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Green Public Procurement in the Dutch Construction Sector

A qualitative research on the inclusion of environmental requirements in procurement of construction projects

SWECO

TU Delft

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A qualitative research on the inclusion of environmental requirements in procurement of construction projects

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Preface

In the past seven months I have worked on my master thesis to complete my MSc Construction Management and Engineering at the Technical University at Delft. During these seven months I encountered multiple complications and setbacks. Difficulties in finding the most suitable graduation company, research topic and research method made this investigation a though one. Despite the complications, I really enjoyed investigating the inclusion of environmental requirements in procurement of Dutch construction projects. By analysing all the procurement documents, I learned a lot of different construction projects and the Dutch procurement process. Furthermore, I think, and hope, the outcome of this research can help to improve the inclusion of environmental requirements, resulting in a more sustainable world. I would like to thank all the people who have helped me to finalise this research.

First of all, I would like to thank my graduation committee, without whom I could never have come to the current conclusions. I would like to thank Marian Bosch-Rekveldt for always being ready to help me. Every time I was struggling, I could stop by for some advice or exchange of ideas. I would like to thank Louis Lousberg for his clear and specific comments during the meetings we had. They helped me to structure the problem and get to the heart of the problem. I would like to thank Hans Bakker for chairing the committee and the effort to send his comments every time by post. Last, I would like to thank Remco Hofstede for welcoming me at Sweco, getting me into contact with experts and showing me the insight of the Dutch procurement process.

Secondly, I would like to thank Sweco, and in particular the BIdcenter, for their cooperation. I really enjoyed working at the beautiful office in the Bildt. Thanks for all the advice and fun we had in the past seven months.

Thirdly, I would like to thank the experts which agreed to participate in the interviews. The evaluation of the misalignment and opportunities stated in the interviews were really important for the final conclusion of this thesis.

Last, I would like to thank my family and friends for supporting me and giving me feedback when I struggled with the research.

Enjoy reading!

Willem Limpers
Delft, July 2020

Summary

The construction sector is responsible for a large share of the human impact on the environment, due to the large amount of resources used. One way to reduce the environmental impact, is the inclusion of environmental requirements in the procurement of construction projects, also called Green Public Procurement (GPP). Research on the usage of environmental requirements in the full procurement process of the invitation to bid, the bid and the assessment of the bid is lacking. To increase the knowledge about GPP, this thesis first analysed the current inclusion of environmental requirements in procurement of Dutch construction projects and then evaluated the found usage to come up with a proposal to develop the inclusion of environmental requirements. The following research question has been derived:

"How can the usage of environmental requirements in procurement of Dutch construction projects be developed?"

The invitation to bid, the bid and the assessment of the bid of 70 procurement projects were gathered from Sweco, a large engineering firm operating in the Dutch construction sector. Based on previous research it was found that a content analysis was the most suitable method to analyse the documents and that a procurement database structure had to be made. By means of literature study characteristics were found of the Dutch procurement process and previous content analyses. These characteristics were used to develop the procurement database. The resulting procurement database consists of four main categories: client and project characteristics, environmental requirements in the invitation to bid, environmental requirements in the bid and environmental requirements in the assessment of the bid. The environmental requirements found in the invitation to bid were labeled with one of five main elements, being a textual reference, a selection criterion, a technical specification, an award criterion and a sub-award criterion. Furthermore, the environmental topic of the requirement was labeled, based on environmental topics found in previous research. Only two of the elements, award and sub-award criteria, were included in the bid and the assessment of the bid, since these documents are made based on the award and sub-award criteria requested in the invitation to bid. Also, in the assessment of the bid the received score on the bid was tracked.

A misalignment was found between the environmental inclusion in the invitation to bid and the bid compared to the assessment of the bid. Environmental requirements were included in 86% of the 70 invitations to bid, 74% of the bids and 46% of the assessments of the bid. Only 50% of the invitations to bid, 47% of the bids and 16% of the assessments of the bid contained three environmental requirements or more, being "solid green" projects. The amount of projects containing environmental requirements was also plotted against the years 2016 to 2019. Around 85% of the invitations to bid per year included environmental requirements. For the bids a growth over time was seen from 14% in 2016 to 100% in 2019. For the assessments of the bid also a growth over time was found from 14% in 2016 to 68% in 2019. In each analysis the misalignment was found. Also, the weight given to the environmental (sub-)award criteria compared to the total obtainable score has been analysed. Just nearly 20% of the total score was attributed to the environmental (sub-)award criteria.

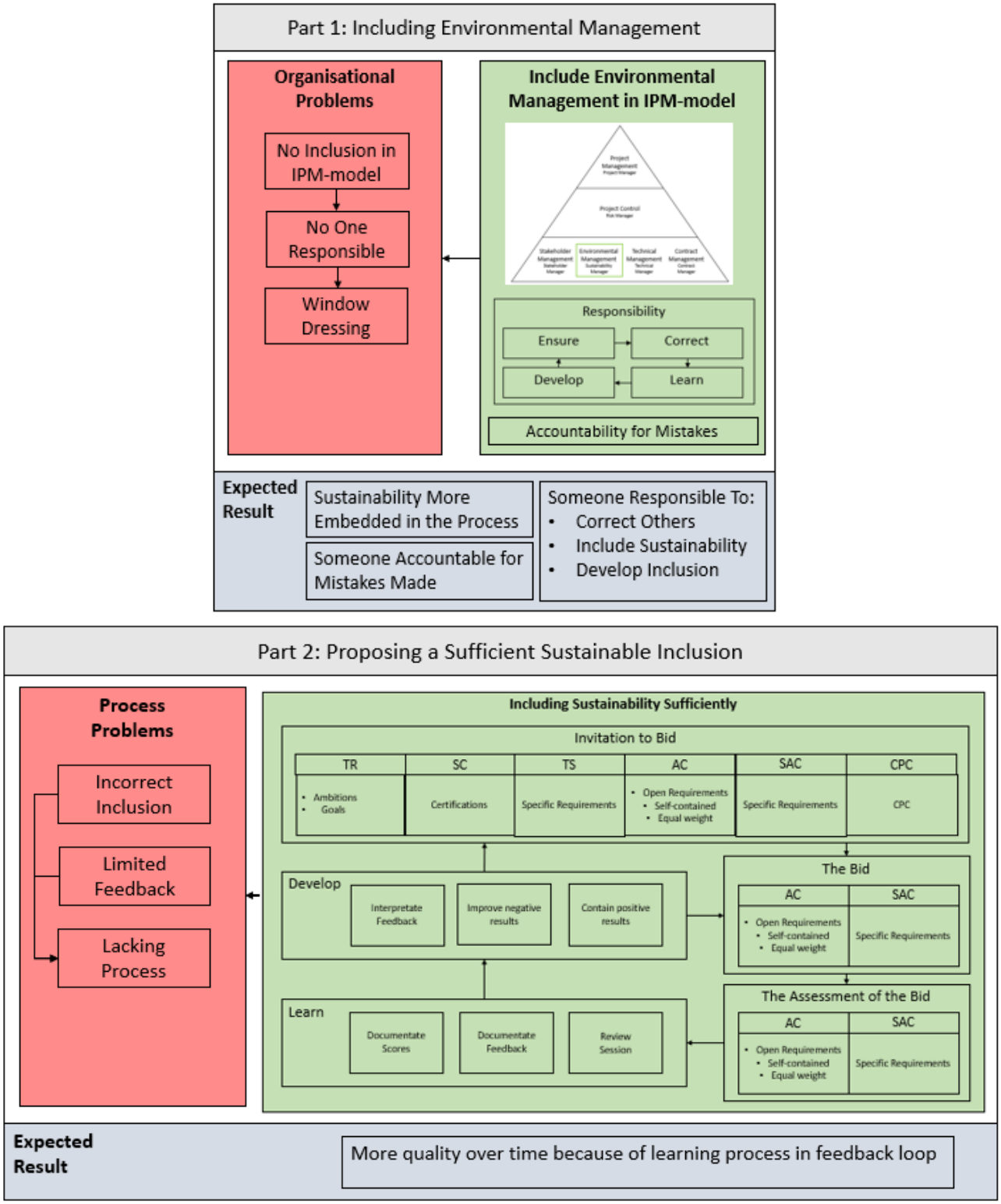
From the analysis three defects possibly causing the misalignment were obtained. First of all, in 36% of the invitations to bid only an environmental textual reference, selection criterion or technical specification was included. Since only the requested (sub-)award criteria are considered in the assessment of the bid, a misalignment of environmental inclusion is caused between the invitation to bid and assessment of the bid.

Secondly, mainly unspecific award criteria are requested in the invitation to bid, such as the inclusion of an environmental action plan, while more detailed environmental requirements are proposed in the bid, such as the inclusion of a sustainability specialist. In the assessment of the bid only a score is given to the unspecific award criteria. Consequently, a misalignment of environmental inclusion is caused between the bid and the assessment of the bid. Thirdly, the assessment of the environmental requirements is done minimally or insufficiently. It was unknown what score could be obtained for 88% of the included environmental sub-award criteria. Moreover, no feedback was given on the received score in 46% of the environmental award criteria included in the assessments. Only the general award criteria were minimally elaborated. Consequently, a misalignment is caused between the requested criteria in the invitation to bid, the detailed proposal in the bid and the assessment of the bid.

Four purchasing experts from Dutch provinces have been interviewed to evaluate the three limitations causing a misalignment and come up with opportunities to resolve them. Clustering the results of the expert interviews, two main categories of problems causing the misalignment were obtained, organisational and process orientated problems, and three categories of opportunities to resolve the misalignment, process orientated opportunities, working together and expand knowledge. By looking critically at the expert interview results and comparing them to the results of the content analysis, two problems were noticed. First of all, window dressing was seen. Ambitions to improve the inclusion of environmental requirements were stated, but not realised. Secondly, the experts only perceive other departments within their organisation or the contractor accountable for the problems and responsible to resolve them. The window dressing and lack of responsibility are caused by the absence of environmental management in the IPM-model. No one is taking action, because no one is responsible. It was concluded that a change in the IPM-model is needed to create responsibility and that the procurement process needs to be improved to incorporate environmental requirements more sufficient.

Based on these insights, a proposal consisting of two parts has been made, as seen in figure 1. First of all, it is recommended to the client to include environmental management in the IPM-model. The environmental management department should have four responsibilities: ensure environmental inclusion, correct limited or incorrect environmental inclusion, learn from mistakes made and develop environmental inclusion based on acquired knowledge. Secondly, sustainability needs to be included in all the elements of the EU Toolkit and a learning process needs to be started. It is recommended to both the client and the contractor to document feedback and review the environmental inclusion in the invitation to bid and bid. The feedback and reviews have to be interpreted and used to improve future invitations to bids and bids. By documenting past performances, future performances can be improved.

The main recommendations for academical research are to investigate the effectiveness of including environmental management in the IPM-model, the competencies needed for environmental management and the follow up of the environmental requirements in the realisation of the projects. Furthermore, it would be interesting to perform the content analysis and expert interviews done in this research with different characteristics, such as analysing different procurement projects or interviewing experts with other expertise.



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List of Abbreviations

AC	-	Award Criterion
BPQR	-	Best Price-Quality Ratio
BREEAM	-	Building Research Establishment Assessment Method
CPC	-	Contract Performance Clause
EMAT	-	Economically Most Advantageous Tender
EMS	-	Environmental Management System
GPP	-	Green Public Procurement
IPM	-	Integral Project Management
LCA	-	Life Cycle impact Assessment
LEED	-	Leadership in Energy and Environmental Design
PNB	-	Province of Noord-Brabant
PNH	-	Province of Noord-Holland
PZH	-	Province of Zuid-Holland
RWS	-	Rijkswaterstaat
TR	-	Textual Reference
TS	-	Technical Specifications
SAC	-	Sub-Award Criterion
SC	-	Selection Criteria
UAV	-	Uniform Administrative conditions
UAV-GC	-	Uniform Administrative Conditions for Integrated Contracts

List of Terms

Green Public Procurement
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

Contractor
Organisation which desires to fulfill the request of a good or service.

Client
Organisation which desires to acquire a good or service.

Invitation to Bid
A formal method of solicitation where prospective suppliers are requested to submit a bid for the provision of goods or services.

Bid
An offer in response to an Invitation to Bid.

Assessment of the Bid
Evaluation of the proposed bid, based on the stated requirements in the invitation to bid, leading to awarding of the contract.

Textual Reference
The usage of a textual reference to sustainability, to which no mandatory requirements are attached.

Selection Criterion
The usage of sustainable selection criteria, to which mandatory requirements are attached for the contracting organization.

Technical Specification
The usage of sustainable technical specifications, to which mandatory requirements are attached for the project.

(Sub-)Award Criterion
The usage of sustainable (sub-)award criteria, to which a qualitative assessment of the inclusion of sustainability in the project is attached.

Contract Performance Clause
The usage of sustainable contract performance clauses, to which mandatory requirements for a sustainable realization and delivery of the project are attached.

Sustainability
Surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelationships.

1

Introduction

Since the World Commission on Environment and Development published the report “Our Common Future” in 1987 the urge to reduce the human impact on the environment has gradually become an important issue (WCED, 1987; Council, 2010). A key sector to reduce this human impact on the environment is the construction sector, as it has a large environmental influence due to the large amount of resources used (Chen, 2010; Rijksoverheid, 2017). The inclusion of environmental requirements in the procurement of construction projects, also called Green Public Procurement (GPP), is one of the ways to reduce the environmental impact (Testa, 2012; Lundberg, 2016). Green Public Procurement is considered to be an important implementation to facilitate an integrated green product policy. However, the usage of GPP in the construction sector is still in development (Cheng, 2018). In this thesis the usage of GPP in the construction sector is investigated.

In order to understand the concept of GPP, a definition of GPP is established, the origin and development of GPP are discussed and the current status of GPP is clarified. Subsequently, the research gap investigated in this thesis is provided. Last, the facilitating company is introduced.

1.1 Green Public Procurement: A Definition

In literature, multiple definitions of GPP can be found, such as “the approach by which Public Authorities integrate environmental criteria into all stages of their procurement process, thus encouraging the spread of environmental technologies and the development of environmentally sound products, by seeking and choosing outcomes and solutions that have the least possible impact on the environment throughout their whole life-cycle” by Bouwer (2006), or 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” by the European Commission (2019a) and as “the purchase of products or services which minimize or provide positive environmental impacts through the factoring of environmental concerns into major purchasing strategies, policies and directives” by the Council (2010). The description of GPP by the European Commission 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” is most commonly used and will therefore be used in this research (Cheng, 2018).

Sometimes, the term Sustainable Procurement is used instead of GPP. However, there is an important difference between the both. Sustainable Procurement considers the environmental, economic and societal aspects of sustainability, whereas Green Public Procurement only considers the environmental aspects (Cheng, 2018). In this thesis, the environmental aspects are considered and therefore the term Green Public Procurement is used.

1.2 The Development of Green Public Procurement

The development of Green Public Procurement started when in 1987 the importance of realising environmental friendly products was introduced by the World Commission on Environment and Development. Not long after that the importance of procurement in this process was recognised and since the 1990's green procurement has been developing as a way to reduce the environmental impact of products (WCED, 1987; Council, 2010). In the World Summit on Sustainable Development in 2002, an implementation plan for sustainable consumption and production was made. As a result, in 2003 the Marrakech process was launched to support the implementation of the sustainable consumption and production plan. One of the topics concerned was green procurement (Fuentes-Bargues, 2017).

Because of the implementation plan for sustainable consumption and production, GPP has made notable advances worldwide. Environmental objectives have been planned in Europe and multiple countries have established their own sustainable development programs (Fuentes-Bargues, 2017). For example, between 2009 and 2012 the Dutch government developed the Green Deals, including plans for the development of green procurement (GreenDeal, 2019).

Besides countries implementing sustainable development programs, sustainability is also becoming of more importance in the private sector. Private organisations are increasingly sharing their sustainable objectives. However, environmental aspects are mostly taken into account only when there are clearly stated business benefits involved or when the violation of regulations is prevented (Varnas, 2009).

The academic research on green public procurement has been growing exponentially from 2003 on. The development of academic research can mainly be seen in Europe, with a clear distinction of topics from the years 2000 to 2016. In the period of 2000-2004 mainly managerial topics were popular. This developed into more GPP process oriented topics in the years 2005-2012. Finally, in the period of 2013-2016, practice and impact, such as emission and reduction, were mainly considered (Cheng, 2018).

1.3 Current Status of Green Public Procurement

Green Public Procurement is considered important to facilitate an integrated green product policy (Cheng, 2018). It is a good way to control and influence the environmental performance of third parties and can be an important market trigger to develop environmental innovations, tools and solutions (Varnas, 2009; Testa, 2012, 2016a; Cheng, 2018). It is considered that GPP can also have financial benefits (PWC, 2009; Council, 2010). However, GPP is considered very complex to implement (Cheng, 2018). Four main limitations for the translation of GPP to practice can be seen in literature.

Cost and Benefits
The perception of costs and benefits differs per organisation. Environmental solutions can be very expensive, which can scare organisations to implement them. Clients need to be willing to pay and contractors need to find affordable solutions (Testa, 2016a). Furthermore, small and medium sized organisations are sometimes not financially strong enough to meet the environmental criteria (Testa, 2012; Cheng, 2018). Also, the fear of time-consuming bureaucracy for the implementation of environmental solutions, resulting in delay and even higher costs can scare organisations (Varnas, 2009). The financial barriers are considered one of the main limitations of the adoption of GPP (Bouwer, 2006; Walker, 2008; Cheng, 2018).

Organisational Pressure
GPP solutions are being controlled mainly from managerial areas. A lack of managerial support can therefore hinder the implementation of GPP (Bouwer, 2006; Bjorklund, 2011; Bratt, 2013). Also, a lack of corporate commitment or low financial incentives for environmental solutions can result in an insufficient practice of the environmental solutions (Council, 2010).

Familiarity
The familiarity with GPP is a complex phenomenon for some organisations, because expertise is needed to assess environmental aspects (Testa, 2016). Often, not enough in-house knowledge and expertise of clients or contractors is available to identify green products and services, hindering the adoption of green procurement (Testa, 2016). The traditional iron triangle of time, cost and quality is considered the benchmark of project performance, rather than the environmental aspects. Other researchers describe the lack of awareness instead of the lack of familiarity (Walker, 2009; Testa, 2012; Cheng, 2018). A possible explanation of the lack of awareness or familiarity with GPP is the minor amount of training (Bouwer, 2006).

Availability of information and knowledge
Another limitation hindering the implementation of GPP is the lack of knowledge, information and competences among procurers (Bouwer, 2006; Walker, 2009; Varnas, 2009; Testa, 2012; Zhu, 2013). Measurable and verifiable environmental preferences are often missing and the knowledge to formulate them is often insufficient (Testa, 2016a). There are multiple reasons for the lack of knowledge and information. The competitive nature of procurement hinders cooperation between organisations, withholding information and knowledge sharing (Wong, 2016). Also, there is a lack of tools and information of environmental requirements available (Bouwer, 2006, Cheng, 2018). Last, vagueness of the requested environmental requirements in procurement makes it difficult for contractors to comply to them (Fuentes-Bargues, 2017). Lastly, there is a lack of monitoring and inspection that causes contractors to not consider environmental requirements (Fuentes-Bargues, 2017).

1.4 Research Gap

Despite the exponential growth of research as stated previously, the amount of research performed on GPP is still limited (Testa, 2012; Cheng, 2018). Cheng (2018) proposes that more research is necessary into the requested environmental requirements in procurement. More insight in governmental regulations and environmental requirements can reduce the complexity of implementing GPP (Wong, 2016). Whereas researches on the influence of mandatory environmental requirements under different award criteria and tender evaluation methods are available, there are still a lot of themes missing (Cheng, 2018).

As a start, the usage of different environmental requirements and their corresponding weighting should be analysed in different countries (Testa, 2016; Cheng, 2018; Fuentes-Bargues, 2019). Whereas Bouwend Nederland (2018) already investigated the inclusion of environmental requirements and their corresponding weighting in open procurement in the construction sector in the Netherlands, additional research can be done. They found that in 27,2% of the award criteria sustainability was included with as main environmental requirement the CO2-Performance scale ("CO2-prestatieladder)/level of ambition, the sustainable execution of the process and a sustainable result. Next to the type of requirement, the corresponding weighting was analysed and selection criteria were looked at. However, this research only focused on procurement using an open procurement procedure, the invitation to bid and a high scope. Research into procurement using other procurement procedures, in more detail and including the bid and assessment of the procurement is missing.

Faith-Ell (2005) and Varnas (2009) state that research into the assessment of environmental requirements is lacking and extensive research is needed. Understanding whether environmental requirements influence the final decision of the contracting authority is missing (Testa, 2016a). Researches that do not only analyse the invitation to bid, but also the bid and assessment of the bid are rarely found. Kippo-Edlund (2005) performed a research into the inclusion of environmental requirements in the assessment of the bid, but only for procurement in Scandinavian countries and also including other sector than the construction sector. Understanding the characteristics and impacts of different awards arrangements, as well as constraints in the process, might make GPP a more feasible policy tool (Cheng, 2018). Research on the alignment of environmental requirements stated in the invitation to bid, the bid and the assessment of the bid is missing (Cheng, 2018).

In order to increase the knowledge about GPP, this thesis will investigate the inclusion of environmental requirements in the invitation to bid, the bid and the assessment of the bid. This will be done for procurement documents of the Dutch construction sector. Both the topics and weight of environmental requirements will be dealt with.

1.5 Introducing the facilitating company: Sweco

This research will be done in cooperation with Sweco, a large engineering and consultancy firm operating within the construction sector. With establishments over multiple countries in Europe, Sweco is a leading firm within its field. The cooperation will be with the BidCenter department of Sweco Netherlands, responsible for managing the procurement done by Sweco. The abovementioned problem is very relevant for the BidCenter of Sweco Netherlands. Encountering procurement on a daily basis, the limitations for the implementation of Green Public Procurement are regularly seen. Being up to date about the current development and future opportunities of Green Public Procurement is therefore of interest to Sweco. In this research, help from the experts of Sweco is received and procurement data of Sweco is used.

2

Research Design

The goal of this research is stated in section 2.1., resulting in the research question discussed in section 2.2. The scope of the research is defined in section 2.3. In this thesis two main research phases are included: investigating the current usage of environmental requirements in the procurement process of the Dutch construction sector, explained in section 2.4.1 and investigating opportunities to develop the environmental inclusion, explained in section 2.4.2. The expected societal, academical and corporate relevance of the research will be stated in section 2.5.

2.1 Goal

The main goal of this thesis is to clarify the current usage of environmental requirements in not only the invitation to bid, but also the bid and assessment of procurement and to make a proposal for the development of environmental inclusion based on the found usage.

2.1.1 The Current Usage of Environmental Requirements

The goal of research Phase I is to construct a procurement database consisting of environmental requirements and their weight used in the invitation to bid, bid and assessment of procurement. It is expected that this procurement database will show how environmental requirements are currently used and weighted in the invitation to bid, how the contractor includes environmental requirements in the bid and how the environmental requirements are assessed. This will provide insight into the alignment of the environmental requirements used in the invitation to bid, the bid and the assessment of the bid. As a result, an overview of the usage of environmental requirements in the procurement process in the Dutch construction sector will be created.

2.1.2 A green future

The goal of research Phase II is to evaluate the results of research Phase I and to argue if the current usage of environmental requirements through the procurement process is sufficient. Based on the evaluation a proposal will be made for the development of future usage of environmental requirements in the procurement process. The acquired knowledge can be used to fill the research gap.

2.2 Research Question

Considering the research gap and goal, the following research question can be derived:

"How can the usage of environmental requirements in procurement of Dutch construction projects be developed?"

In order to do this research in a structured way, the main research question will be divided into four sub-questions.

1. *"How can a procurement database to analyse the inclusion of environmental requirements be constructed?"*
2. *"What procurement data can be derived?"*
3. *"To what extent are environmental requirements used in the procurement database?"*
4. *"What patterns can be found in the procurement database?"*
5. *"Are adjustments to the procurement process needed to develop the incorporation of environmental requirements in procurement of Dutch construction projects?"*

2.3 Scope

In order to define the boundaries of this thesis, the scope will be elaborated. A definition of sustainability, the steps of the project process and the part of the construction sector considered in this research will be discussed. However, through the research additions to the scope can be proposed.

Sustainability
Used for governmental affairs, embraced by big businesses and advertised by activists, the term sustainability has different interpretations. Sustainability can be divided into three pillars: people, planet and profit (Hardi, 1997; West Midlands Round Table, 2000; Fernández-Sánchez, 2010). In this thesis, the planet pillar of sustainability will be of main concern. The planet pillar can be described as: "surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelationships" (Thome, 2016).

Project Process
In multiple phases of the project life cycle procurement is used. In this thesis the project life cycle used at Sweco is considered, since the procurement data used in this thesis is derived from Sweco. The different phases of the project life cycle can be seen in figure 2. A client, being a ministry, province, municipality, independent regulator (such as Rijkswaterstaat) or private organisation, can procure for multiple phases of the project life cycle. The phases concerned in this thesis are the Preliminary Design Phase, the Detailed Design Phase and the Preparation Phase.

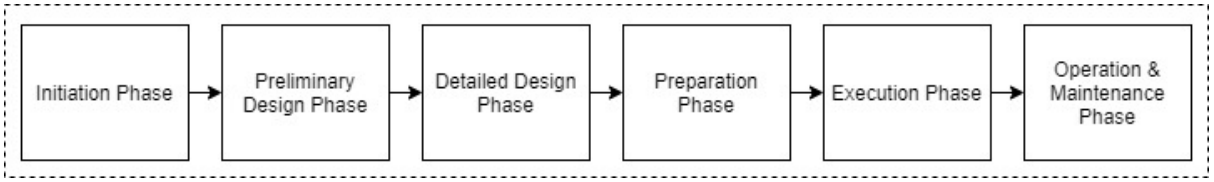

Figure 2 - Construction Project Process (Sweco, 2019)

The Procurement Process of The Dutch Construction Sector
Different sectors and countries have been studied for GPP. In this research the focus will be on the Dutch construction sector. Specifically the ground, road and waterway sector will be investigated, because the information available of Sweco is within this sector. The construction sector is an important sector in the Netherlands, with 5% of the gross domestic product and around 2000 procurement projects annually (Hardeman, 2013a; BDO, 2015). The ground, road and waterway sector, involved in 80% of procurement, is the largest procurement category in the Dutch construction sector (Hardeman, 2013a). Therefore, this is a relevant sector to investigate. Within this sector, only the procurement process steps will be considered. Therefore "*the procurement process of the Dutch construction sector"* is included in the research and sub-questions.

2.4 Research Phases

In this thesis two main research phases will be considered. In Phase I the current usage of environmental requirements in procurement will be investigated. In Phase II the results of Phase I will be evaluated with experts in the field and a proposal for the development of the usage of environmental requirements in procurement will be stated. The research steps taken through the two phases have been inspired by the Grounded Theory Approach as proposed by Verschuren (2010), to provide structure to the research.

2.4.1 Phase I: The Current Usage of Environmental Requirements

In Phase I, three research steps will be taken: a literature study, the construction of the procurement database and the discussion of the results derived from the procurement database.

Literature Study
In order to answer the first sub-question *"How can a procurement database to analyse the inclusion of environmental requirements be constructed?",* four main subjects will be considered in the literature study: the Dutch procurement process, GPP in the procurement process, environmental requirements researched and a closer look into content analysis to environmental requirements. The gathered information can be used to substantiate the construction of the procurement database structure and the analysis of the procurement data.

The Dutch Procurement Process
As a start, the different characteristics of the Dutch procurement process will be studied. The different procedures which can be used to procure, the steps taken in the procurement process and assessment methods of procurement used will be elaborated.

Green Public Procurement in the Procurement Process
The inclusion of GPP in the procurement process will be studied. Legislation and assessment tools from the European Union and the Netherlands will be considered.

Green Public Procurement in Literature
A study will be done into previous research on Green Public Procurement. The research topic and method most suitable for this research will be searched.

A Closer Look into Content Analysis to Environmental Requirements
The most suitable research method and topic will be studied and discussed in detail. Different characteristics will be discussed to form an example for the analysis done in this thesis. These can be used to substantiate the procurement database and data analysis.

The Construction of the Database

In the second research step of Phase I procurement data will be collected, a procurement database structure will be developed based on the findings from the literature study and the procurement database will be filled. This will provide an answer to the second sub-question *"What procurement data can be derived?"*.

Collecting the Procurement Data

The procurement data used in this thesis will be derived from Sweco. To analyse the procurement process, documents of the invitation to bid, bid and assessment of the bid will be gathered. It needs to be checked whether all documents are available for a procurement project to be useful for the analysis.

The Procurement Database Structure

The findings from the literature study will be used to create the structure of the procurement database. The structure will be adjusted to the characteristics found for the Dutch procurement process and the data derived from Sweco.

Filling the Procurement Database

The last step of constructing the procurement database is the coding of the procurement data and filling the procurement database. The coding will be done based upon previous research and characteristics of the Dutch procurement process. Also, a structured way to perform the coding has to be found, to make the analysis more reliable.

Results of the Procurement Database

After the environmental requirements are coded they can be formed into categories. An overview of the results will be created, answering the third sub-question *"To what extent are environmental requirements used in the procurement database?"*. By analysing the results, patterns in the procurement data might be found, providing an answer to the fourth research question *"What patterns can be found in the procurement database?"*.

2.4.2 Phase II: A Green Future

In Phase II of the research the results found in Phase I will be evaluated with experts in the field and a proposal for developing the inclusion of sustainability in the Dutch procurement process will be made. In order to do so, a selection of experts has to be made and experts have to be contacted. Also, interview questions have to be made, the interviews have to be conducted and the answers given by the experts to the questions have to be analysed. This will provide an answer to the fifth sub-question *"Are adjustments to the procurement process needed to develop the incorporation of environmental requirements in procurement of Dutch construction projects?"*.

2.5 Relevance of the Research

Because of the major impact of the construction sector on the environment, the importance of incorporating sustainability within construction projects has increased over the past decades (Chen, 2010; Rijksoverheid, 2017). By looking into the usage of environmental requirements in the procurement process of the Dutch construction sector the knowledge about Green Public Procurement will be increased. This research is expected to contribute on three levels: a societal, academical and corporate level.

2.5.1 Societal Relevance

By means of creating a deeper understanding of the inclusion of environmental requirements in the Dutch procurement process, a higher level of environmental quality can be obtained in construction procurement. Consequently, the environmental quality of construction projects can improve and the impact of the construction sector on the environment can reduce.

2.5.2 Academical Relevance

Research on GPP is, despite the exponential growth since 2003, still lacking. Performing research on the inclusion of environmental requirements in not only the invitation to bid, but also the bid and assessment to bid will fill missing research to GPP. The academical knowledge about GPP will increase. Furthermore, the opportunities which will be stated for the development of GPP, will provide new insights for future research objectives.

2.5.3 Practical Relevance

By constructing the procurement database and analysing the current inclusion of sustainability in the procurement process of the Dutch construction sector, a better insight in the current usage of environmental requirements will be created for contractors and clients. By evaluating the results in the field, a discussion of developing the incorporation of environmental requirements in Dutch public procurement projects will be started.

3

Literature Study

In order to give insight in the theory behind the inclusion of environmental requirements in the Dutch procurement process a literature study was done. The goal of the literature study is to provide the necessary information to construct and analyse the procurement database. An answer will be given on the sub-question *"How can a procurement database to analyse the inclusion of environmental requirements be constructed?"*. The literature study consists of five sections: an elaboration of the Dutch procurement process, GPP in the procurement process, a study into previous research done on GPP, an elaboration of content analysis of the inclusion of environmental requirements and finally a summary of the variables found in the literature study which will be used for the construction and analysis of the database.

3.1 The Dutch Procurement Process

As a start, the procurement procedures which can be used in the procurement process will be discussed. Next, the different steps taken in the Dutch procurement process will be elaborated. Hereafter, the assessment of procurement will be explained in more detail.

3.1.1 Procurement Procedures

Different procurement procedures can be used to allocate the development of a good or service (PianOo, n.d.). An organisation can procure for a single good or service, or for multiple goods or services in a framework agreement. In a framework agreement, procurement requiring recurring purchases is allocated. An advantage of a framework agreement is the faster awarding of different products or works.

A public organisation can use a national or European procedure, depending on the financial size of the good or service. When the financial size of the good or service exceeds the European Threshold, as can be seen in table 1, an European procedure is mandatory. Otherwise only national directives are mandatory and a national procedure can be used. When the total amount of all procurement considered in a framework agreement exceeds the European Threshold, a European procedure is also mandatory (PianOo, n.d.).

Table 1 - Financial thresholds 2020 (Rickard, 2019)

	European Threshold from 2020	**European Threshold before 2020**
Works contracts (all)	€5,350,000	€5,548,000
Supply and services contracts (central government)	€139,000	€144,000
Supply and services contracts (local authorities, universities, academies, emergency services)	€214,000	€221,000
Services concerning social and other specific services (including GP and dentistry services)	€750,000	€750,000
Works or services concession contracts (all)	€5,350,000	€5,548,000

Three main procedures can be seen when the financial size of the good or service is under the European Threshold: the single negotiated procedure, the multiple negotiated procedure and the national open procedure. In the single negotiated procedure one contractor is invited to deliver. In the multiple negotiated procedure multiple contractors, often three to five, are invited. The national open procedure is an open procedure on a national level available for all contractors (PianOo, n.d.).

When the European Threshold is exceeded, two main procedures are considered: the open procedure and the restricted procedure. Where the open procedure is available for all contractors, the restricted procedure is only open to pre-selected contractors (European Union, 2020). In the restricted procedure all contractors can ask for selection, but only a few contractors are pre-selected based on for example experience, past performance or the financial position of the contractor (Ridder, 2009). Next to the two main procedures, some less common procedures can be seen. When the nature of the purchase is very complex, the competitive negotiated procedure or competitive dialogue can be used. Pre-selected contractors are invited to submit initial tenders and to negotiate. For goods not yet available on the market, an innovation partnership procedure can be used wherein a number of contractors participate throughout the process. Lastly, a design contest can be used to obtain an idea for the design of a product (European Union, 2020). A summary of the possible tender procedures can be seen in table 2.

Table 2 - Types of tendering procedures (Ivanova, 2016)

	Tender Procedure	**Explanation**
Under threshold	Single negotiated	One provider is asked to submit a bid. After possible negotiation, the order can be placed.
	Negotiated	A number of tenderers (3-5), chosen on objective grounds, is asked to submit a bid.
	National Open	On a national level, the open and negotiated procedures can be performed.
Above threshold	Outline agreement	The outline agreement is a long-term agreement between the client and vendor for material or services for a defined period of time.
	Open	All parties have the right to register for the tender
	Restricted	All parties have the right to register. Based on pre - announced criteria, the client chooses the candidates, who are invited to submit a tender.
	Negotiated - With publication of a contract notice - Without publication of a contract notice	After the tender is announced, and parties have registered themselves, the client selects, at least, three candidates who are invited to submit a tender. Without an announcement, the client selects, at least, three candidates, who are invited to submit a tender. The procedure is only allowed under certain circumstances.
	Concession	An operator receives substantial remuneration through being permitted to develop the work
	Competitive Dialogue	Several discussion rounds between client and potential vendors, during which all aspects of the tender can be discussed. The procedure is only allowed under certain circumstances.
	Best value procurement	Selection through limited items to be submitted and the use of dominant information

3.1.2 The Procurement Process

Considering the standard procedure for the selection of the contractor ten steps can be derived in the procurement process, as can be seen in table 3. For an open procedure, restricted procedure and competitive dialogue it is shown which process steps are considered (Ridder, 2009; PianOo, n.d. ; Born, 2018; Keizer, 2018).

Table 3 – The Procurement Process Steps for different Procurement Procedures

Nr.	Procurement Process Steps	Procurement Procedure		
		Open	Restricted	Competitive Dialogue
1	Announcement	**X**		**X**
2	Analysis of subscribed contractors	**X**		**X**
3	Invitation to pre-qualify		**X**	
4	Analysis of received pre-qualifications		**X**	
5	Invitation to tender	**X**	**X**	**X**
6	Dialogue			**X**
7	Submission of tender documents and receipt of tenders	**X**	**X**	**X**
8	Adjudication of all bids	**X**	**X**	**X**
9	Decision on contract award	**X**	**X**	**X**
10	Acceptance and awarding of the contract	**X**	**X**	**X**

Announcement
In the Netherlands the announcement of the procurement is done through advertising in for example COBOUW or TenderNed. In the open procedure all organisations can consider to bid. In the announcement the requirements and criteria for the tender are stated.

Analysis of subscribed contractors
The contractors that subscribe on the announcement of the tender will be assessed based on the selection criteria of the client.

Invitation to pre-qualify
The contractors considered suitable for the project are invited to pre-qualify for the procurement procedure. In the invitation the requirements and criteria for the assessment of the pre-qualification are stated.

Analysis of received pre-qualifications
After the invitation to pre-qualify an analysis of the received pre-qualifications is done based on the selection criteria. A shortlist of contractors will be selected for follow-up.

Invitation to bid
After the application through either the open or negotiated procedure, the contractors meeting the selection criteria are invited to bid.

Dialogue
When a competitive dialogue is considered, a dialogue between the contractors and the client is organised. In this dialogue, the contractor can test suitable solutions to the project requirements.

Submission of bids and receipt of bids
After the invitation to bid, the bids are submitted and received in which the contractors have described their working methods and clarified their cost structure.

Adjudication of all bids
The received bids are assessed based on the evaluation requirements. Bids not conform the stated evaluation requirements will be rejected. When a bid is conform the stated requirements, the bid will be monetised.

Decision on contract award
The bids that are conform the stated requirements will be assessed with a predetermined assessment method. With the method, the bids will be rated based on their price or quality value. The bid with the lowest price or highest quality value will be awarded the contract.

Acceptance and awarding of the contract
The contract will be signed after both the contractor and the client agree on the terms in the contract. Different kinds of contracts can be considered, as can be seen in table 4. The contracts are based upon administrative conditions presented in the UAV (Uniform Administrative conditions) or UAV-GC (Uniform Administrative Conditions for Integrated Contracts).

Table 4 - Forms of contracts (PianOo, n.d.)

Contract	Explanation
Design, Build, Finance & Maintain	The contractor is responsible for the design, building, financing and maintenance of the project.
Design, Build,Maintain	The contractor is responsible for the design, building and maintenance of the project.
Design & Construct	The contractor is responsible for the design and construction of the project.
Engineering & Construct	The contractor is responsible for the detailed design and construction of the project.
Performance Contracts	The contractor is responsible for the maintenance of the project
Traditional contracts based on RAW-systematics	The contractor is bind to the conditions as described in the RAW-systematics.
Hybrid Contracts	Combination of RAW-systematics and UAV-GC conditions.
Framework Contract Engineering	Contract considering multiple projects for engineering of the project.

3.1.3 The Assessment Method of Procurement

The awarding of the contract depends on the assessment method of procurement. Two main categories to assess procurement can be seen: price based and value based procurement.

Price Based Procurement

Until April, 1st of 2013, price based procurement, also called the lowest price method, was the standard assessment method in the Dutch construction sector (Dreschler, 2009; PianOo, 2013). The lowest price method works simple: public enterprises procure for a public good or service were price is the most important criterion for awarding. Contractors submit a bid which will be assessed by the public enterprise on the compliance with the requirements. After choosing the bids that meet the requirements, the bid with the lowest price is picked (Dreschler, 2009).

Due to changing legislation concerning procurement, the lowest-price method has been developing. In 1998 the Dutch competition law ('Mededingingswet') was adopted in addition to legislation of the European Union. Rules against the formation of cartels and financial agreements were stated. Since then, the price-based method focused more on requirements (Tweede Kamer der Staten-Generaal, 2016). However, in 2001 the Dutch construction fraud ("Bouwfraude") brought illegal financial agreements between construction firms for composing a bid to light (Dongen, 2001). Consequently, the price was not under influence of market regulation anymore and a new assessment method was needed.

Value Based Procurement

A growing number of studies showed the advantage of using more quality based assessment methods (Snoep, 2016). The most important shift in assessing procurement was when Rijkswaterstaat (RWS) announced the procurement law ("Aanbestedingswet") in 2012. In the procurement law European directives and the Economically Most Advantageous Tender (EMAT) method were made mandatory for public contracting authorities (Tweede Kamer der Staten-Generaal, 2010). In the EMAT method procurement is not only assessed based on price, but also on qualitative award criteria. The proposed bids are assessed based upon these qualitative award criteria (Hardeman, 2013b). For each award criterion the client defines a maximum achievable quality value, depending on their importance to the client. The total quality value of all award criteria results in a fictive discount, which will be subtracted from the initial amount of the bid. As a result, a fictive price is made. The contractor with the lowest fictive price wins the procurement (PianOo, 2016). A lot of different variants to calculate the EMAT are used, depending on the client.

The two main variants to calculate the EMAT are the weighted factor method and the method of value awarding. In the weighted factor method a weight is given to each award criterion, depending on the importance of the criterion. Per criterion a number of points can be scored, depending on the quality of the bid. The final score is the total of the points per criterion times the weight. In the method of value awarding, each criterion is given a grade, from for example 1 to 10, resulting in a fictive discount. The discount is subtracted from the total cost of the bid, resulting in the fictive total costs of the bid. However, sometimes no discount is considered and the contractor with the best grade is selected (PianOo, 2016). Examples of the methods can be found in table 5 and 6.

Table 5 - Example of the weighted factor method (PianOo, 2016)

			Contractor A (winner)		Contractor B	
Criterium	**Max. Score**	**Weight**	**Points**	**Score**	**Points**	**Score**
Price	100	60%	50	30	60	36
Plan	80	30%	80	24	60	18
Quality	80	10%	60	6	40	4
Total	260			60		58

Table 6 - Example of the method of value awarding (PianOo, 2016)

Bid	**Price**	**Grade**	**Fictional Discount**	**Fictional Price**
A	€ 9.800.000	5	€ 500.000	€ 9.300.000
B	€ 10.000.000	8	€ 800.000	€ 9.200.000

The EMAT method has been developing with as most important development the revision of the procurement law in 2016. Four main themes were considered to be important: non-discrimination, equal treatment, transparency and proportionality (Pianoo, 2019). In the revised procurement law, the EMAT method changed to the overarching term for three different assessment methods: Best Price-Quality Ratio (BPQR); Lowest cost and Lowest Price (Rijkswaterstaat, 2017). What previously was meant with EMAT is now called BPQR. According to the Aanbestedingswet 2012, the BPQR method may always be used, but if the lowest cost or price method is used, this has to be substantiated (PianOo, 2016). The BPQR method is favored, because it stimulates for higher quality, where quality is an overarching term for aspects as sustainability, well-functioning, innovation and minimal nuisance. Whereas the lowest price-method is a cheap and simple applicable method, the BPQR method challenges contractors to bring more quality than the minimum (PianOo, 2013; Snoep, 2016). Despite the advantages of BPQR, a few things need to be taken into account for the method to be useful. First of all, the weighted criteria need to be sufficiently significant taken into account compared to the price and to each other. By doing so, contractors will be minimally persuaded to focus on one criterion. The criteria itself also need to be chosen with the expectation to create different scores from contractors (pianOo, 2016). Also, the criteria can be made a wish or a demand. From Dutch legislation it is made mandatory to describe the criteria as clear as possible, to assess the bids as objective as possible and to motivate the final selection in a clear way (PianOo, 2016).

3.2 Green Public Procurement in the Procurement Process

The incorporation of GPP in the procurement process can be seen in two topics: the legislation related to GPP and tools to make it possible to assess GPP.

3.2.1 Legislation for Green Public Procurement

Legislation for Green Public Procurement has been developing on a national and international level. Within the European Union procurement directives are stated to influence the incorporation of GPP via public authorities. Most recent versions of the directives are Directive 2014/24/EU and 2014/25/EU. In the directives more notion for common societal goals, such as environmental protection, are incorporated (European Commission, 2019b). Furthermore, opportunities to include environmental requirements in procurement are stated in the directives (Varnas, 2009). Next to the directives, the European Commission offers a GPP Toolkit suggesting possible environmental requirements to include in the invitation to bid. The proposed requirements can be used by public authorities as an example. Two toolkits can be used for the construction sector, Module 7.5: Office Building Design, Construction and Management and Module 7.7: Road Design, Construction and Maintenance (European Commission, 2016). In the modules, a distinction is made between core and comprehensive environmental criteria. A core criterion is of minimal influence to the budget and complexity of the project and is therefore easy to implement. A comprehensive criterion is however complex and has a large influence on the project on a higher level. In the GPP Toolkit five elements where environmental requirements can occur are considered, as can be seen in table 7

Table 7 - The Five Elements from the EU Toolkit (European Commission, 2019b)

European Toolkit	**Description**
Subject Matter	In a Subject Matter the textual reference to an environmental requirement is made. In this case no obligation to include sustainability is created for the contractor.
Selection Criteria	The selection criteria in which selection and provisions are stated are considered. In this case sustainable obligations for the organisation of the contractor, but not the project, are created.
Technical Specifications	In the Technical Specifications the demands for the deliverable work are stated. Sustainability will be an obligation in the realisation of the project, but there can be made no difference in quality of the bids during the assessment of the bid.
Award Criteria	By including sustainability in the award criteria the different bids can be assessed on their qualitative value for sustainability.
Contract Performance Clauses	In the Contract Performance Clauses the performance with which the contractor must comply are stated. By including sustainability in the contract performance clauses, the performance of the contractor can be checked during the realisation of the project.

The Dutch Government tries to influence the incorporation of Green Public Procurement on a national level. In the Aanbestedingswet 2012 is stated that organisations need to provide as much care for sustainable solutions for public products as possible (Raad van State, 2019). The usage of EMAT criteria shifted from 20% to 80% because of the “EMAT unless” rule in the Aanbestedingswet, making it possible to assess procurement on environmental requirements (PianOo, 2013). Also, Dutch guidelines are available to influence procurement, such as “Innovatief Energie Aanbesteden” (Innovative Energy Procurement) and “De kunst van duurzame energietransitie” (The art of sustainable energy transition). However, no mandatory rules concerning GPP are available.

3.2.2 Assessment of Green Public Procurement

Different tools can be used to assess the environmental selection and award criteria requested in GPP (Testa, 2016a). Three types of tools can be seen: knowledge-based, performance-based and rating tools (Vidal, 2019).

Knowledge-based Tools
Knowledge-based tools include manuals, information and data about environmental topics. For example the GPP Toolkit published by the European Commission as a manual (European Commission, 2019b), the National Environmental Database as a database (SBK, n.d.) or Bouwend Nederland as an informative package (Bouwend Nederland, 2019). Knowledge-based tools can be used to substantiate the assessment of GPP.

Performance-based Tools
Performance-based tools can be used to measure the influence of a project on the environment. The most commonly used tool is the Life Cycle impact Assessment (LCA). Problematic is the amount of expertise and budget needed to perform a full LCA, often not available at the client (Vidal, 2019). Therefore, simplified and public tools are available, providing however a less reliable outcome (Vidal, 2019). An example of a LCA model used in the Netherlands is the SKK Calculation model from CROW (Crow, 2019). Another performance based tool used is an Environmental Management System (EMS), such as ISO14001. An EMS provides a structured way to implement and improve the environmental performance of an organisation. Fuentes-Bargues (2017) proposes an EMS, Eco-labelling and Green Contracts as the main performance based tools used in GPP. When an organisation has an EMS label, it shows their sustainability expertise. However, an EMS cannot be used as an award criteria, because award criteria can only be based on requirements which have to do with the product. An EMS considers the organization, not the product (Bouwer, 2006).

Rating Tools
Rating tools are used to identify design criteria and document the performance of the proposed design, including checklists and calculators (Vidal, 2019). Well-known rating tools are LEED (Leadership in Energy and Environmental Design) and BREEAM (Building Research Establishment Assessment Method). Tools commonly used in the Netherlands are the CO2-prestatieladder, Ambitieweb, Omgevingswijzer and Dubocalc.

3.3 Green Public Procurement in Literature

The amount of research on GPP has been growing exponentially since 2003 (Cheng, 2018). An overview has been made of the research topics and methods considered in literature to investigate GPP. In total, 22 researches have been studied. Four main methods were found to analyse GPP considering five main topics, as can be seen in table 8.

The method most used to analyse GPP is a survey. In order to collect information on different factors of GPP, surveys have been conducted with experts and organisations. The main topics investigated with the surveys are the practice and uptake issues for GPP and the inclusion of environmental requirements in the invitation to bid. Whereas these researches provide a clear overview of the current usage of GPP, detailed information is lacking. The surveys are often gathered for different sectors, resulting in unspecific conclusions. For the construction sector, the amount of respondents is minimal. Moreover, only the invitation to bid is considered and therefore the inclusion of environmental requirements through the procurement process is not fully analysed.

Another method commonly used is a content analysis. An overview is created of the usage of GPP in an electronic database by labelling environmental requirements in procurement documents,. Most often, the invitation to bid is considered. Limitations of the content analysis can be the influence of the author on the outcome and the availability of the data. Organisations are not always willing to share their data for critical research. The research is mainly done considering different sectors. As was seen for the surveys, the results for the construction sector specific are based on less cases and are unspecific. Cheng (2018) performed a content analysis into the available literature considering GPP instead of performing an analysis to GPP itself. Therefore, no method is included for Cheng (2018) in table 8.

The next method seen is conducting interviews. Whereas the response rate of conducting interviews is high, it is more time consuming and limited in number of practitioners. The main topics concerned are the practice and uptake issue for GPP and the inclusion of environmental requirements. Not only the invitation to bid, but also the evaluation of the bid has been discussed. Also, this has been done for the construction sector specific and thus provides more detailed information. However, because of the specific analyses, the results of the interviews are difficult to generalise. Since the researches have been done in different countries and different years, the research has to be repeated in the Netherlands to generalise the conclusions.

Last, case studies are used for a more in-depth study of specific characteristics of procurement projects (Cheng, 2018). The researched topics seen are the practice and uptake issues for GPP, the inclusion of environmental requirements in both the invitation to bid as the assessment of the bid, the effectiveness of GPP as a governmental tool and the assessment tools used for GPP. The conclusions derived from the case studies are very detailed and show insight in the actual usage and effectiveness of GPP. However, the results derived from the case studies are difficult to generalise and cannot be considered for the Dutch construction sector specific.

Considering the available procurement data and research gap, a content analysis is the most suitable research method for this thesis. A content analysis is a qualitative, objective and systematic method to analyse large amounts of data (Kerlinger, 1964). The analysis is objective if the different categories used in the analysis are specified in such a clear way, that other researchers can use them to perform the same analysis. A content analysis is systematic if the inclusion or exclusion of categories, documents or characteristics is based on consistently applied rules (Testa, 2016b). Content analysis done to the inclusion of environmental requirements can offer a good example for this thesis.

Therefore, a detailed elaboration of previous performed content analyses to the usage of environmental requirements will be given. From table 8, eight researches can be derived (Kippo-Edlund, 2005; Faith-Ell, 2005; Bouwer et al., 2006; Nissinen et al., 2009; Testa et al., 2016b; Fuentes-Bargues, 2017; Bouwend Nederland, 2019; Fuentes-Bargues, 2019).

Table 8 – Overview of Research in the Field

List of Performed Researches									
	Method				Topic				
Author	Survey	Interview	Content Analysis	Case Study	practices and uptake issues in GPP	Usage of environmental requirements in GPP calls	Environmental requirements in the evaluation of GPP	effectiveness of GPP as an environmental policy	Assessment tools in GPP
Kippo-Edlund, 2005			X			X	X		
Faith-Ell, 2005	X	X	X	X	X	X			
Bouwer et al., 2006	X		X		X	X	X		
PWC, 2009	X				X	X			
Michelsen, 2009	X	X			X	X	X		
Varnas, 2009	X	X				X	X		
Nissinen et al., 2009			X			X			
Bjorklund, 2011	X				X				
Renda et al., 2012	X				X	X			
Testa et al., 2012					X				
Walker and Brammer, 2012	X				X				
Zhu et al., 2013	X				X				
Bratt et al., 2013				X					X
Lundberg et al., 2016				X				X	
Testa et al., 2016a	X				X				X
Testa et al., 2016b			X			X			
Wong et al., 2016	X	X			X				
Fuentes-Bargues, 2017			X			X			
Cheng et al. 2018					X				X
Bouwend Nederland, 2019			X			X			
Vidal, 2019									X
Fuentes-Bargues, 2019			X			X			

3.4 A Closer look to Content Analysis into Environmental Requirements

By studying previous done content analysis to the usage of environmental requirements in procurement, characteristics usable for this thesis can be found. Also, obstacles for performing the content analysis can be considered beforehand. Five main characteristics have been derived: country and sector, labelling environmental requirements, the value of environmental requirements, the research steps and the results.

Country and Sector

The country and sector considered in the content analysis determines to which extent the results can be generalised. Bouwer (2006) found two main groups of European countries by performing a content analysis to the environmental inclusion in invitations to bid in combination with a survey among EU Member States: "the Green-7" and "the Other-18". "The Green 7" are the seven best performing countries on sustainability in the EU: Austria, Denmark, Finland, Germany, the Netherlands, Sweden and the UK. Since the data used in this thesis is from the Netherlands, research done to procurement from countries of "The Green-7" is better comparable than from other countries. In the analysis Bouwer (2006) considered different sectors. When considering only the construction sector, the amount of analysed cases is limited and less reliable. Most comparable by sector is the analysis of Bouwend Nederland (2019) to the inclusion of environmental requirements in the Dutch construction sector. A large amount of procurement projects has been analysed. However, due to the large amount of procurement analysed, only general results were obtained. Also, the analysis considered only the invitations to bid and procurement projects using an open procurement procedure. Research has also been done to the inclusion of environmental requirements in the construction sector in Spain (Fuentes-Bargues, 2017, 2019), Italy (Testa, 2016b) and Scandinavian countries (Faith-Ell, 2005; Kippo-Edlund, 2005; Nissinen, 2009). Considering "the Green-7", the results from the Scandinavian countries are most comparable with this thesis, apart from the analysis of Bouwend Nederland (2019). The research of Kippo-Edlund (2005) does not only analyse the inclusion of environmental requirements in the invitation to bid, but also in the assessment of the bid. However, this is done for multiple sectors. When looking at the construction sector specifically, only a minimal data set was available.

Labelling Environmental Requirements

Different ways to label the environmental requirements have been used. The most basic way is open coding, meaning that environmental requirements were found and coded to a specific topic (Faith-Ell, 2005). Later on, the topics are combined into categories. A more commonly used way is to first make a list of labels derived from literature and then start coding. In the research of Kippo-Edlund (2005) a predetermined set of topics of environmental requirements was made based on previous research. This set formed the basis to label the environmental requirements found. However, through analysing more environmental requirements could be added. The proposed requirements in the EU Toolkit can be used as a starting point as well. Divided into five topics, different environmental requirements are proposed (section 3.1.4). Testa (2016b) used the EU Toolkit as a starting point for labeling the environmental requirements. During the analysis some of the labels derived from the EU Toolkit were adjusted. In Appendix A the labels seen in previous research can be found.

The Value of Environmental Requirements

A difficult aspect of content analysis to the inclusion of environmental requirements is determining the value of the environmental requirments. There is a difference between the amount of environmental requirements included and the value of the environmental requirements itself. For example, an environmental textual reference has less value than an environmental award criterion. Researchers have come up with different ways to measure the amount of environmentality in procurement.

Bouwer (2006) made a distinction between "solid green" projects, including more than three environmental requirements, and "light green" projects, including one to three environmental requirements. This is a clear and easy way to make a distinction between the amount of sustainability of the procurement projects. However, it is not clearly stated when a requirement is green and no difference is made between the value of the environmental requirements themselves. Another way is to differ between "well-specified criteria" and "not-well-specified criteria" (Kippo-Edlund, 2005). Whether something is a well-specified criterion or not, is decided in cooperation with the purchasers. This is a detailed way to value the different requirements. However, assessing all the requirements can be very time consuming with a very large amount of environmental requirements and multiple purchaser to consider. In the EU Toolkit a distinction is made between core and comprehensive requirements (see section 3.1.4). It is difficult to make a distinction between core and comprehensive requirements, because the influence of an environmental requirement on a project is difficult to value. Testa (2016b) made a variant on the core and comprehensive requirements of the EU Toolkit. Four levels of green were considered: non green, if no green criteria were included, light green, if some forms of green were included, green, if the most demanding criteria were core criteria and hard green when the most demanding criteria were comprehensive criteria.

Research Steps

Four main research steps for content analysis were seen. First of all, the collection and characterisation of the procurement data (Kippo-Edlund, 2005; Testa, 2016b; Fuentes-Bargues, 2017, 2019; Nissinen, 2009). The characteristics considered do slightly differ per author. Testa (2016) considers the geographical origin. Fuentes-Bargues (2017, 2019) obtained five main characteristics: the period in which the procurement process took place, the Spanish administration structure (province, municipality), the subsector (civil engineering or building sector), four price levels (200.000-1.000.000, 1.000.001-5.000.000, 5.000.001-10.000.000 and over 10.000.001) and also the geographical scope. In Appendix B a list can be found including the characteristics used in previous research.

After the procurement data is collected, organised and characterised, the labeling of the environmental requirements starts (Kippo-Edlund, 2005; Nissinen, 2009; Testa, 2016b; Fuentes-Bargues, 2017, 2019). The environmental requirements were labeled based on labels found in literature. Testa (2016b) evaluated the performance of the analysis after 10% and 50% completion, to prevent double work.

After completing the analysis, the results are processed. Kippo-Edlund (2005) analysed whether detailed comparisons between the submitted tenders and the technical specifications, selection criteria and award criteria were attached to the award decision. Testa (2016b) performed a statistical analysis on the inclusion of environmental requirements per regional area. Fuentes-Bargues (2017, 2019) investigated the achievable weight of the environmental requirements. Nissinen (2009) performed a statistical analysis to compare the inclusion of environmental requirements between Scandinavian countries and checked the value of greenness per sector.

Last, a proposal based on the results and a discussion are provided (Kippo-Edlund, 2005; Testa, 2016; Fuentes-Bargues, 2017, 2019; Nissinen, 2009).

Results

The results can be split up between the percentages of procurement projects in which environmental requirements are included, the weight of the environmental requirements and the most occurring topics of environmental requirements. Only results for the construction sector will be discussed.

Bouwer (2006) found that in 14% of the procurement projects of all EU member states environmental requirements are included. When looking at only the "Green 7", a 23% inclusion was found. Testa (2016b) found that in 19% of the public procurement projcets in Italy environmental requirements were included. The inclusion of the environmental requirements was mainly seen in the selection and award criteria (Testa, 2016b). Fuentes-Bargues (2017) found a inclusion of 35% in public procurement projects in Spain. Taking into account that Italy and Spain are not included in the 'Green 7", a growth over the years can be seen for the inclusion of environmental requirements in procurement projects in "The Other 18" countries. Bouwend Nederland (2019) found that 27,2% of the award criteria used in the Dutch infrastructure sector sustainability was considered. They considered public procurement projects from 2018 with a financial size above the European threshold and using an open procurement procedure. Kippo-Edlund (2005) found that 7% of the selection criteria, 13% of the technical specifications, 13%, of the award criteria and 0% of the contract performance clausules considered sustainability. Additional to the inclusion of environmental requirements in the invitation to bid, Kippo-Edlund (2005) looked at the inclusion of environmental requirements in the award decision as well. It was found that although 60% of the procurement projects included some kind of environmental requirements, most of the times they were not considered in the assessment of the bid. Faith-Ell (2005) found that despite environmental requirements were often included, they were rarely seen in the follow-up. They looked at an exploratory case study on the fulfilment and follow-up of environmental requirements and an in-depth case study on the fulfilment and follow-up of environmental requirements.

Two researches considered the achievable weight of the environmental requirments. Fuentes-Bargues (2017) found that an average weight of 5,7% of the total score could be obtained by the environmental requirements. Bouwend Nederland (2019) found that in 58,4% of the procurement projects in which environmental requirements were included, the average weight was less than 15%.

For the most included topics of environmental requirements included, Fuentes-Bargues (2017) found an Environmental Action Plan. Faith-Ell (2005) found as most commonly used environmental requirements environmental services, environmental products and an Environmental Management Systems. Bouwend Nederland (2019) found as main environmental requirements the CO_2-Performance scale ("CO_2-prestatieladder)/level of ambition, the sustainable execution of the process and a sustainable result.

3.5 Conclusion: Towards a Procurement Database

Based upon the discussed literature an answer to the first sub-question *"How can a procurement database to analyse the inclusion of environmental requirements be constructed?"* can be given. A content analysis has been found the most suitable method to investigate the incorporation of environmental requirements in the procurement process of the Dutch construction sector. Four main research steps have been found from previous research.

Step 1: Collection and Characterisation of the Procurement Data

By means of literature study to the Dutch procurement process (section 3.1), it was found that three documents have to be obtained to analyse a procurement project: the invitation to bid, the bid and the assessment of the bid. For a procurement project different characteristics can be considered. Characteristics of the Dutch procurement process and characteristics found in previous researches will be used. A list of characteristics used in previous research is available in Appendix B.

Step 2: Labeling of the Environmental Requirements

A list has been made of the labels found in previous research, to form an example. The list can be found in Appendix A. Following the research of Testa (2016) and the EU Toolkit, the labels can be categorised into five element. These elements will be slightly adjusted to the purpose of this research, as can be seen in table 9.

Table 9 – Terms and Description of the Five Elements

European Toolkit	**This Thesis**	**Description**
Subject Matter	Textual Reference (TR)	The usage of a textual reference to sustainability, to which no mandatory requirements are attached.
Selection Criteria	Selection Criteria (SC)	The usage of sustainable selection criteria, to which mandatory requirements are attached for the contracting organization.
Technical Specifications	Technical Specifications (TS)	The usage of sustainable technical specifications, to which mandatory requirements are attached for the project.
Award Criteria	(Sub-)Award Criteria ((S)AC)	The usage of sustainable (sub-)award criteria, to which a qualitative assessment of the inclusion of sustainability in the project is attached.
Contract Performance Clauses	Contract Performance Clauses (CPC)	The usage of sustainable contract performance clauses, to which mandatory requirements for a sustainable realization and delivery of the project are attached.

Step 3: Processing the Results

It was found that the value of the environmental requirements is perceived most difficult to include in the content analysis. The distinction of "solid green" and "light green", as proposed by Bouwer (2006), has been found most suitable for this thesis. Whereas most distinctions proposed are very time consuming and difficult to interpret, the distinction proposed by Bouwer (2006) provides a clear separation of the amount of sustainability included in procurement. "Solid green" projects contain three or more environmental requirements and "light green" projects contain one to three environmental requirements.

Step 4: Proposal, Conclusions and a Discussion

The last step found in previous content analysis is the inclusion of a proposal for the development of environmental inclusion, a conclusion and a discussion of the results.

4

The Construction of the Procurement Database

Three steps were taken to construct the procurement database. First of all, procurement data was collected, providing an answer to the second sub-question *"What procurement data can be derived?"*. Secondly, a procurement database structure was made. Third, the content was analysed and the procurement database structure was filled.

4.1 Collecting the Procurement Data

The procurement data used in this research was derived from a database of Sweco. In this database the documents of procurement projects are stored. Following the procurement process as stated by Ridder (2009), PianOo (n.d.) and Born (2018), all three documents of the invitation to bid, the bid and the assessment of the bid have to be available for a procurement project to get a complete overview of the inclusion of environmental requirements in the procurement process. The procurement projects were checked on the availability of all three procurement documents. It was found that only 35 of the 118 procurement project available were complete. In order to increase the amount of complete projects, the following steps were taken. First of all, it was asked to the tender managers to upload all their procurement documents and projects. Secondly, in cooperation with the team leader of the BidCenter the responsible tender manager per incomplete procurement project was found. Each of these tender managers was then contacted by email to send the missing documents of their procurement project. Next to contacting the tender managers by email, multiple face-to-face meetings were planned to collect the missing documents. Eventually, the database consisted of 134 procurement projects from which 70 projects were complete. The list with procurement projects and their corresponding completeness can be found in Appendix C.

4.2 The Procurement Database Structure

The structure of the procurement database consists of four main categories. In the first category general characteristics of the procurement projects are gathered. In the second category sustainability in the invitation to bid, in the third category sustainability in the bid and in the fourth category sustainability in the assessment of the bid is considered. The structure of the database was made in excel.

4.2.1 Procurement Data Characteristics

Based on the literature study, the characteristics can be divided into general information, costs, procurement procedure and assessment procedure. The included characteristics for the general information can be seen in table 10. First the client and project name are stated. Hereafter, the classification of the client, as was seen in the project process stated in section 2.3, whether it is an public or private client and whether it is an intern or extern project of Sweco is included. An intern project is a project to which Sweco itself proposes a bid. An extern project is a project in which Sweco advices another organization how to propose a bid. Last, the month, year and the contract forms are included.

Table 10 – Data Characteristics General Information

Nr.	General Information							
	Client	**Project**	**Classification**	**Public/ Private**	**Intern/ Extern**	**Month**	**Year**	**Contract Form**
X	Organisation Name	Project Name	Contractor, Municipality, Province, Ministry, Independent Regulator	Public, Private	Intern, Extern	Month	Year	Design, Build, Finance & Maintain; Design, Build, Maintain; Design & Construct; Engineering & Construct; Performance Contracts; Traditional contracts based on RAW-systematics; Hybrid Contracts; Framework Contract Engineering

The included characteristics for the costs, procurement procedure and assessment method can be seen in table 11. First of all, seven financial categories are considered, based upon the European Threshold. Next, it is considered if the procurement procedure consists of a framework agreement, procurement additional to a framework agreement and whether one of the international or national procedures is used. For the international and national procedures, only the main procedures as seen in section 3.1.1 are considered. For the assessment method the used method of BPQR, Lowest Costs or Lowest Price, the predefined assessment of discount or points, the number of award criteria included and the maximum obtainable score were considered.

Table 11 – Data Characteristics costs, procurement procedure and assessment method

Costs	Procurement Procedure			Assessment Method			
	Framework	**Additional procurement to Framework**	**International or National Procedure**	**Method**	**Predefined Assessment**	**Number of Award Criteria**	**Max Possible Score**
0-200.000 200.000-500.000 500.000-2.000.000 2.000.000-5.400.000 5.400.000-10.000.000 10.000.000-50.000.000 50.000.000-200.000.000	Yes; No	Yes; No	International Open, International Restricted, International Competitive Dialogue, National Open, National Single or Multiple Negotiated Procurement	BPQR; Lowest Costs; Lowest Price	Discount; Points	3	Max. Score

4.2.2 Sustainability in the Invitation To Bid

In the second category the environmental inclusion in the invitation to bid is considered. General environmental data, specific environmental data, environmental (sub-)award criteria data and environmental sub-award specific data are included. In table 12 the characteristics considered for the general and specific environmental data can be seen. It is checked whether sustainability is included in the invitation to bid and if so, what type of element the environmental requirement is. The element can be a textual reference, selection criteria, technical specification, (sub-)award criteria or contract performance clause. For each environmental requirement also specific environmental data is considered. A label of the sustainable topic concerned is given to the environmental requirement, based on the list of labels derived from the literature study in Appendix D. Also, a description of the label will be given. Last, extra comments will be given on the project specific usage of the environmental requirement, to make the reasoning of the author traceable.

Table 12 – General and Specifc Environmental Data in the Invitation to Bid

Nr.	**General Environmental Data**		**Specific Environmental Data**		
	Sustainability Included?	**Element:**	**Label**	**Description**	**Extra Comment**
X	Yes; No	Textual Reference - TR; Selection Criteria - SC; Technical Specification - TS; (sub-)Award Criteria - (S)AC; Contract Performance Clausule - CPC	Environmental Label	Description of the Label	Comment on the project specific usage of the label

If the element of the environmental requirement is an award- or sub-award criterion, extra information needs to be included. As can be seen in table 13, the weighting of the (sub-)award criterion is taken into account. If no weight is given to the environmental (sub-)award criterion, it will be noted that the weighing was unknown. Sometimes, the (sub-)award criterion is partially about sustainability. Therefore, it will be stated if the (sub-)award criterion is fully or partially about sustainability and if partially, which part of the (sub-)award criterion is about sustainability. For specifically the sub-award criteria it is stated to which award criterion it is subordinated and what the weighting of that superior award criterion is.

Table 13 – Environmental (sub-) award criteria data and sub-award specific data in the invitation to bid

Environmental (Sub-)Award Criteria Data			**Environmental Sub-Award Criteria Specific Data**	
Weighting	**Full/Partially Sustainable**	**If Partially, which part**	**Part of Award Criterium:**	**Weighting**
Weighting of the (Sub-) Award Criterion or Unknown	Fully Sustainable; Partially Sustainable	Explanation or Unknown	Award Criterion	Weighting of the Award Criterion or Unknwon

4.2.3 Sustainability in the Bid

In the fourth category of the database structure the environmental inclusion in in the bid is considered. As can be seen in table 14, general environmental data, specific environmental data and environmental sub-award criteria specific data is considered. For the general environmental data it is stated whether sustainability is included in the project and which element is considered for the environmental requirement found. In the bid only award and sub-award criteria are considered. The bid is made based upon the stated (sub-)award criteria in the invitation to bid and will also be assessed based upon them. Therefore, all the environmental requirements proposed in the bid are considered an award- or sub-award criterion. The specific environmental data characteristics considered are the same as for the invitation to bid. For the sub-award criteria it will be tracked to which award criterion it is subordinated.

Table 14 – General, specific and sub-award specific environmental data

Nr.	**General Environmental Data**		**Specific Environmental Data**			**Environmental Sub-Award Criteria Specific Data**
	Sustainability Included?	**Element**	**Label**	**Description**	**Extra Comment**	**Part of Award Criterion**
X	Yes; No	(Sub-)Award Criteria – (S)AC	Environmental Label	Description of the Label	Comment on the project specific usage of the label	Award Criterion

4.2.4 Sustainability in the Assessment of the Bid

In the last category of the procurement database structure the environmental inclusion in the assessment of the bid is considered. As can be seen in table 15, general environmental data, specific environmental data, environmental (sub-)award criteria data and environmental sub-award criteria specific data are included. In the general environmental data it is considered whether the project was won, whether sustainability was included which element was considered for the environmental requirement. Just like in the bid, only an award criterion and sub-award criterion are considered as an element, since only the requested (sub-)award criteria in the invitation to bid are taken into account in the assessment of the bid. Next to the specific environmental data characteristics of a label, description and extra comments, the feedback about sustainability is tracked. It is tracked whether feedback was given on the environmental requirements and if so, it was tracked whether the feedback was fully or partially about sustainability.

Table 15 – General and specific environmental data in the assessment of the bid

Nr.	**General Environmental Data**			**Specific Environmental Data**			
	Won/ Lost	**Sustainability Included?**	**Element**	**Label**	**Description**	**Feedback about Sustainability**	**Extra Comment**
X	Yes; No	Yes; No	(Sub-)Award Criteria – (S)AC	Environmental Label	Description of the Label	Feedback about sustainability; Feedback Partially about sustainability; No feedback	Comment on the project specific usage of the label and feedback

As can be seen in table 16, the received score is taken into account for the (sub-)award criteria. If no score is provided, unknown is written down. It is also included whether the (sub-)award criterion is fully or partially about sustainability and if partially, which part. For specifically the sub-award criteria is tracked to which award criterion it is subordinated and what the received score of the superior award criterion is.

Table 16 – Environmental (sub-)award criteria and sub-award criteria specific data in the assessment of the bid

Environmental (Sub-)Award Criteria Data			**Environmental Sub-Award Criteria Specific Data**	
Score (S)AC	**Full/Partially Sustainable**	**If Partially, which part**	**Part of Award Criterium**	**Score AC**
Score Given or Unknown	Full; Partially	Explanation or Unknown	Award Criterion	Score Given or Unknown

4.3 Filling the Procurement Database

The procurement data has been analysed in a systematic manner with regular evaluation meetings to increase the reliability. This was done by using a content analysis tool, starting the analysis with investigating the ten procurement projects expected to be most sustainable and following the method of Testa (2016b) to evaluate the performance of the analysis after 10% and 50% completion.

4.3.1 A Content Analysis Tool: Atlas TI

Due to the large amount of 70 procurement projects consisting of 333 procurement documents to analyse, a content analysis tool has been used. A content analysis tool makes performing the analysis easier, less time consuming and more structured (Cheng, 2018). The content analysis tool used is Atlas TI, a sophisticated tool to help arrange, reassemble and manage large bodies of textual data for qualitative analysis (AtlasTI, n.d.). In Atlas TI open coding can be used to label the environmental requirements found in the procurement documents. The labels given to the environmental requirements can always be traced back. Three steps were taken to use Atlas TI.

The first step was to upload the procurement documents and organize them in Atlas TI. In Atlas TI document groups were created for each of the 70 procurement projects, the total of invitations to tender, the bids and the assessments of the bids. This resulted in 73 document groups. Consequently, the documents were traceable for both the project name and the type of procurement document. In total 333 documents were uploaded.

The second step consisted of organising the used labels by creating label groups. A label group was made for each of the data characteristics as proposed in the procurement database structure. In each label group the corresponding labels were put. If an environmental requirement was found, it was checked whether a label from previous research was suitable or that a label had to be created. Due to the usage of the label groups the used labels were easy to trace and adjust.

The third step consisted of creating searching terms. Analysing the 333 documents can be done more time efficient with the usage of searching terms. However, the searching terms are not fully reliable to find all the environmental requirements in the procurement documents. For example, images cannot be scanned in Atlas TI. Therefore, the searching terms were only used as a help to make scanning the documents faster.

4.3.2 The first best 10 projects

The first procurement projects analysed were procurement projects likely to contain the most environmental requirements, to verify the completeness of the list of labels for environmental requirement topics derived from previous research, as done by Testa (2016b) and Kippo-Edlund (2005). The list can be found in appendix A. In these first best ten projects a large amount of environmental topics concerned in the Dutch construction sector will be discussed. Consequently, it could be seen whether labels in the list were missing or needed to be adjusted. When the appropriate label was difficult to assess to an environmental requirement, a second opinion was asked to one of the procurement experts from Sweco. After analysing the first best ten projects, a complete list of environmental labels would be created. Also, a sufficient list of searching terms to use in Atlas TI could be made. To come up with the first best ten projects, the team leader of the BidCenter provided a list of the ten projects containing presumably the most environmental requirements, as can be seen in table 17. The adjustments made to the structure of the database and list of labels as a result of the analysis of the first best ten projects were discussed during the 10% meeting.

Table 17 - First 10 projects analysed

Nr.	Purchasing Organisation	Projects
1	De Jong Zuurmond	HM Onderhoudscontract
2	Gemeente Almere	3 Bruggen
3	Gemeente Blaricum	Herinrichting Bijvanck
4	PNB	GOL
5	PNH	Duinpolderweg PNH PZH
6	PNH	Toonbankdiensten Wijckerpoort-Wijckermolen
7	PU	Busstalling Westraven
8	PZH	N206 Europaweg
9	VRA	AVANT
10	VRA	Raamovereenkomst Vervoerregio Amsterdam

4.3.3 The 10% Meeting

In the 10% meeting the adjustments to the list of environmental labels, the scope and the searching terms were discussed with the first supervisor and company supervisor of this thesis and the sustainability expert from Sweco. Ten labels were added by analysing the first best ten projects and the label “Circularity” was split into “Circular Process” and “Circular Measures” based on feedback from the supervisors. Also, the descriptions of the labels were verified with the supervisors. The final list of labels and their description can be seen in table 18.

Table 18 – Final List of labels used in the analysis and their description

Nr	Label	Included in Literature?	Description
1	Circular Process	X	The inclusion of circularity in the process is requested or proposed.
2	Circular Measures		The inclusion of circular measures is requested or proposed.
3	Energy Transition	X	The reduction of energy usage or the usage of energy neutral products is requested or proposed.
4	Environmental Action Plan	X	Process steps to include sustainability in the project are requested or proposed.
5	Environmental Quality	X	The incorporation or consideration of the quality of the environment, being surroundings, flora and fauna, is requested or proposed.
6	Flora & Fauna Compensation		The compensation of lost flora and fauna due to the project works is requested or proposed.
7	Sustainable Ambitions		The ambition of the employer or contractor considering sustainability is incorporated in the document.
8	Sustainable Affordability		The inclusion of the costs and financial feasibility of the requested or proposed sustainable measures.
9	Sustainable Awareness		The creation of awareness of sustainable problems and solutions among the employer or stakeholder is requested or proposed.
10	Sustainable Certification	X	An Environmental Management System, Eco-Label or Green Deal is asked for or proposed (rating tool), for example the CO_2-performance scale, LEED, BREAAM, ISO14001 or Green Deal GWW.
11	Sustainable Cooperation	X	Sessions in which the employer and contractor work together on sustainability are requested or proposed.
12	Sustainable Critical Success Factor		Sustainability is incorporated in the Critical Success Factors.
13	Sustainable Design		A sustainable design of the product is requested or proposed.
14	Sustainable Development	X	The urge to learn and innovate the sustainable processes or products is requested or proposed.
15	Sustainable Experience	X	Experience in working with sustainable problems and solutions is proposed or requested, for example work done in previous projects.
16	Sustainable Expertise	X	Knowledge of sustainability is requested or proposed.
17	Sustainable Exposure	X	Sharing sustainable performances or works among stakeholders for a positive appearance is requested or proposed.
18	Sustainable Maintenance		The inclusion of sustainability in the maintenance strategy is requested or proposed.
19	Sustainable Material	X	The reusage, reduction of usage or usage of sustainable materials is requested or proposed.
20	Sustainable Mobility	X	The usage of electrical vehicles or solutions regarding more efficient traffic to reduce CO_2 emission is mentioned.
21	Sustainable Performance-Based Tools	X	Tools to assess the performance of the product concerning sustainability are requested or proposed, such as LCA, Dubocalc or the “Koraalmodel”.
22	Sustainable Research		Research to sustainability is requested or proposed.
23	Sustainable Reference		A reference to another document is made for sustainable information.
24	Sustainable Specialist		An expert in the field of sustainability, fully or partially, is proposed or asked.

In the 10% meeting scope adjustments were made for missing appendices, not included selection criteria, missing contracts, missing interview and environmental researches, risks and permits.

Missing Appendices
It was noticed that in the documents of the first best ten projects appendices were missing. The appendices do often contain working packages, which specify the technical specifications or selection criteria. It was decided that but when appendices were missing they could be left out of the scope of the project, since collecting all the extra documents would cost too much time. Despite the missing appendices, the technical specifications and selection criteria were still considered in the analysis.

Selection Criteria Not Included
When additional procurement to a framework agreement or a private procurement procedure is used, the selection phase has been finished before the invitation to bid is made. Consequently, the selection criteria are stated in another document than the invitation to bid and no selection criteria can be found for procurement projects where these documents are missing. Due to the amount of time needed to collect all the missing documents, it was decided to leave these documents out of the scope of the research. Also, it was stated by the team manager of the BidCenter that when environmental selection criteria are included in the selection phase, the criteria should also be included in the invitation to bid. Therefore, the selection criteria were still included in the analysis.

Missing Contracts
Since the contract is mostly agreed upon after the awarding of the project, the type of contract is not stated in all the procurement documents and contract performance clauses were rarely found. It has been decided to leave the contract form and contract performance clauses out of the scope of this research.

Missing Interviews
An award criterion often seen was conducting an interview with the project team proposed in the bid. Based on the quality of the answers given during the interview, a discount can be obtained. However, the interviews are mostly not documented. Consequently, the interviews could not be analysed. The award criterion interview has therefore been considered out of the scope of this research.

Environmental Researches, Risks and Permits
In the invitation to bid sometimes including environmental researches, risks or permits is requested. These request do only consider the assessment of the current state of environment of the project and not the improvement of the environmental impact of the project, as investigated in this thesis. It was therefore decided that the environmental researches, risks and permits are left out of the scope of the research.

Last, the searching terms were verified with the supervisor. Hereafter, the searching terms were used as a help to read the documents. The full list of searching terms used and their explanation can be found in appendix E.

4.3.4 The 50% Meeting

After completing the analysis of 40 procurement projects, the 50% meeting was planned to evaluate the findings and adjustments found. The labels, searching terms and scope were again checked. Due to the extensive 10% meeting, no adjustments were found necessary this time. Also, performing the analysis went a lot faster from now on, due to the usage of the searching terms.

4.4 Conclusion

In this chapter the second sub-question *"What procurement data can be derived?"* has been answered, a procurement database structure has been made and filled in a structured way. It was checked whether the procurement projects in the procurement database of Sweco contained an invitation to bid, bid and assessment of the bid. After collecting missing procurement documents and projects by contacting tender managers, a total of 70 complete procurement projects consisting of 333 procurement documents was gathered.

Hereafter, a procurement database structure was made consisting of four categories: procurement data characteristics, sustainability in the invitation to bid, sustainability in the bid and sustainability in the assessment of the bid. The database structure was filled in a structured way, to provide a sound starting point for its analysis. The ten projects likely to contain the most environmental requirements were analysed first, to verify the environmental labels used in the analysis and after completing 10% and 50% of the analysis evaluation meetings were planned, to discuss findings and scope adjustments. Six important scope changes were made. It was noticed that, despite the procurement database was made complete for the invitation to bid, bid and assessment of the bid, still information was missing. Documents including selection criteria, contract performance clauses, technical specifications or assessment interviews were missing. It was decided that the contract performance clauses and assessment interviews were considered out of the scope of the research. The selection criteria and technical specifications were kept included in the scope of the research, because these were not always missing and should also be stated in the invitations to bid. Furthermore, environmental researches, risks and permits were considered out of the scope of the research. These environmental requirements discuss the current state of the environment of the project, instead of improving the environmental impact of the project, as investigated in this thesis. The content analysis tool Atlas TI has been used to make performing the analysis more time efficient.

5

Results of the Content Analysis

The discussion of the results obtained from the procurement database consists of five parts: the results of the data characteristics, the environmental inclusion in the projects, the environmental topics concerned, the environmental requirements not included in the assessment and the environmental requirements included in the assessment. Together, the four parts will answer the sub-questions *"To what extent are environmental requirements used in the procurement database?" and "What patterns can be found in the procurement database?"*.

5.1 Procurement Data Characteristics

In the procurement database mostly public procurement projects between the years 2016 and 2019 from provinces or independent regulators using a negotiated procurement procedure in the Dutch construction sector were seen. 29 different clients, mostly provinces and independent regulators, have been found in the 70 procurement projects. In 80% of the 70 procurement projects public procurement was considered. 96% of the projects took place between 2016 and 2019. The main procurement procedure used was the negotiated procurement procedure. In 26% of the procurement projects a framework agreement was considered and in 29% of the projects was procurement additional to a framework agreement. Most of the time (67%) 3 or 4 award criteria were requested. The assessment of the award criteria was done almost equally with points (47%) or discount (53%). A total of 68% of the projects had a financial size beneath the European threshold. The precise number of projects per client and detailed results of the data characteristics can be found in appendix F.1.

5.2 Inclusion of Environmental Requirements in the Projects

A lower inclusion of environmental requirements has been found for the assessments of the bid compared to the invitation to bid and the bid. The environmental inclusion was looked at in three ways: the general inclusion, the "Solid Green" inclusion and the inclusion over time.

The General Inclusion

In the general inclusion of environmental requirements in the procurement projects, the percentage of projects containing minimal one environmental requirement, of any element or topic, is calculated. As can be seen in table 19, 46% of the 70 assessments of the bids contain an environmental requirement compared to 80% for the invitations to bid and 74% of the bids. A misalignment of environmental inclusion can be seen.

Table 19 – General Environmental Inclusion

(N=70)	Invitation to Bid		Bid		Assessment of the Bid	
	Yes	No	Yes	No	Yes	No
%	86%	14%	74%	26%	46%	54%

The "Solid Green" Inclusion

To differ between the amount of environmental requirements included in the projects, a distinction has been made between "solid green" projects, containing more than three environmental requirements and "light green" projects, containing three or less environmental requirements (Bouwer, 2006). As can be seen in table 20, 50% of the 70 procurement projects are "solid green" in the invitation to bid and 47% in the bid, compared to 16% "Solid Green" assessments of the bid. Again the misalignment is seen.

Table 20 – Inclusion of solid, light and non-green projects

(N=70)	Invitation to Bid			Bid			Assessment of the Bid		
	Solid Green	Light Green	Non Green	Solid Green	Light Green	Non Green	Solid Green	Light Green	Non Green
%	50%	36%	14%	47%	27%	26%	16%	30%	54%

The Inclusion over Time

The percentage of procurement projects containing an environmental requirement has been compared to the years 2016 until 2019. As seen in figure 3, an inclusion of around 85% of the projects including environmental requirements per year was found for the invitations to bid. For the bids a growth over time was seen from 14% in 2016 to a 100% in 2019. For the assessments of the bid also a growth over time was found. However, from 14% in 2016 to 68% in 2019. Despite the growth, always a lower percentage of inclusion was found for the assessment of the bid and again the misalignment was seen.

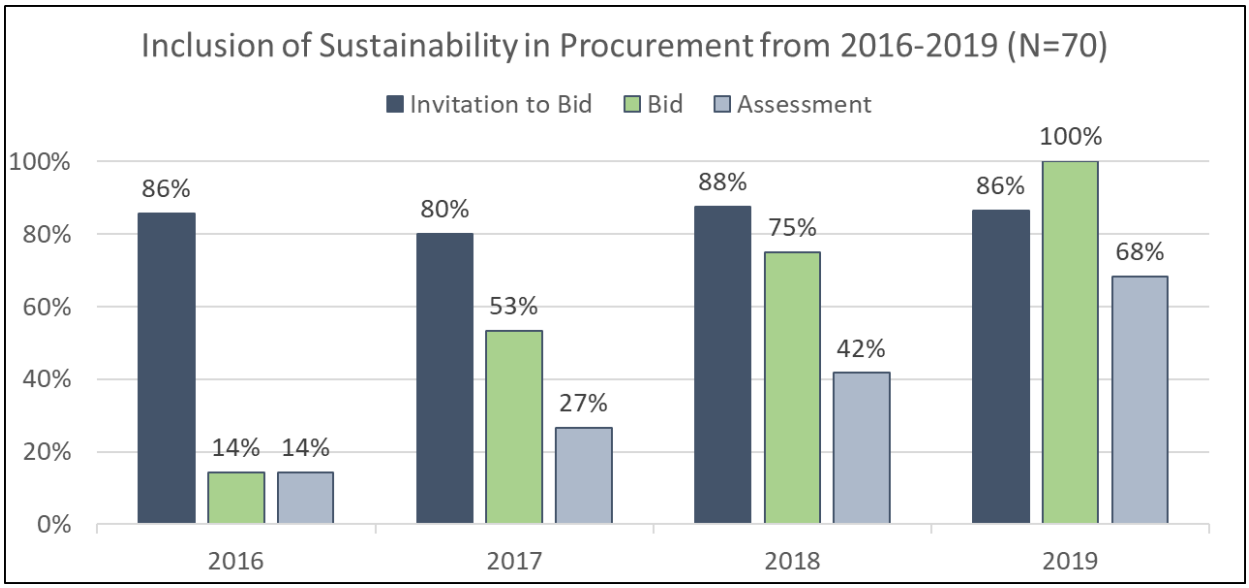

Figure 3 – Inclusion of Environmental Requirements per Year

5.3 Environmental Topics Concerned

Also for the environmental topics concerned in the procurement projects a misalignment was found in the assessment of the bid compared to the invitations to bid and the bids. The environmental topics have been analysed for the invitations to bid, the bids and the assessments of the bids and were then compared.

The Environmental Topics concerned in the Invitations to Bid

As can be seen in table 21, in the invitation to bid clients often state their sustainable goals as a textutal reference and translate these statements in the technical specifications and sub-award criteria. The inclusion of environmental requirements in the selection and award criteria has been found less frequently. If an environmental award criterion was used, this was most of the time with general, unspecific environmental topics. 68 environmental textual references were included, of which 30 times the topic sustainable ambition was used. The topic sustainable reference scored also high with 9 times used. Only 11 times an environmental selection criterion was used, of which the topic sustainable certification was 8 times used. In the technical specifications 77 times environmental requirements were included. The most used topics were an environmental action plan, used 16 times, sustainable ambitions, used 10 times, and sustainable research, used 9 times. 28 environmental award criteria were included. Almost always the topics environmental action plan, 12 times, or sustainable certification, 13 times, were included. A total of 253 award criteria was used in the invitations to bid, of which 11% was an environmental award criterion. The environmental sub-award criteria were included more often than the award criteria: 63 times. The most used topics were sustainable exposure, 10 times, energy transition, 9 times, an environmental action plan, 8 times, and sustainable cooperation, 8 times.

The Environmental Topics concerned in the Bids

In the bid a total inclusion of 36 environmental award criteria and 195 environmental sub-award criteria have been found. The topics environmental action plan and sustainable certification were most seen as an award criterion. This is a logical result, taking into account that these were also the most found topics of the award criteria requested in the invitations to bid. The environmental topics most seen for the sub-award criteria are a sustainable specialist, sustainable ambitions, sustainable experience, sustainable certification and sustainable cooperation. A standard set of proposed sub-award criteria has been found in the bids when an environmental action plan was requested in the invitation to bid. First, the sustainable ambitions, experience and certification of the contractor were elaborated. Next, cooperation with the client under the guidance of a sustainable specialist was proposed. Last, project specific additions were suggested.

The Environmental Topics concerned in the Assessments of the Bid

In the assessment of the bid 26 environmental award criteria and 39 environmental sub-award criteria have been found. For the award criterion an environmental action plan and a sustainable certification were the most used environmental topics. This was expected, since these were also the most seen award criteria topics in the invitation to bid and the bid. For the sub-award criteria it was seen that an environmental action plan was the most included label.

The inclusion of Environment Topics Compared

When comparing the environmental topics included in the invitations to bid, the bids and the assessments of the bid, the previously mentioned misalignment can be seen again. 5 times an award criterion and 34 times an sub-award criterion requested in the invitation to bid was not considered in the assessment of the bid. Meaning that in the assessment of the bid no feedback is given to the received score of the (sub-)award criterion. Also, 3 times an award criterion and 10 times a sub-award criterion was assessed, which was not mentioned in the invitation to bid. These (sub-)award criteria were included in the bid. Both in the invitation to bid and in the bid, mainly general and low detailed environmental topics, such as an environmental action plan, have been found. A much higher inclusion of environmental (sub-)award criteria has been found in the bid. Compared to the the invitation to bid, 8 more award criteria and 118 more sub-award criteria have been found. The large increase might be caused by the standard set of environmental topics proposed in the bid. Compared to the assessment of the bid, a misalignment of 13 not assessed award-criteria has been found. Also, 3 times an award criterion was assessed, which was not included in the bid. In this case, negative feedback was given in the assessment of the bid for the exclusion of the award criterion in the bid. A larger misalignment was found for the sub-award criteria of 156 not assessed criteria. No sub-award criteria were assessed, but not proposed in the bid. It can be seen that mainly the low detailed and general environmental topics of (sub-)award criteria are assessed and that the more detailed environmental topics proposed, such as a sustainable specialist, are not included in the assessments of the bid.

Table 21 – inclusion of the environmental labels

Inclusion of the Environmental Labels	**Invitation to Bid**					**Bid**		**Assessment of the Bid**		**Total**
Label Name	**TR**	**SC**	**TS**	**AC**	**SAC**	**AC**	**SAC**	**AC**	**SAC**	
Circular Process	5		4	1	2	2	6	1		21
Circular Measures					1		6		3	10
Energy Transition	4		2		9	1	8		2	26
Environmental Action Plan	2		16	12	8	15	11	12	9	85
Environmental Quality	1									1
Flora & Fauna Compensation			1							1
Sustainable Ambitions	30		10		5		24		1	70
Sustainable Affordability	1		3		1		6			11
Sustainable Awareness						1				1
Sustainable Certification	2	8	5	13	1	6	18	9	2	64
Sustainable Cooperation			7		8		18		3	36
Sustainable Critical Success Factor	1									1
Sustainable Design			2							2
Sustainable Development	5			1	3		6			15
Sustainable Experience		1			1	1	20		3	26
Sustainable Expertise	3	2	1		3		4		1	14
Sustainable Exposure			5		10	1	13	1	4	34
Sustainable Maintenance	2				2		1			5
Sustainable Material	1		1		2	2	8	1	2	17
Sustainable Mobility				1	3	2	3	1	2	12
Sustainable Performance-Based Tools	1		6		1	1	17		4	30
Sustainable Research	1		9				2			12
Sustainable Reference	9		5		1					15
Sustainable Specialist					2	4	24	1	3	34
Total	68	11	77	28	63	36	195	26	39	

5.4 Environmental Requirements not Included in the Assessment

The environmental requirements not included in the assessment of the bid have been analysed. It has been investigated in what percentage of the projects a minimum of one environmental requirement was missing in the assessment, in what percentage of the projects all the environmental requirements were missing in the assessment and what the environmental topics of the missing environmental requirements were. It was found that part of the misalignment is caused by the inclusion of environmental textual references, technical specifications and selection criteria, since these are not included in the assessment of the bid. Furthermore, it has been found that mainly detailed environmental topics included as a sub-award criterion are missing in the assessment of the bid.

Projects Missing one or more Environmental Requirements in the Assessment of the Bid

As can be seen in table 22, in 44% of the 70 procurement projects an environmental requirement was included in the invitation to bid and/or the bid, but not in the assessment of the bid. It has been analysed whether the misalignment occurred most between the invitation to bid and the assessment, the bid and the assessment or all three of the documents. In table 23 it can be seen that in 40% of the procurement projects an environmental requirement was included in the invitation to bid, but not in the bid. In 30% of the procurement projects an environmental requirement was included in the bid, but not in the assessment of the bid. In 26% of the projects an environmental requirement was included in both the invitation to bid and the bid, but not the assessment of the bid.

A possible explanation for the larger percentage of misalignment found for the invitation to bid is the inclusion of environmental requirements as a textual reference, selection criterion or technical specification. In 36% of the invitations to bid, environmental requirements of these elements were included. Since these elements are not considered in the awarding, they are not included in the assessment of the bid and a misalignment originates. A disadvantage of including environmental requirements only as a textual reference, selection criterion or technical specification is that by using these element, no environmental qualitative comparison of the bids can be made. 4% of misalignment was found for the award and sub-award criteria, which means that most of the time an environmental (sub-)award criterion was assessed, when it was requested in the invitation to bid. In conclusion, it can be said that the misalignment of environmental requirements included in the invitation to bid and the assessment of the bid is mainly caused by the inclusion of environmental textual references, technical specifications and selection criteria in the invitations to bid.

The found misalignment of 30% of the projects in which an environmental requirement is included in the bid, but not in the assessment of the bid, is mainly caused by sub-award criteria. 29% of the projects contain an environmental sub-award criterion in the bid which is not included in the assessment of the bid, compared to 4% for the award criteria.

Table 22 - General: Environmental Requirements included in the Invitation to Bid and Bid, but not in the Assessment of the Bid

(N=70)	Inclusion of an Environmental Requirement in the Invitation to Bid or the Bid, but not the Assessment	Inclusion of an Environmental Requirement in the Invitation to Bid and the Bid, but not the Assessment
%	44%	26%

Table 23 – Detailed: Environmental Requirements included in the Invitation to Bid and Bid, but not in the Assessment of the Bid

(N=70)	Inclusion of an Environmental Requirement in the Invitation to Bid, but not the Assessment								Inclusion of an Environmental Requirement in the Bid, but not the Assessment		
	TR	SC	TS	TR, SC and TS	AC	SAC	AC and SAC	Total	AC	SAC	Total
%	17%	6%	19%	36%	7%	6%	4%	40%	4%	29%	30%

Projects Missing all Environmental Requirements in the Assessment of the Bid

It can only be considered for the award and sub-award criteria whether all environmental requirements included in the invitation to bid and/or bid are missing in the assessment of the bid, since the other elements are not considered in the assessment of the bid. As can be seen in table 24, it almost never occurs that none of the proposed environmental award criteria is included in the assessment of the bid. However, for the environmental sub-award criteria this does occur. It has been found that in 6% of the invitations to bid and 17% of the bids all of the environmental sub-award criteria are not mentioned in the assessment of the bid. The misalignment is mainly caused by a lack of assessment of the sub-award criteria.

Table 24 – Environmental Requirements included in the Invitation to Bid or Bid, but all requirements are missing in the Assessment

(N=70)	Invitation to Bid		Bid	
	AC	SAC	AC	SAC
%	0%	6%	1%	17%

Environmental Topics of the missing Environmental Requirements

As can be seen in table 25, the environmental topics of the sub-award criteria most included in the invitation to bid and not in the assessment of the bid are energy transition, sustainable exposure, sustainable cooperation and sustainable ambitions. In the invitation to bid 41 times a sub-award criteria was considered, which was not considered in the assessment of the bid. For the bid, it has been found that mainly the environmental topics of the previously mentioned standard set sub-award criteria to fulfill an environmental request, are not assessed. The topics found most are sustainable specialist, sustainable ambition, sustainable certification, sustainable experience and sustainable cooperation. In conclusion it can be said, that mainly detailed environmental topics included as sub-award criteria are not included in the assessment of the bid.

Table 25 - Environmental Labels Included in the Invitation to Bid or Bid, but not Assessed

Environmental Labels Included in the Invitation to Bid or Bid, but not Assessed	Invitation to Bid		Bid		Total
Label Name	AC	SAC	AC	SAC	
Circular Process		2	1	6	9
Circular Measures				3	3
Energy Transition		7	1	6	14
Environmental Action Plan	3		4	3	10
Environmental Quality					
Flora & Fauna Compensation					
Sustainable Ambitions		4		23	27
Sustainable Affordability		1		6	7
Sustainable Awareness			1		1
Sustainable Certification	4		2	16	22
Sustainable Cooperation		5		15	20
Sustainable Critical Success Factor					
Sustainable Design					
Sustainable Development	1	3		6	10
Sustainable Experience		1	1	17	19
Sustainable Expertise		2		4	6
Sustainable Exposure		7		10	17
Sustainable Maintenance		2		1	3
Sustainable Material		2	1	6	9
Sustainable Mobility		2	1	1	4
Sustainable Performance-Based Tools					
Sustainable Research				2	2
Sustainable Reference		1			1
Sustainable Specialist		2	3	21	26
Total	8	41	15	146	

5.5 Environmental Requirements Included in the Assessment

For the environmental requirements included in the assessments of the bid, the environmental topics, avarge weight and inclusion of feeback has been analysed. It has been found that mainly low detailed environmental topics of award criteria were included in the assessments of the bid. For almost half of the environmental award criteria included in the assessment of the bid, no feedback was given about the received score. An avarage weight of 19,5& of the total score could be obtained by the award criteria. For 88% of the sub-award criteria it was unknown what the given weight is.

Environmental Topics included in the Assessment of the Bid

As can be seen in table 26 the environmental topics assessed most for both the award and sub-award criteria of the invitation to bid and bid are environmental action plan and sustainable certifications. More detailed environmental topics are not considered in the assessment of the bid.

Table 26 - Environmental Labels Included in the Invitation to Bid or Bid and Assessed

Environmental Labels Included in the Invitation to Bid or Bid, and Assessed	**Invitation to Bid**		**Bid**		**Total**
Label Name	**AC**	**SAC**	**AC**	**SAC**	
Circular Process	1		1		2
Circular Measures		1		3	4
Energy Transition		2		2	4
Environmental Action Plan	9	6	11	8	34
Environmental Quality					
Flora & Fauna Compensation					
Sustainable Ambitions		1		1	2
Sustainable Affordability					
Sustainable Awareness					
Sustainable Certification	9	1	4	2	16
Sustainable Cooperation		3		3	6
Sustainable Critical Success Factor					
Sustainable Design					
Sustainable Development					
Sustainable Experience				3	3
Sustainable Expertise		1			1
Sustainable Exposure		3	1	3	7
Sustainable Maintenance					
Sustainable Material			1	2	3
Sustainable Mobility	1	1	1	2	5
Sustainable Performance-Based Tools					
Sustainable Research					
Sustainable Reference					
Sustainable Specialist			1	3	4
Total	20	19	20	32	

Average Weight given to the Environmental (Sub-)Award Criteria

The average weight has been calculated by comparing the total weight given to the environmental award and sub-award criteria to the total obtainable score. A difficulty for this comparison was the sometimes partial inclusion of sustainability in an award or sub-award criterion, without knowing which part is about sustainability. Therefore, the calculation was done in two ways. In the first calculation, the (sub-)award criteria partially about sustainability were excluded from calculating the average weight. In the second calculation, the (sub-)award criteria partially about sustainability were included in calculating the average weight. As can be seen in table 27, an average weight of 19% has been found when the (sub-)award criteria partially about sustainability were excluded and an average weight of 19,5% when the (sub-)award criteria partially about sustainability were included. The average weight is only minimally influenced by the (sub-)award criteria partially about sustainability. Compared to the average weightings found by Bouwend Nederland (2019) of mostly 15%, a growth of the average weighting can be seen. Sometimes the weighting of an (sub-)award criterion was not stated. As can be seen in table 27 this has happened a lot for the sub-award criteria. Using method 1 88% of the weightings of the sub-award criteria was unknown and using method 2 78% was unknown.

Table 27 - Avarage weighting and unknown weightings in assessment of the bid

Avarage weighting and unknown weightings in assessment of the bid	**Method 1**			**Method 2**		
	Avarage Weighting	**Unknown Weighting (N=70)**		**Avarage Weighting**	**Unknown Weighting (N=70)**	
		AC and SAC	**SAC**		**AC and SAC**	**SAC**
%	19%	7%	88%	19,5%	17%	78%

Feedback given about the Received Scores

The feedback about the included (sub-)award criteria could be fully about sustainability, partially about sustainability or not included. As can be seen in table 28, on 46% of the award criteria included in the assessments, no feedback was given. About the sub-award criteria, always feedback was given. However, for 36% of the provided sub-award criteria, the feedback was only partially about sustainability.

Table 28 – Feedback given to the included (sub-)award criteria

Feedback Provided	**AC (N=26)**			**SAC (N=39)**		
	Yes	**Partially**	**No**	**Yes**	**Partially**	**No**
%	50%	4%	46%	64%	36%	0%

5.6 Conclusion

In this chapter the results of the content analysis have been discussed, providing an answer on the sub-questions *"To what extent are environmental requirements used in the procurement database?" and "What patterns can be found in the procurement database?"*.

First, the characteristics of the procurement projects were investigated, to know more about the kind of procurement projects analysed. In the procurement database mainly public procurement projects were seen between the years 2016 and 2019, from provinces or independent regulators, using a negotiated procurement procedure and with a financial size below the European threshold.

A lower inclusion of environmental requirements has been found in the assessment of the bid, compared to the invitations to bid and the bids. In 86% of the 70 invitations to bid, 74% of the bids and 46% of the assessments of the bid environmental requirements were included. 50% of the invitations to bid, 47% of the bids and 16% of the assessments were "solid green", containing three environmental requirements or more. When plotting the environmental inclusion against the years 2016 to 2019, around 85% of the projects including environmental requirements per year were found for the invitations to bid. For the bids a growth over time was seen from 14% in 2016 to 100% in 2019. For the assessments of the bid also a growth over time was found, from 14% in 2016 to 68% in 2019. Overall, misalignment was observed.

From the analysis three defects possibly causing the misalignment were found, as can be seen in figure 4. First of all, in 36% of the invitations to bid only an environmental textual reference, selection criterion or technical specification was included. These elements are not considered in the assessment of the bid and consequently a misalignment of the environmental inclusion between the invitation to bid and assessment of the bid originates. Secondly, in the invitation to bid mainly unspecific environmental topics, such as the inclusion of an environmental action plan, are requested. In the bid a standard set of detailed environmental topics of sub-award criteria, such as the inclusion of a sustainability specialist, was found to fulfill the requested requirements from the invitation to bid. However, in the assessment of the bid only the unspecific award criteria were included. Consequently, a misalignment between the environmental inclusion in the bid and the assessment of the bid originates. Thirdly, the assessment of the environmental requirements is often done minimally or insufficiently. The average weight of the (sub-)award criteria found was 19,5%. It was unknown for 88% of the included environmental sub-award criteria what score could be obtained. Moreover, no feedback was given on the received score of 46% of the award criteria included in the assessments. Only the general award criteria were minimally elaborated. Consequently, a misalignment originates between the requested criteria in the invitation to bid, the more detailed proposal in the bid and the minimal assessment of the bid.

In order to gather information about the cause of these problems and find possible solutions for them, interviews have been conducted with experts in the field of the procurement process of the Dutch construction sector.

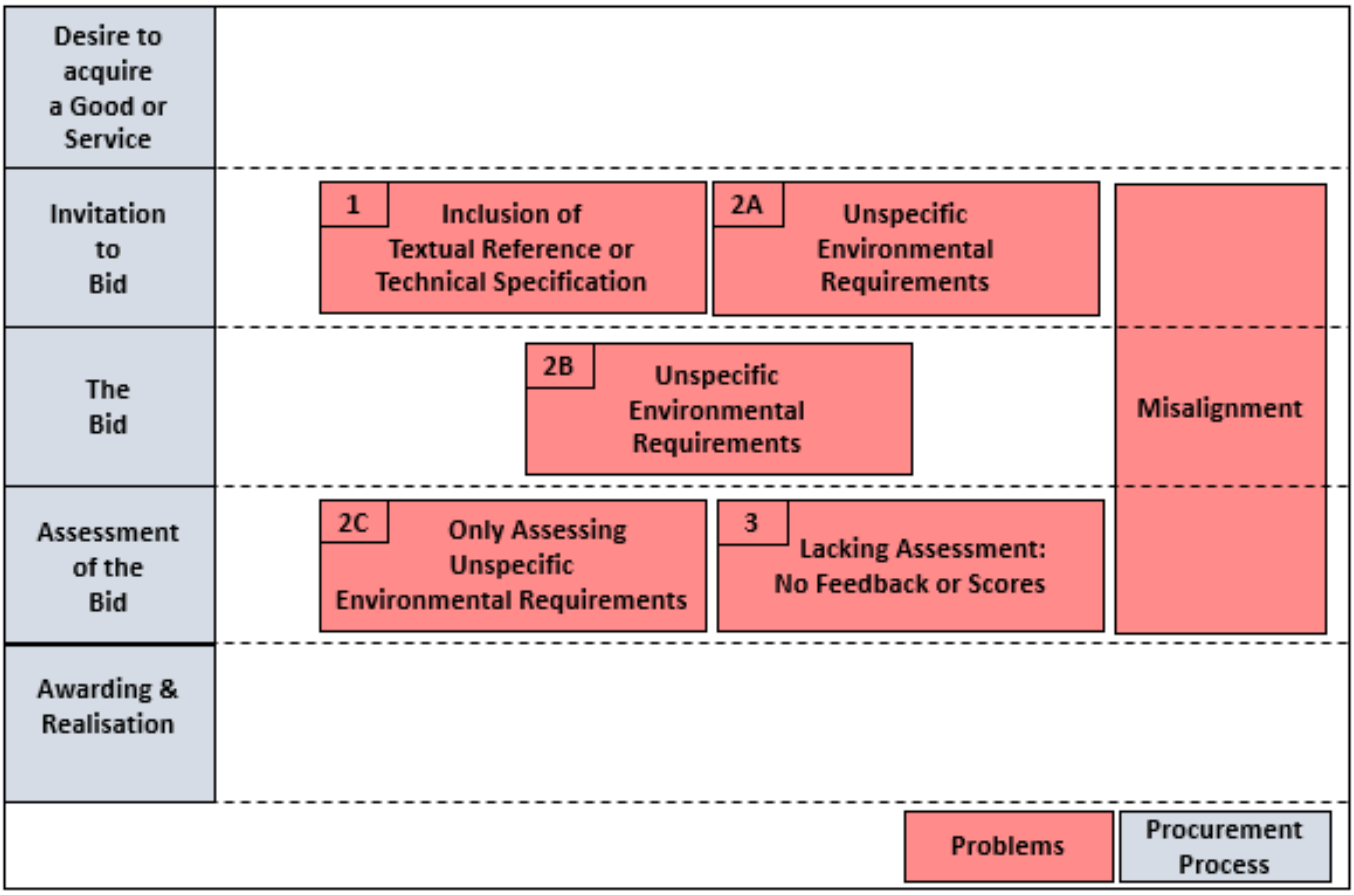

Figure 4 - Three Defects Found Causing the Misalignment

6

Evaluation of the Results with the Field

Experts have been interviewed to evaluate the results of the content analysis and to obtain more insight in possible causes or opportunities for the found misalignment. First of all, it will be discussed which experts were selected and how. Secondly, the expert interview set up will be elaborated. Third, the results derived from the interviews will be discussed. Fourth, the expert interview results will be interpreted. At the end of this chapter, a conclusion will be given and the last sub-question *"Are adjustments to the procurement process needed to develop the incorporation of environmental requirements in procurement of Dutch construction projects?"* will be answered.

6.1 The Experts

The experts were selected based on two requirements. First of all, the experts should be working in the field of purchasing construction projects and sustainability. These experts have knowledge of including environmental requirements and are therefore able to evaluate and compare the results of the content analysis. Secondly, the experts should work at provinces, because most of the projects considered in the procurement database were procured by a province. The network of Sweco was used to select and contact multiple experts. Eventually, four purchasing experts from the provinces of Zuid-Holland, Noord-Holland and Noord-Brabant have been interviewed, as can be seen in table 29.

Table 29 – Experts Interviewed

Interviewee	**Organisation**	**Expertise**
#1	Province of Zuid Holland	Strategic Purchasing Advisor
#2	Province of Noord Brabant	Senior Purchasor
#3	Province of Noord Holland	Program Manager Sustainability
#4	Province of Noord Holland	Manager Subsidy and Purchasing

6.2 Expert Interview Set up

The interview was made up of five parts and considered two main themes of questions. In the first part an introduction about the research was given. In the second part questions were asked about general results found in the research. The third part consisted of questions about the exclusion of sustainability in the assessment of the bid. The fourth part went into more detail about the cases where sustainability was included in the assessment. Last, the results found in the research were presented and the interviewee could ask questions. The two main question themes were questions evaluating the current usage of sustainability in procurement and questions about opportunities to enhance the inclusion of sustainability in the procurement process in the future. The evaluation questions resulted in problems perceived by the experts causing the misalignment and the opportunity questions resulted in opportunities to overcome the stated problems. In the end, a total of 17 questions was asked. The list of used questions can be found in Appendix G.1.

All the interviews were conducted using video calling, due to the obligation to stay at home to control COVID-19. A summary of the used terms and research method was made and sent to the interviewees, to let the experts understand the research. Details of the result were deliberately left out of the summary to prevent influencing the opinions of the interviewees. A presentation was made to make sure the interview would be structured. Conducting the interviews with the presentation and video calling was practiced beforehand to make sure the interviews would be finished in time.

6.3 Expert Interview Results

Three of the experts agree that the current way of including environmental requirements in insufficient and needs to be improved. One experts considers the current environmental inclusion sufficient. Together the experts mentioned eight problems causing the lack of environmental inclusion in Dutch procurement projects and seven opportunities to resolve the problems. The interdependency between the problems and opportunities can be seen in figure 5. The complete set of answers stated by the experts can be found in Appendix G.2

6.3.1 Problems

Clustering the results of the expert interviews, the following eight problems related to GPP.

Lack of Ambition
It was noticed by the experts that the ambition of employers to include sustainability differs on both a personal and departmental level. A misalignment of sustainable ambitions can result in differences of interpreting sustainable goals and realising sustainable projects. For example, a project team might see sustainability as an obstacle which slows down realising the project.

Lack of Knowledge
A problem considered by all the experts is the lack of knowledge about sustainability within their organisations. Due to the lack of knowledge, detailed ambitions, goals and standards cannot be stated. Also, it is not known how to include environmental requirements, which environmental requirements can be included and how to assess them. Furthermore, it is very difficult to measure and assess the value of sustainability included in a proposal. A lot of assumptions have to be made, which makes the assessment less reliable.

Lack of clarity

Due to the lack of clarity, it is not known how to translate the ambitions and goals into environmental requirements. As a result, only very general and unspecific environmental requirements are incorporated, which are difficult to meet for the contractor and difficult to assess for the client. This could be a reason for the misalignment found in the content analysis.

Lack of Skill

The experts state that the lack of skills available at the client are limiting the environmental inclusion, because only environmental requirements which can be assessed, carried out and monitored, can be included in procurement. Consequently, a lot of the environmental requirements cannot be included. Furthermore, a higher weight or bigger share of environmental award criteria cannot be substantiated in a good way. It was also stated that sometimes the assessment department meant to include sustainability in the assessment, but this was not noticed by the contractor. In this case there is a lack of skill to clarify the feedback.

Lack of Standards

A problem perceived by two of the experts is a lack of standards. There are not enough standards in place and the standards that are available, are too easy to meet. Consequently, sustainability is included only minimally. For example, the sustainable goal of a province can be standard included as a textual reference in the template of an invitation to bid. However, in the specification of the project itself sustainability is not found important enough and is not considered anymore. There are no sufficient standards to make a detailed inclusion of sustainability obligatory.

Lack of Familiarity

Whereas all organisations are familiar with requirements considering price or safety, environmental requirements are unfamiliar to include and are not embedded in the procurement projects. Often, the characteristics of a project are decided upon before the environmental requirements are included. Consequently, little budget and time is left for sustainability. Furthermore, sustainability is often combined with innovation requirements and is therefore not an object which stands on its own.

Lack of Importance

Formerly, sustainability was included as a “sub-sub-sub-criterion” and was not really taken into account. The experts state that this is not the case anymore, but that the weight of the environmental (sub-)award criteria is still insufficient. Because of the low weight given to environmental requirements, the (sub-)award criteria play a small part in the awarding and get little attention in the assessment. Consequently, the contractor will not ask about missing feedback on the environmental requirements, because there is no work lost due to the minimal part of sustainability in procurement.

Including sustainability is scary

Due to the lack of clarity and standards, it is difficult to include sustainability in a legally unquestionable way. The risk of legal procedures as a result of requesting environmental requirements is perceived scary for the clients. Especially for the inclusion of sustainability in an early stage, the legal complexity is high. Consequently, more common requirements like price and safety, which are already legally strong, get the most attention.

6.3.2 Opportunities

Seven opportunities were mentioned by the experts, to overcome the problems and develop the incorporation of environmental requirements in the procurement process. Each of this opportunities resolves one or several of the problems, as can be seen in figure 5.

Work Together

The most commonly mentioned opportunity was working together. Both at the clients and contractors knowledge and expertise is available. Sharing this knowledge and expertise can help to overcome the lack of knowledge and skill. Next to this, more frequently questions need to be asked to each other. When the client does not know how to include environmental requirements or does not know whether the market is able to fulfill the requested requirements, this needs to be asked to the contractor. The other way around, the contractor needs to ask explanation of the client when feedback or weights are not included in the invitation to bid or assessment of the bid. The environmental requirements might be assessed, but not written down in the assessment of the bid. An example of both sides working together is the green deal. When higher standards and requirements are shared, the inclusion of environmental requirements in the procurement process can be improved. To make this happen, competition and legal procedures need to be minimalised. Working together might consequently also help to overcome the fear for legal procedures of the client.

Include Sustainability Open in an Early Stage

Sustainability will be more embedded in a project by including environmental requirements in an early stage of the procurement process. Currently, all the characteristics of the project have already decided upon when sustainability is considered. As a result, little budget and time is left to include environmental requirements. When sustainability is included in the beginning of the project formulation, it can become part of the project instead of an adjustment. This will help to get clients become familiar with sustainability. By including low detailed environmental requirements in the early stage, there will be room for multiple scenario's to include sustainability in the project. If contractors are included in this process, they can come up with ideas for the open way sustainability is asked. As a result, their knowledge and expertise will be used better. Consequently, the level of ambition and importance can be increased.

Specify Criteria For Sustainability in a Later Stage

In a later stage of the procurement process sustainability needs to be specified. By offering more detail of the requested requirements in a later stage of the procurement process, it will be more clear for the contractor what is request and easier to assess the requirements for the clients. Consequently, it will be possible to substantiate a greater importance of sustainability and better specified standards can be made. This will help to overcome the lack of clarity, lack of standards and lack of importance.

Higher Standards

The environmental standards need to be more specific and of higher quality. The current standards available offer too little help for the inclusions of environmental requirements and are too easy to meet. Also, more standards need to be set up to offer more guidance for the incorporation of environmental requirements. Next to this, sustainability should be incorporated standard as a demand or an environmental award criteria instead of a sub-award criterion or textual reference. The correct balance needs to be found with the other standards used in procurement, but eventually the higher standards will make the environmental requirements more important and make it possible to consider higher ambitions.

Expand knowledge

More knowledge about sustainability has to be included in the organisations of the client and contractor in two phases. In the first phase environmental specialists need to be added to the procurement teams to advice the teams on the incorporation and assessment of environmental requirements. Also, the knowledge available in the market needs to be used more often. In the second phase sustainability has to be incorporated in the competencies of the procurement teams the same as for price, planning and safety. As a result, the lack of knowledge and lack of skill can be resolved.

Include Selection Criteria

The incorporation of environmental selection criteria will motivate contractors to invest in sustainability within their own organisation. For example, the usage of sustainable materials, such as electrical machines. For the client the inclusion of environmental selection criteria is also beneficial, because it shows external parties that the client only works with sustainable contractors. As a result, a positive external status is created. The inclusion of environmental selection criteria can help to overcome the lack of importance and ambition.

Use innovative ways of procuring

Different innovative ways of procuring can be used to overcome the lack of standards and the fear of legal procedures. By asking less requirements more opportunities to implement sustainability will be available for the contractor. Furthermore, long contracts can offer an opportunity to standardise the work and develop innovations. In "family procurement" multiple assets of the same kind, for example five bridges, will be procured. Consequently, standardisation and innovation can better be implemented. A disadvantage can be that this is a certainty for work, reducing the stimulus to innovate. This calls for good contract management.

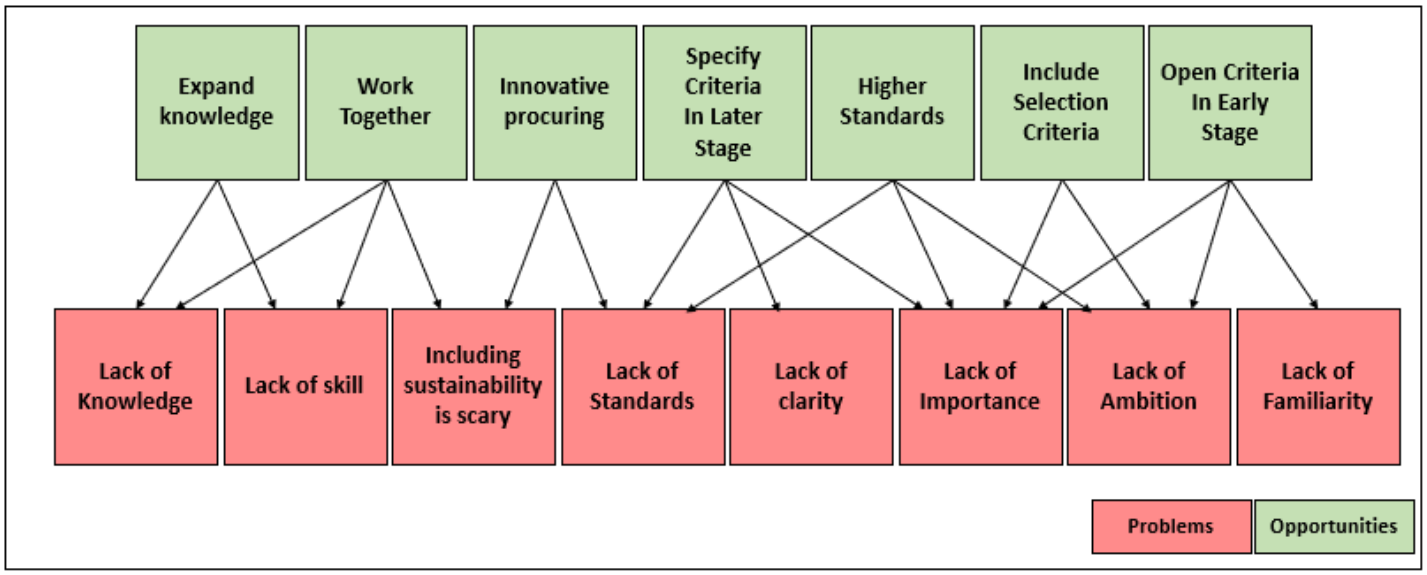

Figure 5 – Problems for environmental inclusion and corresponding opportunities

6.4 Interpreting the Expert Interview Results

The expert interview results have been interpreted, leading to a categorisation and a critical review.

6.4.1 Categorising the Experts Interview Results

The problems stated by the experts can be divided into two main categories: organisational and process orientated problems. The opportunities stated by the experts can be divided into three main categories: process orientated opportunities, working together and expand knowledge. The problems and opportunities have also been linked to the procurement process step they influence. Furthermore, the interdependency between the problems and opportunities has been incorporated. An overview can be seen in figure 6.

Organisational problems
During the interviews the experts mentioned several problems within their organisation which limit the inclusion of environmental requirements, being a lack of knowledge, a lack of skill, a lack of familiarity, a lack of ambition and including sustainability is scary. The lack of ambition and fear to include environmental requirements limit the desire to acquire a sustainable good or service. The lack of knowledge, skill and familiarity limit the inclusion and quality of environmental requirements in the invitation to bid, the bid and the assessment of the bid.

Process Orientated Problems
A lack of standards, importance and clarity are limitations within the procurement process and were therefore categorised as process orientated problems. The lack of standards limits the need to acquire sustainable goods and services. The lack of importance limits the incorporation of environmental requirements in the invitation to bid. The lack of clarity hinders the construction of the invitation to bid, the interpretation of the proposal in the bid and the performance of the assessment of the bid.

Process Orientated Opportunities
The experts proposed several opportunities which influence the procurement process, being the usage of innovative procurement procedures, higher standards, environmental selection criteria, open environmental requirements early in the procurement process and specific environmental requirements later in the procurement process. The inclusion of innovative procurement procedures, higher standards and open environmental requirements early in the procurement process influence the acquisition of sustainable goods or services. The inclusion of specific criteria in a later procurement process stage and environmental selection criteria improve the quality of environmental inclusion in the invitation to bid. The process orientated opportunities improve the inclusion of environmental requirements in the procurement process and as a result, reduce the process orientated problems. A procurement process of higher quality is easier to work with. Consequently, the process orientated opportunities also reduce the organisational problems.

Working Together
An opportunity mentioned often was working together. The increase of expertise, knowledge and feedback due to cooperation between the client and contractor reduce organisational problems through the whole procurement process.

Expand Knowledge

Another opportunity mentioned regularly was expanding knowledge. By acquiring more knowledge, it will be known which environmental requirements can be requested and how environmental requirements can be assessed. Also, better specified ambitions and goals can be stated. Consequenlty, sustainability will be more embedded in the organisation and the organisational problems will be reduced.

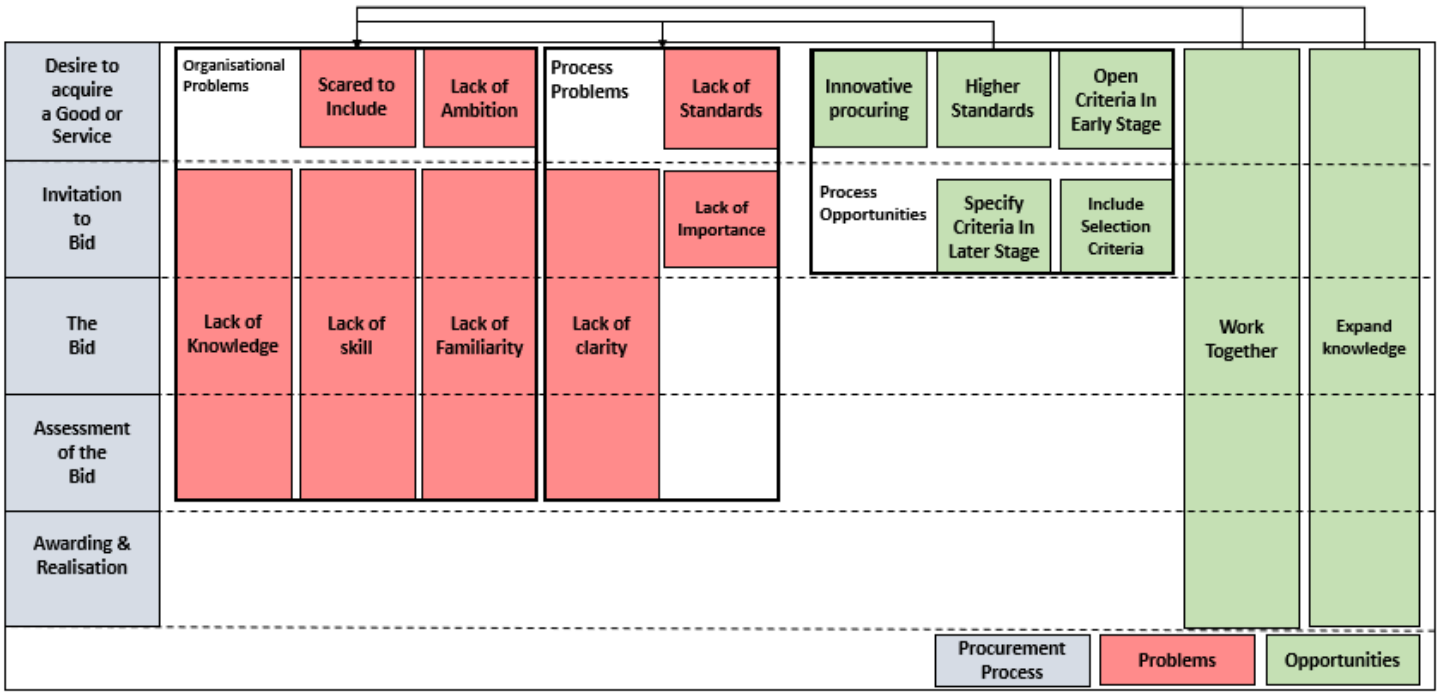

Figure 6 - Interdependency between the Categories of Problems and Opportunities

6.4.2 A Critical Look on the Experts Interview Results

By looking critically at the expert interview results, two problems were noticed: window dressing and a lack of responsibility of the experts. The two problems are caused by the absence of environmental management in the Integral Project Management (IPM) model. Nobody is accountable for the lack of environmental inclusion or responsible to improve the environmental inclusion.

Window dressing

Because the experts notice the lack of environmental inclusion and state ambitions to resolve them, one would expect that an improvement of actual environmental inclusion would have been noticed in the content analysis. However, for each of the years 2016 until 2019 the inclusion of actual environmental requirements in the invitation to bid, for example an award criterion, and feedback in the assessment of the bid was missing. Window dressing is seen: ambitions to improve the inclusion of environmental requirements are stated, but not realised.

The experts consider only others responsible

The experts only perceive other departments within their organisation or the contractor accountable for the problems:

- Other departments of the organisation hinder the inclusion of environmental requirements, due to a lack of ambition.
- Project teams limit the different environmental requirements which can be requested, due to a lack of skill and knowledge.
- Project teams perceive environmental requirements as a hinder to the realisation of the project, due to a lack of familiarity.
- The contractors limit the environmental inclusion due to legal procedures they confront the client with.
- The contractors hinder the development of environmental inclusion, because they do not provide feedback on unclear environmental requirements and missing scores.

and responsible to resolve the problems:

- Cooperation between the client and contractor will solve the problems.
- More knowledge is needed in other departments.
- Project teams should include sustainability earlier.

instead of considering their own mistakes and possibilities to resolve the mistakes.

Sustainability not included in the IPM-model

The experts perceive themselves not accountable, because they are not accountable. In fact, no one is really accountable for the lack of environmental inclusion and responsible for the development of opportunities to resolve the problems. This can be seen by looking at the Integral Project Management (IPM) model. The IPM-model is the Dutch standard used to structure the work to be done in construction projects. Five processes with a corresponding team role can be distinguished (Rijkswaterstaat, 2019). As can be seen in figure 7, sustainability is not included in the IPM-model. In discussions with sustainability experts of Sweco, it was stated that sustainability is often only included as a minor part of the task package of the technical manager. No one can really be held accountable for mistakes made when including sustainability. When sustainability is not taken into account, nobody loses work. Consequently, initiatives to really include sustainability are not taken and window dressing can be seen. This is summarised in figure 8.

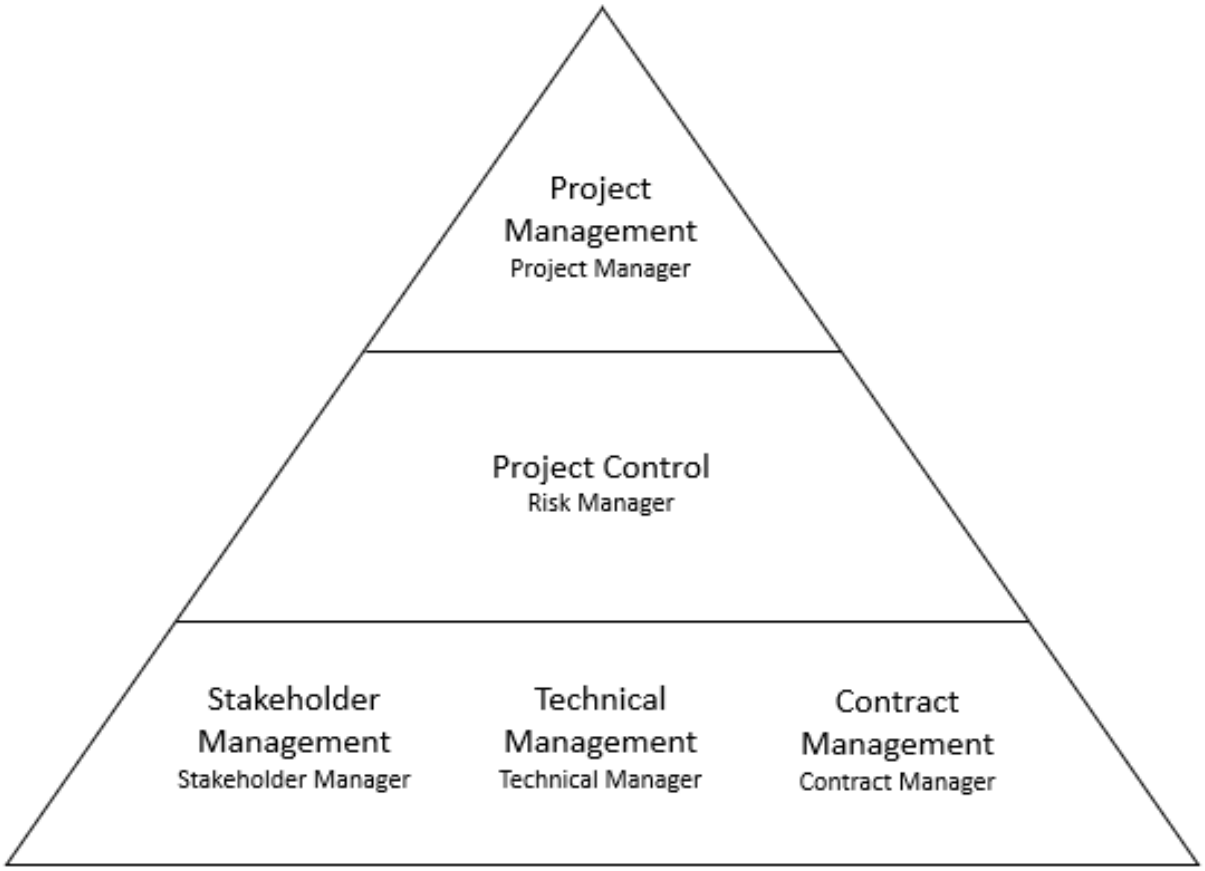

Figure 7 - IPM-model (Rijkswaterstaat, 2019)

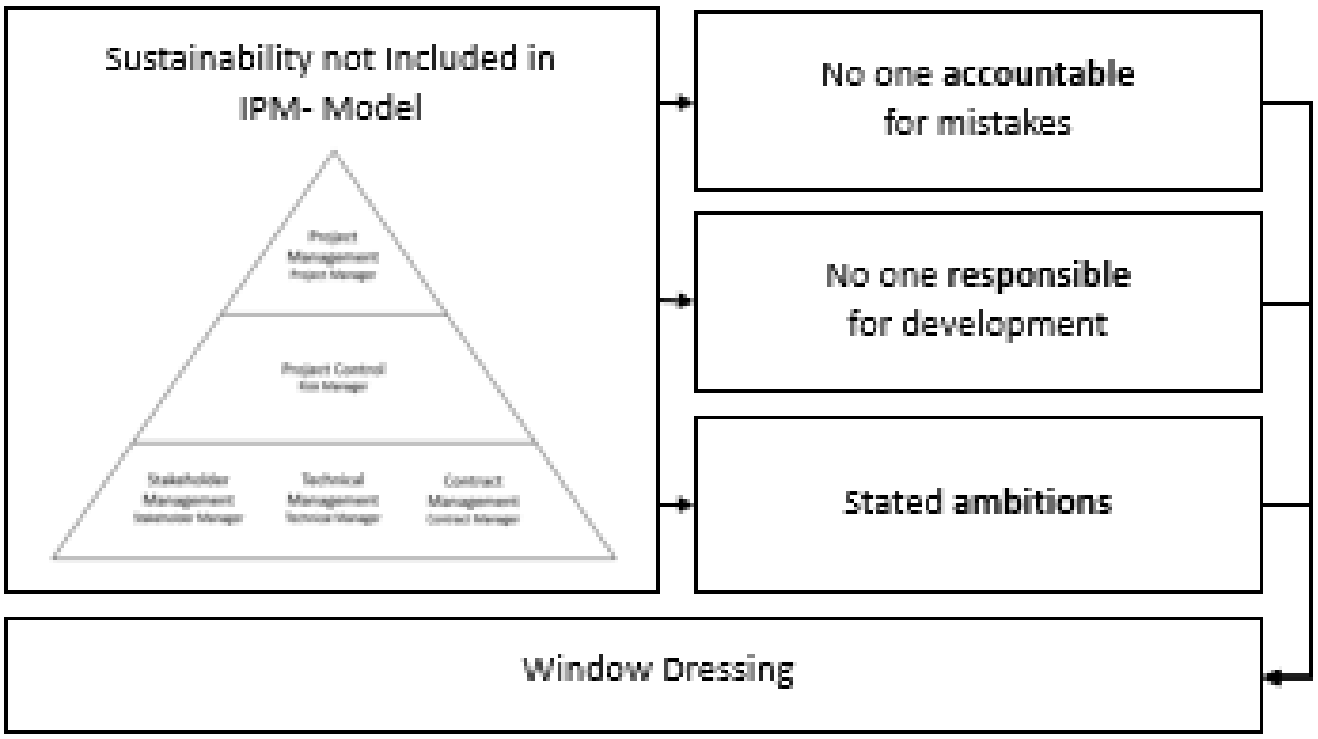

Figure 8 - Cause of the Window Dressing

6.5 Conclusion

In this chapter the content analysis results have been evaluated by interviewing four purchasing experts from the provinces of Zuid-Holland, Noord-Holland and Noord-Brabant and the last sub-question *"Are adjustments to the procurement process needed to develop the incorporation of environmental requirements in procurement of Dutch construction projects?"* has been answered.

Clustering the results of the expert interviews, the following eight problems related to GPP: a lack of knowledge, a lack of skill, including sustainability is scary, a lack of standards, a lack of clarity, a lack of importance, a lack of ambition and a lack of familiarity. Also, the experts proposed seven opportunities to resolve the problems: expand knowledge, work together, use innovative ways of procuring, specify criteria for sustainability in a later stage, include selection criteria, include sustainability open in an early stage, higher standards.

The stated problems and opportunities have been interpreted, leading to a categorisation and critical review. Two main categories were obtained for the problems, organisational and process orientated problems, and three categories were obtained for the opportunities, process orientated opportunities, working together and expand knowledge. By looking critically at the expert interview results and comparing them to the content analysis results, two problems were noticed. First of all, window dressing was seen. Ambitions to improve the inclusion of environmental requirements are stated, but not realised. Secondly, the experts only perceive other departments within their organisation or the contractor accountable for the problems and responsible to resolving the problems, instead of considering their own mistakes and possibilities to resolve the mistakes. The window dressing and lack of responsibility are caused by the absence of environmental management in the IPM-model. No one can really be held accountable for mistakes made when including sustainability or responsible to develop GPP. It is concluded that a change in the IPM-model is needed to create responsibility and that the procurement process needs to be improved to incorporate environmental requirements more sufficient.

7

A Proposal of an Environmental Included Procurement Process

In this chapter a proposal has been made for the development of including environmental requirements in procurement of Dutch construction projects. The proposal consists of two parts: including environmental management in the IPM-model and developing the quality of included environmental requirements. Together the two parts answer the main research question *"How can the usage of environmental requirements in procurement of Dutch construction projects be developed?"*.

7.1 Part 1: Including Environmental Management in the IPM-model

The first part of the proposal consists of including environmental management in the IPM-model, as can be seen in figure 9. Because sustainability is not specifically incorporated in the IPM-model, no one is responsible for the development of including environmental requirements. When environmental management is included in the IPM-model, sustainability will be a self-contained part of the project. Most organisations use the IPM-model as a reference to construct a project team. Environmental management will be equal to contract management, stakeholder management and technical management, instead of a last extra when all project characteristics have already decided upon. As a result, sustainability will be embedded in the project process. The inclusion of environmental management in the IPM-model is the responsibility of the client.

Figure 9 - Environmental Management Included in the IPM-Model

The environmental management department must have four main responsibilities, as can be seen in figure 10. They need to ensure that sustainability is included in the procurement process. Furthermore, they need to ensure that clear organizational ambitions and goals are available and known through the organisation. When sustainability is excluded or incorrectly included, they need to correct others. The environmental management department will be accountable for unsolved mistakes. The environmental management department will be responsible to learn from the mistakes made and best practice projects realised. Moreover, to acquire more knowledge and to share this knowledge. Here cooperation with the contractor can be beneficial. With the acquired knowledge, new environmental tools and requirements need to be developed, which the environmental management department needs to ensure to include again. A summary of part 1 of the proposal can be seen in figure 11.

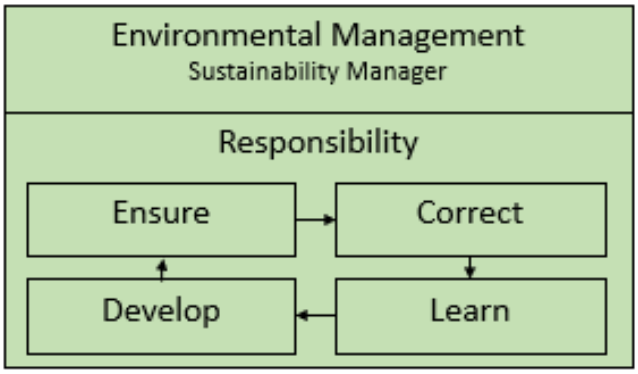

Figure 10 - Responsibilities of the Environmental Management

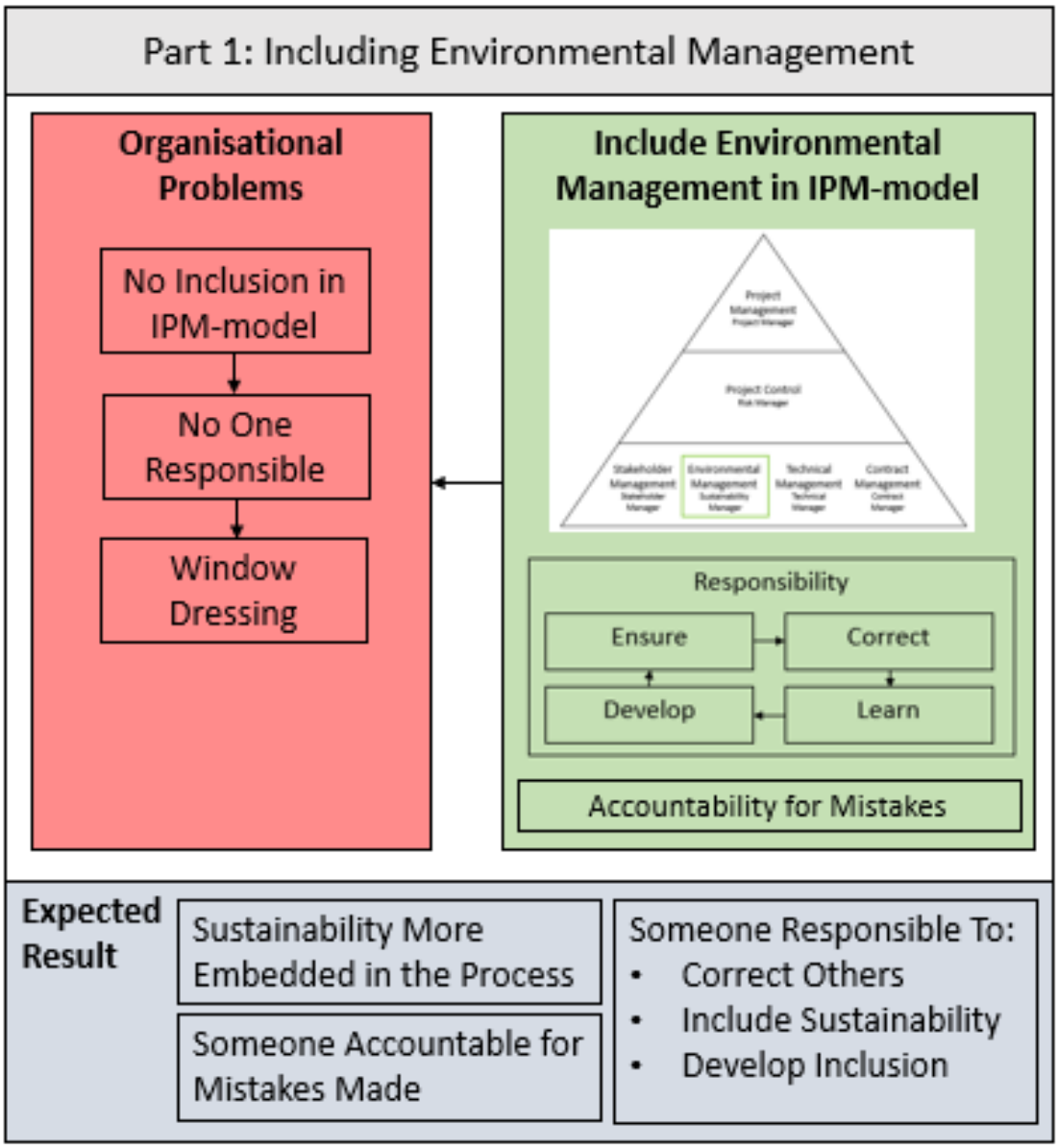

Figure 11 - Part 1: Including Environmental Management

7.2 Part 2: Including Sustainability Sufficiently in the Invitation to Bid, Bid and Assessment of the Bid

Part 2 of the proposal consists of an example of sufficiently including environmental requirements in the invitation to bid, bid and the assessment of the bid and how to learn from past performances. Best practice projects have been used to come up with the proposal. They were derived by analysing the projects included in the procurement database on their environmental inclusion. It was looked at whether the projects contained multiple environmental elements in combination with multiple environmental topics with a sufficient weight. In table 30 the best practice projects are stated and in Appendix H the full analysis can be found. The different ways of including environmental requirements seen in the best practice projects have been used as an example to compose a sufficiently sustainable invitation to bid, bid and assessment of the bid. The implementation of a sufficiently environmental included invitation to bid, bid or assessment of the bid is depended on the project and cannot be reached at once. Constructing a perfect invitation to bid, bid or assessment of the bid will be an ongoing learning process. A summary of part 2 can be found in figure 12.

Table 30 - Best Practice Procurement Projects: The Invitation to Bid, Bid and Assessment of the Bid

Nr.	Purchasing Organisation	Project Name
Best Practices: Invitation to Bid		
4	Gemeente Almere	3 Bruggen
12	Heijmans	Gemeente Haaksberger, Stepelerveld
Best Practices: The Bid		
2	De Jong Zuurmond	HM Onderhoudscontract
4	Gemeente Almere	3 Bruggen
11	Gemeente Utrecht	Van Wijk Singel midden en zuid & Plaatbrug Zuid
38	Politie Nederland	Raamovereenkomst huisvesting
46	PU	Busstalling Westraven
49	PZH	Raamovereenkomst 2019-2023 Perceel 1
52	PZH	N206 Europaweg
65	VRA	Guisweg Ontwerp en MER
66	VRA	Raamovereenkomst Vervoerregio Amsterdam Perceel 1
69	Waterschap Drents Overijsselse Delta	Raamovereenkomst herbouw en renovatie gemalen en stuwen 2019-2022
Best Practices: The Assessment of the Bid		
4	Gemeente Almere	3 Bruggen
7	Gemeente Blaricum	Herinrichting Bijvanck
10	Gemeente Schiedam	Ambachtenbuurt
22	OFN	Gemeente Groningen Abri's

Sustainability Included Sufficiently: The Invitation to Bid

Environmental requirements need to be embedded in the invitation to bid in order to be sufficiently included. Therefore, sustainability needs to be included in all of the five elements stated in the EU Toolkit.

- Textual Reference: textual references can be made to the environmental goals and ambitions stated by the client. When clear goals and ambitions are stated, the references clarify what the client expects. However, the textual references need to be seen as an extra, not a means on its own.
- Selection Criteria: By including environmental selection criteria, contractors can be selected which include sustainability within their organization and have sustainable expertise. This can be done by requesting a sustainable certification, for example ISO14001 or the CO_2-performance scale.

- Technical Specifications: In the technical specifications detailed environmental requirements have to be included. In the content analysis a lot of open technical specifications were found, such as an environmental action plan. The technical specifications are however the wrong place to request an open environmental requirement. The open environmental requirements need to be included in the award criteria, to make it possible to do a qualitative assessment on the proposed interpretation by the contractor. In the technical specifications specific requirements need to be included to make it clear what is expected. Examples can be: a minimum amount of sessions with a sustainability expert, the usage of a sustainable performance-based tool, a minimum or maximum budget for sustainability, the development of sustainable solutions, sustainable design aspects or the usage of sustainable materials.
- Award Criteria: To prevent limiting the possible options to include sustainability in the project, it is best to request open environmental award criteria. For example, an environmental action plan or circular process proposal can be requested. To make sustainability a full-fledged part of the project, it has to be a self-contained award criterion. A weight equal to or higher than the weight of the other award criteria has to be given to the environmental award criterion. Only an open, on its own and sufficiently weighted environmental award criterion will provide an environmental embedded project.
- Sub-Award Criteria: As part of the environmental award criterion, project specific preferences can be included as a sub-award criterion. For example, requesting a plan for sustainable exposure to stakeholders, the usage of sustainable materials, including a sustainability expert, cooperation in sustainability sessions, sustainable design aspects and the usage of sustainable tools.
- Contract Performance Clauses: Despite the contract performance clauses had to be left out of the scope of the content analysis, they can play an important part in improving the inclusion of sustainability in the procurement process. In the contract performance clauses goals that need to be achieved in the realisation of the project are included. By including environmental goals in the contract, such as a minimum CO_2-reduction, usage of reusable materials or included sustainability sessions, sustainability will become more embedded in the project. When the progress of the implementation of the goals is well documented, the inclusion of sustainability can be monitored and evaluated. As a results, there can be learned from past performance, to enhance future performance.

Sustainability Included Sufficiently: The Bid

The environmental inclusion in the bid is dependent on the requested requirements in the invitation to bid. A bid perfectly including sustainability is therefore hard to propose and more a learning process. Sufficient and well documented feedback is important to develop the bids. When environmental requirements are requested as previously proposed, the contractor can include sustainability for the award- and sub-award criteria as follows.

- Award Criteria: The contractor needs to include a sustainable plan as a self-contained part of the bid, embedded through the project plan. This can be done with a standard way of including sustainability. First the expertise, ambitions and certifications of the contractor have to be stated, to show the contractor is suitable to realise the project. A sustainability manager is included to make sure the project is realised sustainable, sustainability is embedded in the project and expertise is available. A sustainability performance-based tool is included to keep track of the sustainable realisation. Last, project specific characteristics are included, such as the usage of sustainable materials.
- Sub-Award Criteria: The more detailed requests in the sub-award criteria are project specific. However, the contractor can optimise meeting the sub-award criteria by using lessons learned from previous projects.

Sustainability Included Sufficiently: The Assessment of the Bid

Sufficient feedback and complete scores on the bid are essential for the development of environmental requirements. By receiving extensive feedback, the contractors will learn and the quality of the bids will increase to meet the requirements of the client. The feedback and received scores have to be documented by both the client and the contractor to be able to learn from past performances. By documenting the feedback, the preferences of the client can be kept track of, there can be learned from mistakes made in and insufficient proposals can be improved. Sufficient feedback needs to be included as follows:

- Award Criteria: A detailed substantiation of the given score has to be included. Feedback has to be provided on both the positive and negative aspects of the proposed plan. As a result, the contractor will know what aspects of the environmental proposal are sufficient and what aspects have to be improved. The knowledge about environmental inclusion will increase and future bids will be of higher quality.
- Sub-Award Criteria: Feedback has to be included on the detailed sub-award criteria. Moreover, feedback has to be given on the not requested details proposed in the plan as well. Despite no score can be given to on unrequested criteria, the feedback will help to improve future bids.

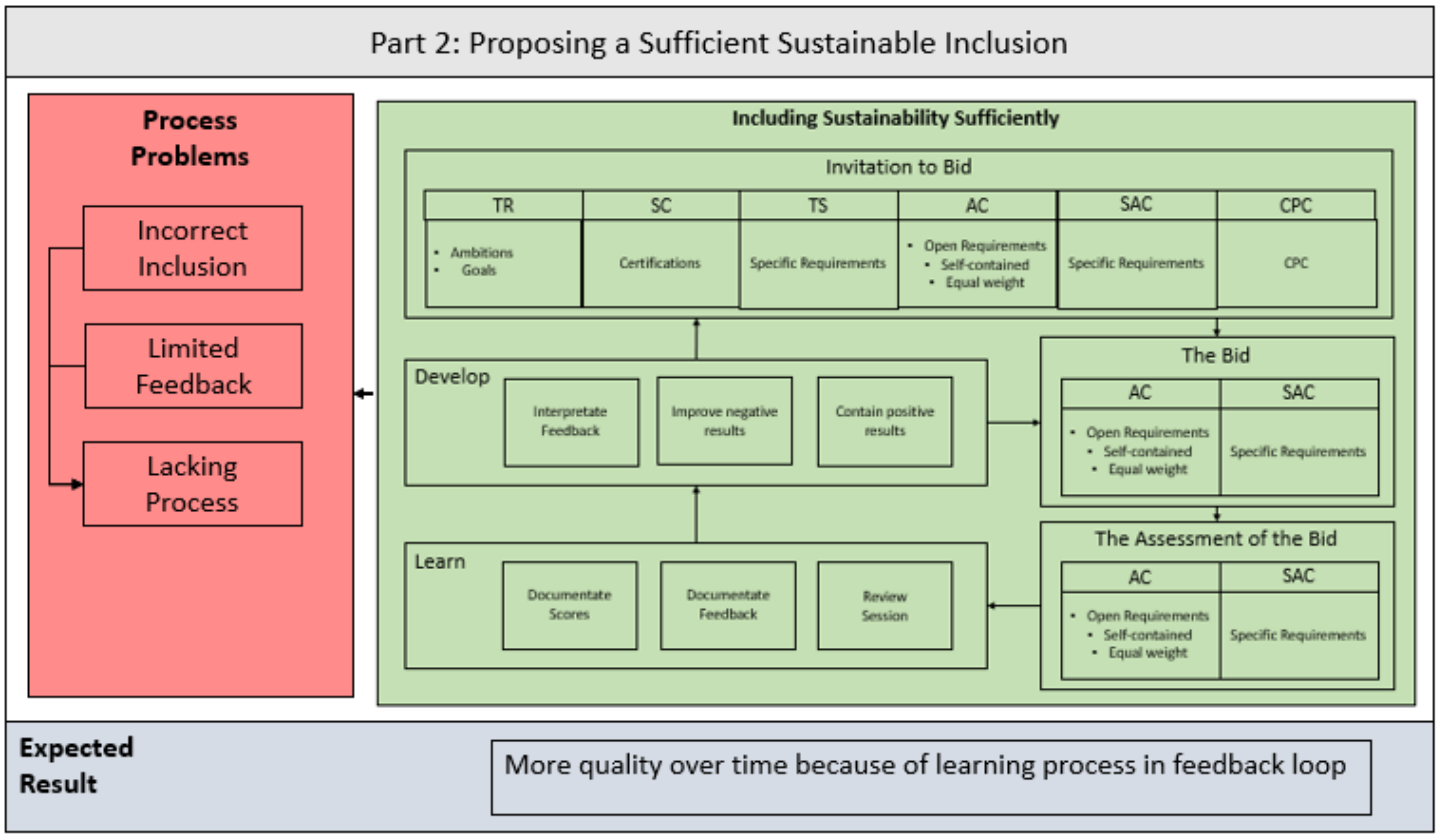

Figure 12 - Part 2: Proposing a Sufficient Sustainable Inclusion

7.3 Conclusion

A proposal has been made for the development of including environmental requirements in procurement of Dutch construction projects, consisting of two parts. Together the two parts answer the main research question *"How can the usage of environmental requirements in procurement of Dutch construction projects be developed?"*.

The first part consists of including environmental management in the IPM-model. Most organisations use the IPM-model as a reference to construct a project team. When sustainability is included in the IPM-model, it will be self-contained and embedded in the project process. The environmental management department should have four responsibilities:

- Ensure: ensure environmental inclusion.
- Correct: correct a limited or incorrect environmental inclusion.
- Learn: document and interpret the mistakes made.
- Develop: develop the environmental inclusion based on the acquired knowledge.

The inclusion of environmental management in the IPM-model is the responsibility of the client.

Part 2 of the proposal consists of an example of sufficiently including environmental requirements in the invitation to bid, bid and the assessment of the bid and how to learn from past performances. Best practice projects have been used to come up with the proposal. Sustainability needs to be included in all the elements of the EU Toolkit.

Invitation to bid:

- Textual Reference: Reference to clear environmental ambitions and goals.
- Selection Criteria: Requesting sustainable certifications.
- Technical Specifications: Specific environmental requirements of the project.
- Award Criteria: Open, self-contained and equally weighted environmental requirements.
- Sub-Award Criteria: Specific environmental requirements of the project, which need to be assessed.
- Contract Performance Clauses: Minimum to acquire environmental goals.

The bid:

- Award Criteria: Sustainability has to be self-contained and embedded in the bid, with standard elements to include.
- Sub-Award Criteria: Depended on the invitation to bid.

The assessment of the bid:

- Award Criteria: Feedback on both positive and negative aspects of the bid, to substantiate the given scores. The feedback needs to be well documented to learn from past performances.
- Sub-Award Criteria: Feedback on both positive and negative aspects of the bid, to substantiate the given scores. Moreover, feedback needs to be given to sustainable proposals not requested. The feedback needs to be well documented to learn from past performances.

A learning process needs to be started. Feedback has to be documented and the environmental inclusion in the invitation to bid and bid has to be reviewed. Insights of the feedback and review session have to be interpreted and used to improve future invitations to bids and bids. By documenting past performances, future performances can be improved.

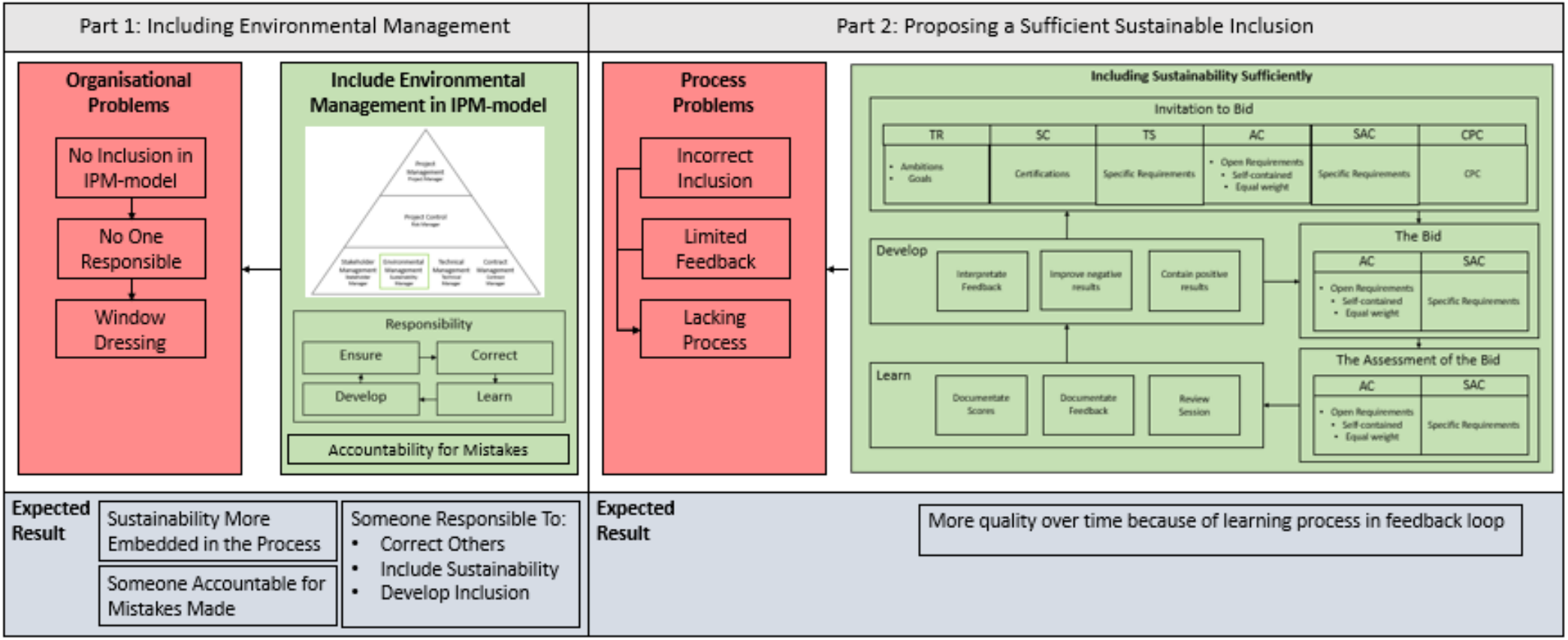

Figure 13 - A Proposal of an Environmental Included Procurement Process

8

Discussion & Limitations

In this chapter the results of this thesis are discussed in section 8.1. Furthermore, in section 8.2 the limitations of the research are explained. Last, the validity of the research is elaborated in section 8.3.

8.1 Discussion on the Results

8.1.1 Discussion of the Results of the Content Analysis

Data Characteristics

Whereas in previous research procurement projects were analysed with an open procedure above the European threshold, this research considered mostly projects using a negotiated procedure under the European threshold. Also, more recent projects are considered than in previous research. The results of this research are an addition to the current available academical research. Comparing previous found results with the results found in this thesis needs to be done critically. The found results in this thesis can only be compared with full certainty with projects containing the same data characteristics found for the procurement project set in this thesis.

The Value of Environmental Requirements

A difficulty for the interpretation of the results is the value of the environmental requirements. As was seen in literature, measuring the value of the environmental requirements is complex and different ways to measure the value are used. This is necessary, because the amount of influence of different environmental requirements on a project is not equal. The environmental value of the projects has been tried to include with "solid" and "light" green projects. About 50% of the invitations to bid of the 70 procurement projects was "Solid Green". This is more than twice as high as the outcome of 23% environmental inclusion in the invitation to bid found by Bouwer (2006) for the Green 7, in which the Netherlands are included. This implicates a growth in "Solid Green" projects over the years. This method creates a difference in the amount of environmental value per project and not per environmental requirement. In this thesis each environmental requirement is valued equally, which might misrepresent the findings. Specifying the value of environmental requirements even further, as was done by Kippo-Edlund (2005) and Testa (2016), is very time consuming. Since limited time was available, it was chosen to only consider the "solid" and "light" green difference.

Inclusion of environmental requirements in the invitation to bid

The greater inclusion of environmental requirements found compared to other research shows the expected growth of environmental inclusion. It is however difficult to say what the reason is for the growth. It cannot be said with full certainty whether the usage of a negotiated procurement procedure, the more recent years of the projects or the usage of Dutch procurement projects is the reason for the higher inclusion of environmental requirements compared to previous research. The outcome also might be influenced by the unequal amount of projects analysed per client. For example, if one client not considers environmental requirements at all and a lot of projects from this client are included, this influences the outcome of the procurement database. For the award criteria specifically a lower inclusion was found compared to previous research. A total of 253 award criteria was used in the invitations to bid, of which 11% was an environmental award criterion. This is a lower percentage than the 27,2% found by Bouwend Nederland (2019). This could be caused by the different procurement procedures used in the projects analysed by Bouwend Nederland (2019).

Not including selection criteria

The limited inclusion of selection criteria found might be caused by the large amount of missing documents for the selection phase. For a lot of the projects separate documents were used for the selection phase, which were not included in the procurement database. Consequently, it cannot be said with full certainty that environmental selection criteria are rarely used. In the 10% meeting it was however stated by the supervisor from Sweco that if environmental selection criteria are included in a project, they should not only be included in a separate selection document, but also in the invitation to bid.

Inclusions of sustainability only as a textual reference or technical specification

The elements textual reference and technical specification are considered together to explain the found misalignment between the invitations to bid and the assessment of the bid, but the elements have a different influence on the realisation of the project. As was derived from the expert interviews, an environmental textual reference is often just an ambition included in the template made for making an invitation to bid and has limited influence on the actual realisation of the project. On the contrary, an environmental technical specification does influence the project. In the technical specifications environmental requirements which have to be included in the project are stated. The environmental value of a technical specification might therefore be greater than the environmental value of a textual reference. However, for both the textual reference as the technical specifications applies that they are not accounted for in the assessment and consequently be a reason for the found misalignment. Therefore the elements were considered together.

Inclusion of the Environmental Topics

The topics of the environmental requirements included do align with the environmental topics found in previous research for the invitation to bid. The main labels found in the invitation to bid were general environmental requirements, such as an environmental action plan. This was also found in the research of Bouwend Nederland (2019). For the bid and assessment of the bid no research is available to make a comparison.

Inclusion of environmental requirements in the bid

The found standard set of included sub-award criteria in the bid cannot be generalised with full reliability to other organisations than Sweco. It is expected that other contractors also use a standard set of environmental requirements in theirs bids, but most likely with different sub-award criteria. Furthermore, the found growth of inclusion of environmental requirements in the bids between 2016 and 2019 needs to be looked at critically. The unequal amount of projects analysed per year might have influenced the results.

Inclusion of environmental requirements in the assessment
A lack of documentation of assessment documents makes the interpretation of the findings for the inclusion of environmental requirements in the assessment of the bid less reliable. During the analysis it was seen that appendices, evaluation meetings or oral feedback belonging to the assessment of the bid were often not documented. Consequently, there is a chance that environmental requirements in the assessment of the bid were missed. On the contrary, this lack of documentation shows once more the insufficiency of the procurement process.

The Misalignment: Environmental Requirements included, but not Assessed
It was found that in 40% of the invitations to bid and 30% of the bids environmental requirements were included, which were not included in the assessment of the bid. This is in line with the findings of Kippo-Edlund (2005) for procurement in Scandinavian countries. Both the Scandinavian countries and the Netherlands are part of the "Green 7", which makes the comparison more reliable. This makes the found misalignment more reliable, since it was also seen in previous research.

The Assessment of Environmental Requirements
The found average weighting and included feedback of the environmental requirements which were assessed need to be considered critically. It was difficult to standardise the weightings due to the large amount of different ways of calculating the score of a bid, unknown weightings and weightings partially applicable to environmental requirements. The found average weighting is slightly higher than in previous research. This was not expected, considering the smaller budget of the projects analysed in this thesis, since it was stated in literature that often projects with a larger project budget include sustainability more often (Testa, 2012; Cheng, 2018). No feedback was given for 46% of the included award criteria in the assessment. However, from the interviews it was found that sometimes the feedback is provided orally instead of in the assessment documents. In this case the problem is not a lack of feedback, but a lack of documentation.

8.1.2 Discussion of the Expert Interview Results

The Limitations stated by the Experts
The eight problems stated by the experts were also seen in literature. The lack of knowledge, familiarity, coorperation and standards were all mentioned by other authors (Bouwer, 2006; Walker, 2009; Varnas, 2009; Testa., 2012; Zhu, 2013). Despite the problems stated by the experts are relevant and important to resolve, it is expected that resolving these problems will only be effective in part 2 of the proposal. Environmental requirements will be included only after responsibility is created. The limitation of managerial responsibility was also stated by Wong (2016). Interestingly, the experts did not mention costs as a limitation of including environmental requirements, while this is seen as one of the main limitations in literature (Bouwer et al., 2006; Walker et al., 2008; Cheng et al., 2018). This might mean that clients do not consider costs as a problem to include sustainability anymore.

The Opportunities stated by the Experts
The opportunities to cooperate, acquire more knowledge, include the requirements earlier and create more standards were also perceived by Wong (2016). It was expected that the experts would mention these opportunities. One opportunity not mentioned was the inclusion of governmental rules. In the literature study it was seen that there are no obligatory rules to include environmental requirements and that the inclusion of obligatory rules is seen as an important opportunity in literature (Testa 2012, Wong 2016). An opportunity mentioned by the experts which was not seen in literature is the inclusion of innovative procurement contracts. The difference in opportunities stated might be caused by the different background of the experts compared to the experts interviewed in previous research.

The Critical look at the Expert Interview Results

At the beginning of this research it was expected to find window dressing of environmental inclusion. It was however not known what the window dressing caused. It was found that the window dressing is caused by a lack of responsibility. The lack of responsibility was also seen by Wong (2016). However, Wong stated that not the lack of responsibility, but the lack of obligatory rules is the most important limitation of GPP. In this research it is considered that when public organisations state to perceive sustainability important and to improve the sustainability of projects, they should also act so. This should not need an obligation. The missing roles of environmental management that cause the lack of responsibility were not seen in literature, because the IPM-model is mostly used in the Netherlands. However, the inclusion of self-contained environmental management could also enhance the inclusion of GPP in other countries.

8.1.3 Discussion on the Proposal

Part 1: Including Environmental Management in the IPM-model

As stated previously, it is considered that including environmental management in the IPM-model is considered to resolve the lack of responsibility, instead of making obligatory rules. However, if including an environmental management department will not be effective, including obligatory rules might be needed to make sure environmental requirements will be included.

Part 2: Including Sustainability Sufficiently in the Invitation to Bid, Bid and Assessment of the Bid

The proposal of including sustainability sufficiently needs to be seen as an example. Composing the perfect invitation to bid, bid and assessment of the bid will be a learning process. Different opportunities have to be tried to include to see whether they are effective. The perfect inclusion is also very project dependent. Therefore good feedback and documentation of the feedback are key for the development of including environmental requirements.

8.2 Limitations of the Research

In this section the limitations of performing the content analysis and conducting the expert interviews are discussed.

8.2.1 Limitations of the Content Analysis

Through the process of performing the content analysis one main limitation was perceived: missing documents. The amount of procurement data acquired was less than expected, because for a lot of projects not all documents were available. Documents were also missing while analysing the procurement projects. A lot of appendices were missing, containing technical specifications. Documents containing the selection phase were not available, limiting the analysis of the selection criteria. Furthermore, the contracts of the procurement projects were not available, making it not possible to analyse the kind of contracts used and the contract performance clauses. For the assessment the documentation of review sessions and interviews. Despite the missing documents limited this research, they also showed the lack of documentation of procurement projects, which hinders the possibility to learn from mistakes made. Consequently, it is more difficult to develop the inclusion of environmental requirements.

8.2.2 Limitations of Conducting the Expert Interviews

For conducting the interviews two limitations could be seen: the selected interviewees and the questions.

The selected Interviewees
A specific selection of purchasing experts from Dutch provinces was interviewed. Therefore, the results derived from the expert interviews do only apply to the organisation, field of work or even department of the experts. Also, two out of the four interviewees were from the province of Noord-Holland, making it more likely that the goals of this client come more forward in the results compared to the other two clients.

The Questions
The questions asked can influence the answers given by the experts. Despite the questions were reviewed by the supervisors of this thesis in three meetings, there is always a chance that the questions influenced the opinion of the experts.

8.3 Validity of the Research

As Yin (2009) states, the validity of qualitative research is complex to determine due to the often limited amount of cases included and the influence of the author's opinion. To increase the validity of this research, the analysis was performed in multiple ways, evaluated by multiple people and based on previous findings. One of the characteristics of the research most dependent on the opinion of the author was coding the environmental elements and topics of the environmental requirements found. The coded environmental elements and labels have been tracked in AtlasTI, to make them traceable and give other researchers the opportunity to check them. Moreover, in the procurement database comments are linked to the environmental requirements, explaining the context in which the environmental requirement is stated. By doing so, it was tried to show the reasoning of the author. To check the validity of the results, the results were compared with previous findings. It was made sure that the previous research to which the results were compared, made use of content analysis considering a country and sector comparable to this thesis. Therefore, researches looking at procurement from "Green 7" countries and the construction sector were used. Furthermore, the results were considered in multiple ways. The found misalignment was interpreted generally, by differing between the environmental value of the projects and over the years 2016 to 2019. The average weight of the environmental requirements and inclusion of feedback about the environmental requirements was calculated in two different ways. Despite the different ways of analysing, no major differences were found in the result. Also, The results found were in line with previous research findings. It can be said the results are valid, because they are in line with previous research and were the same despite performed in different ways.

Also, the generalisability of the findings needs to be considered. The detailed findings found from the content analysis can only be generalised for projects with exactly the same characteristics as the procurement projects included in the procurement database, but superior trends found for all the projects in the procurement database, can be generalised. The lack of environmental inclusion of specific award criteria in the invitation to bid and assessment of the bid, not including the more detailed sub-award criteria in the assessment of the bid and the lack of feedback given to the environmental requirements were found for a large share of the procurement projects and were verified during the expert interviews. Furthermore, the problems and opportunities stated were also seen in literature and the lack of responsibility was also seen by by experts of Sweco. While the detailed results of this research are only generalisable for procurement projects with the same characteristics as the projects included in the procurement database, the superior trends found are generalisable for the procurement of Dutch construction projects.

9

Conclusion

This chapter contains the conclusion of this thesis. In section 8.1 a brief recap of the performed research is provided. The sub-questions are answered in section 8.2, leading to an answer to the main research question in section 8.3. Next, the contribution of this research and recommendations for further research are discussed in section 8.4 and 8.5.

9.1 Recap of the Research Design

In this research the current usage of environmental requirements in the invitation to bid, the bid and the assessment of the bid has been analysed and evaluated with experts from different provinces in the field of procurement of construction projects, to come up with a proposal how to develop the inclusion of environmental requirements in the future. By means of literature study information was gathered about the Dutch procurement process, the inclusion of GPP in the procurement process and previous research done to the inclusion of environmental requirements in the procurement process. A content analysis was found to be the most suitable method to analyse the current environmental inclusion. Data of procurement projects containing an invitation to bid, bid and assessment of the bid was collected and structured. A procurement database structure was made based upon characteristics found in the literature study. The procurement database structure consists out of four categories: the characteristics of the projects, the inclusion of environmental requirements in the invitation to bid, the inclusion of environmental requirements in the bid and the inclusion of environmental requirements in the assessment of the bid. After finishing the procurement database structure, the procurement data was labeled and the database was filled. The environmental requirements found in the data were labeled with one of five elements, being a textual reference, selection criterion, technical specification, award criterion or sub-award criterion, and the environmental topic concerned. Three meetings were planned during the performance of the analysis to evaluate the method and make sure scope adjustments and mistakes would be considered timely. After the analysis was finished, patterns were searched in the procurement data. The results of the content analysis were evaluated by conducting interviews with four purchasing experts from Dutch provinces. After conducting the interviews the answers were categorised and interpreted. Based on the findings of the content analysis and the expert interviews, a proposal was made to develop the inclusion of environmental requirements in the Dutch procurement process, providing an answer to the main research question.

9.2 Answering the Sub-Questions

In this section the answers to the five sub-questions, stated at the start of the research, are discussed.

Sub-question 1: "How can a procurement database to analyse the inclusion of environmental requirements be constructed?"

From the literature study it was found that a content analysis was the most suitable method to analyse the inclusion of environmental requirements in procurement of construction projects. To perform the content analysis, a procurement database structure was made consisting of four categories. In the first category characteristics were incorporated of the clients and projects included in the procurement database. By means of literature study a list was made of characteristics used in previous research. The characteristics relevant for this thesis were included in the procurement database structure and if necessary, characteristics were adjusted or added. In the second category the inclusion of environmental requirements in the invitation to bid was considered. Five main elements of including environmental requirements in procurement were considered: a textual reference, a selection criterion, a technical specification, an award criterion and a sub-award criterion. Furthermore, a list was made of labels of environmental topics used in previous research to code the environmental requirements with. In the third category the bid was considered. In the bid, only award and sub-award criteria were included, since the environmental requirements included in the bid are a proposal for the requested environmental (sub-)award criteria in the invitation to bid. In the fourth category the assessment of the bid was considered. Next to the elements and topics, also the score and feedback on the environmental requirements were included.

Sub-question 2: "What procurement data can be derived?"

Procurement data from the project database of Sweco was gathered to perform the content analysis. For a procurement project to be useful all the procurement documents of invitation to bid, bid and assessment of the bid had to be available. After a first analysis to the completeness of the procurement database, it was found that a lot of the projects were incomplete. As much of the missing documents as possible were obtained contacting the tender managers of Sweco via email and face-to-face meetings. Eventually, data of 70 complete projects, consisting of 333 documents, was gathered.

Sub-Question 3: "To what extent are environmental requirements used in the procurement database?"

It was found that the inclusion of environmental requirements in the assessment of the bid is lacking compared to the inclusion of environmental requirements in the invitation to bid and the bid. Environmental requirements are included in 86% of the invitations to bid, 74% of the bids and 46% of the assessments of the bid of the 70 procurement projects. If only "solid green" projects, containing three environmental requirements or more, are considered sustainable, the percentages found were lower with 50% inclusion in the invitations to bid, 47% in the bids and 16% in the assessments of the bid. The amount of projects containing environmental requirements was also plotted against the years 2016 to 2019. Around 85% of the invitations to bid per year included environmental requirements. For the bids a growth over time was seen from 14% in 2016 to 100% in 2019. For the assessments of the bid also a growth over time was found: from 14% in 2016 to 68% in 2019. A lower percentage of inclusion was found for the assessment of the bid. Also, the weight given to the environmental (sub-)award criteria compared to the total obtainable score has been analysed. Just nearly 20% of the total score was attributed to the environmental (sub-)award criteria.

Sub-Question 4: "What patterns can be found in the procurement database?"

From the analysis three defects possibly causing the misalignment were derived. First of all, in 36% of the 70 projects only an environmental textual reference, selection criterion or technical specification was included in the invitation to bid. These elements are not considered in the assessment of the bid and consequently cause a misalignment between the environmental inclusion in the invitation to bid and assessment of the bid. Secondly, mainly unspecific award criteria, such as the inclusion of an environmental action plan, are requested in the invitation to bid and more detailed environmental requirements, such as the inclusion of a sustainable specialist, are proposed in the bid to fulfill the request. In the assessment of the bid only the unspecific award criteria are assessed. Consequently, a misalignment between the environmental inclusion in the bid and the assessment of the bid is caused. Thirdly, the assessment is often done minimally or insufficient. For 88% of the included environmental sub-award criteria it was unknown what score could be obtained. Furthermore, no feedback was given to 46% of the award criteria included in the assessments of the bid. Only the general award criteria were minimally elaborated. Consequently, a misalignment is caused between the requested criteria in the invitation to bid, the more detailed proposal in the bid and the minimal assessment of the bid.

Sub-Question 5: "Are adjustments to the procurement process needed to develop the incorporation of environmental requirements in procurement of Dutch construction projects?"

Four purchasing experts from Dutch provinces have been interviewed to evaluate the three limitations causing a misalignment and come up with opportunities to resolve them. Clustering the results of the expert interviews, two main categories of problems causing the misalignment were obtained, organisational and process orientated problems, and three categories of opportunities to resolve the misalignment, process orientated opportunities, working together and expand knowledge. However, by looking critically at the expert interview results and comparing them to the results of the content analysis, two problems were noticed. First of all, window dressing was seen. Ambitions to improve the inclusion of environmental requirements were stated, but not realised. Secondly, it was noticed that the experts only perceive other departments within their organisation or the contractor accountable for the problems and responsible to resolve them. The window dressing and lack of responsibility are caused by the absence of environmental management in the IPM-model. No one is taking action, because no one is responsible. It is concluded that a change in the IPM-model is needed to create responsibility and that the procurement process needs to be improved to incorporate environmental requirements more sufficient.

9.3 The Final Conclusion

An answer can be given to the main research question:

"How can the usage of environmental requirements in procurement of Dutch construction projects be developed?"

The usage of environmental requirements in procurement of Dutch construction projects can be developed by first including environmental management in the IPM-model and hereafter starting a learning process to include environmental requirements sufficiently.

To come up with a proposal, the current usage of environmental requirements in procurement of Dutch construction projects was analysed By means of literature study a procurement database was constructed. Procurement data consisting of an invitation to bid, bid and assessment of the bid was acquired and analysed in the procurement database. A misalignment was found of environmental inclusion in the assessment of the bid compared to the invitation to bid and the bid. Three patterns causing the misalignment were found: the incorrect inclusion of environmental requirements in the invitation to bid, requesting unspecific environmental requirements and a lacking assessment of the bid. Four purchasing experts of Dutch provinces were interviewed to evaluate the misalignment. By looking critically at the expert interviews results, window dressing and a lack of responsibility was noticed, caused by the absence of environmental management in the IPM-model. Nobody is responsible for the inclusion of environmental requirements. It was concluded that a change in the IPM-model is needed to create responsibility and that the procurement process needs to be improved to incorporate environmental requirements more sufficient.

Based on these insights, a proposal consisting of two parts has been made, as seen in figure 14. First of all, environmental management needs to be included in the IPM-model. The environmental management department should have four responsibilities: ensure environmental inclusion, correct limited or incorrect environmental inclusion, learn from mistakes made and develop environmental inclusion based on the acquired knowledge. Secondly, sustainability needs to be included in all the elements of the EU Toolkit and a learning process needs to be started. Feedback has to be documented and the environmental inclusion in the invitation to bid and bid has to be reviewed. Insights of the feedback and review session have to be interpreted and used to improve future invitations to bids and bids. By documenting past performances, future performances can be improved.

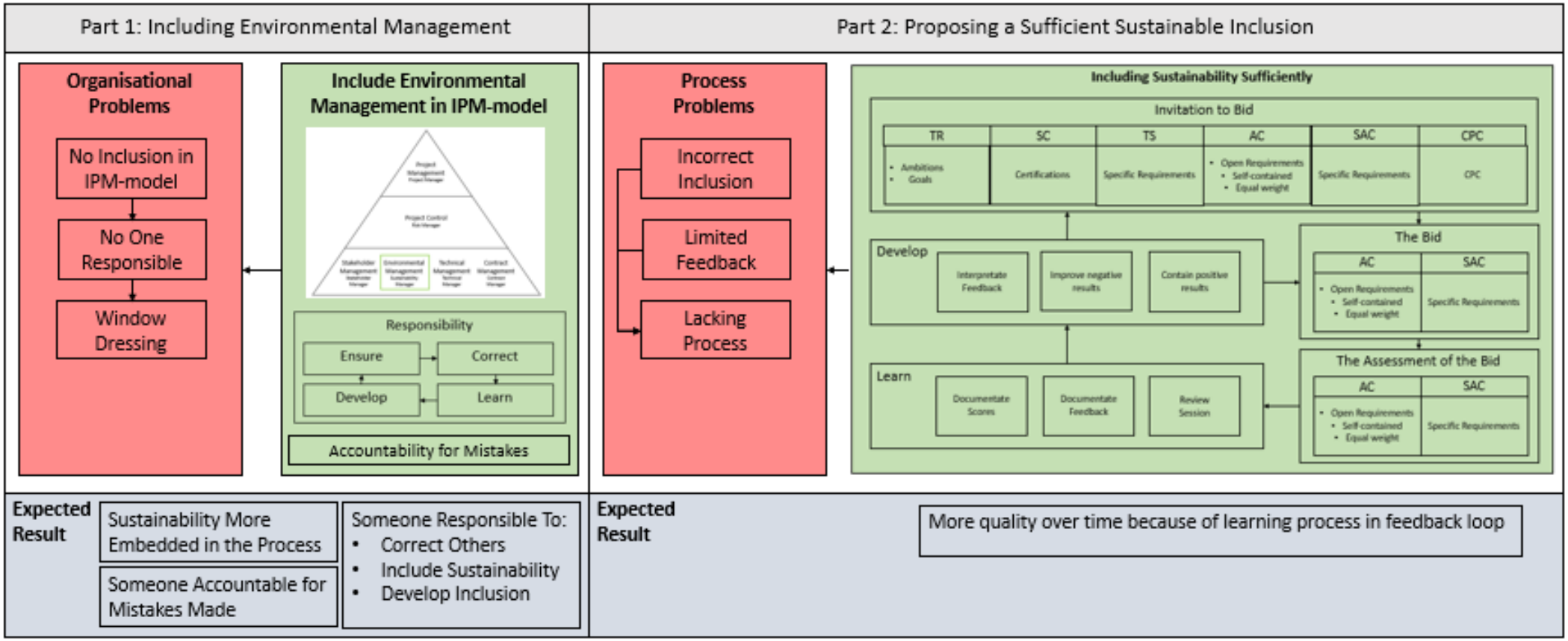

Figure 14 - A Proposal of an Environmental Included Procurement Process

9.4 Recommendations

Recommendations for implications in the field and for future academical research have been made.

9.4.1 Recommendations for the Field

Part 1: Including Environmental Management in the IPM-model
It is recommended for the client to include environmental management in the IPM-model and provide the environmental management department with the following four responsibilities:

- Ensure: ensure environmental inclusion.
- Correct: correct a limited or incorrect environmental inclusion.
- Learn: document and interpret the mistakes made.
- Develop: develop the environmental inclusion based on the acquired knowledge.

In this part of the proposal the role of the contractor is advisory. With their expertise and knowledge the contractor can help the client with implementing environmental management in the IPM-model. However, the main responsibility will be for the client.

Part 2: Including Sustainability Sufficiently in the Invitation to Bid, Bid and Assessment of the Bid
In the second part of developing the inclusion of environmental requirements it is recommended for the client and contractor to include environmental requirements as follows:

Invitation to bid (client):

- Textual Reference: Reference to clear environmental ambitions and goals.
- Selection Criteria: Requesting sustainable certifications.
- Technical Specifications: Specific environmental requirements of the project.
- Award Criteria: Open, self-contained and equally weighted environmental requirements.
- Sub-Award Criteria: Specific environmental requirements of the projects, which need to be assessed.
- Contract Performance Clauses: Minimum to acquire environmental goals.

The bid (Contractor):

- Award Criteria: Sustainability has to be self-contained and embedded in the bid, with standard elements to include.
- Sub-Award Criteria: Depended on the invitation to bid.

The assessment of the bid (client):

- Award Criteria: Feedback on both positive and negative aspects of the bid to substantiate the given scores. The feedback needs to be well documented to learn from past performances.
- Sub-Award Criteria: Feedback on both positive and negative aspects of the bid to substantiate the given scores. Moreover, feedback needs to be given to sustainable proposals not requested. The feedback needs to be well documented to learn from past performances.

This example can be used by the client and contractor as a starting point of sufficiently including sustainability, but the perfect way to include environmental requirements will be project specific and difficult to reach at once. It is therefore highly recommended for both client and contractor to review each finished procurement project. The review can be done both inter in the organisation and in coorperation with the client and contractor. Specifically for the contractor, it is recommended to document the feedback received in the assessment of the bid and interpret the feedback. The insights derived from the review sessions and feedback can help to improve limitations and learn from best practices.

Sweco Specific Advise

Specifically for Sweco it is advised to improve the finishing phase of the procurement projects. This consists of the documentation of procurement data and reviewing the procurement projects. During the analysis it was noticed that currently a lot of documents are missing. When the invitations to bid, the bid and especially the assessments of the bid are documented in an organised and structured way, they can easily be traced and be an example for future bids. A good development would be to keep track of all the procurement characteristics in a database. The procurement database made for this thesis can be used as an example. Reviewing the procurement projects, both intern and with the client, would enhance the learning process. The reviews can be used to learn from mistakes and best practices, if they are done consistent, are well documented and interpreted. As a result, the inclusion of environmental requirements in the bid can be improved over time.

9.4.2 Recommendations for Academical Research

The Content Analysis

The following topics concerning the content analysis would be interesting for future academical research to investigate:

- Perform the same analysis in cooperation with another contractor, to see if the same results would be found.
- Analyse procurement projects with other data characteristics, such as another procurement procedure, budget or assessment methods.
- Let other researchers perform the analysis, to see if the same environmental elements and topics would be given to the environmental requirements found.
- Perform the analysis with more procurement projects, to make the analysis more reliable.

The Interviews

The following topics concerning the experts interviews would be interesting for future academical research to investigate:

- Conduct interviews with experts of other clients: municipalities, independent regulators, contractors and the ministry.
- Conduct interviews with experts from not only the purchasing department, but also the project and assessment departments. This will create a complete overview of the opinion of experts in the procurement process towards environmental inclusion.

The Development of Including Environmental Requirements

The following topics concerning the development of including environmental requirements would be interesting for future academical research to investigate:

- The effectiveness of the inclusion of environmental management in the IPM-model.
- The competencies needed of the team members of environmental management department.
- The competencies needed to compose a sustainable bid.
- The follow up of the environmental requirements in the realisation of the project.
- The construction of specific environmental standards and goals proposed by clients and contractors,
- The effectiveness of using innovative contracts, such as procuring for multiple assets at once, to improve the inclusion of environmental requirements.
- The development of tools to measure the effectiveness of sustainability in procurement.

10

Reflection

This chapter reflects on the findings and process of this research. In section 10.1 the contribution of the research findings are discussed. In section 10.2 the process of the research and lessons learned are elaborated.

10.1 Contribution of the Research

The findings of this research contribute on two levels: an academical contribution and a contribution to the field. The knowledge about the incorporation of GPP in the construction sector has been increased, by filling the research gap of research to not only the invitation to bid, but also the bid and the assessment of the bid. Limitations of the incorporation of environmental requirements in the procurement of construction projects, a proposal to resolve these limitations and possible future research topics for academical research have been shown. The limitations and proposal can be used in the field to develop the inclusion of environmental requirements. The research brings attention to the incorporation of sustainability in the construction sector.

For Sweco specifically an improved way of working with data has been shown. By structuring and organising the procurement data, patterns were found which can improve future bids. This way of using procurement data can be used more often in the future, with the procurement database made for this thesis as an example. Also, the database of Sweco has been made more complete for the thesis, which is also usefull for Sweco. Last, this thesis shows Sweco the way they have been including sustainability in bids over the years 2016 to 2019. The insights derived from this data can be used to improve future inclusion and therefore improve the quality of future bids.

10.2 Process of the Research

At the start of this master thesis I wanted to focus on the following points:

Structuring the process of my own research
One of the things I liked most about the master Construction Management and Engineering was learning to structure complex processes. Therefore, I wanted to show that I have learned to analyse a complex process in a structured way to bring the core problems limiting the process to light. I am content with the way I analysed the problem of lacking environmental inclusion. Three core limitations were found out of a large amount of data. I would have liked to have more time to compose the proposal. When not only experts of the client, but also of the contractor would have been interviewed, the proposal would have been more reliable.

Sticking to the schedule
Additional to the goal to structure the process, was the inclusion of a structured planning. With a weekly planning it was tried to stick to the schedule as much as possible. At the beginning of the research it was expected to finish this thesis half June. The delay encountered was caused by the period which had to be waited on response of the interviewees. The interviewees should have been contacted in an earlier phase of the research. Considering this thesis had to be written during the intelligent lockdown caused by COVID-19, I am still content with the final time schedule.

Learning from the field
Next to learning on a theoretical basis, I was eager to learn from within the field. By analysing the 70 procurement projects and working at the office of Sweco, experience was gained from within the field. I had hoped to perform a test case of including environmental requirements. Unfortunately, this did not fit in the time schedule anymore.

Performing the research independent
Performing the research independently could have been better. During the performance of the research, regularly advise was needed from the supervisors or experts of Sweco. Nonetheless, I have learned to work more independently during this thesis.

Write a clear report
During my studies I always encountered difficulties to write in correct and clearly specified English. One of my goals was to write a clearly and correct written report. Despite the big effort I have put in writing this thesis, I did not succeed to write the report as clear and correct as I would have wanted. However, in the past seven months I have learned a lot new writing skills.

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Appendix A

Table 31 – Environmental Labels Used in Previous Research

Research	Environmental Labels			Used in Thesis	If yes, which label	If no, why
EU Toolkit and Testa et al. (2016b)	SM (Subject Matter)		Strength	No	-	Not seen
	SC (selection criteria)		Exclusion of certain contractors	No	-	Not detailed enough
			Experience of the architect in environmental construction	Yes	Sustainable Experience	-
			Technical capacity for environmental management measures	Yes	Sustainable Expertise	-
	TS (Technical specification)	Energy	Energy consumption standard	No	-	To detailed, energy is considered as: Energy Transition
			Localized RES (comprehensive)	No	-	To detailed, energy is considered as: Energy
			Energy efficiency training	No	-	To detailed, energy is considered as: Energy
		Materials	Exclusion of products which contain sulphurhexafluoride (SF6)	No	-	To detailed, materials are considered as: Sustainable Materials
			Exclusion of indoor paints and varnishes	No	-	To detailed, materials are considered as: Sustainable Materials
			Recycled materials/eco-friendly	Yes	Sustainable Materials	-
			Timber	No	-	To detailed, materials are considered as: Sustainable Materials
			Volatile organic compound	No	-	To detailed, materials are considered as: Sustainable Materials
			Steel (comprehensive) [applicable for renovation works]	No	-	To detailed, materials are considered as: Sustainable Materials
		Water	(comprehensive) Rainwater and gray water use	No	-	Not seen
			Water facilities equipped with the latest technology	No	-	Not seen
			Dual-flush maximum use	No	-	Not seen
			Waterless urinals operate with a biodegradable liquid or without liquid	No	-	Not seen
			Water-saving devices saving of at least x % for toilet flushing.	No	-	Not seen
			Tap insert better performance than normal tap use	No	-	Not seen

		Noise	Noise control	No	-	Not considered in sustainability in this research.
	AC (award criteria)	Energy	Lowest energy consumption	No	-	To detailed, energy is considered as: Energy
			Renewable energy source (RES) usage	No	-	To detailed, energy is considered as: Energy
			(comprehensive) Innovative efficient building services	No	-	To detailed, energy is considered as: Energy
		Materials	Materials complying with ecostandards	Yes	-	Sustainable Certification
			Construction materials based on renewable raw materials	Yes	-	Sustainable Materials
			Sustainable forestry sources	No	-	To detailed, materials are considered as: Sustainable Materials
			(comprehensive) R-values for insulation	No	-	To detailed, materials are considered as: Sustainable Materials
		Water	(comprehensive) Rainwater and gray water use	No	-	Not seen
		Noise	Noise control	No	-	Not considered in sustainability in this research.
	CPC (contract Performance Clausule)		Compulsory blower door test	No	-	Not seen
			Bookkeeping	No	-	Not seen
			Transport and recycling of building materials	Yes	Split into: Sustainable mobility and Sustainable Materials	-
			Waste management	Yes	Circular Process	-
			Transport minimizing impacts (e.g., noise, environment)	Yes	Sustainable Mobility	-
Fuentes-Bargues (2019)	Quality control				Environmental Quality	-
	Certified environmental accreditation			Yes	Sustainable Certification	-
	Environmental action plan			Yes	Environmental Action Plan	-
	Programming and organisation of the works/study of the project			Yes	Environmental Action Plan	-
	Energy efficiency and sustainability improvements			Yes	Energy Transition	-
	Waste management			Yes	Circular Process	-
	Quality and environmental control			No	Environmental Quality	-
	Use of materials and manufacturing techniques			Yes	Sustainable Materials	-

	Environmental management Environmental criteria		Yes	Environmental Action Plan	-
	Improvements in the project		No	-	Not detailed enough
	Sustainability		No	-	Not detailed enough
	Training		Yes	Sustainable Cooperation	-
	Knowledge		Yes	Sustainable Development	-
	Awareness		Yes	Sustainable Exposure	-
	Environmental Management System		Yes	Sustainable Certification	-
	Structure Procurement Process		Yes	Environmental Action Plan	-
Testa et al., 2016a	Environmental Strategy		Yes	Environmental Action Plan	-
	Environmental requirements for the performance of services		No	-	Not detailed enough
	Environmental requirements for products		No	-	Not detailed enough
Faith-Ell, 2005	Requirements for Environmental Management Systems		Yes	Sustainable Certification	-
	Selection criteria	Environmental Management System	Yes	Sustainable Certification	-
	Technical SPecification	Environmental Impact Assessment	Yes	Sustainable Performance-based Tools	-
	Award decision	Recycled material	Yes	Circular Process	-
		Product Declaration	No	-	Not seen
Kippo-Edlund (2005)		Environmental Management System	Yes	Sustainable Certification	-
	CO_2 Performance scale		Yes	Sustainable Certification	-
	Sustainable execution of the process		Yes	Environmental Action Plan	-
Bouwend Nederland (2019)	Sustainable result		No	-	Not detailed enough

Appendix B

Table 32 – List of Characteristics used in previous researches

Author	Characteristic	Used in this Research	Reason
Kippo-Edlund, 2005; Testa et al., 2016; Fuentes-Bargues et al., 2017, 2019; Nissinen et al., 2009	Budget	Yes	Comparison of projects above and beneath the European threshold
Kippo-Edlund, 2005; Testa et al., 2016; Fuentes-Bargues et al., 2017, 2019; Nissinen et al., 2009	Time Period	No	Comparison of environmental inclusion over the years
Nissinen et al. (2009)	Product Groups	No	Only Construction sector
Fuentes-Bargues (2017)	Administration Structure	Yes	
Fuentes-Bargues (2017)	Subsector	No	Only Infrastructure within the Construction Sector
Testa et al.	Geographical Origin	No	Only the Netherlands

Appendix C

Table 33 – Project Completeness Analysis

Opdrachtgever	Project	Uitvraag	PvA	Beoordeling	Volledigheid
BAM	Dishoek	1	1	1	3
Boskalis	A1 Apeldoorn Azelo	0	1	1	2
Boskalis	Vechtdalverbinding	1	1	0	2
De Jong Zuurmond	HM Onderhoudscontract	1	1	1	3
Deep	Fysische Metingen GEOxyz	0	1	1	2
Gemeente Almere	C1	1	1	1	3
Gemeente Almere	3 Bruggen	1	1	1	3
Gemeente Alphen aan den Rijn	Ingenieursdiensten + Archeologie	1	1	1	3
Gemeente Amsterdam	Ingenieursdiensten Gebiedsontwikkeling Oost	0	1	0	1
Gemeente Blaricum	Herinrichting Bijvanck	1	1	1	3
Gemeente Leiden	Leiden Riolering	0	1	0	1
Gemeente Leiden	Leidse Ring Noord	0	1	0	1
Gemeente Overbetuwe	Spoorkruisingen Elst Noord	1	1	1	3
Gemeente Roermond	Busstation Roermond	1	1	1	3
Gemeente Schiedam	Ambachtenbuurt	1	1	1	3
Gemeente Utrecht	Inspecties Civiele Kunstwerken	0	1	0	1
Gemeente Utrecht	Van Wijk Singel midden en zuid & Plaatbrug Zuid	1	1	1	3
HDSR	Raamovereenkomst Ingenieursdiensten	0	1	1	2
Gemeente Venlo	Vierpaardjes	1			
Heijmans	Gemeente Sittard-Geleen Oranjelaan	1	1	1	3
Heijmans	Gemeente Roermond Stationsstraat	1	1	1	3
Heijmans	Welterlaan Heerlen	1	1	1	3
Heijmans	Provincie Gelderland N301	1	1	1	3
Heijmans	Kerkewijk	0	1	0	1
Heijmans	N225 asfaltonderhoud	1	1	1	3
Heijmans	N615 Beek en Donk	0	1	0	1
Heijmans	Gemeente Haaksberger, Stepelerveld	1	1	1	3
Heijmans	Lintveldseweg	1	1	1	3
Heijmans	Gemeente Bourne OV verlichting	1	1	0	2
HHNK	Zeef 2 Dijkversterking Noordzeekanaal	1	1	1	3
KWS	A58 Goes	0	1	1	2
KWS	Prestatieplan Reconstructie Tiendenplein	0	1	0	1
KWS	Engineering en uitvoeren Groot Onderhoud	1	1	1	3
KWS	GO Z&D 19	1	1	1	3
Ministerie van I en W	MIRT verkenning A15	1	1	0	2
OFN	Gemeente Groningen Abri's	1	1	1	3
Pauw Dodewaard	Vogelbuurt	1	1	1	3
Pauw Dodewaard	GU Onderhoud straatwerk	1	1	1	3
Pauw Dodewaard	GU Onderhoud Riolering	1	1	1	3
Pauw Dodewaard	GN Onderhoud verharding	1	1	0	2
PFL	Hogering Almere	1	1	1	3
PGL	Station Nijmegen Heyendaal	1	1	1	3
PNB	N279 Den Bosch Veghel	1	1	1	3
PNB	Gemert Noord Omgevingsplan	0	1	0	1
PNB	N395	0	1	1	2

PNB	Raamovereenkomst Provincie Noord-Brabant	0	1	0	1
PNB	GOL	1	1	1	3
PNB	N279 Veghel Asten	1	1	1	3
PNB	N620 en N622	0	1	0	1
PNB	N321 Grave Cuijk	1	1	0	2
PNB	Sint Hubert	1	1	1	3
PNH	A9 Heiloo	1	1	0	2
PNH	Raamovereenkomst Provincie Noord-Holland 2015-2019	0	1	0	1
PNH	Brug Ouderkerk	0	1	0	1
PNH	HOV Hilversum	0	1	0	1
PNH	HOVASZ	0	1	0	1
PNH	Leeghwaterbrug	0	1	1	2
PNH	Schagerbrug A variantenstudie	0	1	0	1
PNH	N231b	1	1	1	3
PNH	Gebiedscontract 4,5,6	0	1	0	1
PNH	N243	0	1	1	2
PNH	Oeververvanging traject 20 PMO	0	1	0	1
PNH	Koopvaardersschutsluis	1	1	1	3
PNH	HOV 'Gooi	0	1	1	2
PNH	Toonbankdienst Midden-Noord	1	1	1	3
PNH	Royal FloraHolland	1	1	1	3
PNH	Oevertrajecten	1	1	1	3
PNH	Duinpolderweg PNH PZH	1	1	1	3
PNH	Regionale Energiestrategie	1	1	0	2
PNH	Toonbankdiensten Wijckerpoort-Wijckermolen	1	1	1	3
Politie Nederland	Raamovereenkomst huisvesting	1	1	1	3
ProRail	Westelijke Ontsluiting Amersfoort	1	1	1	3
ProRail	Rail BST 3.0	1	1	0	2
ProRail	PHS Nijmegen	1	1	1	3
ProRail	PHS Alkmaar-Amsterdam	1	1	1	3
ProRail	S- en O-borden	1	1	1	3
ProRail	PHS Sloterdijk	1	1	1	3
ProRail	HilHOV3	0	1	1	2
ProRail	Utrecht CS Perron 3	0	1	0	1
ProRail	PHS Saal MLT	1	1	1	3
PU	Raamovereenkomst Provincie Utrecht 2016-2020	0	1	0	1
PU	N411	1	1	0	2
PU	VRT Vernieuwde Regionale Tramlijn	1	1	1	3
PU	N212	1	1	0	2
PU	Busstalling Westraven	1	1	1	3
PU	N201	1	1	1	3
PU	N226 onderdoorgang Maarsbergen	0	1	1	2
PU	Tunneltje De Bilt	0	0	1	1
PU	Snelfietsroutes	1	1	1	3
PZH	N444 Nagelbrug	0	1	0	1
PZH	RijnlandRoute	1	1	0	2
PZH	N211 Geeft Energie	1	1	0	2
PZH	De Gouwe	1	1	1	3
PZH	N470 Geeft Energie	0	1	0	1
PZH	Raamovereenkomst 2014-2018	0	1	0	1
PZH	N216 Peursumsebrug	1	1	1	3
PZH	N206 Europaweg	1	1	1	3

PZH	Oevers Delftse Schie	1	1	0	2
PZH	N228	1	1	1	3
PZH	Raamovereenkomst 2019-2023 Perceel 1	1	1	1	3
PZH	Raamovereenkomst 2019-2023 Perceel 3	1	1	1	3
RCE	RCE Nulmeting Archeologie	1	1	1	3
RWS	SAA A6	1	1	1	3
RWS	Projectbeheersing Hoevelaken	0	1	0	1
RWS	Projectbeheersing Houtribdijk	0	1	0	1
RWS	Projectbeheersing RWS Midden Nederland	0	1	1	2
RWS	Projectbeheersing Sluizenprogramma	0	1	0	1
RWS	Raamcontract SCB	1	1	1	3
RWS	SCB A-wegen	0	1	0	1
RWS	Toonbankdiensten Houtribdijk	0	1	1	2
RWS	HOHO A27	0	1	0	1
RWS	PAWOR	0	1	0	1
RWS	SCB A15MaVa	0	1	1	2
RWS	SCB KRW-NURG	0	1	1	2
RWS	Voortoetsen CAL	1	1	1	3
RWS	A4 Haaglanden N14 Burgerveen (Arcadis)	0	1	0	1
RWS	Via15 Technisch Team	0	1	0	1
RWS	Infocentrum Blankenburgverbinding	1	1	0	2
Shell	Head Quarters Redevelopment	0	1	0	1
TenneT	SCB Diensten	1	1	1	3
UMC	Raamovereenkomst Technisch Adviseurs	0	1	1	2
Vitens	Inhuur adviserend personeel	1	1	1	3
VRA	Guisweg Ontwerp en MER	1	1	1	3
VRA	AVANT	1	1	1	3
VRA	Airportsprinter	1	1	1	3
VRA	Raamovereenkomst Vervoerregio Amsterdam	1	1	1	3
Waterschap AA en Maas	ITA	1			
Waterschap HDSR	Raamovereenkomst		1	1	
Waterschap Brabantse Delta	ITA	1			
Waterschap Drents Overijsselse Delta	Raamovereenkomst herbouw en renovatie gemalen en stuwen 2019-2022	1	1	1	3
Waterschap Vallei en Veluwe	Grebbedijk	0	1	0	1
Waterschap Vallei en Veluwe	Noordelijke Randmeerdijk	1	1	1	3

Appendix D

Table 34 - General Information Labels

Nr	Label	Description
1	Time	For each document (invitation to bid, bid and assessment) the month and year will be tracked. This will be done for the years 2013-2020.
2	Assessment Method	The assessment method used to come up with the awarding will be labeled, being EMVI, Price or BVP.
3	Procurement Procedure	The procedure followed to select the contractors will be labeled. The following procedure labels are considered: Additional procurement to Framework Agreement, Framework Agreement, European Open Procedure, European Restricted Procedure, National Open Procedure, National Negotiated Procurement and National Negotiated Procurement.
4	Awarding	It will be labeled whether the bid was won or lost.
5	Assessment Calculation	It will be labeled with which kind of calculation method the bid will be assessed, using the labels: Discount and Points.
6	Environmental Inclusion	The first check will be if sustainability is included in the invitation to bid, the bid and the assessment of the bid.

Table 35 - Environmental Labels

Nr	Label	Description
1	Circular Process	The inclusion of circularity in the process is requested or proposed.
2	Circular Measures	The inclusion of circular measures is requested or proposed.
3	Energy Transition	The reduction of energy usage or the usage of energy neutral products is requested or proposed.
4	Environmental Action Plan	Process steps to include sustainability in the project are requested or proposed.
5	Environmental Quality	The incorporation or consideration of the quality of the environment, being surroundings, flora and fauna, is requested or proposed.
6	Flora & Fauna Compensation	The compensation of lost flora and fauna due to the project works is requested or proposed.
7	Sustainable Ambitions	The ambition of the employer or contractor considering sustainability is incorporated in the document.
8	Sustainable Affordability	The inclusion of the costs and financial feasibility of the requested or proposed sustainable measures.
9	Sustainable Awareness	The creation of awareness of sustainable problems and solutions among the employer or stakeholder is requested or proposed.
10	Sustainable Certification	An Environmental Management System, Eco-Label or Green Deal is asked for or proposed (rating tool), for example the CO_2-performance scale, LEED, BREAAM, ISO14001 or Green Deal GWW.
11	Sustainable Cooperation	Sessions in which the employer and contractor work together on sustainability are requested or proposed.
12	Sustainable Critical Success Factor	Sustainability is incorporated in the Critical Success Factors.
13	Sustainable Design	A sustainable design of the product is requested or proposed.
14	Sustainable Development	The urge to learn and innovate the sustainable processes or products is requested or proposed.
15	Sustainable Experience	Experience in working with sustainable problems and solutions is proposed or requested, for example work done in previous projects.
16	Sustainable Expertise	Knowledge of sustainability is requested or proposed.
17	Sustainable Exposure	Sharing sustainable performances or works among stakeholders for a positive appearance is requested or proposed.
18	Sustainable Maintenance	The inclusion of sustainability in the maintenance strategy is requested or proposed.
19	Sustainable Material	The reusage, reduction of usage or usage of sustainable materials is requested or proposed.
20	Sustainable Mobility	The usage of electrical vehicles or solutions regarding more efficient traffic to reduce CO_2 emission is mentioned.
21	Sustainable Performance-Based Tools	Tools to assess the performance of the product concerning sustainability are requested or proposed, such as LCA, Dubocalc or the “Koraalmodel”.
22	Sustainable Research	Research to sustainability is requested or proposed.
23	Sustainable Reference	A reference to another document is made for sustainable information.
24	Sustainable Specialist	An expert in the field of sustainability, fully or partially, is proposed/ asked.

Table 36 - Environmental Labels used per Element

Nr	Label	SM	SC	TS	AC	SAC	CPC
1	Circular Process			X	X	X	
2	Circular Measures					X	
3	Energy Transition	X		X	X		
4	Environmental Action Plan	X		X	X	X	
5	Environmental Quality	X					
6	Flora & Fauna Compensation			X			
7	Sustainable Ambitions	X		X	X	X	
8	Sustainable Affordability			X	X	X	
9	Sustainable Awareness				X		
10	Sustainable Certification		X	X	X	X	X
11	Sustainable Cooperation			X	X	X	
12	Sustainable Critical Success Factor	X					
13	Sustainable Design			X			
14	Sustainable Development	X			X	X	X
15	Sustainable Experience				X	X	
16	Sustainable Expertise	X	X			X	
17	Sustainable Exposure			X	X	X	
18	Sustainable Maintenance			X		X	
19	Sustainable Material				X	X	
20	Sustainable Mobility				X		
21	Sustainable Performance-Based Tools			X	X	X	
22	Sustainable Research	X		X			
23	Sustainable Reference	X		X		X	
24	Sustainable Specialist				X	X	

Appendix E

The searching terms used in Atlas TI are the following:

Duurza|Milieu|LCA|LCC|Reductie|CO2|BREEAM|LEED|Green|Circula|Materiaal|afval|klimaat|Dubo|Flora|Fauna|contract|Innova|Eco|ISO|Ambitieweb|ladder|koraal|Energie.

A "|" is used between the terms to include all the terms in the searching command.

Table 37 – Used Searching Terms in AtlasTI

Searching Term	**Explanation**
Duurza	By including duurza: duurzaam, duurzame and duurzaamheid are included. Dutch for sustainability.
Milieu	Dutch for environment.
LCA	Inclusion of Life Cycle Analysis
LCC	Inclusion of Life Cycle Costing
Reductie	Dutch word for reduction
CO2	By including CO2: CO2, CO2-prestatie, CO2-ladder
BREEAM	Including the BREEAM tool
LEED	Including the LEED tool
Green	Including all terms with green.
Circula	By using Circula: circular, circulair, and circularity are included.
Materiaal	Dutch word for material
Afval	Dutch word for waste
Klimaat	Dutch word for climate
Dubo	By including Dubo, the tool Dubocalc could be included
Flora	Inclusion of Flora
Fauna	Inclusion of Fauna
Contract	Inclusion of contract, in order to not miss environmental contracts.
Innova	By including innova: innovation, innovatie, innovatief.
ECO	By including Eco: ecologie, ecologisch and eco
ISO	Including all ISO standards
Ambitieweb	Including the tool ämbitieweb in which sustainable ambitions are stated
ladder	Including the CO2-performance scale (CO2-prestatie ladder)
Koraal	Including the tool "koraal" in which the environmental footprint is stated
Energie	Including energy

Appendix F

Appendix F.1

In the following figures the detailed results of the data characteristics can be found.

Table 38 – Clients in Database

Nr	Client	Number of projects
1	BAM	1
2	De Jong Zuurmond	1
3	Gemeente Almere	2
4	Gemeente Alphen aan den Rijn	2
5	Gemeente Blaricum	1
6	Gemeente Overbetuwe	1
7	Gemeente Roermond	1
8	Gemeente Schiedam	1
9	Gemeente Utrecht	1
10	Heijmans	7
11	HHNK	1
12	KWS	2
13	OFN	1
14	Pauw Dodewaard	3
15	PFL	1
16	PGL	1
17	PNB	4
18	PNH	6
19	Politie Nederland	1
20	ProRail	6
21	PU	4
22	PZH	6
23	RCE	1
24	RWS	6
25	TenneT	1
26	Vitens	1
27	VRA	5
28	Waterschap Drents Overijsselse Delta	1
29	Waterschap Vallei en Veluwe	1
	Total	70

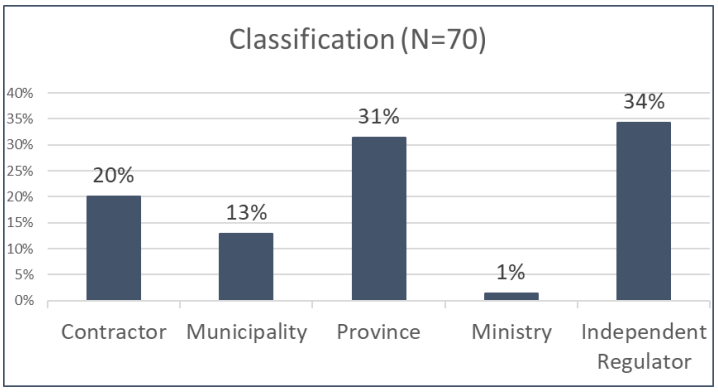

Figure 15 – Classification of the Data

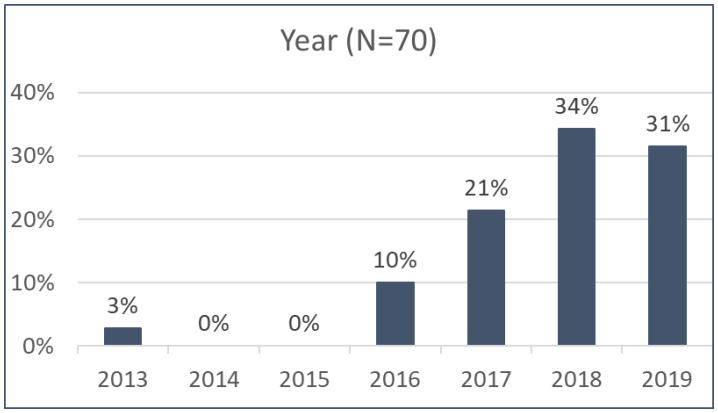

Figure 16 - Percentage of the Projects per Year

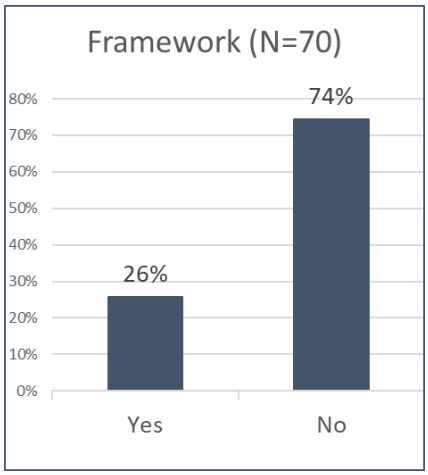

Figure 17 – Usage of Framework Agreements

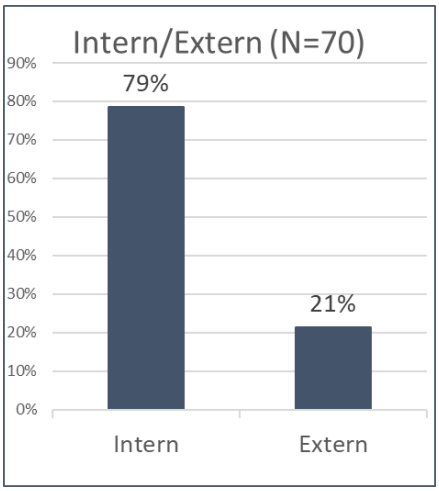

Figure 18 – Usage of Intern/Extern Projects

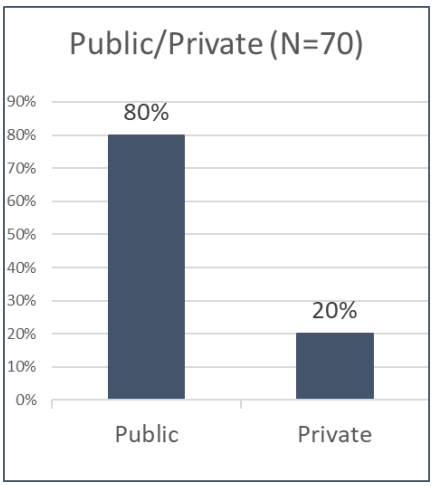

Figure 19 – Public/Private Projects

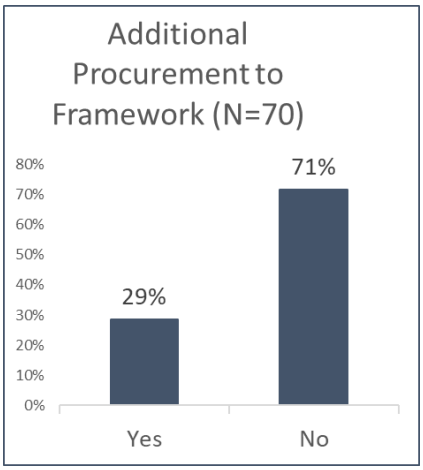

Figure 20 – Additional Procurement

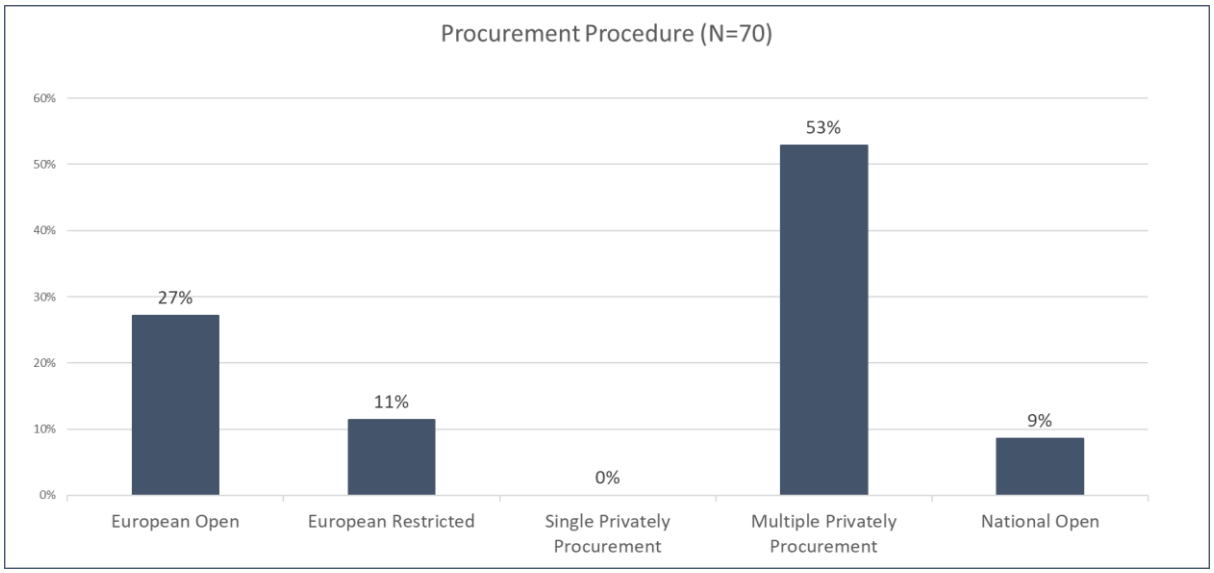

Figure 21 – Usage of Procurement Procedures

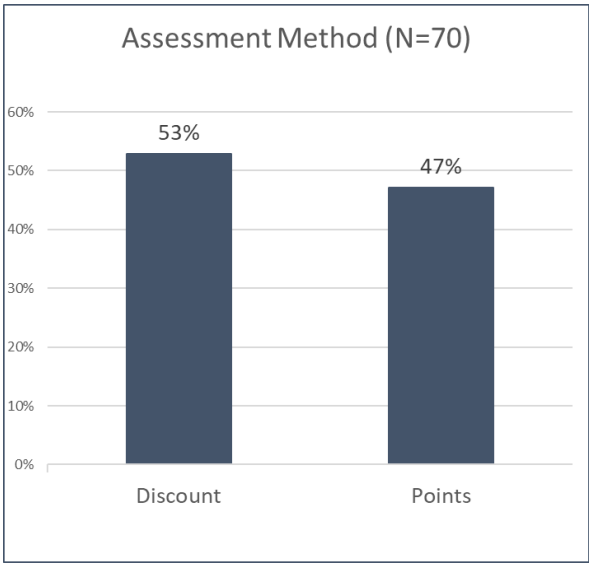

Figure 22 – Used Assessment Methods

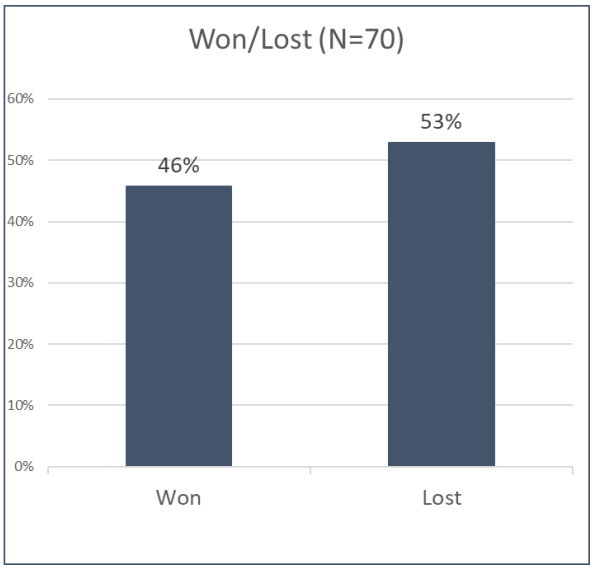

Figure 23 – Procurement Won

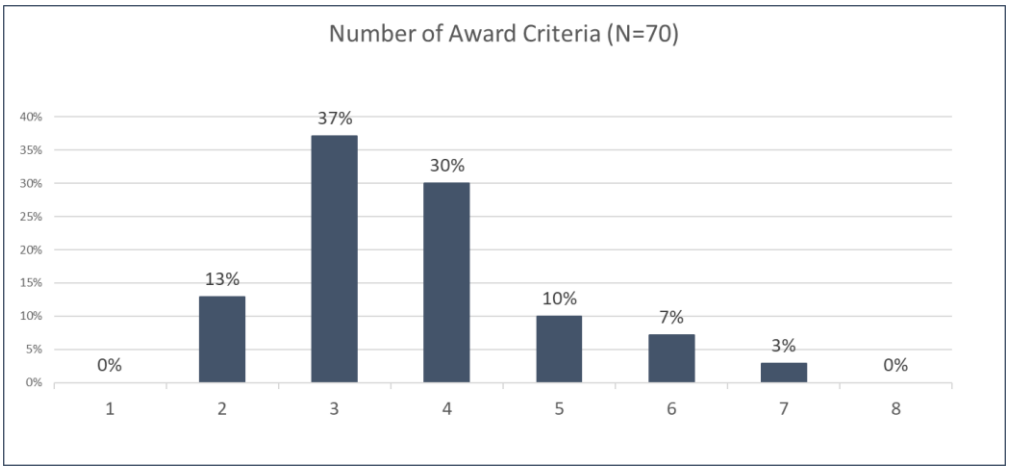

Figure 24 – Number of Award Criteria used

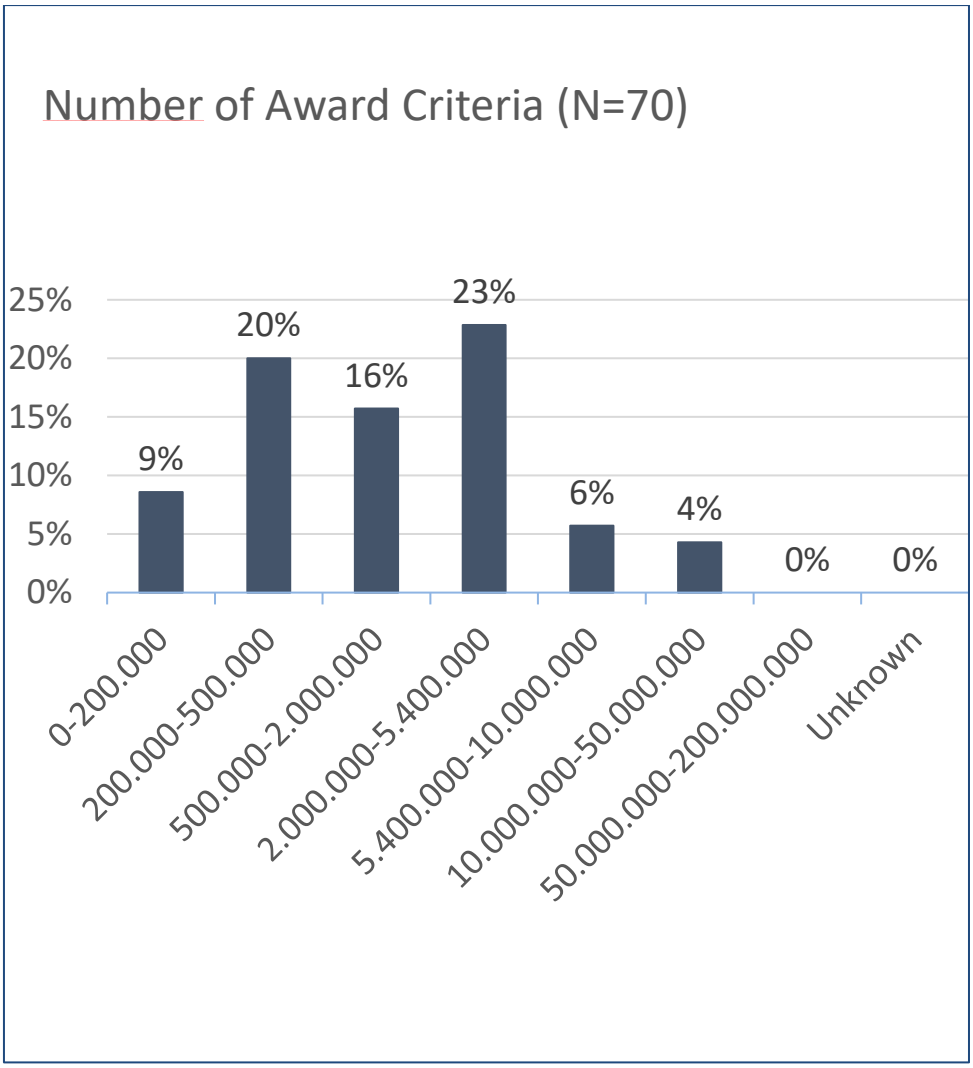

Figure 25 - Budget of the Projects

Appendix F.2

Table 39 – Inclusion of Environmental Labels

Element	Code	Total		
		I	B	A
SM	Sustainable Performance-Based Tool	1	0	0
SM	Sustainable Certification	2	0	0
SM	Sustainable Expertise	3	0	0
SM	Sustainable Reference	9	0	0
SM	Sustainable Ambitions	30	0	0
SM	Sustainable Material	1	0	0
SM	Circular Process	5	0	0
SM	Sustainable Development	5	0	0
SM	Sustainable Maintenance	2	0	0
SM	Energy Transition	4	0	0
SM	Environmental Quality	1	0	0
SM	Sustainable Affordability	1	0	0
SM	Sustainable Research	1	0	0
SM	Sustainable Critical Success Factor	1	0	0
SM	Environmental Action Plan	2	0	0
SC	Sustainable Certification	8	0	0
SC	Sustainable Experience	1	0	0
SC	Sustainable Expertise	2	0	0
TS	Sustainable Maintenance	0	0	0
TS	Sustainable Research	9	0	0
TS	Sustainable Affordability	3	0	0
TS	Circular Process	4	0	0
TS	Flora&Fauna Compensation	1	0	0
TS	Sustainable Reference	5	0	0
TS	Sustainable Certifications	0	0	0
TS	Sustainable Exposure	5	0	0
TS	Energy Transition	2	0	0
TS	Sustainable Expertise	1	0	0
TS	Sustainable Cooperation	7	0	0
TS	Sustainable Design	2	0	0
TS	Environmental Action Plan	16	0	0
TS	Sustainable Ambitions	10	0	0
TS	Sustainable Performance-Based Tool	6	0	0
TS	Sustainable Material	1	0	0
AC	Sustainable Certification	13	6	9
AC	Circular Process	1	2	1
AC	Sustainable Mobility	1	2	1
AC	Sustainable Exposure	0	1	1
AC	Energy Transition	0	1	0
AC	Sustainable Experience	0	1	0
AC	Sustainable Ambition	0	0	0
AC	Sustainable Development	1	0	0
AC	Sustainable Cooperation	0	0	0
AC	Sustainable Awareness	0	1	0
AC	Sustainable Performance-Based Tool	0	1	0
AC	Sustainable Specialist	0	4	1
AC	Sustainable Affordability	0	0	0
AC	Environmental Action Plan	12	15	12

AC	Sustainable Material	0	2	1
SAC	Environmental Action Plan	8	11	9
SAC	Sustainable Performance-Based Tool	1	17	4
SAC	Sustainable Material	2	8	2
SAC	Sustainable Experience	1	20	3
SAC	Sustainable Specialist	2	24	3
SAC	Sustainable Reference	1	0	0
SAC	Sustainable Affordability	1	6	0
SAC	Sustainable Mobility	3	3	2
SAC	Sustainable Ambitions	5	24	1
SAC	Sustainable Expertise	3	4	1
SAC	Energy Transition	9	8	2
SAC	Circular Process	2	6	0
SAC	Circular Measures	1	6	3
SAC	Sustainable Research	0	2	0
SAC	Sustainable Exposure	10	13	4
SAC	Sustainable Certification	1	18	2
SAC	Sustainable Development	3	6	0
SAC	Sustainable Cooperation	8	18	3
SAC	Sustainable Maintenance	2	1	0
SAC	Sustainable Flexibility	0	0	0

Appendix G

Appendix G.1

Table 40 – Questions asked in the Interviews

Nr.	Question
1	A growth of sustainable ambitions and inclusion of environmental requirements can be seen. De you see this as well?
2A	Is sustainability taken into account in the procurement of your organisation?
2B	How?
3A	A misalignment can be seen between the inclusion of environmental requirements in the invitation to bid and the assessment. Do you also see this?
3B	How could this happen?
4	Why is sustainability sometimes considered as subject matter or technical specification, but not as award criterion?
5A	Sustainability is rarely considered as a selection criterion. Why?
5B	What opportunities lie here?
6A	Sometimes Sustainability is considered as an award criterion, but not assessed. Why?
6B	What opportunities lie here?
7	How is an assessment on an environmental award criterion done in your organisation?
8	Often, only an Environmental Action Plan or Environmental Certification are assessed. Why?
9A	Would you adjust the weight given to environmental award criteria?
9B	If yes/no, why?
10	Sometimes the weight is not known, especially for environmental sub-award criteria. Why?
11	Do you think there is a misalignment in ambition of the buyers, project team and assessors?
12	What opportunities do you see for sustainability in procurement?
13	Whose responsibility is this?
14	What is the role of the contractor in this?
15	Would you change the way procurement is evaluated?
16	Would you change the purchasor, project or assessment team?
17	Are there opportunities in the procurement procedures (like a framework agreement) to improve the inclusion of sustainability in procurement?

Appendix G.2

Table 41 – Answers conducting during the Interviews– Answers conducting during the Interviews

Question	Answers			
	Respondent 1	**Respondent 2**	**Respondent 3**	**Respondent 4**
Organisation	Province of Zuid Holland (PZH)	Province of Noord Brabant (PNB)	Advise Bureau's	Province of Noord Holland
Job Title	Strategic Purchasing advisor	Senior-Purchasor	Asset Manager (Program Manager Sustainability)	Manager Subsidies en Inkoop
Relation with sustainability?	Responsible for the translation of the sustainable ambitions into the procurement strategy	Sustainable Ambitions for purchasing goods	Always been important. Now at Province of Noord Holland Program Manager Sustainability.	Affiniteit en ambitie. Enorme opgave met doelen, andere weg is nodig.
1	More and higher ambitions can be seen, influenced by the coalition. The purchasing department gives advice. The inclusion of sustainability grows, however slowly. It's a search to requests which can also be assessed, carried out and monitored.	Yes. The PNB is awarded to procure the most sustainable. Sustainable award criteria weight 50% and a CO_2 reduction is asked as proof. There is a workdocument and administrive agreements about sustainability, which is shared with contractors to include in the contract. It is working: a CO_2-reduction is seen for projects of the last two years.	Yes, amount of ambitions did not change, but became more serious. Become obligated by law (climate agreements).	The importance increases, but it is difficult how to implement the increase. How to include sustainability correctly in procurement? Including the correct weight has been difficult. Also, it has to be part of the project, instead of a criterion. Currently, sustainability is included when most of the project is already worked out. All the specifications and conditions are than already decided. Opportunity: keep the project open and include sustainability in an early phase of the project
2A	If possible, yes.	Yes.	Yes	Yes
2B	The purchasing department advises the executive office how sustainability	Minimum of 50% weight for sustainable award criteria and a CO_2-	Considering the goal of 2030, it has to be taken into account, also because the long	Is discussed. Unfortunately, there are still project in which sustainability is not or minimal included. Or,

	can be included in the procurement. Formerly, sustainability was included as sub,sub,sub requirement and it was unknown if it would be included.However, in recent years it is accounted for.	inclusion needs to be shown.	project times. In the EMVI criteria a plan is requested and demands are stated. In the PZH five themes need to be considered for sustainability. Also usage is made of the ambitionweb.	the inclusion of sustainability is sufficient for the RVO requirements, which are easy to comply with, causing a minimal role for sustainability. Within the organisation it is described that sustainability should be taken into account, but not how. The level of ambition is unclear and therefore the box of sustainability is easily checked. The environmental policy needs to be tightened. Sometimes sustainability is included in an early description of the project, but mostly this is already finished and sustainability needs to be added. Other criteria, like price, are simply better embedded in the process.
3A	Yes.	Not really.	No.	Not a good example.
3B	Formerly occured because insufficient knowledge. Now sustainability teams are available with the needed knowledge. Is expected to stop happening. Ask for sustainability and assess or not at all.	Cannot occur, because it is integrated in the organisation. Opportunity: sustainable requirements possible which are not requisted/unknown by the purchasing organization.	Formerly: maybe because the procuring organisation has sustainable ambitions, but does not use them. If sustainability is included in the demands or EMVI criteria, it has tob e assessed. Otherwise incorrect with the procurement law.	Lack of concreteness. Therefore it is not known how to provide feedback or assess. Gebrek aan specifiekheid, dan weet je ook niet hoe je het moet beargumenteren. Certainlt to make it legally watertight. This is also difficult for the purchase team. I fit is not specific, it is difficult to include and teams might be “scared” to do so.
4	Probably a template of the invitation to bid including sustainability. Then the project team considers	If an reference is made to sustainability, this will also be translated into the award criteria. Maybe in other	If it is included in a correct way in the technical specifications, it is not needed in the award criteria. However, it is not	The procurement policies of a lot of organisations is to abstract. There are ambitions, but not specific enough to make award criteria other

	sustainability out of scope and sustainability will consequently only be included in the template (textual reference etc.)	organisations not enough knowledge is available. Also, the same ambition is needed in the purchasing, project and executive department. Formerly, this was a problem, now not anymore. Also: the technical specifications can conflict with the award criteria.	sufficiently specific yet to do so. Aksing for an environmental action plan in the demands is of no use, more details are needed. So for now, it needs tob e included as an award criterion.	than very general ones. There is not enough knowledge to do so and therefore it is only written down that "it is important". The specific assignment to include sustainability is sometimes missing. Sustainability needs to be included in an earlier step and if it is unclear as organization how to do so, ask it to the market. Most people are used to focus on price. Consequently, letting this go and focusing on sustainability might feel strange or scary.
5A	Guess: Expected that contractors already have sustainability included or good contractors will be excluded because of the sustainable requirements.	Often open procurement procedure so no selection criteria. Sometimes sustainable selection criteria are included, it however says only something about how sustainable the contractor is not the project.	Sometimes the CFO2-performance scale is used. However, this is already not distinguishing anymore because a lot of contractors score high on the scale. Nonetheless, Bouwend Nederland made protest to asking the scale 5 as a slection criterion. It is a search to a process feasable for all parties.	Same reason: becasue the criteria for sustainability are not specific enough, it is difficult to substantiate the criteria legally.
5B	Opportunity: it motivates organisations to invest in their own organisation. Not an opportunity for the procurement project (remove an organization because of selection criteria and the sustainable product cannot be seen). Opportunity for	Opportunity: demand sustainable materials in the selection criteria (electrical machines for example)	Opportunity: fort he CO2-performance scale level 4 or 5, not only the own organisation needs to be sustainable, but also the project.	Yes, you can stimulate contractors to distinguish themselves for sustainability. Especially for framework agreements, sustainable contractor scan be included.

	province to externtal parties (we procure sustainable)			
6A	In this case the assessment was done incorrect. Feedback is needed. Maybe it was noticed, but not considered important enough to write down.	Not seen.	Weird	You would say the contractor has a part in this. Maybe the weight of the sub-award criterion was to low to play a major part in the award decision. Maybe difficult to assess.
6B	Opportunity: for contractors: ask if feedback is missing. Maybe assessed but not written down. For procuring organisation: i fit is considered, give feedback. In this way it can grow in the realisation.	Not seen	If sustainability is included as a sub-award criterion, it is uncertain if the contractor is challenged to include sustainability. Therefore, sustainability should be included as an awarrd-criterion. Courage is needed of the procuring organisations to include sustainability as an demand or an award criterion.	Opportunity: the better the assessment is, the higher the weight can be and the more distinguishing sustainability will be. The procuring organisation has to improve this in order to be able to include sustainability more often and present.
7	Depends on the invitation to bid. Prefered requirements are asked for and depending on these requirements an assessment will be done.	Sustainability is combined with innovation. A plan needs to be provided and a score will be given to the plan depending on the technology readiness level. Afterwards meetings can be planned to discuss in more detail.	Did a plea for a project that sustainability needs more feedback and this time it was done. The goals can only be achieved when sufficient attention is paid to the goal and a conmversation is started about the goal.	If the tender is awarded to a contractor, the feedback is less important. But for contractors which do not get the tender awarded, the feedback needs to be clear. It needs to be known why points are or are not scored. This also depends on the kind of invitation. A qualitative feedback needs to be included.
8	Missed opportunity for the procuring organisation to exclude more	Not interested in the process (proposed measures to come to the result) but in	Depends on the period of the data. Sustainability is difficult to quantify. A	An certificate is objective and therefore easy to ask. As an award or selection criterion. For an environmental

	details in the assessment.	the result. If the requested result is not sufficient, the process will be checked on mistakes.	reduction of CO_2 of 50% is needed compared to 1990, but it is unclear what the amount of CO_2 was back than. Therefore it is unclear how many reduction is needed. This includes a lot of assumptions. The resulting plan or ambition sounds good, but is often not reliable. Therefore it is more easy to ask these general topics, they sound good, but need to be more specific. MKI and more knowledge in the organisation needs therefore be developed.	action plan this shows that the procuring organization considers sustainability as difficult. Something needs to be requested and because a lack of knowledge this is something general.
9A	Partly yes.	Not now.	Yes	Would like that, but even better is to really include it in the project.
9B	Correct balance needs to be found icw other requirements. However, it is considered more and more important, so maybe an higher score would be in place.	Is all sufficient at the PNB. Communication about the weight with contractors is however very important.	First make sustainability specific as a demand or award criterion, but otherwise change the weight. The deadline for 2030 is coming closer so action is needed, despite the conservative sector. Contractors which can be sustainable need to get more opportunities to show this. This can be stimulated with a higher weight.	To increase the weight, there should be sufficient instruments and knowledge to assess the criterion. This is not the case yet and needs to be developed.
10	It can be that all the criteria are awarded with the	It has to be clear what is asked, otherwise the	Sustainability should be an award criterion	Used to that there is feedback included. If this is done correct, a

	same value. However, it confuses the contractor who maybe wants to include a lot of sustainability. Missed opportunity. Motivate contractors to ask about missing information.	procurement does not work. When not clear, it has to be asked by the contractor or from within the procuring organization. It also can be that no award was given because the requirements are awarded the same/in the order as provided (1,2,3).	instead of an sub-award criterion.	dispute with the (rejected) contractor is prevented. Maybe the feedback is provided in a short conversation afterwards. Or maybe it is not important enough for the contractor, or they do not lose tenders on sustainability.
11	Here probably no misalignment, more not enough knowledge. If it was asked for and not assessed, the assessment team has to learn from it. Maybe the assessment team meant to include it, but it was not clear for the contractor.	There can be differences between the project team and sustainable goals of the province. Project team might want to see sustainability to slow down the project progress. More a formerly problem, not anymore. Projectteam also part of the assessment.	This difference can bes een, even on a personal level. There are employees who think sustainability is important and include it and who do not. At the purchase department, a platform is available for information about sustainability to get the same ambitions in the organization. Here can be seen which requirements and tools are sustainability and effective. This is however not a reason for the seen misalignment.	The invitation has to be in such a way specific, that each team can see the same requirements. But if the purchase department/province cannot specify their ambitions sufficient, a misalignment could occur. A mismatch between idea and practise, ambition and realisation. If ambition are stated, this does not mean that everyone within the organization knows them and (has the expertise to) adjust them. At the PNH a new policy is shared with the intention that this is a policy for everyone, not only the purchase department. The mislignment can aslo occur because the requested criteria not feasible are.
12	Opportunities from the market: work together, knowledge sharing. If the provinces asks criteria, they do not know if contractors are able to fulfill the wises. Therefore it	Give sustainability a standard place and high weight in the awarding criteria. Translate these to the contract. And let all employees (contract, engineer) see that sustainable	Include in the demands what is possible. If not, include in the award criteria.	Provide more possibilities for the market to give substance to the project. By doing so, the knowledge and expertise of the market is used more. Consequently, the level of ambition can be extended. Do not

	is needed to work together. Smart people work on both sides. Is better to do before tendering, not afterwarts.	measures work. Sometimes it is better to have less quality of the products and make it sustainable (use used concrete instead of new). Next, maybe cooperation between the engineers and biologists. Sustainable ambitions need to be included from director until executor.		include every detail at the start, but include the contractors in this process. Is difficult, because if the work is not awarded to a contractor, legal complexity will occur due to the openness. This will possibly scare public organisations. Solutions might be more discussion between contractor and procuring organization, instead of via email in a meeting.
13	Opportunity: interaction: from both sides (contractor province) help is needed, so work together.	Opportunity: interplay contractor and procuring organisation. People are needed who can think different.	Primar the procuring organisation, because they make the rules and pay. They give the practical input of the work. But there is also a responsibility for the contractor. For example the green deal.	Starts with the procuring organisation, they need to expand the playing field and invite contractors. For the contractors: do not begin legal procedures to fast, because this can scare away the procuring organisations. Initiative of contractors is also more than welcome.
14	Openness from the contractor (also bit procuring organisation) important, despite the competition. Improving the world needs to be done by cooperation.	Maybe include contractor in an earlier stage.	See 13.	Role of the contractor is maybe to help the procuring organisation to overcome it's fear for difficult procedures and choose the easy way, which only holds innovation back.
15	Yes, i fit will improve the quality of the resulting project. How to do so: very difficult. WIthin the teams this is done by adding smart people with the needed knowledge. Improve based on feedback. Maybe a	Not now, maybe in the future a higher standard for sustainability.	Make it a lot more important.	Yes, first because you request it. Secondly, because this influences how the contractor sees an award criterion. If more value is added to the weight of an environmental award criterion, you show that you consider it more important. After the procurement also

	better invitation to bid?			feedback can be given in a meeting.
16	Include needed knowledge in the teams.	Keep checking what every teams did and provide feedback. Also, include sustainability in an earlier stage of the procurement process. Change in process.	Include a sustainability advisor in the teams to provide advice, especially in the begin of the process. However, inthe future the teams not to have the competencies on their own. The same as for planning, time and costs, sustainability needs to become a standard for a project.	Not the composition of the teams needs to be adjusted, but the expertise. The knowledge available in the market needs tob e used more, but also the knowledge in the own organization needs to be improved to procure and assess sustainability correct.
17	Difficult. Doing it now, hot item. Soon included in the framework agreement, ask for help how to include sustainability better. Hopefully resulting in more quality in the execution of the project.	Use innovative ways of proucring. Maybe use less requirements, to leave it more to the contractor.	Long contracts might be a solution, because this offers an opportunity to you can work on innovations together. Also, procurement for multiple assets can be good: for example 5 bridges. In this way standardization and innovation can better be implemented. This is done by RWS and PNH. This is however new and needs to be developed.	If a framework agreement is used, contractors can be included which have proven to possess the sustainable expertise and experience. A disadvantgae can be that this is a sertainty for work, and the incetive to innovate disappears. This calls for good contract management.

Appendix H

Appendix H.1

Table 42 - Analysis of Sufficient Environmental Inclusion: The Invitations to Bid

Nr.	Purchasing Organisation	Project Name	Example Available in the Invitations to Bid					
			TR	SC	TS	AC	SAC	CPC
1	BAM	Dishoek						
2	De Jong Zuurmond	HM Onderhoudscontract	X				X	
3	Gemeente Almere	C1	X	X				
4	Gemeente Almere	3 Bruggen			X	X	X	
5	Gemeente Alphen aan den Rijn	Ingenieursdiensten + Archeologie - Perceel Ingenieursdiensten		X				
6	Gemeente Alphen aan den Rijn	Ingenieursdiensten + Archeologie - Perceel Onderzoeken		X				
7	Gemeente Blaricum	Herinrichting Bijvanck	X			X	X	
8	Gemeente Overbetuwe	Spoorkruisingen Elst Noord			X			
9	Gemeente Roermond	Busstation Roermond	X					
10	Gemeente Schiedam	Ambachtenbuurt	X					
11	Gemeente Utrecht	Van Wijk Singel midden en zuid & Plaatbrug Zuid	X				X	
12	Heijmans	Gemeente Haaksberger, Stepelerveld	X		X	X	X	
13	Heijmans	Provincie Gelderland N301						
14	Heijmans	Lintveldseweg						
15	Heijmans	Gemeente Roermond Stationsstraat	X					
16	Heijmans	N225 asfaltonderhoud						
17	Heijmans	Welterlaan Heerlen						
18	Heijmans	Gemeente Sittard-Geleen Oranjelaan						
19	HHNK	Zeef 2 Dijkversterking Noordzeekanaal						
20	KWS	GO Z&D 19	X				X	
21	KWS	Engineering en uitvoeren Groot Onderhoud	X				X	
22	OFN	Gemeente Groningen Abri's	X			X	X	
23	Pauw Dodewaard	GU Onderhoud straatwerk	X			X		
24	Pauw Dodewaard	GU Onderhoud Riolering				X	X	
25	Pauw Dodewaard	Vogelbuurt						
26	PFL	Hogering Almere						
27	PGL	Station Nijmegen Heyendaal						
28	PNB	Sint Hubert			X			
29	PNB	N279 Veghel Asten			X			
30	PNB	GOL	X		X			
31	PNB	N279 Den Bosch Veghel						
32	PNH	Oevertrajecten	X					
33	PNH	Royal FloraHolland			X			
34	PNH	Toonbankdiensten Wijckerpoort-Wijckermolen						
35	PNH	Koopvaardersschutsluis						
36	PNH	Toonbankdienst Midden-Noord						
37	PNH	N231b	X		X			
38	Politie Nederland	Raamovereenkomst huisvesting	X					
39	ProRail	PHS Saal MLT	X				X	
40	ProRail	PHS Alkmaar-Amsterdam	X					
41	ProRail	PHS Nijmegen	X			X	X	
42	ProRail	PHS Sloterdijk	X				X	

43	ProRail	S- en O-borden Perceel 1	X		X		X	
44	ProRail	Westelijke Ontsluiting Amersfoort	X		X			
45	PU	Snelfietsroutes			X			
46	PU	Busstalling Westraven	X		X	X		
47	PU	N201	X		X			
48	PU	VRT Vernieuwde Regionale Tramlijn	X					
49	PZH	Raamovereenkomst 2019-2023 Perceel 1	X	X	X		X	
50	PZH	Raamovereenkomst 2019-2023 Perceel 3	X	X	X			
51	PZH	De Gouwe						
52	PZH	N206 Europaweg	X			X		
53	PZH	N216 Peursumsebrug	X					
54	PZH	N228	X					
55	RCE	RCE Nulmeting Archeologie						
56	RWS	Voortoetsen CAL	X	X		X		
57	RWS	Raamcontract SCB - Perceel 1		X				
58	RWS	Raamcontract SCB - Perceel 2		X				
59	RWS	Raamcontract SCB - Perceel 3		X				
60	RWS	Raamcontract SCB - Perceel 4		X				
61	RWS	SAA A6						
62	TenneT	SCB Diensten						
63	Vitens	Inhuur adviserend personeel	X					
64	VRA	AVANT			X			
65	VRA	Guisweg Ontwerp en MER	X		X			
66	VRA	Raamovereenkomst Vervoerregio Amsterdam Perceel 1	X					
67	VRA	Raamovereenkomst Vervoerregio Amsterdam Perceel 2	X					
68	VRA	Airportsprinter						
69	Waterschap Drents Overijsselse Delta	Raamovereenkomst herbouw en renovatie gemalen en stuwen 2019-2022	X				X	
70	Waterschap Vallei en Veluwe	Noordelijke Randmeerdijk						

Appendix H.2

Table 43 - Analysis of Sufficient Environmental Inclusion: The Bids

Nr.	Purchasing Organisation	Project Name	Example Available in the Bid		Most Included
			AC	SAC	
1	BAM	Dishoek			
2	De Jong Zuurmond	HM Onderhoudscontract	X	X	X
3	Gemeente Almere	C1	X	X	
4	Gemeente Almere	3 Bruggen	X	X	X
5	Gemeente Alphen aan den Rijn	Ingenieursdiensten + Archeologie - Perceel Ingenieursdiensten			
6	Gemeente Alphen aan den Rijn	Ingenieursdiensten + Archeologie - Perceel Onderzoeken			
7	Gemeente Blaricum	Herinrichting Bijvanck		X	
8	Gemeente Overbetuwe	Spoorkruisingen Elst Noord			
9	Gemeente Roermond	Busstation Roermond		X	
10	Gemeente Schiedam	Ambachtenbuurt		X	
11	Gemeente Utrecht	Van Wijk Singel midden en zuid & Plaatbrug Zuid	X	X	X
12	Heijmans	Gemeente Haaksberger, Stepelerveld		X	
13	Heijmans	Provincie Gelderland N301			
14	Heijmans	Lintveldseweg	X	X	
15	Heijmans	Gemeente Roermond Stationsstraat			
16	Heijmans	N225 asfaltonderhoud			
17	Heijmans	Welterlaan Heerlen			
18	Heijmans	Gemeente Sittard-Geleen Oranjelaan			
19	HHNK	Zeef 2 Dijkversterking Noordzeekanaal		X	
20	KWS	GO Z&D 19		X	
21	KWS	Engineering en uitvoeren Groot Onderhoud		X	
22	OFN	Gemeente Groningen Abri's	X	X	
23	Pauw Dodewaard	GU Onderhoud straatwerk		X	
24	Pauw Dodewaard	GU Onderhoud Riolering	X	X	
25	Pauw Dodewaard	Vogelbuurt		X	
26	PFL	Hogering Almere			
27	PGL	Station Nijmegen Heyendaal		X	
28	PNB	Sint Hubert		X	
29	PNB	N279 Veghel Asten	X	X	
30	PNB	GOL		X	
31	PNB	N279 Den Bosch Veghel		X	
32	PNH	Oevertrajecten			
33	PNH	Royal FloraHolland			
34	PNH	Toonbankdiensten Wijckerpoort-Wijckermolen		X	
35	PNH	Koopvaardersschutsluis		X	
36	PNH	Toonbankdienst Midden-Noord		X	
37	PNH	N231b		X	
38	Politie Nederland	Raamovereenkomst huisvesting	X	X	X
39	ProRail	PHS Saal MLT		X	
40	ProRail	PHS Alkmaar-Amsterdam		X	
41	ProRail	PHS Nijmegen	X	X	
42	ProRail	PHS Sloterdijk		X	
43	ProRail	S- en O-borden Perceel 1			
44	ProRail	Westelijke Ontsluiting Amersfoort			
45	PU	Snelfietsroutes		X	
46	PU	Busstalling Westraven	X	X	X

47	PU	N201		X	
48	PU	VRT Vernieuwde Regionale Tramlijn			
49	PZH	Raamovereenkomst 2019-2023 Perceel 1	X	X	X
50	PZH	Raamovereenkomst 2019-2023 Perceel 3		X	
51	PZH	De Gouwe			
52	PZH	N206 Europaweg	X	X	X
53	PZH	N216 Peursumsebrug			
54	PZH	N228		X	
55	RCE	RCE Nulmeting Archeologie			
56	RWS	Voortoetsen CAL	X	X	
57	RWS	Raamcontract SCB - Perceel 1			
58	RWS	Raamcontract SCB - Perceel 2			
59	RWS	Raamcontract SCB - Perceel 3			
60	RWS	Raamcontract SCB - Perceel 4			
61	RWS	SAA A6			
62	TenneT	SCB Diensten			
63	Vitens	Inhuur adviserend personeel			
64	VRA	AVANT		X	
65	VRA	Guisweg Ontwerp en MER	X	X	X
66	VRA	Raamovereenkomst Vervoerregio Amsterdam Perceel 1	X	X	X
67	VRA	Raamovereenkomst Vervoerregio Amsterdam Perceel 2			
68	VRA	Airportsprinter			
69	Waterschap Drents Overijsselse Delta	Raamovereenkomst herbouw en renovatie gemalen en stuwen 2019-2022	X	X	X
70	Waterschap Vallei en Veluwe	Noordelijke Randmeerdijk		X	

Appendix H.3

Table 44 - Analysis of Sufficient Environmental Inclusion: The Assessments of the Bid

Nr.	Purchasing Organisation	Project Name	Example Available in the Bid	
			AC	SAC
1	BAM	Dishoek		
2	De Jong Zuurmond	HM Onderhoudscontract		
3	Gemeente Almere	C1		
4	Gemeente Almere	3 Bruggen	X	X
5	Gemeente Alphen aan den Rijn	Ingenieursdiensten + Archeologie - Perceel Ingenieursdiensten		
6	Gemeente Alphen aan den Rijn	Ingenieursdiensten + Archeologie - Perceel Onderzoeken		
7	Gemeente Blaricum	Herinrichting Bijvanck	X	X
8	Gemeente Overbetuwe	Spoorkruisingen Elst Noord		
9	Gemeente Roermond	Busstation Roermond		
10	Gemeente Schiedam	Ambachtenbuurt	X	X
11	Gemeente Utrecht	Van Wijk Singel midden en zuid & Plaatbrug Zuid	X	
12	Heijmans	Gemeente Haaksberger, Stepelerveld	X	
13	Heijmans	Provincie Gelderland N301		
14	Heijmans	Lintveldseweg		
15	Heijmans	Gemeente Roermond Stationsstraat		
16	Heijmans	N225 asfaltonderhoud		
17	Heijmans	Welterlaan Heerlen		
18	Heijmans	Gemeente Sittard-Geleen Oranjelaan		
19	HHNK	Zeef 2 Dijkversterking Noordzeekanaal		
20	KWS	GO Z&D 19		
21	KWS	Engineering en uitvoeren Groot Onderhoud		
22	OFN	Gemeente Groningen Abri's	X	X
23	Pauw Dodewaard	GU Onderhoud straatwerk		
24	Pauw Dodewaard	GU Onderhoud Riolering		
25	Pauw Dodewaard	Vogelbuurt		
26	PFL	Hogering Almere		
27	PGL	Station Nijmegen Heyendaal		
28	PNB	Sint Hubert		
29	PNB	N279 Veghel Asten		
30	PNB	GOL		
31	PNB	N279 Den Bosch Veghel		
32	PNH	Oevertrajecten		
33	PNH	Royal FloraHolland		
34	PNH	Toonbankdiensten Wijckerpoort-Wijckermolen		
35	PNH	Koopvaardersschutsluis		
36	PNH	Toonbankdienst Midden-Noord		
37	PNH	N231b		
38	Politie Nederland	Raamovereenkomst huisvesting		
39	ProRail	PHS Saal MLT		
40	ProRail	PHS Alkmaar-Amsterdam		
41	ProRail	PHS Nijmegen	X	
42	ProRail	PHS Sloterdijk		
43	ProRail	S- en O-borden Perceel 1		
44	ProRail	Westelijke Ontsluiting Amersfoort		
45	PU	Snelfietsroutes		
46	PU	Busstalling Westraven		

47	PU	N201		
48	PU	VRT Vernieuwde Regionale Tramlijn		
49	PZH	Raamovereenkomst 2019-2023 Perceel 1		
50	PZH	Raamovereenkomst 2019-2023 Perceel 3		
51	PZH	De Gouwe		
52	PZH	N206 Europaweg	X	
53	PZH	N216 Peursumsebrug		
54	PZH	N228		
55	RCE	RCE Nulmeting Archeologie		
56	RWS	Voortoetsen CAL		
57	RWS	Raamcontract SCB - Perceel 1		
58	RWS	Raamcontract SCB - Perceel 2		
59	RWS	Raamcontract SCB - Perceel 3		
60	RWS	Raamcontract SCB - Perceel 4		
61	RWS	SAA A6		
62	TenneT	SCB Diensten		
63	Vitens	Inhuur adviserend personeel		
64	VRA	AVANT		
65	VRA	Guisweg Ontwerp en MER		
66	VRA	Raamovereenkomst Vervoerregio Amsterdam Perceel 1	X	
67	VRA	Raamovereenkomst Vervoerregio Amsterdam Perceel 2		
68	VRA	Airportsprinter		
69	Waterschap Drents Overijsselse Delta	Raamovereenkomst herbouw en renovatie gemalen en stuwen 2019-2022	X	
70	Waterschap Vallei en Veluwe	Noordelijke Randmeerdijk		