, if they respondents did not want to, they did not have to fill them in.

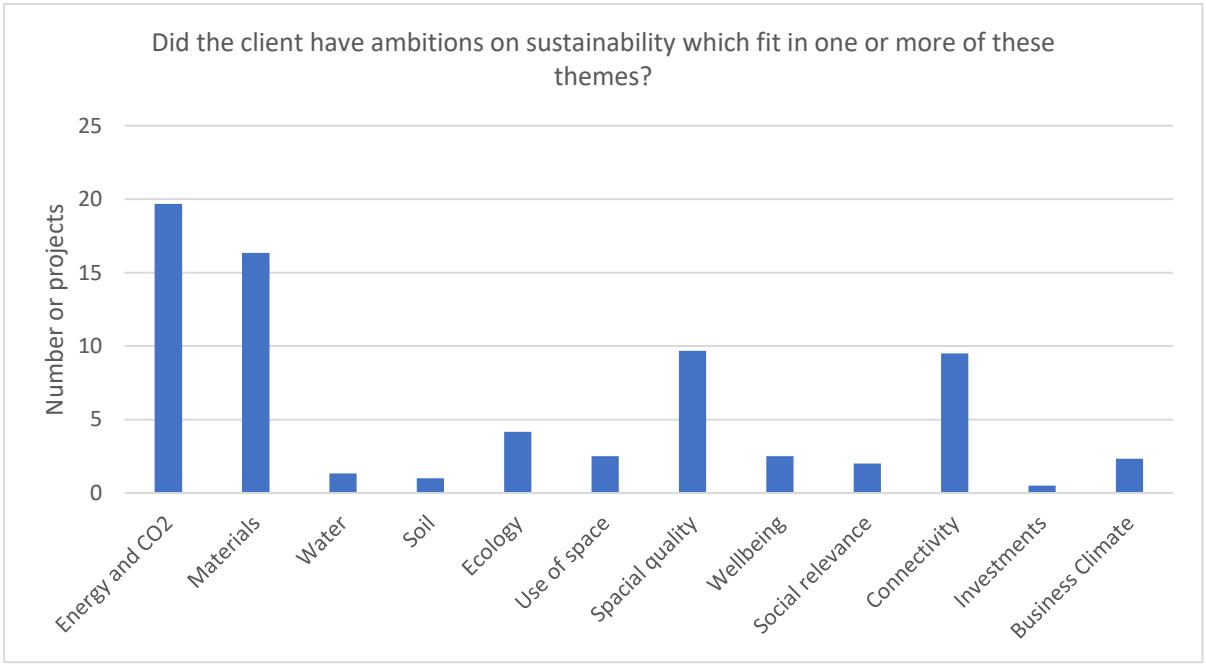

Figure 5: Number of projects per theme of sustainability

In total, 28 responses on 23 projects were collected. For some projects, two or three responses were collected. The survey questions, bar charts for all of the questions, as well as descriptive statistics for some of the questions can be found in appendices 1, 2 and 3. In the case that there were two or more responses for a project, the average of the two responses was used.

To analyse the first aspect, the survey contains questions to characterize the projects participants discussed. The twelve themes of the ambition web are used to categorize projects. More about the ambition web can be found in the theoretical framework. Most clients had ambitions on energy and CO_2 and materials. (see figure 5) Besides this, several projects had ambitions on themes which relate to social sustainability, such as special quality and connectivity. Ambitions on economical sustainability were used the least.

In most cases, award criteria are used to embed sustainable ambitions into the contract preparation and procurement phase (see figure 6), followed by technical system specifications and technical process requirements. Selection criteria, exclusion criteria and provisional sums are used less frequent.

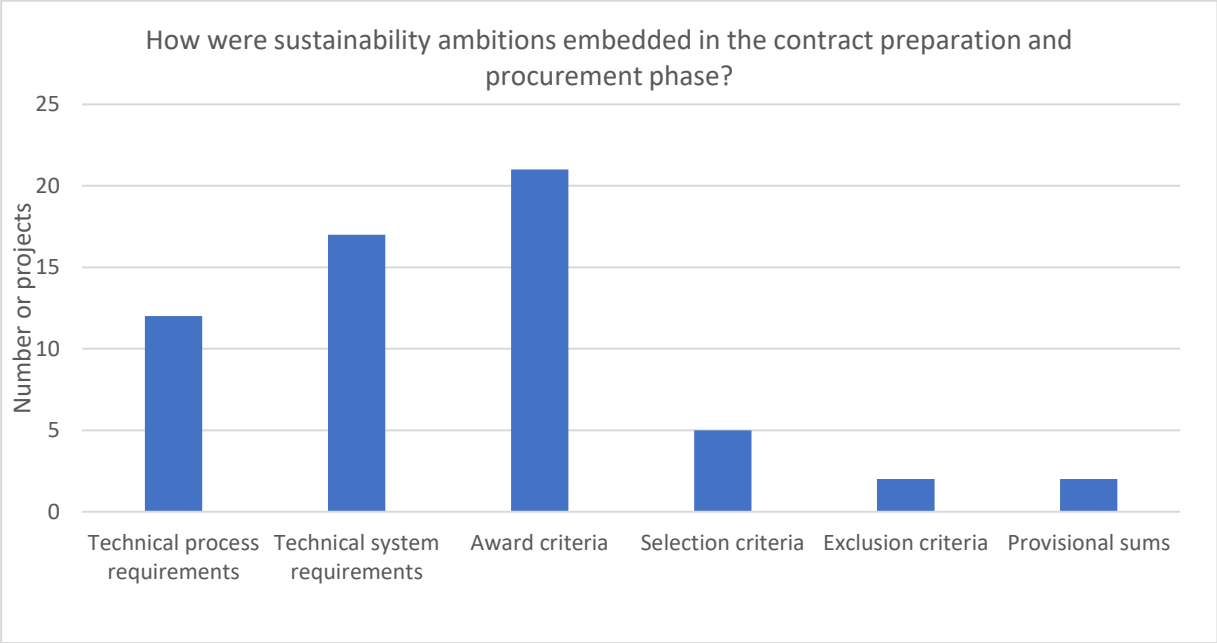

Figure 6: Overview of frequency of use of method of embedding sustainability ambitions

The third aspect, which concerns the extent to which the ambitions of a client are realised was represented in the survey by four questions. The first two survey questions considered whether the

Figure 7: Adjustment of ambitions in contract preparation phase

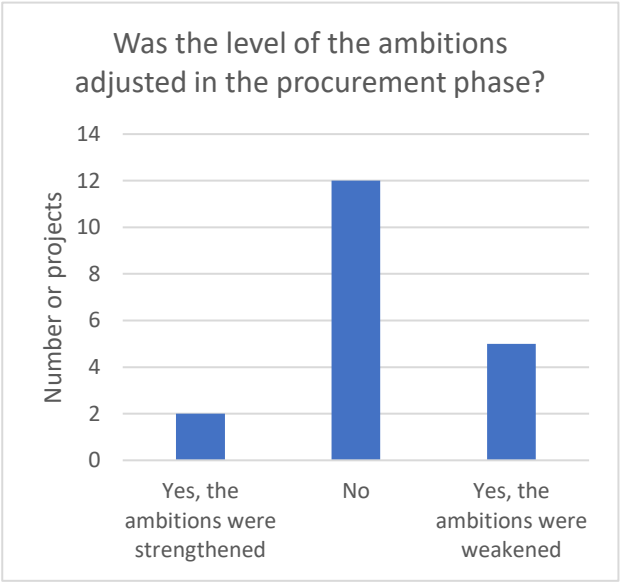

Figure 8: Adjustment of ambitions in the procurement phase

ambitions of the client were adjusted in the contract preparation and procurement phase respectively. The third survey question measures the degree to which the client's ambitions were converted to measurable agreements in the contract. The last survey question measured how successful the conversion of the ambitions was experienced by the respondent. The results of these four survey questions can be found in figures 7-10. For both the contract preparation phase as well as the procurement phase, the level of the ambitions was not changed during the phase in most projects. If they were changed, they were weakened more often than they were strengthened. In less than half of the contracts, ambitions were converted to quantitively measurable agreements. Apart from some exceptions, the respondents experienced the conversion of the ambitions as successful.

In cases where respondents indicated that the translation was not successful, the reasons they indicated for this differed. One respondent indicated that the sustainability goals that were translated in the award criteria were not realistic, which resulted in the situation in which none of the bidders scored many points on this award criterion, because it was not worth the effort and money to score a high number of points. In another project a respondent indicated that the client was not decisive enough and did not perceive sustainability as an important factor. Another respondent indicated that the translation was slightly unsuccessful, because the client lowered its ambitions in the dialogue phase of the competitive dialogue.

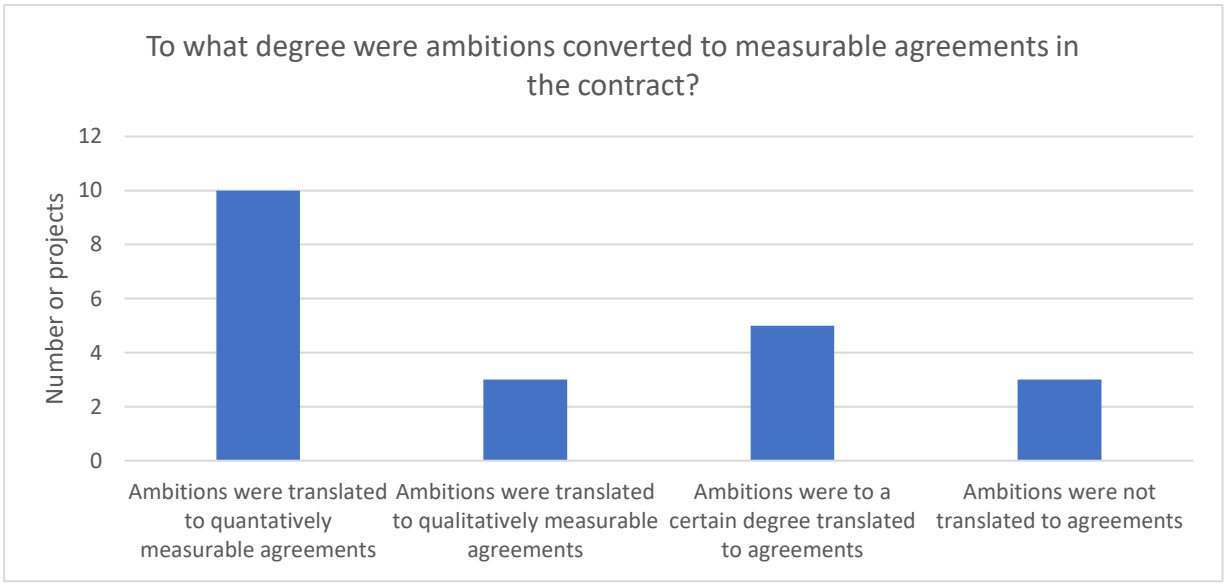

Figure 9: Degree to which ambitions were converted to measurable agreements in the contract

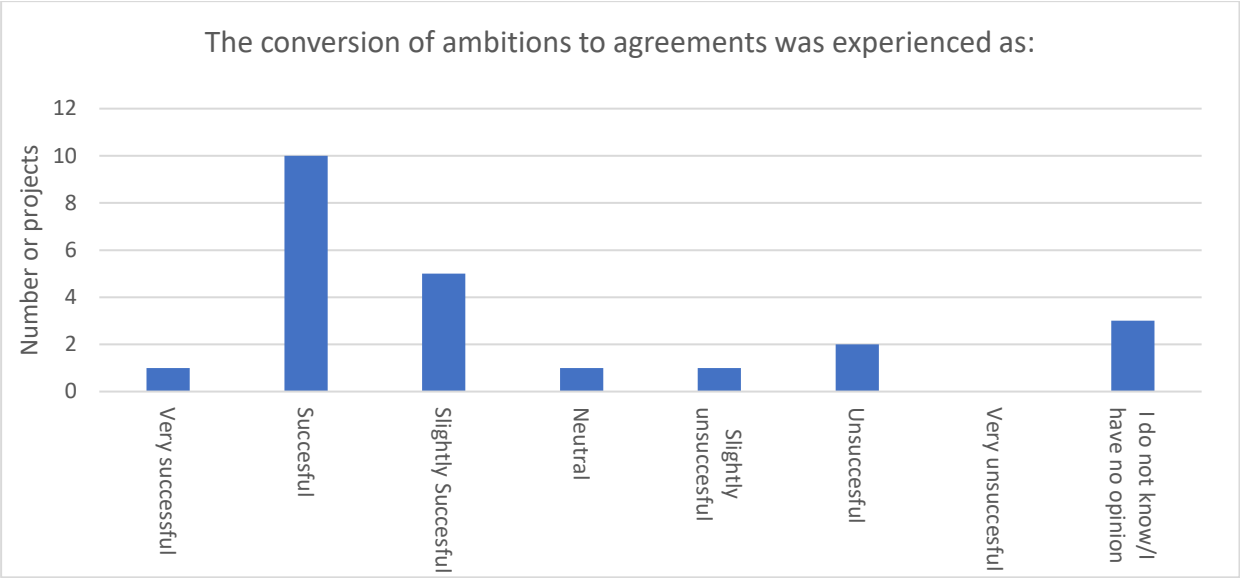

Figure 10: The successfulness of the conversion, according to the experience of the respondents

The fourth and last aspect was covered by an open survey question. All answers that were given are unique, but often showed similarities and, therefore, were grouped. The results of this question can be seen in Table 3.

Table 3: Means to improve the translation of sustainability ambitions of clients to contractual agreements

Answer	# responses
Improve communication between client and bidders	3
Increase priority on sustainability of client	3
More clarity about the ambitions of the client	3
More specific ambitions of the client	3
More structure in the process	3
Make more use of technical specifications	2
Create more room for innovation	1
Do not focus on all ambitions	1
Increase funding for sustainability in project	1
More flexibility in the process	1
Use life cycle costing	1

4.2 Categorisation

As mentioned in the introduction, Witteveen+Bos works on a large variety of projects (e.g., roads, bridges, buildings, water works, etc.). Therefore, it cannot be assumed that one method of embedding sustainability ambitions works best for all types of project. This is confirmed by Rosell (2021). He argues that there are many factors that influence the success of a certain green public procurement method. The categorisation in this research is made on the sector in which the project is done and the task of the project. Figure 11 shows how the categorisation is made. Most projects are either infrastructure or built environment projects, therefore, these two categories are chosen. Two projects fit neither

categories. These projects are water projects which are not related to infrastructure. Because the large majority of the projects are infrastructure projects, a further distinction is made between road projects and bridge and tunnel projects. In the next section, a multi-criteria decision analysis is provided for each category (with the exception of other projects) to determine which method of embedding sustainability into the contract preparation and procurement phase of works in the Netherlands works best.

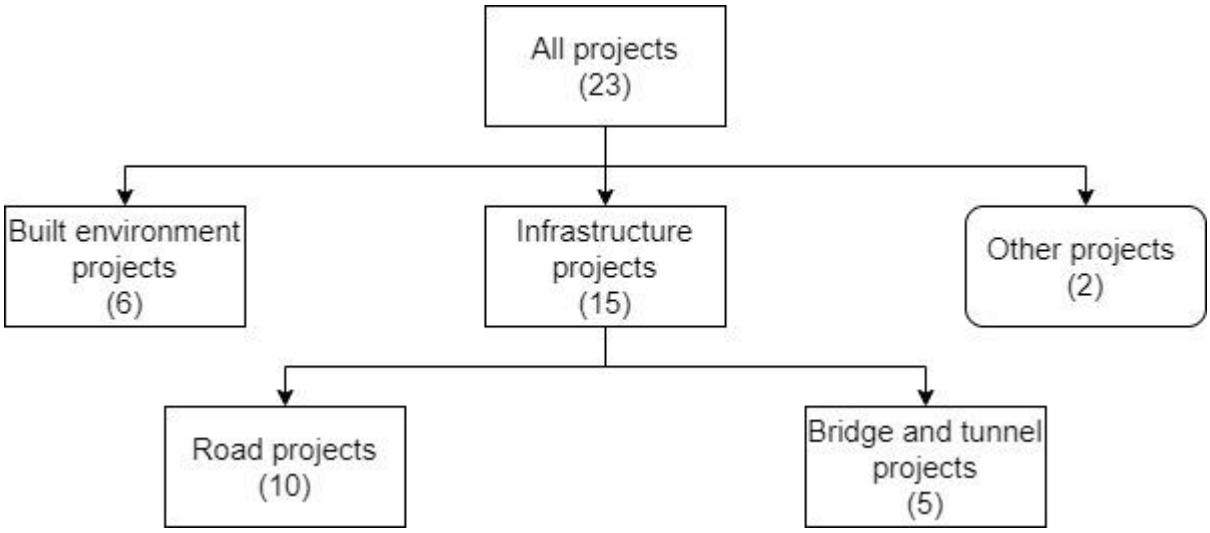

Figure 11: Categorisation of projects. In brackets, the number of projects per category are displayed

4.3 Multi-criteria decision making analysis

Decision makers often have to take many stakeholders into account when making a decision. Each stakeholder has a different interest in relation to the outcome of the decision. In many cases, there are multiple factors that influence a decision. This also goes for Witteveen+Bos' their role when applying green public procurement. There are many cases where they can for example either decide to take an action which pleases stakeholder A and benefits social sustainability, or another option which pleases stakeholder B and benefits environmental sustainability. Typically, a decision maker intuitively weighs these factors against each other. However, when the stakes are high, it is important for a decision maker and its stakeholders to structurally weigh the criteria against each other to make the right decision (Franco, L.A.; Montibeller, G. (2010). Multi-criteria decision making (MCDM) is a part of operations research concerned with this. There is a wide range of MCDM methods that can be applied to this problem.

In this research, the Simple Multi-Attribute Rating Technique (SMART) is used. SMART is a fully compensatory decision method. The method was first introduced by Edwards in 1977. It helps decision makers to make a choice between alternatives based on weighted average, using a ten-step process (Edwards, 1977):

1. Identify the stakeholder whose utility needs to be maximised.
2. Identify the issue for which the utility needs to be maximised.
3. Identify the entities to be evaluated.
4. Identify the relevant dimensions of value for evaluation of the entities.
5. Rank the dimensions in order of importance.
6. Rate dimensions in order of importance.
7. Sum the importance of the weights and divide each by the sum.

8. Measure the location of each entity being evaluated on each dimension.
9. Calculate utilities for entities, using:

$$V(a) = \sum_{i=1}^{n} w_i * V_i(a)$$

10. Decide. The highest V(a) for each category will be considered as best option to embed green public procurement into the tender process.

The SMART method is suitable for this research, because it is a fully compensatory method. This means that if a method scores low on a criterion, it can make up for this low score by scoring high on another criterion. MCDM methods that do not have this characteristic are not suitable for this research. It is possible to use combinations of multiple methods in a tender process, which means that weaknesses of one method can be mitigated by the strengths of another method. Therefore, completely excluding a method in the MCDM is not beneficial for the outcome of the research.

In this research, three stakeholders have been identified. Clients of Witteveen+Bos, Witteveen+Bos itself and contractors that realise the works of the clients. Clients typically are public organisations and are considered as problem owner in this research. Nevertheless, Witteveen+Bos is considered as decision maker in this part of the research. Therefore, the weights of the SMART model will be determined by employees of the company.

The issue for which the utility needs to be maximised is the degree to which realising the sustainability ambitions of clients of Witteveen+Bos is realised in the contract preparation and procurement phase of works.

As mentioned in the theoretical framework, there are six options in which sustainability ambitions can be embedded in the contract preparation and procurement phase of works in the Netherlands. These options are technical process requirement, technical system requirements, award criteria, selection criteria, exclusion criteria and provisional sums. These six options are the entities that will be evaluated in this part of the research. They will be evaluated for each of the categories determined in the previous chapter.

The dimensions of value are depicted in figure 12. They are divided into two categories: Criteria based on data from projects and criteria based on evidence in scientific literature. The scores that are given to each sub-criterion are based on the rubric which can be found in appendix 4.

By interviewing two employees of Witteveen+Bos, the weights of the criteria have been determined. They can also be found in figure 12**.**

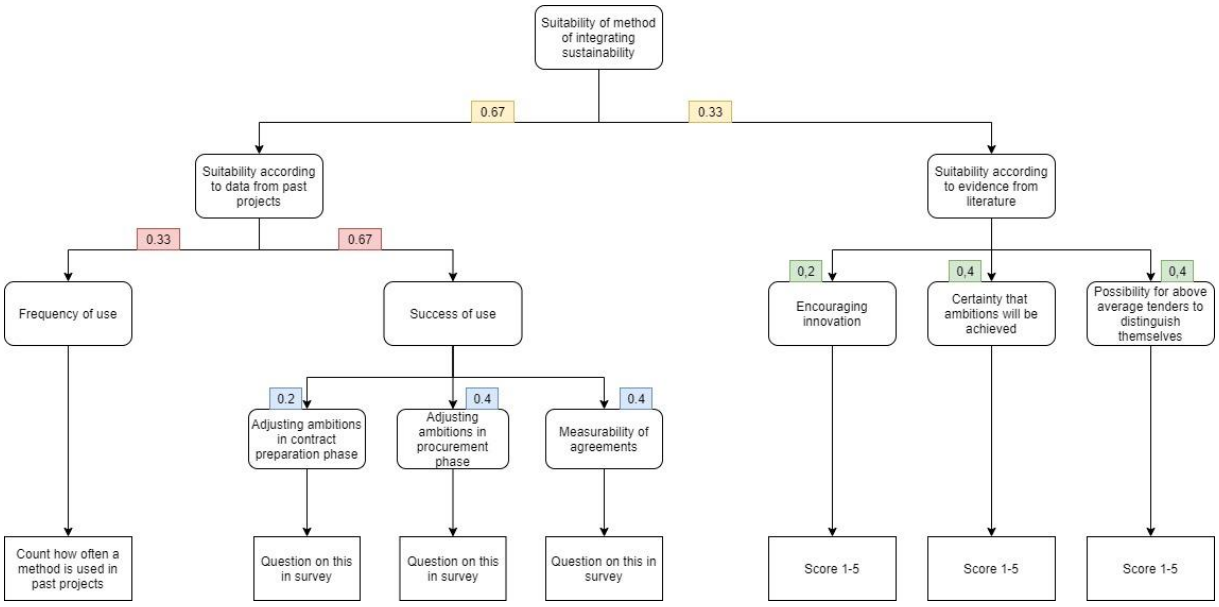

Figure 12: The dimensions of value and their corresponding weights of the SMART analysis

Table 4 shows the total normalised scores for each category. These normalised scores show the suitability of a method for integrating green public procurement on a scale of 0-100. In every category except for road projects, award criteria are most suitable for integrating sustainability. Exclusion criteria and provisional sums are the least suitable. None of the six building projects had any green selection or exclusion criteria, and none of the nine road projects made use of green exclusion criteria or provisional sums. Therefore, no score could be given for these methods in these two categories. If a higher weight is put on the data from projects, technical process requirements surpass award criteria as best method to incorporate green public procurement. If a lower weight is given to the data, the margin between award criteria and technical process requirements increases as well, but in this case award criteria are more suitable. A more extensive sensitivity analysis for all categories can be found in appendix 5. This sensitivity analysis displays the impact of a change in weight of suitability according to data from past projects and literature on the suitability of a method for green public procurement.

Table 4: Normalised scores of the MCDM per category

Category *(number of projects)*	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
All projects *(23)*	71,38	65,46	71,48	25,47	10,78	14,30
Infrastructure projects *(15)*	71,49	67,85	74,57	15,79	14,57	37,64
Building projects *(6)*	37,23	69,95	81,27	No data	No data	36,68
Road projects *(9)*	72,37	65,43	69,72	18,42	No data	No data
Bridge and tunnel projects *(5)*	49,39	51,84	74,09	39,03	11,82	41,23

The normalised scores for all projects and the categories for the data from past projects can be found in table 5**.** For a more extensive elaboration, as well as the calculations behind these scores, see appendix 4. With regard to suitability according to evidence from literature, the normalised scores can be found in table 6. The raw scores and an explanation for each of the scores can be found in and below table 7.

Table 5: Normalised scores for suitability according to evidence from data from past projects of the MCDM per category

Category *(number of projects)*	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
All projects *(23)*	84,37	75,53	74,67	19,95	11,17	0,00
Infrastructure projects *(15)*	84,53	79,10	79,28	5,50	16,82	34,84
Building projects *(6)*	33,40	82,23	89,28	No data	No data	33,40
Road projects *(9)*	85,86	75,50	72,05	9,43	No data	No data
Bridge and tunnel projects *(5)*	51,55	55,21	78,56	40,20	12,72	40,20

Table 6: Normalised scores for suitability according to evidence from literature of the MCDM per category

Criterium	Weight	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
Encouraging innovation	*0,2*	25	25	75	50	0	100
Certainty that ambitions will be achieved	*0,4*	100	100	25	0	25	25
Possibility for above average tenders to distinguish themselves	*0,4*	0	0	100	67	0	33
Total (normalised) score	***1***	**45**	**45**	**65**	**37**	**10**	**43**

Table 7: Raw scores for suitability of method according to literature of the MCDM per category

Criterium	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
Encouraging innovation	2	2	4	3	1	5
Certainty that ambitions will be achieved	5	5	2	1	2	2
Possibility for above average tenders to distinguish themselves	2	2	5	4	2	3

Encouraging innovation

Technical (process and system) requirements typically do not encourage innovation, since they only set minimum standards. If the client embeds very high ambitions into technical requirements (e.g., a bridge should be 100% circular), the number of market parties that can meet this requirement is very low, or even zero. This will result in a very high price for the client, which is undesirable. When the clients set functional specifications, bidders have some room to come up with an innovative solution. A solution which is not yet known to the market often does not meet the technical requirements, therefore bidders that come up with an innovative solution can have a lower chance to win the work. Technical requirements are awarded two points. Award criteria help in stimulating improvement of tenders, and therefore also have a positive effect on innovation. Four points are therefore applied to this method. Selection criteria can also stimulate improvement of tenders but are only applied in cases where the number of bidders exceeds the pre-determined amount by the client. Because of this, they receive three points. Exclusion criteria typically consider non-compliance with law, which is not related to innovation, therefore exclusion criteria are awarded one point. Provisional sums are the most suited for encouraging innovation, because implementing green public procurement in the post-award phase allows for more cooperation between the contractor and the client, which can lead to more innovation. They are therefore awarded five points.

Certainty that ambitions will be achieved

When sustainable ambitions are embedded in technical process and system requirements, bidders are contractually bound to realise them. Therefore, when a client wants to have certainty that their (minimum) ambitions are reached, technical process and system requirements are a safe choice. These are awarded five points. When award criteria are used, bidders that meet the minimum have a larger chance to win the work. Still, it is possible that a bidder that does not meet the minimum ambitions of the client wins the work, for example when they have a low offer price. Therefore, two points are awarded in this category. As mentioned earlier, using selection criteria carries the risk that ambitions are completely lost when the number of bidders is low, therefore bidders that do not meet the requirements will have an equal chance to bidders that do if selection criteria are used. One point is awarded to selection criteria. Exclusion criteria can be used to eliminate bidders that did not comply with contractual agreements (for example on sustainability goals) in past projects. They can therefore increase certainty that the ambitions will be reached a little and are awarded two points. Using provisional sums for sustainability allows for cooperation between the client and contractor in the post-award phase, which has the potential to increase the performance on sustainability. Even though more funds are available for sustainability, the contractor is not (contractually) obliged to meet the minimum ambitions. Therefore, two points are awarded to provisional sums.

Possibility for above average tenders to distinguish themselves

Technical process and system requirements contractually set a minimum standard. If only these methods are used, a bidder that performs significantly better than the minimum standard does not have a larger chance to win the work than a contractor that barely meets the standard. Therefore, two points are awarded to technical process and system requirements. Award criteria give a fictive discount to bidders, based on their offer. The better the offer, the higher the discount and the larger the chance is to win the work. Award criteria are therefore given five points. Selection criteria also benefit bidders that perform better than the average. Still, because the risk that the number of bidders is too low to apply selection criteria exists, they offer no guarantee that a tender that performs above the average will win the work. Therefore, four points are awarded. When exclusion criteria are used, only tenders that performed far below the average in past projects are excluded, above average tenders are not rewarded more than average tenders. Two points are awarded to exclusion criteria. Provisional sums give above average bidders the opportunity to distinguish themselves in the post-award phase. Three points are awarded to provisional sums.

5 Discussion

In this chapter, the implications of this study, how the study relates to the existing literature, unexpected findings and limitations of the research are discussed.

5.1 Implications of findings

This research is part of the transition of the Dutch building economy towards a circular future. The aim of this thesis is to add knowledge about the Dutch building economy to the body of knowledge on sustainable building, particularly about sustainability in the contract preparation and procurement phase of works. There are several methods of embedding green public procurement into the contract preparation and procurement phase, this thesis aims to find out which method can best be selected by clients in which particular situation. Based on the results of a multi-criteria decision analysis, this paper concludes that the use of award criteria is the best method to embed green public procurement, closely followed by using technical process specifications and using technical system specifications. These three methods can be combined in tender processes. That way, the disadvantages of every individual method can be mitigated while the benefits of all methods can be combined. Clients can opt to add provisional sums to the other three options to encourage innovation.

This study is, to my knowledge, the only recent one of its kind on the methods of implementing green public procurement for works in the Netherlands. Less recent studies, such as PwC (2009) and Prenen (2008) collected statistical information on the state of green public procurement in the Netherlands. Nevertheless, given the high ambitions of the Dutch government, it is fair to assume that the situation has changed in the past decade. Moreover, this study also goes further in depth than the studies of PwC and Prenen. The outcome of this thesis can be used as a guideline by public organisations and engineering firms when they are designing a procurement process for a work. The procurement process of a work is similar to that of a product or service. Therefore, the outcome of this study has the potential to be generalised to the contract preparation and procurement process of products and services.

5.2 Relation of study in comparison to other studies

Considering the outcomes of studies on green public procurement in different countries, the results of this research are not that surprising. The outcomes of this research are very similar to that of Testa (2015) in Italy and show some similarities (but also some differences) to the research of Rahman & Islam (2017) in Bangladesh and Babatunde et al. (2020) in Nigeria. It comes as no surprise that the situation in the Netherlands most closely resembles that of Italy. This makes sense, because the Netherlands and Italy are both members of the European Union, and many of the rules of their respective procurement systems are European rules. It can therefore be assumed that the characteristics of a certain method of embedding green public procurement in the Netherlands have the same characteristics in Italy. There are other similarities between the two countries, such as the height of the GDP per capita.

5.3 Surprising observations

A survey was conducted to determine how well the sustainability ambitions of clients of Witteveen+Bos were realised in past projects. Interestingly, the respondents were quite positive about the realisation of these ambitions (see figures 7-10). Given that the Dutch government has very high ambitions on sustainability in the building economy and that the Dutch building economy is still in the early stages of a transition, I had expected that the respondents would indicate that the ambitions of the clients were not converted that well in past projects. I expect this, because the height of the ambitions would result in relatively large steps which should be taken by the clients.

Nevertheless, at the current pace, we are unlikely to reach the goal of a circular building economy in the Netherlands in 2050 (PBL, 2021). When the respondents were asked how the degree to which the client's ambitions are realised could be improved, most of them indicated that the client could set higher ambitions and make significant improvements in the communication of their sustainability ambitions. (see table 3). This in line with the report of the PBL (Netherlands Environmental Agency), which states that an intensification of the current policies on sustainability is necessary to realise the ambitions.

5.4 Limitations and points for discussion in the scientific literature

The SMART model in this research used data from past projects and evidence from scientific literature as inputs. The scientific literature focusses on a European context or other local contexts outside of Europe. These contexts differ from the context in the Netherlands. Even though many of the procurement laws that apply in Europe also apply in the Netherlands, there are subtle differences between countries within Europe.

In the scientific literature, no clear distinction is made between technical system specifications and technical process specifications. Some papers describe contract performance clauses, which have some similarities to technical process specifications, but they are applied in a different phase of the procurement process. Besides, very little is reported in the scientific literature about using provisional sums for green public procurement. In this research, it is assumed that they have the same benefits as methods in which green public procurement is applied in the post-award phase, which makes them very promising for clients who are looking to encourage innovation. Aside from the fact that provisional sums are applied in the post-award phase, there is no evidence in literature to confirm that this assumption holds. More research should be done on this in order to prove that this assumption either does or does not hold.

5.5 Limitations and points for discussion about the data from past projects

The data that serves as input for the SMART model is based on a set of 23 projects, for which a total of 28 responses were collected. Some projects had two or three responses. It can be argued that a set of 23 projects is too small to make valid recommendations about the entire sector that concerns works in the Netherlands. Some of the methods that were investigated were used in a very small number of projects, especially selection criteria (5), exclusion criteria (2) and provisional sums (2). To make the recommendations generalisable for the entire sector, more projects should be added to the set, especially projects in which these three methods were used.

Even though the survey was anonymous, I know that some respondents made a large contribution to my data, because they filled in the survey for multiple (up to three) projects. This has implications for the validity of my results, because the bias of one respondent can have a significant influence on the data that I gather, especially considering the fact that a respondent contributed multiple projects to my dataset and that the total number of projects I gathered data on is limited.

Another aspect which potentially has an impact on the validity of the results is that it is possible that respondents misinterpreted some of the questions, or that the answers that were given by the respondent were misinterpreted. The chance of the latter is relatively low, because the data gathering method was a survey with a small number of open questions, which leaves little room for misinterpretation.

For some projects, multiple responses were recorded. Sometimes, there were differences between two responses on the same project. For some projects which had multiple respondents, one respondent indicated that the translation of the ambitions was slightly successful, whilst another

respondent indicated that the translation was successful. This shows that respondents filled in the survey based on their experience of the project, and that their experience of the project can differ from that of another respondent.

The results of the survey showed that respondents in general were positive about the translation of the ambitions to contractual agreements. It is questionable whether this can be said for all projects in which Witteveen+Bos is involved, because the number of projects for which the survey was filled in is limited, and because respondents could choose for which project(s) they would fill in the survey. It is therefore possible that they decided to fill in the survey for projects in which the translation was successful, and that projects in which the translation was unsuccessful are not represented.

6 Conclusion

In this chapter, the answers to the research questions will be discussed, as well as the recommendations based on this research.

6.1 Answers to the research sub-questions

In this sub-chapter, the five sub-questions of the research will be answered.

6.1.1 How is the procurement process of projects in which Witteveen+Bos is involved organised?

There are several types of procurement procedures. Every procurement procedure has its own characteristics, but there are certain similarities they all share. Some procedures have a selection phase to bring down the number of bidders, whilst others only have an award phase in which the winning bidder is chosen. Regardless of which procedure is chosen, the client has to follow European and national procurement laws and judge bidders in an objective manner. For works under €5.350.000,-, national procedures can be used. Above this threshold, European procedures have to be used. Witteveen+Bos typically acts as advisor their client, which most often are public organisations that act as contracting party.

6.1.2 What ways of embedding sustainability policy ambitions in the procurement process are there?

Sustainability considerations can be embedded into the contract preparation and procurement phase of works in the Netherlands in several ways. These can be characterised as technical process specifications, technical system specifications, award criteria, selection criteria, exclusion criteria and provisional sums.

- Technical process and technical system specifications are first applied in the pre-award phase. Afterwards, they are implemented in the contract. They have the benefit that they set minimum standards that bidders have to pass, but the downside that bidders that perform above the minimum standard are not rewarded for this.
- Award criteria are applied in the award phase. They have the benefit that above average performers can distinguish themselves from average ones, but they do not offer the guarantee that the minimum ambitions will be reached that technical specifications do offer.
- Selection criteria are used in the selection phase. Not all procurement procedures have a selection phase. Selection criteria mostly concern references from former projects and do not treat bidders on a pass or fail basis. The main downside of using selection criteria for sustainability is that in case there is a limited number of bidders, selection criteria will not be used. When a client embeds its sustainability ambitions in selection criteria, they take the risk that the ambitions will be completely lost.
- Exclusion criteria mostly concern non-compliance with environmental law or performance under contractually agreed terms in past projects. They are applied during the selection phase (restricted procedures) or before the award phase (public procedures). They (slightly) increase the certainty that minimum ambitions will be reached, because they eliminate bidders that have not met contractual agreements in the past. They treat bidders on a pass or fail basis, so there is no room for innovation and above average tenders cannot distinguish themselves when exclusion criteria are used.

- Provisional sums are applied in the post-award phase. The benefit of this is that in the post-award phase, cooperation between the client and contractor is allowed. This makes it easier for the contractor to come up with an innovative solution, because the risk of trying something new is shared between the contractor and the client. The downside of using provisional sums for green public procurement is that they offer no contractual guarantee that a minimum level of sustainability will be met; Only that a certain amount of money will be spent on it.

6.1.3 Which factors of sustainability goal anchoring in the contracting phase influenced the realization of sustainability policy ambitions in past projects in which Witteveen+Bos was involved?

To answer this question, a survey was conducted amongst employees of Witteveen+Bos.

Most clients had ambitions on energy and CO_2 and materials. Besides this, several projects had ambitions on themes which relate to social sustainability, such as special quality and connectivity. Ambitions on economical sustainability are reported the least.

Award criteria are most frequently used to embed sustainable ambitions, followed by technical system and technical process specifications. Selection criteria, exclusion criteria and provisional sums were used less by clients. It is possible that provisional sums are used so little because clients are risk-averse and do not want the uncertainty of moving the dialogue on what to do with sustainability in their project to the post-award phase.

Employees of Witteveen+Bos were relatively positive about the translation of the sustainability ambitions. In 16 out of 20 projects, they were of the opinion that the translation from sustainability ambitions to measurable project goals in the procurement process was either partially successful, successful or very successful. However, in less than half of the projects, the ambitions of the clients were converted to quantitively measurable agreements in the contract. This is interesting, especially considering that many respondents were positive about the translation. In some cases, the ambitions of the client were lowered in the contract preparation or procurement phase. In most cases, the ambitions remained the same, however. The results of the survey give a positive view about the current situation.

Nevertheless, the respondents also indicated that there are certain aspects that can be improved. Several respondents reported that the clients could get more out of their sustainability ambitions by improving their communication and offering more clarity about their ambitions. Some indicated that improvements could be made by giving more priority to and making more funds available for sustainability. Some comments were made on the contract preparation and procurement phases, some mentioned that there should be more structure in the process and that more technical specifications should be used. Interestingly, no comments were made on the position of the contractor.

6.1.4 Which categorisation of projects in which Witteveen+Bos is involved is suitable to analyse the success of the implementation of green public procurement in the contract preparation and procurement phase?

Based on the set of projects for which respondents participated in the survey, a categorisation was made. This can be found in figure 13 below. The categorisation serves as input for the multi-criteria decision analysis which is discussed in the next chapter.

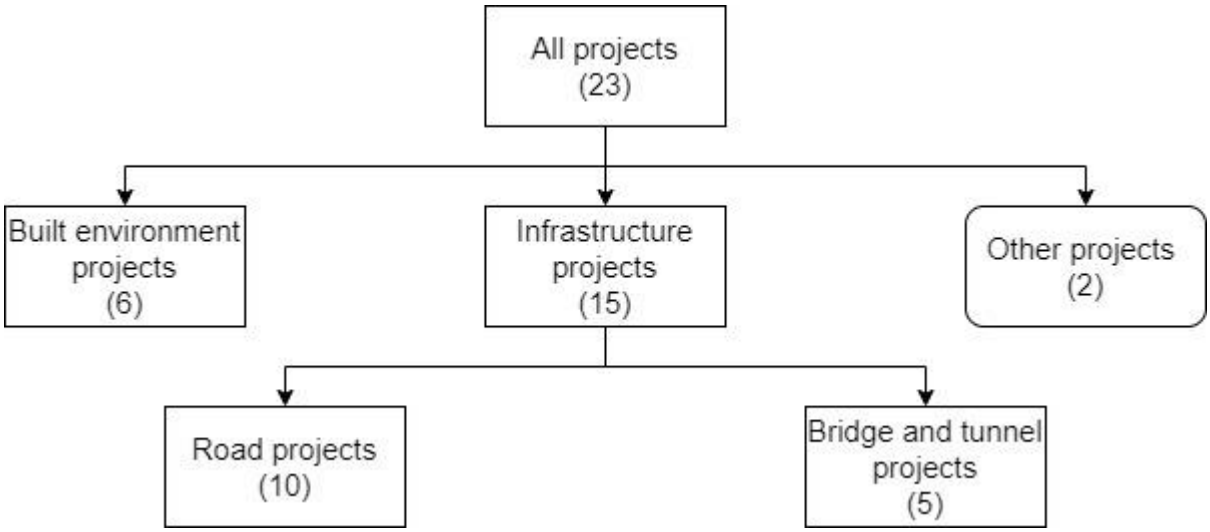

Figure 13: Categorisation of projects. In brackets, the number of projects per category are displayed.

6.1.5 Which type of green public procurement embedding best suits best to which type of situation?

A multi-criteria decision analysis was conducted to determine which method of implementing green public procurement works best for which type of project. There were two types of criteria: Criteria based on data from past projects and criteria based on literature. The results of this can be found in the table 8 below. The results in table 8 are based on the SMART model which can be found in the results section. The results have been normalised using a 0 (least suitable) to 100 (perfectly suitable) scale.

Table 8: Ranking of suitability of methods of embedding green public procurement into the contract preparation and procurement phase. The normalised scores are displayed in brackets.

Category	#1	#2	#3	#4	#5	#6
All projects	Award criteria *(71,48)*	Technical process requirements *(71,38)*	Technical system requirements *(65,46)*	Selection criteria *(25,47)*	Provisional sums *(14,30)*	Exclusion criteria *(10,78)*
Infrastructure projects	Award criteria *(74,57)*	Technical process requirements *(71,49)*	Technical system requirements *(67,85)*	Provisional sums *(37,64)*	Selection criteria *(15,79)*	Exclusion criteria *(14,57)*
Built environment projects	Award criteria *(81,27)*	Technical system requirements *(69,95)*	Technical process requirements *(37,23)*	Provisional sums *(36,68)*	*	*
Road projects	Technical process requirements *(72,37)*	Award criteria *(69,72)*	Technical system requirements *(65,43)*	Selection criteria *(18,42)*	**	**
Bridge and tunnel projects	Award criteria *(74,09)*	Technical system requirements *(51,48)*	Technical process requirements *(49,39)*	Provisional sums *(41,23)*	Selection criteria *(39,03)*	Exclusion criteria *(11,82)*

*None of the built environment projects made use of selection criteria and exclusion criteria, so no score could be given to these methods in the multi-criteria decision analysis.
**None of the road projects in the built environment category made use of exclusion criteria and provisional sums, so no score could be given to these methods in the multi-criteria decision analysis.

In most situations, using award criteria is the best method. The difference between the scores of award criteria and technical process requirements is very small, especially for all projects and infrastructure projects. If more weight is put on data from past projects in these categories, technical process requirements become the most suitable method. Selection criteria, exclusion criteria and provisional sums do not lie on the efficient frontier and are therefore not the most effective method to integrate sustainability ambitions into the contract preparation and procurement phase, regardless of how the weights are set.

6.2 Answer to the main research question

The main research question of this research is: "How and where in the contract preparation and procurement phase should sustainability policy ambitions be embedded, in order to make sure that they are realised in the project?". The straightforward answer to this question can be found in table 8. According to the multi-criteria decision analysis, for all types of projects with the exception of road projects, award criteria are the most suitable. For road projects, technical process requirements should be used. Still, the differences between award criteria and technical process and system requirement are very small.

In the multi-criteria decision analysis, the option to use multiple methods has not been taken into account, however. According to Appolini, green public procurement can be applied in the pre-award phase, the award phase and the post award phase. In the pre-award phase, the client can use technical process specifications to set minimum standards about how the work will be realised and technical system specifications to set minimum standards about the work itself. The client can then use the award phase to reward bidders that can perform better than the minimum standards by using award criteria. In the post-award phase, clients that are looking for an innovative solution can make use of provisional sums to come up with an idea which is not available in the market. This way, the downsides of all methods are taken care of: Technical specifications do not reward bidders that perform better than the minimum standard, but award criteria do. Award criteria have the downside that they offer no guarantee that minimum standards will be achieved, but these are taken care of by the technical specifications. Like award criteria, provisional sums offer no contractual guarantee that a work will be sustainable, but technical specifications do.

In order to achieve the policy ambitions of the clients, innovations have to be made. Provisional sums are a possible method to realise some innovations. Innovations also bring a challenge: How do you make sure that the market adopts new, better methods? A client could choose to make a recently introduced method part of the technical specifications, but it is likely that only a very limited number of contractors is able to meet this requirement and will register for the work. This makes the winning bid typically higher than in a situation where more bidders register. Clients can also opt to introduce a new method into the award criteria. That way, they will benefit bidders that have embraced the innovation. By increasing the weight on the award criterion in future projects, bidders are encouraged to adopt the method. When enough bidders have done so, the client can incorporate the new method into the technical specifications, which forces the remaining bidders to also embrace the innovation. By using this method, clients can encourage the market of contractors to gradually innovate, whilst minimising the risk in their own tender processes.

6.3 Recommendations

In this chapter, the recommendations for the company as well as recommendations for further research are discussed.

6.3.1 Recommendations to Witteveen+Bos

To improve the degree to which clients of Witteveen+Bos their sustainability ambitions are realised, Witteveen+Bos can do the following to improve the contract preparation and procurement phase:

1. Combine technical specifications with award criteria in tender procedures

The SMART analysis shows that award criteria and technical process requirements are the most effective methods to integrate sustainability into the contract preparation and procurement phase, closely followed by technical system requirements. Clients have the opportunity to combine these three methods. They can convert their minimum ambitions into technical specifications and embed their more ambitious goals into award criteria. If a client is looking for a solution which is not yet in the market, they can make use of provisional sums to develop a solution together with the contractor or use functional specifications instead of detailed technical specifications.

2. Use functional specifications instead of detailed specifications

When a client only specifies how a finished work should function, and some boundary conditions within which it should, contractors are encouraged to come up with a creative solution. Contractors are able to take advantage of their strengths, which allows them to come up with solutions that are either better or cheaper than the solution a client would get if they described every single detail of their work in the technical specifications.

3. Offer more guidance to clients in their formulation and communication of sustainability goals

Ambitions of clients are often lost in the contract preparation or procurement phase. This sometimes happens because of poor communication between the client and bidders, or because the sustainability goals of the client are not formulated properly. Progress can be made by setting the sustainability goals of the client as early as possible in the project, and by formulating these in a SMART way. As soon as these goals are finalised, they should be communicated to the potential bidders. It is important that the goals are clearly formulated. This way, the risk that bidders misinterpret what the client wants is minimised.

6.3.2 Recommendations for further research

Whilst this research answered the research question, it also made some assumptions which need to be confirmed and created some new questions which can be answered. To further improve the body of knowledge on green public procurement in the Netherlands, the following actions can be taken:

1. Research on using provisional sums for green public procurement

Very little research on using provisional sums for green public procurement is done. Since provisional sums are applied in the post-award phase, this research assumes that the benefits of applying green public procurement in the post award phase are also relevant for using provisional sums. Additional research can be done to confirm that this assumption is indeed true.

2. A multi-criteria decision analysis on combinations of methods of embedding green public procurement

In this research, a multi-criteria decision analysis was done to determine which single method of implementing green public procurement is best. As stated in chapter 5.2, it is very likely that a

combination of multiple methods works best. A multi-criteria decision analysis on combinations of methods can be conducted to confirm this hypothesis.

3. Research on the position of the client in the contract preparation and procurement phase

The respondents of the survey indicated that clients could improve the realisation of their sustainability ambitions by improving their communication about or increasing their priority on their ambitions. Because many respondents spoke about the position of the client, and not about the contractor, it appears that the attitude towards sustainability of the client is vital in realising the ambitions. More research on the formulation of the goals set by the client and on which goals the client should focus, as well as communication between client and contractor, has the potential to add to the knowledge about realising sustainability and contribute to the green transition of the building economy.

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8 Appendices

Appendix 1: Questions of survey

Duurzaamheid in contractvoorbereiding en aanbesteding

Start of Block: Default Question Block

Welkom bij deze enquête. Deze enquête is onderdeel van een afstudeeronderzoek van de bachelor Technische Bedrijfskunde aan de Universiteit Twente. Het onderzoek wordt in opdracht van Witteveen+Bos uitgevoerd en heeft als doel om bij te dragen aan het realiseren van de duurzaamheidsambities van opdrachtgevers. Het onderzoek wordt uitgevoerd door Thomas Hazewindus, je kunt contact met hem opnemen via thomas.hazewindus@witteveenbos.com.

De gegevens die je in de enquête invult zullen alleen voor het afstudeeronderzoek gebruikt worden en vertrouwelijk behandeld worden. Het is tijdens elk stadium van de enquête mogelijk om jezelf terug te trekken en af te zien van deelname. In het verslag zullen namen van opdrachtgevers, opdrachtnemers en medewerkers van Witteveen+Bos geanonimiseerd worden. Indien je interesse hebt in het rapport, kan je dit aan het einde van de enquête aangeven.

Het is de bedoeling om de enquête over één project in te vullen. Mocht je aan meerdere relevante projecten hebben gewerkt, zou het fijn zijn als je de enquête meerdere keren in kan vullen. Het is mogelijk om de enquête deels in te vullen en op een ander moment af te maken. Je browser onthoudt 1 week lang wat je hebt ingevuld. Mocht je een begin aan de enquête willen maken voor een ander project, terwijl je de enquête al gedeeltelijk hebt ingevuld, kun je de incognito modus gebruiken om een blanco versie van de enquête te krijgen. De enquête zal ongeveer 10 minuten per project in beslag nemen.

Van harte bedankt voor je deelname!

Ik heb de bovenstaande tekst gelezen en ik ga akkoord met deelname aan het onderzoek

- ○ Ja (1)
- ○ Nee (2)

Skip To: End of Survey If Ik heb de bovenstaande tekst gelezen en ik ga akkoord met deelname aan het onderzoek = Nee

Page Break

Kun je een korte omschrijving van het project geven?

_____

Wie was er opdrachtgever van het project?

- Het Rijk (1)
- Een provincie (2)
- Een waterschap (3)
- Een Gemeente (4)
- Overig, namelijk: (5) _____

Wat was de omvang van het project? (in euro)

- <€1,5 miljoen (1)
- €1,5 miljoen - €5 miljoen (2)
- €5 miljoen - €10 miljoen (3)
- €10 miljoen - €30 miljoen (4)
- €30 miljoen - €100 miljoen (5)
- €100 miljoen - €300 miljoen (6)
- >€300 miljoen (7)

Welke aanbestedingsprocedure is er doorlopen?

- ○ Europese niet-openbare procedure (1)
- ○ Europese openbare procedure (2)
- ○ Nationale niet-openbare procedure (3)
- ○ Nationale openbare procedure (4)
- ○ Meervoudig onderhandse procedure (5)
- ○ Enkelvoudig onderhandse procedure (6)
- ○ Concurrentiegerichte dialoog (7)
- ○ Anders, namelijk: (8) _____

Is het project al afgerond?

- ○ Ja (1)
- ○ Nee, de status van het project is: (2)

_____

Page Break

de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's?

- ☐ Energie en CO2 (1)
- ☐ Materialen (2)
- ☐ Water (3)
- ☐ Bodem (4)
- ☐ Ecologie (5)
- ☐ Ruimtegebruik (6)
- ☐ Ruimtelijke kwaliteit (7)
- ☐ Welzijn (8)
- ☐ Sociale relevantie (9)
- ☐ Bereikbaarheid (10)
- ☐ Investeringen (11)
- ☐ Vestigingsklimaat (12)
- ☐ Anders, namelijk: _____

Hoe ambitieus vond je de ambities van de opdrachtgever?

- ○ Erg hoog (1)
- ○ Hoog (2)
- ○ Iets hoger dan gemiddeld (3)
- ○ Gemiddeld (4)
- ○ Iets lager dan gemiddeld (5)
- ○ Laag (6)
- ○ Erg laag (7)
- ○ Weet niet/geen mening

Page Break

Display This Question:

If Had de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's? = Energie en CO2

*

Hoe zijn de ambities op het gebied van energie vertaald in de contractvoorbereiding en aanbesteding?

- ☐ Contractueel door proceseisen (1)
- ☐ Contractueel door systeemeisen (2)
- ☐ Gunningscriteria (3)
- ☐ Selectiecriteria (4)
- ☐ Geschiktheidseisen (5)
- ☐ Stelpost (6)
- ☐ Overig: _____

Display This Question:

If Had de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's? = Materialen

*

Hoe zijn de ambities op het gebied van materialen vertaald in de contractvoorbereiding en aanbesteding?

- ☐ Contractueel door proceseisen (1)
- ☐ Contractueel door systeemeisen (2)
- ☐ Gunningscriteria (3)
- ☐ Selectiecriteria (4)
- ☐ Geschiktheidseisen (5)
- ☐ Stelpost (6)
- ☐ Overig: _____

Display This Question:

If Had de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's? = Water

Hoe zijn de ambities op het gebied van water vertaald in de contractvoorbereiding en aanbesteding?

- ☐ Contractueel door proceseisen (1)
- ☐ Contractueel door systeemeisen (2)
- ☐ Gunningscriteria (3)
- ☐ Selectiecriteria (4)
- ☐ Geschiktheidseisen (5)
- ☐ Stelpost (6)
- ☐ Overig: _____

Display This Question:

If Had de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's? = Bodem

Hoe zijn de ambities op het gebied van bodem vertaald in de contractvoorbereiding en aanbesteding?

- ☐ Contractueel door proceseisen (1)
- ☐ Contractueel door systeemeisen (2)
- ☐ Gunningscriteria (3)
- ☐ Selectiecriteria (4)
- ☐ Geschiktheidseisen (5)
- ☐ Stelpost (6)
- ☐ Overig: _____

Display This Question:

If Had de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's? = Ecologie

Hoe zijn de ambities op het gebied van ecologie vertaald in de contractvoorbereiding en aanbesteding?

- ☐ Contractueel door proceseisen (1)
- ☐ Contractueel door systeemeisen (2)
- ☐ Gunningscriteria (3)
- ☐ Selectiecriteria (4)
- ☐ Geschiktheidseisen (5)
- ☐ Stelpost (6)
- ☐ Overig: _____

Display This Question:

If Had de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's? = Ruimtegebruik

Hoe zijn de ambities op het gebied van ruimteverbruik vertaald in de contractvoorbereiding en aanbesteding?

- ☐ Contractueel door proceseisen (1)
- ☐ Contractueel door systeemeisen (2)
- ☐ Gunningscriteria (3)
- ☐ Selectiecriteria (4)
- ☐ Geschiktheidseisen (5)
- ☐ Stelpost (6)
- ☐ Overig: _____

Display This Question:

If Had de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's? = Ruimtelijke kwaliteit

*

Hoe zijn de ambities op het gebied van ruimtelijke kwaliteit vertaald in de contractvoorbereiding en aanbesteding?

- ☐ Contractueel door proceseisen (1)
- ☐ Contractueel door systeemeisen (2)
- ☐ Gunningscriteria (3)
- ☐ Selectiecriteria (4)
- ☐ Geschiktheidseisen (5)
- ☐ Stelpost (6)
- ☐ Overig: _____

Display This Question:

If Had de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's? = Welzijn

*

Hoe zijn de ambities op het gebied van welzijn vertaald in de contractvoorbereiding en aanbesteding?

- ☐ Contractueel door proceseisen (1)
- ☐ Contractueel door systeemeisen (2)
- ☐ Gunningscriteria (3)
- ☐ Selectiecriteria (4)
- ☐ Geschiktheidseisen (5)
- ☐ Stelpost (6)
- ☐ Overig: _____

Display This Question:

If Had de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's? = Sociale relevantie

Hoe zijn de ambities op het gebied van sociale relevantie vertaald in de contractvoorbereiding en aanbesteding?

- ☐ Contractueel door proceseisen (1)
- ☐ Contractueel door systeemeisen (2)
- ☐ Gunningscriteria (3)
- ☐ Selectiecriteria (4)
- ☐ Geschiktheidseisen (5)
- ☐ Stelpost (6)
- ☐ Overig: _____

Display This Question:

If Had de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's? = Bereikbaarheid

Hoe zijn de ambities op het gebied van bereikbaarheid vertaald in de contractvoorbereiding en aanbesteding?

- ☐ Contractueel door proceseisen (1)
- ☐ Contractueel door systeemeisen (2)
- ☐ Gunningscriteria (3)
- ☐ Selectiecriteria (4)
- ☐ Geschiktheidseisen (5)
- ☐ Stelpost (6)
- ☐ Overig: _____

Display This Question:

If Had de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's? = Investeringen

Hoe zijn de ambities op het gebied van investeringen vertaald in de contractvoorbereiding en aanbesteding?

- ☐ Contractueel door proceseisen (1)
- ☐ Contractueel door systeemeisen (2)
- ☐ Gunningscriteria (3)
- ☐ Selectiecriteria (4)
- ☐ Geschiktheidseisen (5)
- ☐ Stelpost (6)
- ☐ Overig: _____

Display This Question:

If Had de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's? = Vestigingsklimaat

Hoe zijn de ambities op het gebied van vestigingsklimaat vertaald in de contractvoorbereiding en aanbesteding?

- ☐ Contractueel door proceseisen (1)
- ☐ Contractueel door systeemeisen (2)
- ☐ Gunningscriteria (3)
- ☐ Selectiecriteria (4)
- ☐ Geschiktheidseisen (5)
- ☐ Stelpost (6)
- ☐ Overig: _____

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If Had de opdrachtgever duurzame ambities die pasten binnen één of meer van de volgende thema's? = Anders, namelijk:

Hoe zijn de andere ambities vertaald in de contractvoorbereiding en aanbesteding?

- ☐ Contractueel door proceseisen (1)
- ☐ Contractueel door systeemeisen (2)
- ☐ Gunningscriteria (3)
- ☐ Selectiecriteria (4)
- ☐ Geschiktheidseisen (5)
- ☐ Stelpost (6)
- ☐ Overig: _____

Page Break

Kun je je antwoord op de vorige vraag (Hoe zijn de ambities vertaald in de contractvoorbereiding en aanbesteding?) toelichten voor de door jou aangekruiste antwoorden?
(bijvoorbeeld: De energieambities van de opdrachtgever zijn in de gunningscriteria vertaald door middel van de CO2 prestatieladder die 15% mee woog.)

Display This Question:

If Hoe zijn de ambities op het gebied van energie vertaald in de contractvoorbereiding en aanbesteding? = Contractueel door proceseisen

Or Hoe zijn de ambities op het gebied van materialen vertaald in de contractvoorbereiding en aanbest... = Contractueel door proceseisen

Or Hoe zijn de ambities op het gebied van water vertaald in de contractvoorbereiding en aanbesteding? = Contractueel door proceseisen

Or Hoe zijn de ambities op het gebied van bodem vertaald in de contractvoorbereiding en aanbesteding? = Contractueel door proceseisen

Or Hoe zijn de ambities op het gebied van ecologie vertaald in de contractvoorbereiding en aanbested... = Contractueel door proceseisen

Or Hoe zijn de ambities op het gebied van ruimteverbruik vertaald in de contractvoorbereiding en aan... = Contractueel door proceseisen

Or Hoe zijn de ambities op het gebied van ruimtelijke kwaliteit vertaald in de contractvoorbereiding... = Contractueel door proceseisen

Or Hoe zijn de ambities op het gebied van welzijn vertaald in de contractvoorbereiding en aanbesteding? = Contractueel door proceseisen

Or Hoe zijn de ambities op het gebied van sociale relevantie vertaald in de contractvoorbereiding en... = Contractueel door proceseisen

Or Hoe zijn de ambities op het gebied van bereikbaarheid vertaald in de contractvoorbereiding en aan... = Contractueel door proceseisen

Or Hoe zijn de ambities op het gebied van investeringen vertaald in de contractvoorbereiding en aanb... = Contractueel door proceseisen

Or Hoe zijn de ambities op het gebied van vestigingsklimaat vertaald in de contractvoorbereiding en... = Contractueel door proceseisen

Or Hoe zijn de andere ambities vertaald in de contractvoorbereiding en aanbesteding? = Contractueel door proceseisen

Contractueel door proceseisen

_____

Display This Question:

If Hoe zijn de ambities op het gebied van energie vertaald in de contractvoorbereiding en aanbesteding? = Contractueel door systeemeisen

Or Hoe zijn de ambities op het gebied van materialen vertaald in de contractvoorbereiding en aanbest... = Contractueel door systeemeisen

Or Hoe zijn de ambities op het gebied van water vertaald in de contractvoorbereiding en aanbesteding? = Contractueel door systeemeisen

Or Hoe zijn de ambities op het gebied van bodem vertaald in de contractvoorbereiding en aanbesteding? = Contractueel door systeemeisen

Or Hoe zijn de ambities op het gebied van ecologie vertaald in de contractvoorbereiding en aanbested... = Contractueel door systeemeisen

Or Hoe zijn de ambities op het gebied van ruimteverbruik vertaald in de contractvoorbereiding en aan... = Contractueel door systeemeisen

Or Hoe zijn de ambities op het gebied van ruimtelijke kwaliteit vertaald in de contractvoorbereiding... = Contractueel door systeemeisen

Or Hoe zijn de ambities op het gebied van welzijn vertaald in de contractvoorbereiding en aanbesteding? = Contractueel door systeemeisen

Or Hoe zijn de ambities op het gebied van sociale relevantie vertaald in de contractvoorbereiding en... = Contractueel door systeemeisen

Or Hoe zijn de ambities op het gebied van bereikbaarheid vertaald in de contractvoorbereiding en aan... = Contractueel door systeemeisen

Or Hoe zijn de ambities op het gebied van investeringen vertaald in de contractvoorbereiding en aanb... = Contractueel door systeemeisen

Or Hoe zijn de ambities op het gebied van vestigingsklimaat vertaald in de contractvoorbereiding en... = Contractueel door systeemeisen

Or Hoe zijn de andere ambities vertaald in de contractvoorbereiding en aanbesteding? = Contractueel door systeemeisen

Contractueel door systeemeisen

_____

Display This Question:

If Hoe zijn de ambities op het gebied van energie vertaald in de contractvoorbereiding en aanbesteding? = Gunningscriteria

Or Hoe zijn de ambities op het gebied van materialen vertaald in de contractvoorbereiding en aanbest... = Gunningscriteria

Or Hoe zijn de ambities op het gebied van water vertaald in de contractvoorbereiding en aanbesteding? = Gunningscriteria

Or Hoe zijn de ambities op het gebied van bodem vertaald in de contractvoorbereiding en aanbesteding? = Gunningscriteria

Or Hoe zijn de ambities op het gebied van ecologie vertaald in de contractvoorbereiding en aanbested... = Gunningscriteria

Or Hoe zijn de ambities op het gebied van ruimteverbruik vertaald in de contractvoorbereiding en aan... = Gunningscriteria

Or Hoe zijn de ambities op het gebied van ruimtelijke kwaliteit vertaald in de contractvoorbereiding... = Gunningscriteria

Or Hoe zijn de ambities op het gebied van welzijn vertaald in de contractvoorbereiding en aanbesteding? = Gunningscriteria

Or Hoe zijn de ambities op het gebied van sociale relevantie vertaald in de contractvoorbereiding en... = Gunningscriteria

Or Hoe zijn de ambities op het gebied van bereikbaarheid vertaald in de contractvoorbereiding en aan... = Gunningscriteria

Or Hoe zijn de ambities op het gebied van investeringen vertaald in de contractvoorbereiding en aanb... = Gunningscriteria

Or Hoe zijn de ambities op het gebied van vestigingsklimaat vertaald in de contractvoorbereiding en... = Gunningscriteria

Or Hoe zijn de andere ambities vertaald in de contractvoorbereiding en aanbesteding? = Gunningscriteria

Gunningscriteria (denk hierbij aan welk duurzaam gunningscriterium is gebruikt, hoe zwaar het meetelde, etc.)

_____

Display This Question:

If Hoe zijn de ambities op het gebied van energie vertaald in de contractvoorbereiding en aanbesteding? = Selectiecriteria

Or Hoe zijn de ambities op het gebied van materialen vertaald in de contractvoorbereiding en aanbest... = Selectiecriteria

Or Hoe zijn de ambities op het gebied van water vertaald in de contractvoorbereiding en aanbesteding? = Selectiecriteria

Or Hoe zijn de ambities op het gebied van bodem vertaald in de contractvoorbereiding en aanbesteding? = Selectiecriteria

Or Hoe zijn de ambities op het gebied van ecologie vertaald in de contractvoorbereiding en aanbested... = Selectiecriteria

Or Hoe zijn de ambities op het gebied van ruimteverbruik vertaald in de contractvoorbereiding en aan... = Selectiecriteria

Or Hoe zijn de ambities op het gebied van ruimtelijke kwaliteit vertaald in de contractvoorbereiding... = Selectiecriteria

Or Hoe zijn de ambities op het gebied van welzijn vertaald in de contractvoorbereiding en aanbesteding? = Selectiecriteria

Or Hoe zijn de ambities op het gebied van sociale relevantie vertaald in de contractvoorbereiding en... = Selectiecriteria

Or Hoe zijn de ambities op het gebied van bereikbaarheid vertaald in de contractvoorbereiding en aan... = Selectiecriteria

Or Hoe zijn de ambities op het gebied van investeringen vertaald in de contractvoorbereiding en aanb... = Selectiecriteria

Or Hoe zijn de ambities op het gebied van vestigingsklimaat vertaald in de contractvoorbereiding en... = Selectiecriteria

Or Hoe zijn de andere ambities vertaald in de contractvoorbereiding en aanbesteding? = Selectiecriteria

Selectiecriteria (denk hierbij aan welk duurzaam selectiecriterium is gebruikt, hoe zwaar het meetelde, etc.)

_____

Display This Question:

If Hoe zijn de ambities op het gebied van energie vertaald in de contractvoorbereiding en aanbesteding? = Geschiktheidseisen

Or Hoe zijn de ambities op het gebied van materialen vertaald in de contractvoorbereiding en aanbest... = Geschiktheidseisen

Or Hoe zijn de ambities op het gebied van water vertaald in de contractvoorbereiding en aanbesteding? = Geschiktheidseisen

Or Hoe zijn de ambities op het gebied van bodem vertaald in de contractvoorbereiding en aanbesteding? = Geschiktheidseisen

Or Hoe zijn de ambities op het gebied van ecologie vertaald in de contractvoorbereiding en aanbested... = Geschiktheidseisen

Or Hoe zijn de ambities op het gebied van ruimteverbruik vertaald in de contractvoorbereiding en aan... = Geschiktheidseisen

Or Hoe zijn de ambities op het gebied van ruimtelijke kwaliteit vertaald in de contractvoorbereiding... = Geschiktheidseisen

Or Hoe zijn de ambities op het gebied van welzijn vertaald in de contractvoorbereiding en aanbesteding? = Geschiktheidseisen

Or Hoe zijn de ambities op het gebied van sociale relevantie vertaald in de contractvoorbereiding en... = Geschiktheidseisen

Or Hoe zijn de ambities op het gebied van bereikbaarheid vertaald in de contractvoorbereiding en aan... = Geschiktheidseisen

Or Hoe zijn de ambities op het gebied van investeringen vertaald in de contractvoorbereiding en aanb... = Geschiktheidseisen

Or Hoe zijn de ambities op het gebied van vestigingsklimaat vertaald in de contractvoorbereiding en... = Geschiktheidseisen

Or Hoe zijn de andere ambities vertaald in de contractvoorbereiding en aanbesteding? = Geschiktheidseisen

Geschiktheidseisen

_____

Display This Question:

If Hoe zijn de ambities op het gebied van energie vertaald in de contractvoorbereiding en aanbesteding? = Stelpost

Or Hoe zijn de ambities op het gebied van materialen vertaald in de contractvoorbereiding en aanbest... = Stelpost

Or Hoe zijn de ambities op het gebied van water vertaald in de contractvoorbereiding en aanbesteding? = Stelpost

Or Hoe zijn de ambities op het gebied van bodem vertaald in de contractvoorbereiding en aanbesteding? = Stelpost

Or Hoe zijn de ambities op het gebied van ecologie vertaald in de contractvoorbereiding en aanbested... = Stelpost

Or Hoe zijn de ambities op het gebied van ruimteverbruik vertaald in de contractvoorbereiding en aan... = Stelpost

Or Hoe zijn de ambities op het gebied van ruimtelijke kwaliteit vertaald in de contractvoorbereiding... = Stelpost

Or Hoe zijn de ambities op het gebied van welzijn vertaald in de contractvoorbereiding en aanbesteding? = Stelpost

Or Hoe zijn de ambities op het gebied van sociale relevantie vertaald in de contractvoorbereiding en... = Stelpost

Or Hoe zijn de ambities op het gebied van bereikbaarheid vertaald in de contractvoorbereiding en aan... = Stelpost

Or Hoe zijn de ambities op het gebied van investeringen vertaald in de contractvoorbereiding en aanb... = Stelpost

Or Hoe zijn de ambities op het gebied van vestigingsklimaat vertaald in de contractvoorbereiding en... = Stelpost

Or Hoe zijn de andere ambities vertaald in de contractvoorbereiding en aanbesteding? = Stelpost

Stelpost

_____

Page Break

Zijn de ambities bij de vertaalslag in de contractvoorbereiding bijgesteld?

- Ja, de ambities zijn versterkt (3)
- Ja, de ambities zijn verzwakt (1)
- Nee, de ambities zijn gelijk gebleven (2)

Zijn de ambities bij de vertaalslag in de aanbesteding bijgesteld?

- Ja, de ambities zijn versterkt (3)
- Ja, de ambities zijn verzwakt (1)
- Nee, de ambities zijn gelijk gebleven (2)

In hoeverre zijn de ambities vertaald naar meetbare afspraken in de contractering?

- De ambities zijn vertaald naar kwantitatief meetbare afspraken in de contractering (1)
- De ambities zijn vertaald naar kwalitatieve afspraken in de contractering (2)
- De ambities zijn tot op zekere hoogte vertaald naar afspraken in de contractering (3)
- De ambities zijn niet vertaald naar afspraken in de contractering (4)

De vertaalslag van ambities naar afspraken werd ervaren als:

- ○ Erg succesvol (1)
- ○ Succesvol (2)
- ○ Een beetje succesvol (3)
- ○ Neutraal (4)
- ○ Een beetje onsuccesvol (5)
- ○ Onsuccesvol (6)
- ○ Erg onsuccesvol (7)
- ○ Weet niet/geen mening (8)

Display This Question:

If De vertaalslag van ambities naar afspraken werd ervaren als: = Erg succesvol

Je gaf aan dat de vertaalslag van de ambities als erg succesvol werd ervaren. Welke factoren waren hiervoor het belangrijkst? Kun je dit toelichten met een voorbeeld?

_____

Display This Question:

If De vertaalslag van ambities naar afspraken werd ervaren als: = Succesvol

Je gaf aan dat de vertaalslag van de ambities als succesvol werd ervaren. Welke factoren waren hiervoor het belangrijkst? Kun je dit toelichten met een voorbeeld?

_____

Display This Question:

If De vertaalslag van ambities naar afspraken werd ervaren als: = Een beetje succesvol

Je gaf aan dat de vertaalslag van de ambities als een beetje succesvol werd ervaren. Welke factoren waren hiervoor het belangrijkst? Kun je dit toelichten met een voorbeeld?

_____

Display This Question:

If De vertaalslag van ambities naar afspraken werd ervaren als: = Neutraal

Je gaf aan dat de vertaalslag van de ambities als neutraal werd ervaren. Welke factoren waren hiervoor het belangrijkst? Kun je dit toelichten met een voorbeeld?

_____

Display This Question:

If De vertaalslag van ambities naar afspraken werd ervaren als: = Een beetje onsuccesvol

Je gaf aan dat de vertaalslag van de ambities als een beetje onsuccesvol werd ervaren. Welke factoren waren hiervoor het belangrijkst? Kun je dit toelichten met een voorbeeld?

_____

Display This Question:

If De vertaalslag van ambities naar afspraken werd ervaren als: = Onsuccesvol

Je gaf aan dat de vertaalslag van de ambities als onsuccesvol werd ervaren. Welke factoren waren hiervoor het belangrijkst? Kun je dit toelichten met een voorbeeld?

_____

Display This Question:

If De vertaalslag van ambities naar afspraken werd ervaren als: = Erg onsuccesvol

Je gaf aan dat de vertaalslag van de ambities als erg onsuccesvol werd ervaren. Welke factoren waren hiervoor het belangrijkst? Kun je dit toelichten met een voorbeeld?

_____

Page Break

Wat zou er in de contractvoorbereiding en aanbesteding beter kunnen om de ambities van de opdrachtgever te realiseren?

_____

Page Break

Je bent aan het einde van de enquête gekomen. Hartelijk dank voor je deelname.

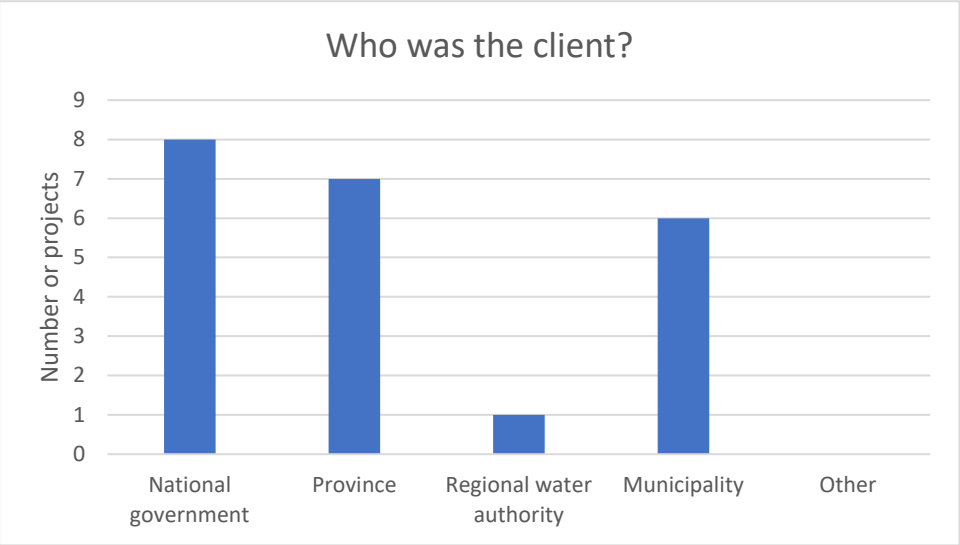
Heb je interesse om het rapport van het afstudeeronderzoek te ontvangen, zodra deze is afgerond?

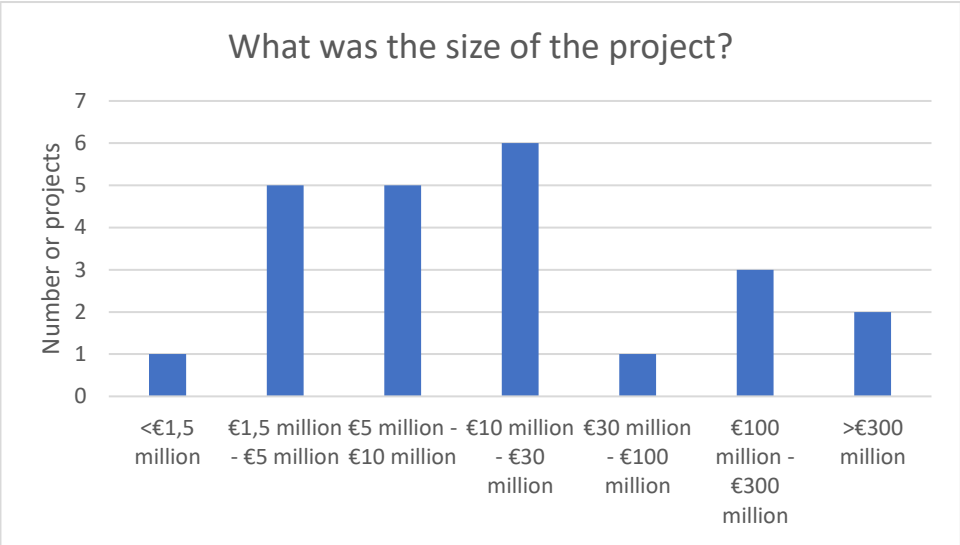
- ○ Ja, deze ontvang ik graag via e-mail: (1)
_____
- ○ Nee (2)

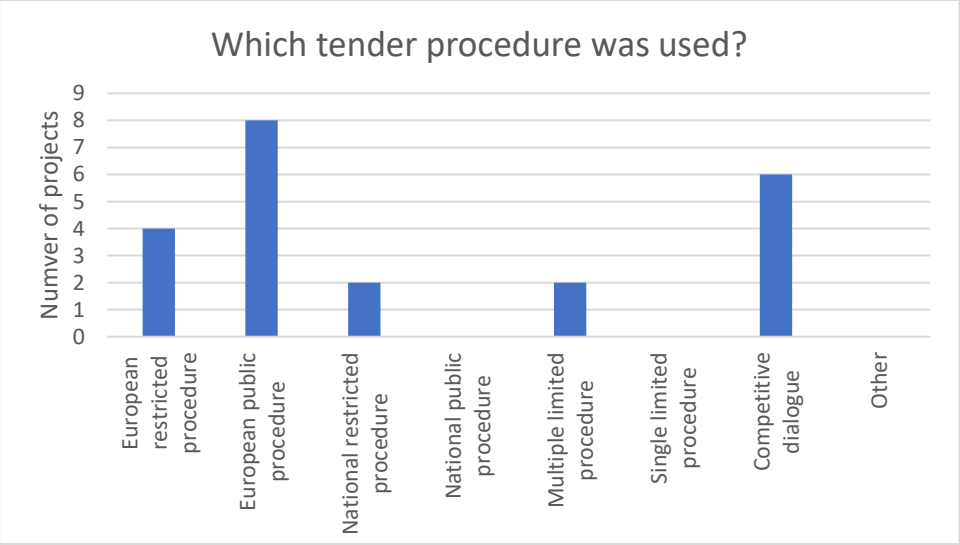
End of Block: Default Question Block

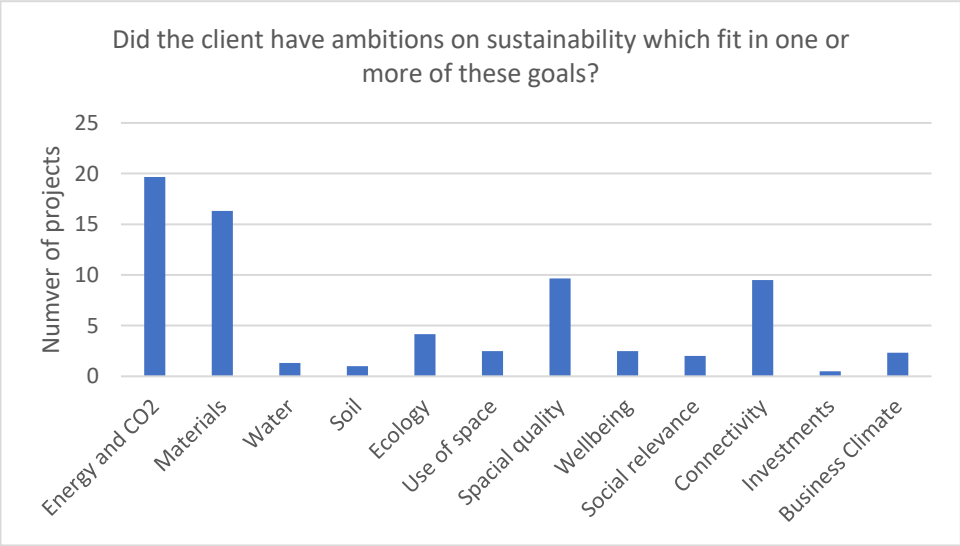
Witteveen + Bos

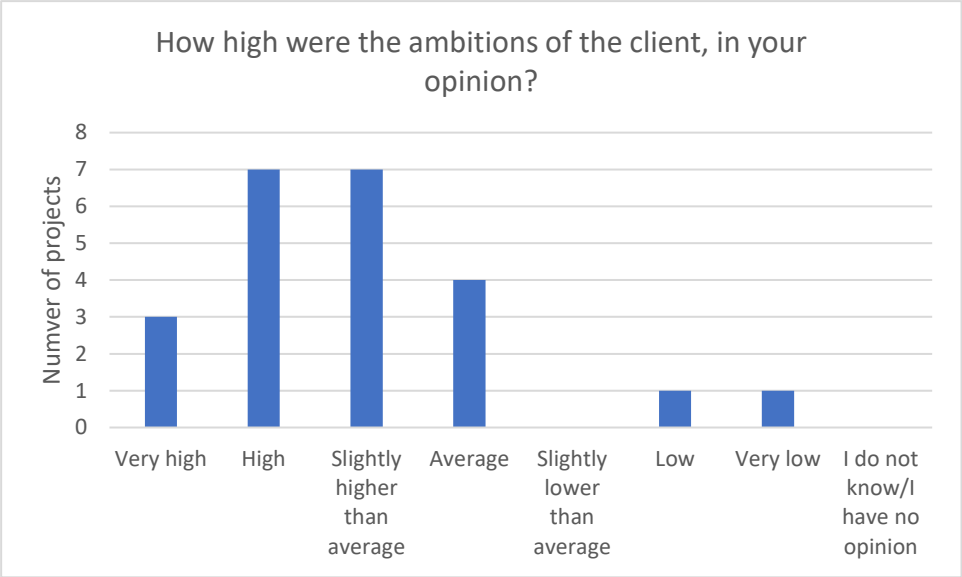
Appendix 2: Results of the survey

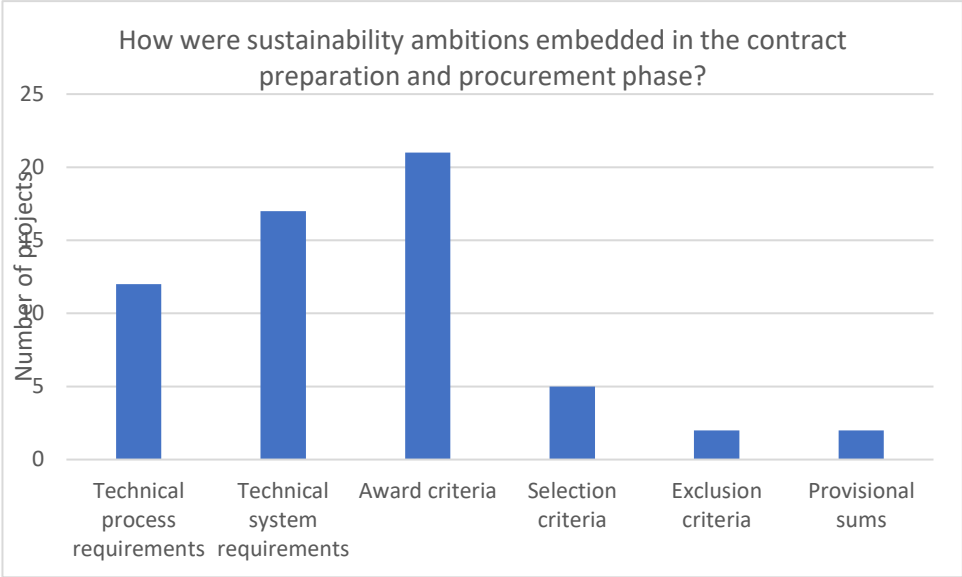


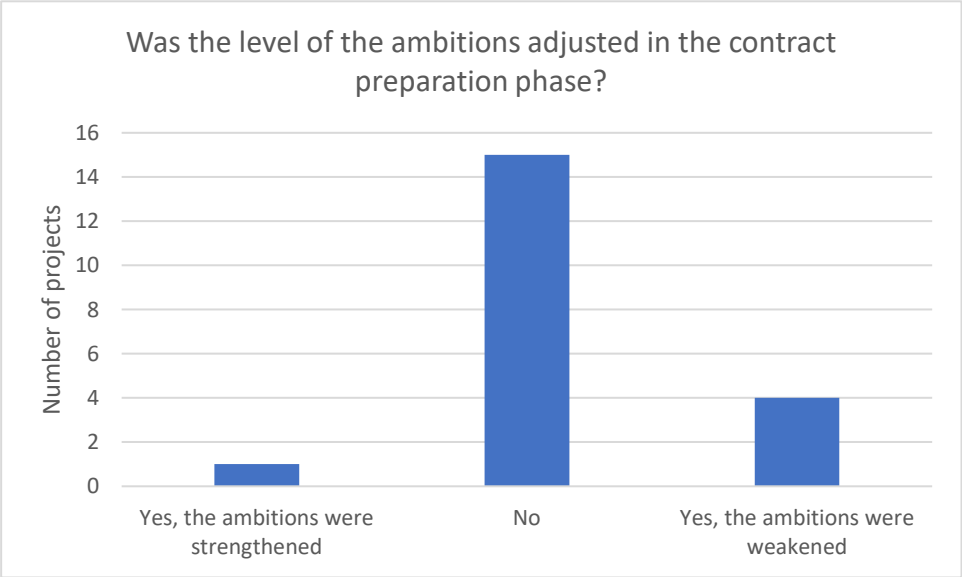


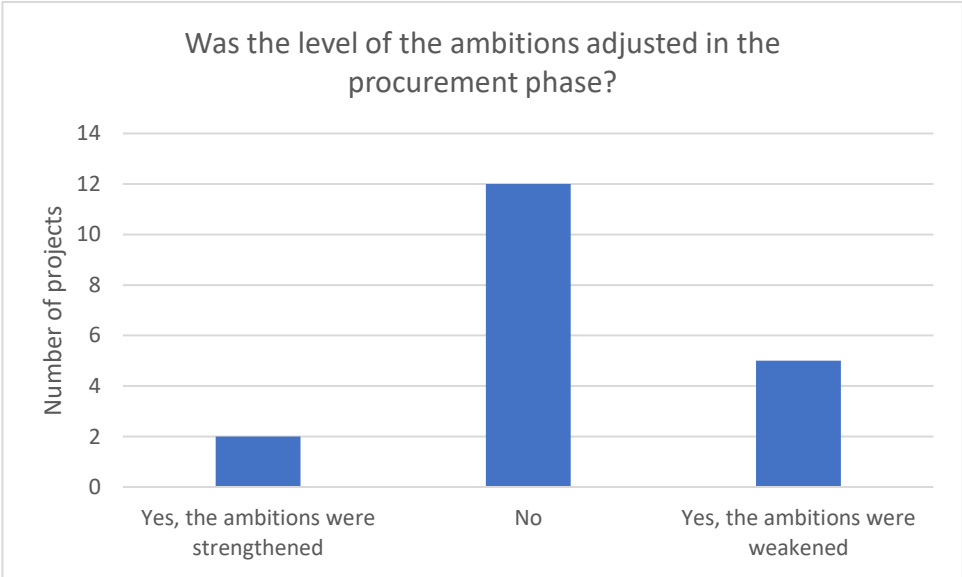


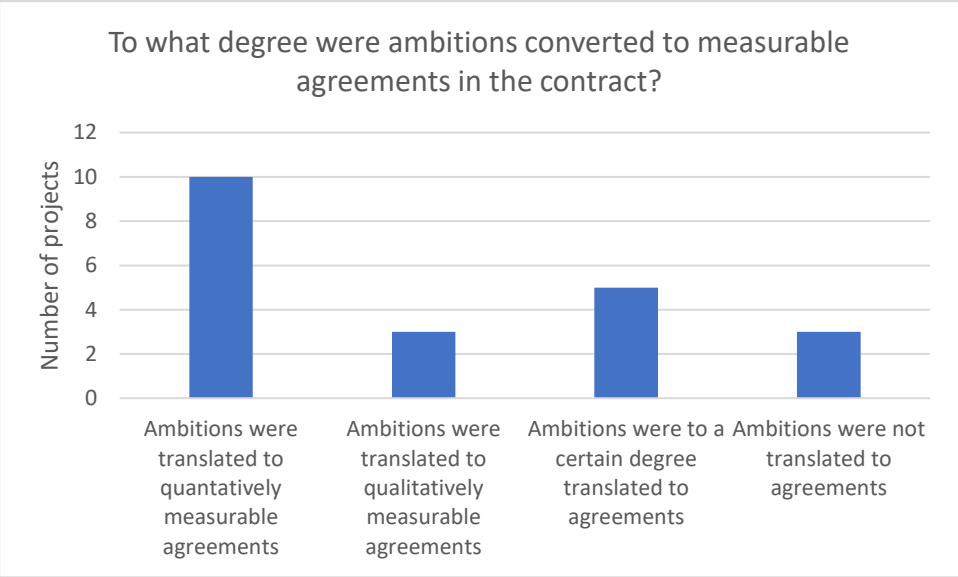


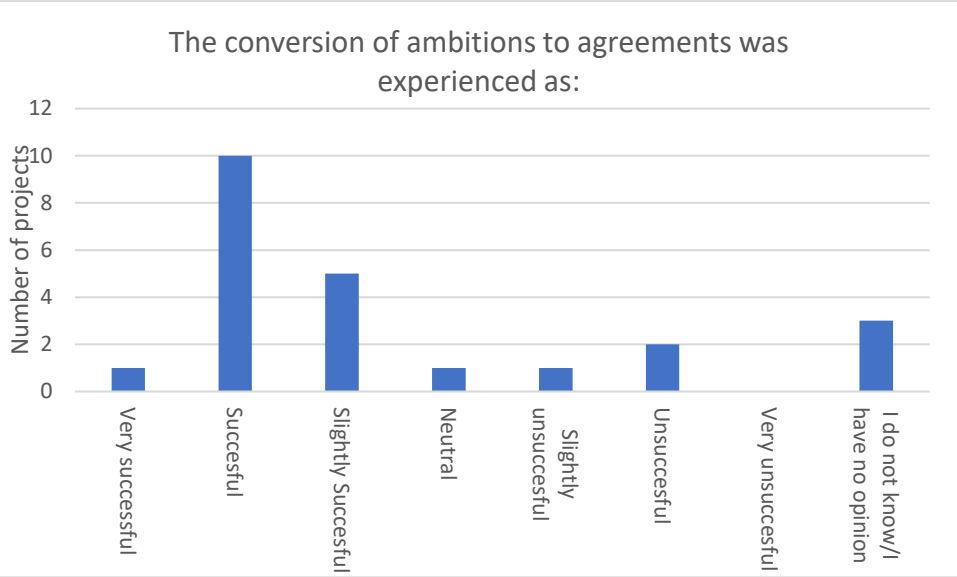

How high were the ambitions of the client, in your opinion?
Numver of projects
0
1
2
3
4
5
6
7
8
Very high
High
Slightly higher than average
Average
Slightly lower than average
Low
Very low
I do not know/I have no opinion


How were sustainability ambitions embedded in the contract preparation and procurement phase?
Number of projects
0
5
10
15
20
25
Technical process requirements
Technical system requirements
Award criteria
Selection criteria
Exclusion criteria
Provisional sums


Was the level of the ambitions adjusted in the contract preparation phase?
Number of projects
0
2
4
6
8
10
12
14
16
Yes, the ambitions were strengthened
No
Yes, the ambitions were weakened


Was the level of the ambitions adjusted in the procurement phase?
Number of projects
0
2
4
6
8
10
12
14
Yes, the ambitions were strengthened
No
Yes, the ambitions were weakened





Answer	# responses
Improve communication between client and bidders	3
Increase priority on sustainability of client	3
More clarity about the ambitions of the client	3
More specific ambitions of the client	3
More structure in the process	3
Make more use of technical specifications	2
Create more room for innovation	1
Do not focus on all ambitions	1
Increase funding for sustainability in project	1
More flexibility in the process	1
Use life cycle costing	1

Appendix 3: Descriptive statistics of survey

All projects	n	Min	Max	Average	StDev
Size of project	22	1	7	3,78	1,67
Height of ambitions	22	1	7	5,09	1,44
Adjusting of ambitions in contract preparation phase	22	0	3	1,61	0,77
Adjusting of ambitions in procurement phase	22	0	3	1,52	0,88
Measurability of ambitions in contract	22	1	4	2,95	1,13
Experiences success of conversion	19	2	7	4,48	2,14

Projects in which process requirements were used	n	Min	Max	Average	StDev
Size of project	12	1	7	4,09	1,83
Height of ambitions	12	4	7	5,73	0,86
Adjusting of ambitions in contract preparation phase	12	0	3	1,73	0,75
Adjusting of ambitions in procurement phase	12	0	2	1,45	0,78
Measurability of ambitions in contract	12	2	4	3,20	0,87
Experiences success of conversion	9	2	6	5,00	2,31

Projects in which system requirements were used	n	Min	Max	Average	StDev
Size of project	17	2	7	3,87	1,59
Height of ambitions	17	4	7	5,60	1,02
Adjusting of ambitions in contract preparation phase	17	0	3	1,60	0,80
Adjusting of ambitions in procurement phase	17	0	2	1,33	0,79
Measurability of ambitions in contract	17	1	4	3,07	1,10
Experiences success of conversion	16	2	7	5,14	2,31

Projects in which award criteria were used	n	Min	Max	Average	StDev
Size of project	21	1	6	3,42	1,46
Height of ambitions	21	1	7	5,11	1,59
Adjusting of ambitions in contract preparation phase	21	0	2	1,53	0,75
Adjusting of ambitions in procurement phase	21	0	3	1,37	0,87
Measurability of ambitions in contract	21	1	4	2,82	1,15
Experiences success of conversion	20	2	7	5,06	1,76

Projects in which selection criteria were used	n	Min	Max	Average	StDev
Size of project	5	2	4	3,00	0,71
Height of ambitions	5	5	7	6,50	0,87
Adjusting of ambitions in contract preparation phase	5	0	2	1,50	0,87
Adjusting of ambitions in procurement phase	5	0	2	1,25	0,83
Measurability of ambitions in contract	5	1	3	2,00	0,82
Experiences success of conversion	4	3	6	5,00	2,49

Projects in which exclusion criteria were used	n	Min	Max	Average	StDev
Size of project	2	3	6	4,50	1,50
Height of ambitions	2	6	7	6,50	0,50
Adjusting of ambitions in contract preparation phase	2	1	2	1,50	0,50
Adjusting of ambitions in procurement phase	2	1	1	1,00	0,00
Measurability of ambitions in contract	2	2	3	2,50	0,50
Experiences success of conversion	2	2	6	4,00	2,00

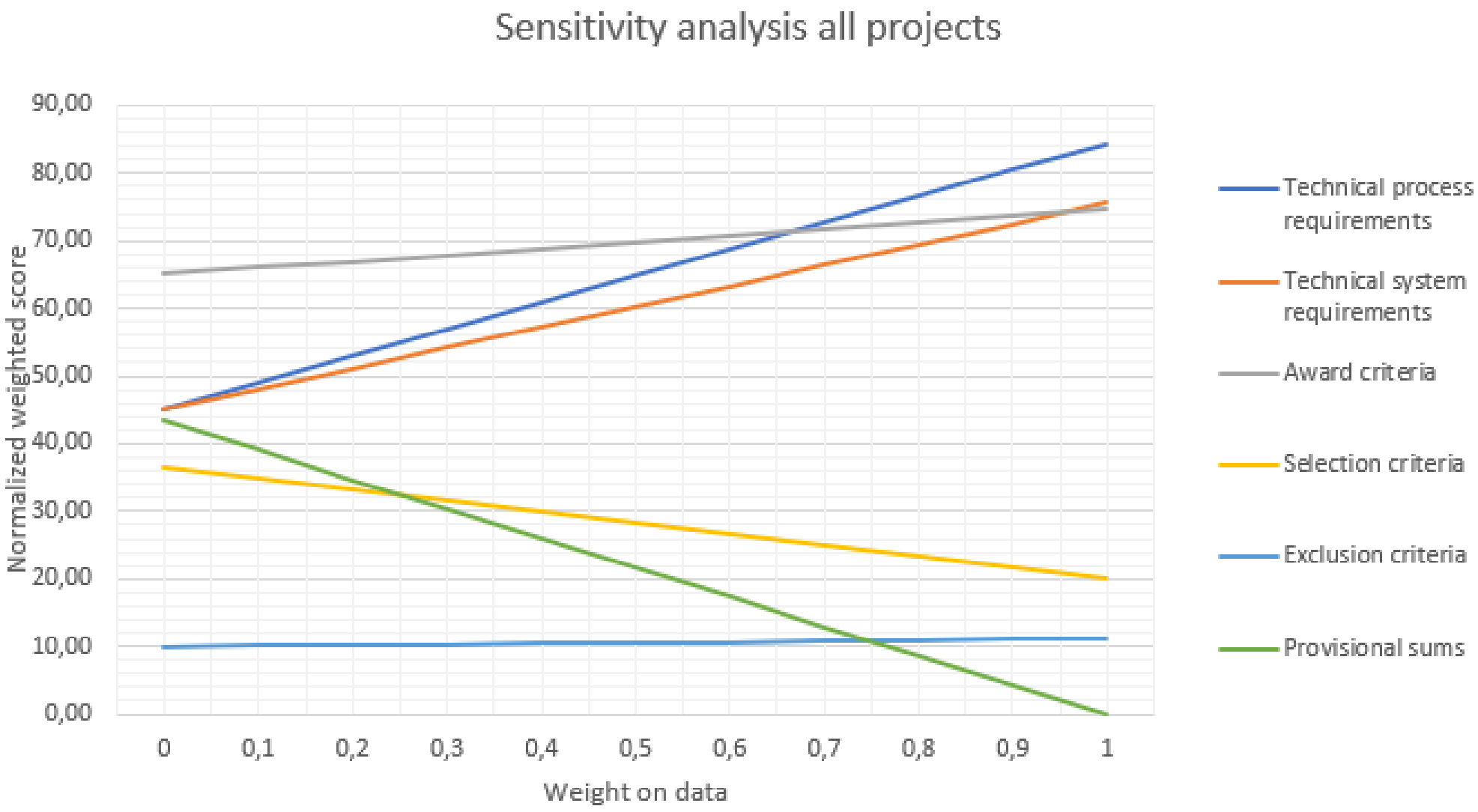
Projects in which provisional sums were used	n	Min	Max	Average	StDev
Size of project	2	3	3	3,00	0,00
Height of ambitions	2	6	7	6,50	0,50
Adjusting of ambitions in contract preparation phase	2	1	2	1,50	0,50
Adjusting of ambitions in procurement phase	2	1	1	1,00	0,00
Measurability of ambitions in contract	2	1	3	2,00	1,00
Experiences success of conversion	2	6	7	6,50	0,50

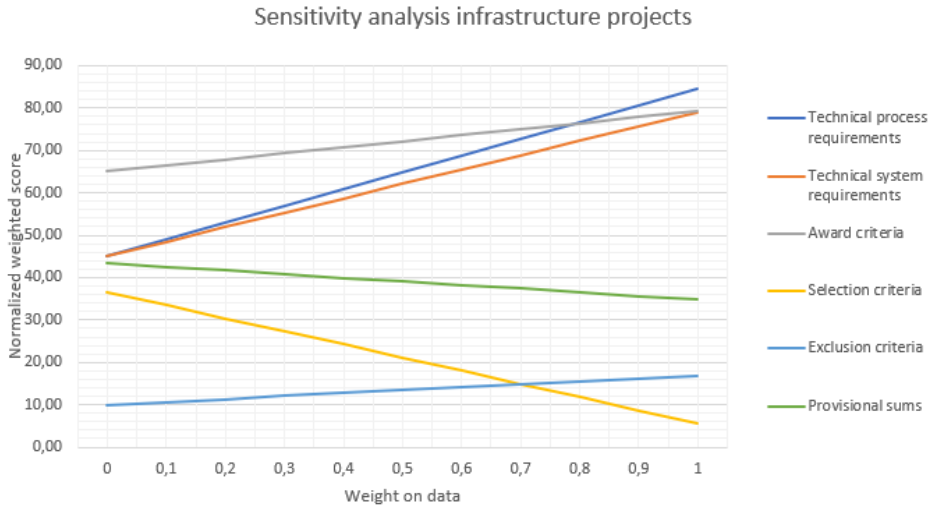
Appendix 4: Rubrics for SMART

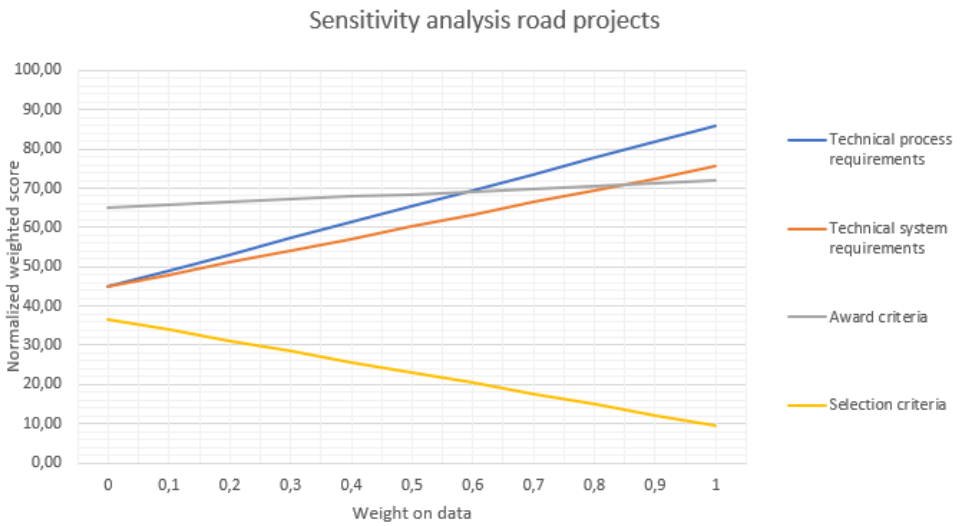
Criterium\# points	1	2	3	4	5
Encouraging innovation	It is not possible for bidders to come up with an innovative solution	Bidders that come up with a solution which is not common practice in the market are awarded less points than bidders that come up with	Bidders can come up with innovative solutions, but are not awarded extra points for it	Bidders can come up with innovative solutions and are awarded extra points for it	Bidders are only considered by the client if they come up with an innovative solution
Certainty that ambitions will be achieved	Bidders that cannot meet the minimum ambitions of the client have an equal or greater chance to win a work than bidders who can meet the minimum ambitions.	Bidders are awarded slightly less points by the client if they can show that they can achieve the minimum ambitions, but is it still possible for a bidder who cannot meet the minimum to win the work	Bidders are awarded less points by the client it they can show that they can achieve the minimum ambitions, making it hard for a bidder who cannot meet the minimum to win the work	Bidders are awarded far less points by the client if they can show that they can achieve the minimum ambitions, making it practically impossible for a bidder who cannot meet the minimum to win the work	Bidders are only considered by the client if they can show that they can achieve the minimum ambitions
Possibility for above average bidders to distinguish themselves	Above average bidders have a lower chance to win the work than average or below average bidders	Above average bidders have the same chance to win the work as average or below average bidders	Above average bidders have a slightly larger chance to win the work as average or below average bidders	Above average bidders have a significantly larger chance to win the work as average or below average bidders	Above average bidders are (practically) guaranteed to win the work over average or below average bidders

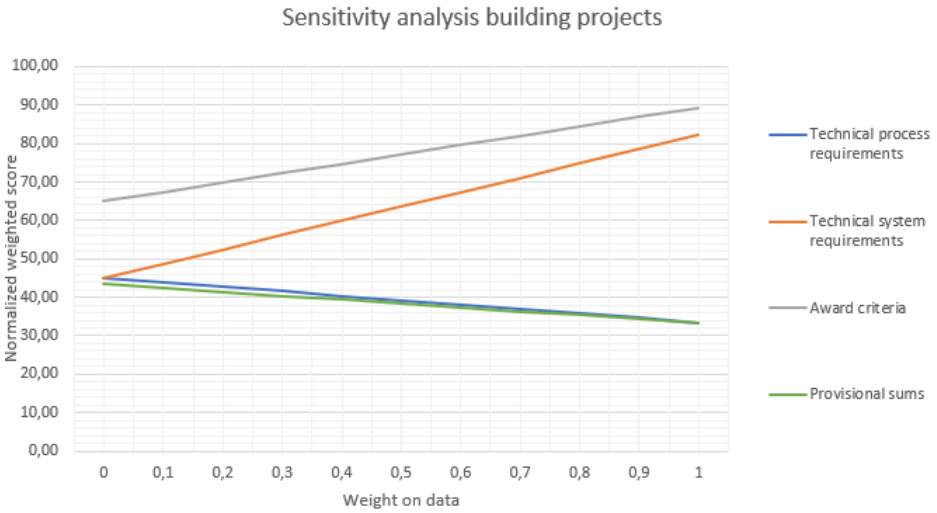
Criterium	Number of points			
Frequency of use	Count the number of projects in which the method was used, 1 point is awarded per use			
Adjusting ambitions in the contract preparation phase	*1 point*: The height of ambitions decreased during the contract preparation phase	*2 points*: Ambitions did not change during the contract preparation phase	*3 points:* The height of ambitions increased during the contract preparation phase	
Adjusting ambitions in the procurement phase	*1 point:* The height of ambitions decreased during the procurement phase	*2 points:* Ambitions did not change during the procurement phase	*3 points:* The height of ambitions increased during the procurement phase	
Measurability of agreements	*1 point:* Ambitions were not converted to agreements in the contract	*2 points:* Ambitions were to a certain extent converted to agreements in the contract	*3 points:* Ambitions were converted to qualitative measurable agreements in the contract	*4 points:* Ambitions were converted to quantitively measurable agreements in the contract

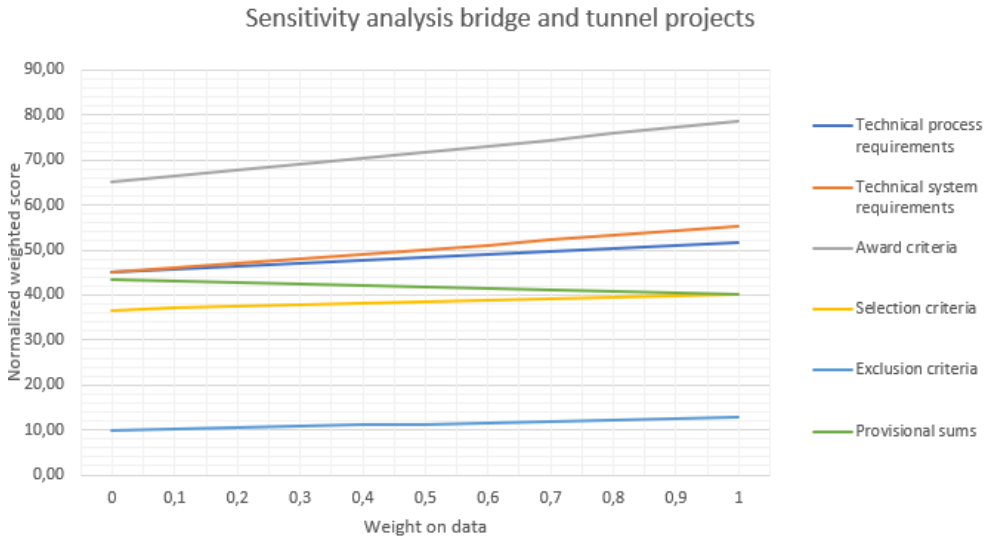
Appendix 5: Sensitivity analysis of SMART




Sensitivity analysis infrastructure projects
Normalized weighted score
90,00
80,00
70,00
60,00
50,00
40,00
30,00
20,00
10,00
0,00
0
0,1
0,2
0,3
0,4
0,5
0,6
0,7
0,8
0,9
1
Weight on data
Technical process requirements
Technical system requirements
Award criteria
Selection criteria
Exclusion criteria
Provisional sums


Sensitivity analysis road projects
Normalized weighted score
100,00
90,00
80,00
70,00
60,00
50,00
40,00
30,00
20,00
10,00
0,00
0
0,1
0,2
0,3
0,4
0,5
0,6
0,7
0,8
0,9
1
Weight on data
Technical process requirements
Technical system requirements
Award criteria
Selection criteria


Sensitivity analysis building projects
Normalized weighted score
100,00
90,00
80,00
70,00
60,00
50,00
40,00
30,00
20,00
10,00
0,00
0
0,1
0,2
0,3
0,4
0,5
0,6
0,7
0,8
0,9
1
Weight on data
Technical process requirements
Technical system requirements
Award criteria
Provisional sums


Sensitivity analysis bridge and tunnel projects
Normalized weighted score
90,00
80,00
70,00
60,00
50,00
40,00
30,00
20,00
10,00
0,00
0
0,1
0,2
0,3
0,4
0,5
0,6
0,7
0,8
0,9
1
Weight on data
Technical process requirements
Technical system requirements
Award criteria
Selection criteria
Exclusion criteria
Provisional sums

Appendix 6: Elaboration on SMART (data from projects)

All projects *n= 23*	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
Frequency of use	12	17	21	5	2	2
Adjusting ambitions in contract preparation phase	1,73	1,60	1,53	1,50	1,50	1,50
Adjusting ambitions in procurement phase	1,45	1,33	1,37	1,25	1,00	1,00
Measurability of agreements	3,20	3,07	2,82	2,00	2,50	2,00
Infrastructure projects *n= 15*	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
Frequency of use	9	11	13	3	2	1
Adjusting ambitions in contract preparation phase	1,78	1,64	1,46	1,33	1,50	2,00
Adjusting ambitions in procurement phase	1,56	1,45	1,46	1,00	1,00	1,00
Measurability of agreements	3,25	3,10	3,00	2,00	2,50	3,00
Building projects *n= 6*	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
Frequency of use	1	4	5	0	0	1
Adjusting ambitions in contract preparation phase	1,00	1,50	1,60	#DIV/0!	#DIV/0!	1,00
Adjusting ambitions in procurement phase	0,00	1,00	1,00	#DIV/0!	#DIV/0!	1,00
Measurability of agreements	4,00	3,00	2,80	#DIV/0!	#DIV/0!	1,00
Road projects *n= 9*	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
Frequency of use	4	7	7	2	0	0
Adjusting ambitions in contract preparation phase	2,25	1,57	1,43	1,00	#DIV/0!	#DIV/0!
Adjusting ambitions in procurement phase	2,00	1,43	1,43	1,00	#DIV/0!	#DIV/0!
Measurability of agreements	3,33	3,17	3,00	1,00	#DIV/0!	#DIV/0!
Bridge and tunnel projects *n= 5*	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
Frequency of use	4	3	5	1	2	1
Adjusting ambitions in contract preparation phase	1,25	1,67	1,40	2,00	1,50	2,00
Adjusting ambitions in procurement phase	1,00	1,33	1,40	1,00	1,00	1,00
Measurability of agreements	3,00	2,67	2,80	3,00	2,50	3,00

All projects *n= 23*	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
Frequency of use	53	79	100	16	0	0
Adjusting ambitions in contract preparation phase	100	44	12	0	0	0
Adjusting ambitions in procurement phase	100	73	81	55	0	0
Measurability of agreements	100	89	69	0	42	0
Infrastructure projects *n= 23*	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
Frequency of use	67	83	100	17	8	0
Adjusting ambitions in contract preparation phase	67	45	19	0	25	100
Adjusting ambitions in procurement phase	100	82	83	0	0	0
Measurability of agreements	100	88	80	0	40	80
Building projects *n= 23*	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
Frequency of use	20	80	100	0	0	20
Adjusting ambitions in contract preparation phase	0	83	100	No data	No data	0
Adjusting ambitions in procurement phase	0	100	100	No data	No data	100
Measurability of agreements	100	67	60	No data	No data	0
Road projects *n= 23*	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
Frequency of use	57	100	100	29	0	0
Adjusting ambitions in contract preparation phase	100	46	34	0	No data	No data
Adjusting ambitions in procurement phase	100	43	43	0	No data	No data
Measurability of agreements	100	93	86	0	No data	No data
Bridge and tunnel projects *n= 23*	Technical process requirements	Technical system requirements	Award criteria	Selection criteria	Exclusion criteria	Provisional sums
Frequency of use	75	50	100	0	25	0
Adjusting ambitions in contract preparation phase	0	56	20	100	33	100
Adjusting ambitions in procurement phase	0	83	100	0	0	0
Measurability of agreements	100	33	60	100	0	100