SEEKING SUSTAINABILITY IN THE CONSTRUCTION SECTOR:
OPPORTUNITIES WITHIN IMPACT ASSESSMENT AND SUSTAINABLE PUBLIC PROCUREMENT

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LIST OF APPENDED PAPERS

This thesis is based on the following papers which are referred to in the text by their Roman numerals.

Papers included in the thesis:


The paper was written by the thesis author. Professor Balfors initiated the theme of the paper and was responsible for outlining the paper. She also provided comments on the paper. Dr. Faith-Ell supported the paper with the information based on field-level experiences. In addition, she commented on the paper.


The thesis author was responsible for collecting the data and writing the paper. Professor Balfors and Associate Professor Ulla Mörtberg initiated the theme of the paper. They also provided comments on the paper. Dr. Faith-Ell enabled the thesis author with the necessary contacts for the interview, and also commented on the paper.


The paper was written by the thesis author. Professor Balfors and Dr. Faith-Ell guided and commented on the paper.


The largest part of the paper was written by the thesis author. The thesis author was also responsible for the paper outline, submission to the journal, data triangulation and Web-Hipre analysis. Ms. Le Lann Roos was involved in an action research in a case that is included in the paper. She also developed a master thesis report based on the case (sections of this report are used in the paper).


The thesis author was responsible for the paper.
# Table of Content

**Acknowledgments**........................................................................................................... iii

**LIST OF APPENDED PAPERS**............................................................................................. v

**Table of Content**.................................................................................................................. vi

**Abbreviations**....................................................................................................................... vii

**Abstract**................................................................................................................................... 1

1. **Introduction**.......................................................................................................................... 2  
   1.1. Background to the study  
   1.2. Research Aim and Questions  
   1.3. Thesis structure

2. **Theoretical perspectives**.......................................................................................................... 8  
   2.1. GPP and SPP  
   2.2. EIA and SEA

3. **Research Methodology**........................................................................................................... 16  
   3.1. First phase  
   3.1.1. Methodological limitation in the first phase  
   3.2. Second Phase  
   3.2.1. Methodological limitation in the second phase

4. **Results**.................................................................................................................................... 23  
   4.1. Towards inter-linking impact assessment and GPP  
   4.2. Opportunities to link impact assessment and GPP  
   4.3. Partnerships to link impact assessment and GPP  
   4.4. Key concerns for progress towards SPP  
   4.5. Discourses on SPP

5. **Discussion**............................................................................................................................ 40  
   5.1. The practicality of inter-linking impact assessment and GPP/SPP  
   5.2. Sustainability in the construction sector

6. **Concluding remarks**............................................................................................................... 44

7. **Future research**..................................................................................................................... 46

**References**............................................................................................................................... 47
ABBREVIATIONS

BREEAM - Building Research Establishment’s Environmental Assessment Method
CDP - competitive dialogue procedure
EIA - environmental impact assessment
EIS - environmental impact statement
EBP - evidence based policy
EU – European Union
GPP – green public procurement
LCA - life cycle assessment
MEAT - most economically advantageous tender
OECD – Organisation for Economic Cooperation and Development
PPS - provisionally preferred solution
SPP - sustainable public procurement
SEA - strategic environmental assessment
Abstract

Growing concerns regarding sustainability have led the construction sector to adopt various policy instruments for reducing the impacts caused by construction activities. One such policy instrument includes impact assessment, which enables the construction sector to evaluate the environmental consequences of proposed developments at project (environmental impact assessment) and strategic (strategic environmental assessment) level. In recent years, the construction sector has also adopted green public procurement, which is a process whereby contracting authorities aim to procure services and products that meet environmental requirements. In certain contexts, green public procurement has extended to sustainable public procurement, which involves the incorporation of both environmental and social considerations in the procurement of services and products. Promoting sustainability in the construction sector is a significant challenge. This challenge is primarily due to the requirement of high levels of cooperation among project stakeholders, on the one hand, and a lack of coordination between project planning and implementation on the other hand. Therefore, procurement plays a significant role as it establishes the tone for the interaction between contracting authorities and contractors. The overall aim of this thesis is to bolster the knowledge of promoting sustainability in the construction sector, with the specific aim of analysing the ways in which policy instruments such as environmental impact assessment and green public procurement can be reinforced to improve the coordination between planning and the implementation of sustainability considerations. This thesis conceptualises an inter-link between impact assessment and green public procurement, and identifies the opportunities to develop the inter-link. It is appropriate to plan for green public procurement at the pre-decision phase of an environmental impact assessment. The inter-link can be strengthened by involving contractors in planning for green and sustainable public procurement. One way to involve contractors is with the aid of competitive dialogue procedure, which is a procurement procedure that allows contracting authorities to hold discussions with contractors regarding the authority’s requirements. This study strengthens the conceptualisation that competitive dialogue procedure can facilitate green and sustainable public procurement. The various elements in a competitive dialogue procedure can enable the contracting authorities to ensure the consistency between the weight for environmental considerations in contract award criteria and the relevant preferences. This thesis also discusses key concerns for progress towards sustainable public procurement, which includes among others the incorporation of sustainability values in procurement decisions. In addition, this study identified certain discourses on future trends for green and sustainable public procurement. The discourses provide an opportunity for reflection, and thereby indicate that analytical support is required to develop criteria in a way that enables the evaluation of sustainable public procurement against the background of sustainability and justice regarding natural capital. Innovation must be promoted with a focus on sustainability values. Moreover, green or sustainable public procurement must be discussed between contracting authorities and contractors in light of its contribution to sustainability.

Key words: Environmental impact assessment; green public procurement; sustainable public procurement; competitive dialogue procedure; construction sector
1. **Introduction**

“Let what I dig from thee, O Earth, rapidly spring and grow again. O Purifier, let me not pierce through thy vitals or thy heart”

- Atharva Veda. Translation: (Griffith, 1896)

1.1. **Background to the study**

The Earth’s natural resource base is not infinite (Rockström et al., 2013). The pressures on resources are increasing as natural resources underpin the functioning of the European and global economy (EC, 2011a). For instance, Europe has the world’s highest net imports of resources per person and its economy relies heavily on imported raw materials and energy. Moreover, the possible negative social and environmental impacts on third countries are an ongoing cause of concern. In the year 2007, the total amount of material directly used in the EU economy was more than eight billion tonnes (EC, 2011b). An equivalent of 16% of the EU Gross Domestic Product is spent each year by European public authorities on the procurement of goods such as building components, transport vehicles, services such as building maintenance and cleaning works. A major share of annual expenditure of the public authorities is represented by construction and renovation works (CEC, 2008). It must therefore be noted that one of the significant users of natural resources and energy is the construction sector. The Worldwatch Institute data shows that the construction sector consumes 40 percent of the total raw material flow into the global economy each year and more than a quarter of the world’s annual appetite for wood (Roodman and Lenssen, 1995). A substantial amount of energy is also used during the manufacturing and transportation of building materials, installation and construction activities (Yan et al., 2010). In addition, studies show that the construction sector accounts for the largest share of energy use and the environmental impacts during operation phase (cf: Adalberth 2000; OECD, 2003). According to the Organization for Economic Co-operation and Development (OECD), the construction sector’s energy use accounts for 25 to 40% of final energy consumption in OECD countries (OECD, 2003). As a result of vast consumption of resources and energy, the sector has been greatly responsible for environmental pollution and problems related to sustainability. The incidence of CO$_2$ emissions is evident during the different phases of a building life cycle such as the production of materials, setting the site, exploitation, construction of the building, and demolition (González and Navarro, 2006).

As environmental and sustainability issues continue to become increasingly significant, the construction sector needs to act for three important reasons that Ofori (1992) has listed. Primarily, to contribute to the overall effort being made to address environmental issues and sustainability concerns. The second reason includes the sector’s need to prepare for opportunities that can be anticipated regarding the changes that will be required in terms of design, con-
Struction and management, the new materials to use, and the processes to adopt. Moreover, the reason why the construction sector is required to act is also because it will have to take proactive measures for handling the array of environment-related statutes, regulations, policies and requirements. Such environmental requirements and “changing priorities in construction management” (Lam et al., 2010) have obliged the construction sector to respond to issues concerning sustainability. Sustainability in the construction business is concerned with achieving a win-win situation for contributing to the improved environment and the advanced society, and simultaneously gaining competitive advantages for construction companies (Shen et al., 2010).

Therefore, the construction sector is in crucial need of improving its environmental performance (Tam et al., 2006). According to Rikhardsson (1998), the improvement of environmental performance implies that the sector must minimise the environmental impact of its activities, products or services. The construction sector is thereby compelled to ask itself many questions regarding the approaches to handling environmental problems within the overall design process, the suitable materials to be used, environmentally benign practices, and other such issues and aspects that influence its contribution to the improved environment (Ball, 2002). Moreover, the issues that should inform the social dimension are less acknowledged and addressed by stakeholders involved in the development process (Edum-Forwe and Price, 2009). Such social issues focus on an adherence to ethical values during development, addressing topics such as ethical trading throughout the supply chain, the provision of adequate local services, including the provision of information to local community during construction activities. Also relevant is the conservation of local heritage, and access to green space, which tackles topics such as the accessibility of residents to green areas (van der Heijden and van Bueren, 2011).

The construction sector is pushed by government authorities to adopt several policy instruments that guide “the better management of development in harmony with the environment” (Glasson et al., 2007). Policy instruments can generally be classed as regulation (sticks), economic means (carrots) and information (sermons) (Vedung, 1998). Similarly, in the construction sector, policy instruments can be categorised into legislative and regulatory, economic, and information instruments (Vermande and van der Heijden, 2011). Legislative and regulatory instruments are tools derived from routinised legal forms establishing the archetype of state interventionism. They set out the values and interests protected by the state. Economic instruments are close to legislative and regulatory instruments as they follow the same route, drawing their force and legitimacy from having been developed on a legal basis. However, they use monetary techniques either to levy resources intended to be redistributed (eg: taxes) or to direct the behaviours of actors (eg: through subsidies, pollution fees) (Lascoumes and Le Gales, 2007). Thus the industries self-regulate their activities affecting the environment in their own economic in-
terest. The state may pursue this course by playing the additional role of building the capacity among industries via the information instrument (Lenschow and Zito, 1998). Information instruments offer less interventionist forms of public regulation (Lascoumes and Le Gales, 2007), as they involve only the communication of claims and reasons but neither material resources nor obligatory directives (Vedung, 1998). The primary focus in this thesis will be on legislative and regulatory instruments. Four key policy instruments have been considered in this thesis, namely, green public procurement (GPP), sustainable public procurement (SPP), environmental impact assessment (EIA) and strategic environmental assessment (SEA).

GPP is defined 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”. According to the Commission, the priority sectors involve, among others, construction and energy from renewable sources (CEC, 2008). The adoption of GPP practices is facilitated when national public procurement legislation covers appropriate provisions (EEA and UNEP, 2007). Furthermore, the development of GPP is seen as one part of a plethora of initiatives to promote sustainable development. Given that sustainable development has adopted social dimension, it is not surprising that there is now a growing debate about how social aspects can be combined with GPP to produce SPP (McCruden, 2004).

According to Glasson et al. (2005), the emergence of an increasing demand by clients for goods and services with less or no environmental damage, and also a growing market for clean technologies is creating a response from project developers. The project developers or construction contractors need to be alerted to potential conflict. Glasson et al. (2005) have identified a policy instrument that can signal the developer of potential conflict and could be used to discuss green solutions that offset negative environmental impacts. Such a policy instrument is called EIA. Sadler and McCabe (2002) define EIA as “a systematic process to identify, predict and evaluate the environmental effects of proposed actions and projects”. Furthermore, they have stated EIA’s twofold purposes a) it aids the decision-making process by providing information on the likely environmental consequences of proposed actions b) it intends to promote environmentally sound practices through the identification of appropriate mitigation measures. EIA is also considered as a planning tool (Bichard and Frost 1988; McDonald and Brown 1995; Briffett 1999) in which design attributes and mitigation concepts are carefully examined prior to the final design (Marshall, 2002) Appropriate mitigation is an important outcome of EIA and the means by which development projects can be made environmentally feasible (Slinn et al., 2007). Ultimately, it is essential to determine the outcomes of EIA. Therefore, EIA should include a commitment to follow-up. EIA follow-up provides the
Seeking sustainability in the construction sector: opportunities within impact assessment and sustainable public procurement

project proponents the opportunity to implement measures to mitigate impacts and prevents EIA being just a pro forma practice (Marshall et al., 2005).

However, various researchers have identified challenges concerning the translation of information produced in the EIA phase into action (during the project implementation phase). For instance, Faith-Ell (2007) has indicated that the environmental requirements in construction contracts were based on the knowledge of individuals within the government (client) and not on a systematic discussion of relevant environmental information such as the EIA report. Furthermore, her study revealed that the execution of environmental requirements was dependent on the knowledge, resources and economy of contractors. Slotterback (2008) has raised the issue that there is little attention to what happens after the EIA is completed and the implementation of mitigation measures begins. Arts et al. (2001) have identified substantial differences between the project plans including the EIA report and their implementation. Ridgway (2005) has indicated the need to improve the delivery of EIA commitments during the construction, installation and commissioning phases of the project.

One of the most recent trends in EIA has been its application at the level of policies, plans and programmes (Glasson et al., 2005). This application of EIA, called the SEA is defined as a “process that aims to integrate environmental and sustainability considerations in strategic decision-making” (Therivel, 2004). In recent years, SEA is being positioned within a broader context of sustainability and is the most frequently applied process oriented environmental planning and management instrument in public (Fischer, 2009). Similar to EIA, SEA also requires that the actual consequences of decisions are examined against the perceived effects, and that impacts are mitigated, which is a function inherently associated with follow-up measures (Partidário and Fischer, 2004). Hence, it is important that concrete project decisions consider previous strategic decisions. Such an order of planning from strategic to project level is called tiering (van Buuren and Nooteboom, 2010). Tiering intends to link environmental assessments at different planning levels in order to facilitate better scoping of the assessment, and also, if necessary, to permit the postponement of detailed issues. A tiered approach, therefore, can minimise the problem of EIA being only a ‘snapshot in time’ (Arts et al., 2005). Furthermore, in order to promote continuity in the integration of environmental considerations, Lyhne (2011) has argued that it is appropriate to investigate whether it would be possible for a single actor to assume the overall responsibility for SEA application throughout the strategic decision-making process.

However, in terms of the construction sector, it is usually fragmented. The sector consists of a wide range of trades and professions, which include architects, engineers, builders and others. Moreover, each of these trades and professions comprises of a range of organisations and businesses, both large players and small
enterprises (Vermande and van der Heijden, 2011) that involve several parties with different objectives. This might eventually lead to problems while assuming direct responsibility for environmental protection (Ofori, 2000).

One way that has been advocated to deal with fragmentation and promote better communication among project actors is evolved forms of contracting such as partnering. The concept of partnering in the construction industry is based on collaboration, trust and openness, which enables the combined effort of project actors towards meeting project objectives (Naoum, 2003; Kadefors, 2004; Lu and Hong Yan, 2007; Alderman and Ivory, 2007; Gadde and Dubois, 2010). Hence, there is a need to understand whether partnering can facilitate policy instruments such as EIA and GPP. For instance, in terms of GPP, a Nordic study has recommended that national level institutions should identify appropriate models for more dialogue in tender processes, especially in construction work. Such models include “competitive dialogue procedure” (Nordic Council of Ministers, 2010). This new procedure allows authorities to hold discussions with shortlisted candidates regarding the authority’s requirements, before the authority invites final written tenders (Brown, 2004). Moreover, it is intended for the procurement of complex projects, for which technical, legal and/or financial solutions are not objectively specifiable by the contracting authority (Hoezen et al., 2012). It is also important to focus on the coordination between planning and construction phases. It must be emphasised that the coordination between planning and construction phases in the context of this study is concerned with the translation of environmental and sustainability considerations into action.

1.2. Research Aim and Questions

The overall aim of this study is to bolster the knowledge of promoting sustainability in the construction sector. The specific aim is to analyse the ways in which policy instruments such as EIA and GPP can be reinforced to improve the coordination between planning and the implementation of environmental and sustainability considerations. Hence, this study examined the following research questions (RQ):

1. How can EIA and GPP play a role in improving the coordination between planning and implementation of environmental considerations in the construction sector? (Paper I, Paper II and Paper III)

2. What are the perspectives of various categories of stakeholders in the Swedish construction sector regarding impact assessment (both EIA and SEA) and GPP? (Paper II)

3. Given the policy contexts of GPP in various countries, what are the concerns for progress towards SPP? (Paper III and Paper V)
Seeking sustainability in the construction sector: opportunities within impact assessment and sustainable public procurement

4. What are the benefits and challenges linked to the implementation of competitive dialogue procedure (CDP) and how could such a procedure facilitate GPP/SPP? (Paper IV)

5. What are the discourses related to the future trends in GPP/SPP? (Paper V)

1.3. Thesis structure

This thesis is composed of a cover essay (kappa) and five papers. After providing an overview of the research field, the cover essay has highlighted the research questions, which are addressed in subsequent papers (see Fig. 1.). Furthermore, the cover essay includes a theoretical and methodological basis for the research conducted in the five papers. It also summarises, discusses and analyses all the papers in the light of a wider research context.

Section 2 describes the theoretical perspectives of EIA, SEA, GPP, SPP, sustainability, partnerships and procurement procedures. Section 3 focuses on the research strategy followed by descriptions of the methods adopted in the study and its limitations. Section 4 summarises the results of Papers I, II, III, IV and V and presents supplementary aspects related to the results. Section 5 analyses the findings by considering the wider context such as the theoretical premises of the integration of policy instruments. This section also describes how the need for philosophical reflection motivated Paper V, and analyses the results in light of a perspective advocated by J. Ehrenfeld in Ehrenfeld and Hoffman (2013), regarding the contribution of instruments such as GPP/SPP to
2. THEORETICAL PERSPECTIVES

2.1. GPP and SPP

The theoretical perspectives of GPP and SPP included in this study are primarily under the following categories: environmental and social, legal, contractual, and economic (see Fig. 2).

The definition of GPP proposed by Bouwer et al. (2005) considered four building blocks as its basis and they included: 1) A green product 2) the use of green technology 3) green functionality, whereby organisations ask for a green function to meet its needs whilst also achieving value 4) GPP process, whereby green criteria are integrated into all steps of the procurement process. Thus, they defined GPP 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 lifecycle”. Furthermore, Bouwer et al. (2005) have suggested that environmental technologies must be defined in the context of GPP as there is a mutual influence between environmental technologies and GPP. This mutual influence is revealed when the technological innovation developed by the industry allows public authorities to ask for more green solutions (goods and services). The demand of public authorities for green products stimulates industries to invest and develop environmental technologies. Hence the definition: “environmental technologies are procured when a public body
asks for outcomes and solutions (equipment, goods and services, [managerial] procedures) that prevent, reduce, manage and treat pollution and the environmental impact of a product, activity and process throughout their whole life cycle. These technologies improve organisation’s efficiency and competitiveness and provide solutions for the sustainable growth of the public and private markets” (Bouwer et al., 2005). In Paper II, renewable energy procurement was selected as a parameter for focusing the discussion on GPP, and renewable energy technology was identified as one of the priority areas for encouraging GPP in the construction sector.

Whilst certain descriptions of GPP focused on technology, few others considered taking “nature seriously into account” (Sutton and Preece, 1998) in GPP. Sutton and Preece (1998) have argued that most procurement decisions are made in a policy vacuum when it comes to biodiversity. Among others, they have cited the example of bauxite mining threatening the Jarrah forests. They have suggested that GPP should follow the principle of benefiting biodiversity through changes to land management practices related to material production. They have also discussed the principle of ‘dematerialisation’ to meet human needs in ways that greatly reduce the use of materials and energy, thereby causing the least possible impact on natural habitats, reducing the demand for land and thus enabling habitat restoration purposes. Paper III has discussed certain issues that require careful examination on the path to dematerialisation.

The development and use of environmental criteria in GPP is widely discussed in the literature (Sterner, 2002; Faith-Ell, 2005; Nissinen et al., 2009; Michelsen and de Boer, 2009; Varnäs et al., 2009; Palmujoki et al., 2010; Tarantini et al., 2011). In the EU, the GPP criteria are categorised as “core” and “comprehensive” criteria. The core criteria are designed to facilitate easy implementation of GPP, focusing on the key areas of the environmental performance of a product. They are intended to be applied with low administrative costs and minimum verification efforts. The comprehensive GPP criteria take into account higher levels of environmental performance and may require additional administrative costs, intended for use by contracting authorities that seek to go further in promoting environmental and innovation goals (CEC, 2008). Paper III provides few examples of core and comprehensive criteria in the construction sector, which are based on the recommendations provided in the European Commission’s GPP toolkit. In addition, Paper III provides an overview of Tarantini et al’s (2011) case study of windows to define GPP criteria. They have discussed how in a GPP procedure, specific criteria should be developed at the level of building element such as external walls, windows and roofs. As such they have taken into account only the technical characteristics that influence the environmental performance in the use phase, leaving apart the selected products and materials. Furthermore, the GPP criteria for construction materials and products that are part of this element should refer to the environmental impact of their production. In this way, Tarantini et al.
(2011) have suggested that it will be possible to aggregate GPP criteria at different construction product scales (materials, products, components, elements) and address the environmental impact of building materials at different levels. However, SPP goes further as the criteria under SPP require product/service with not only minimum environmental impact but also a positive social outcome in relation to another product that fulfils the same purpose (Claro et al., 2013).

The definition of sustainable procurement devised by DEFRA (2006) is “a process whereby organisations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole-life basis in terms of generating benefits not only to the organisation, but also to society and the economy, whilst minimising damage to the environment”. Value for money implies the balanced accomplishment of multiple factors such as greater quality or improved performance, which can be enhanced by increasing or ensuring quality and on-time delivery of requirements while minimising total costs (Erridge and Nondi, 1994). Nevertheless, a definition that puts sustainability objectives in the forefront can be found in Walker and Brammer (2012). They define sustainable procurement in the public sector as “the pursuit of sustainable development objectives through the purchasing and supply process, incorporating social, environmental and economic aspects”. It must be noted that SPP is not about burdening the market with extra requirements. It is a well-defined strategy that introduces sustainability requirements in bids, support measures and the promotion of dialogue and open communication between the contractors and the contracting authorities (UN, 2008). As regards the sustainability requirements, a critical question that McCrudden (2004) has raised is whether the term SPP will enable us to understand the commonalities of green and social public procurement, or serve only to camouflage their essential differences. The social public procurement herein refers to socially responsible procurement, which is about using the procuring power of public and private organisations to purchase products, works and services that have a positive social impact. The implementation of socially responsible procurement can consider an umbrella of issues including health and safety at work, international labour standards, the fight against illegal and child labour, the ethical procurement of raw materials (Defranceschi and Vidal, 2007) as well as considerations of human rights, philanthropy and community (Carter, 2004). In the context of SPP, it is important to clarify the extent to which the social criteria of socially responsible procurement are compatible with international and regional legal frameworks (McCrudden, 2004) or the ways in which social criteria can be applied in a legally compliant manner (Vasileva et al., 2012).

In GPP, the preferences of the contracting authorities to base their purchasing on environmental criteria may also lead to the perception that they are in the danger zone of engaging in discriminatory practices under the garb of environmentalism. The primary concern is where the balance needs to be drawn (Kunzlik, 2009).
Wedin (2009) has concluded that GPP is not imposed through imperium other than in the form of ‘balancing norms’. Although imperium indicates the use of instruments involving the use of force, its use is pervasive in modern government (McCruden, 2007). The formulation of balancing norms, on the other hand, requires specific information and more than legal knowledge for implementation. However, Wedin (2009) argues that they do not clearly indicate how the balancing act should be done. For instance, the Court of Justice of the European Union (CJEU) has clarified that so-called ‘horizontal criteria’ (Arrowsmith and Kunzlik, 2009) [used to promote social, environmental, and other societal objectives] must be linked to the subject matter of the contract (ClientEarth, 2011a). In terms of such CJEU rule, it can be said that the balancing norm (horizontal criteria) if used should be executed in a particular way (linked to the subject matter of the contract) for which more knowledge is necessary. Furthermore, ClientEarth (2012) have recommended that this rule should be interpreted broadly to include, for instance, aspects embedded in a product or service due to choices made in the production phase, but not necessarily visible in that product or service. In particular, there has been a resistance from the Commission to accept technical specifications that relate to production processes.

Kunzlik (2009) draws some conclusions regarding the extent to which the public authorities in the EU are allowed to favour the procurement of renewable energy. He argues that even if the Commission accepts that the supply of renewable energy can be specified in a contract, it does so whilst simultaneously maintaining its position against the permissibility of requirements related to production processes and methods that do not affect consumption characteristics. However, at the consumption stage, electricity from renewable sources and that from fossil fuels are indistinguishable in terms of their polluting effects. It is only at the production stage that the electricity from renewable sources is less polluting. Thus Kunzlik argues that the distinction between production processes and methods affecting consumption characteristics and those which do not is obscuring the true position. In Paper III, such issues have been highlighted as important considerations during the transformation of GPP to SPP.

The EU stipulates two options for awarding the tenders in the Commission Directive 2004/18/EC, and they include the lowest price (contract awarded to the lowest bidder) or the most economically advantageous tender (MEAT) (EU, 2004). MEAT has been applied with an intention to achieve value for money. It is the weighted sum of different aspects of the product or service that provides value to the procurer in terms of price, quality, environmental and social aspects (Parikka-Alhola and Nissinen, 2012). The concept of MEAT enables the incorporation of environmental requirements in the award criteria (Parikka-Alhola, 2008). In Paper IV, a construction project from Stockholm is discussed, in which the MEAT criteria was adopted for its procurement. The Commission Directive 2004/18/EC has highlighted that it should be the
responsibility of the contracting authorities to provide the bidders with the criteria for the award of the contract and the relative weighting given to each criterion in adequate time for bidders to be aware of them when preparing their tenders. Further, the tenders should be assessed by taking the economic and quality criteria as a whole, thereby enabling the selection of the MEAT (EU, 2004). Thus, in this approach, the price and the qualitative criteria such as the environmental requirements and also social requirements will have to be combined into a single measure. Either quality must be evaluated in monetary terms or price must be converted into a score that should be added to the quality score (Bergman and Lundberg, 2013). Lundberg and Marklund (2011) have also emphasised the need for award methods and scoring rules, which account for both price and environmental requirements, in order to enable GPP to be an efficient environmental policy instrument. Furthermore, following-up with environmental issues and delivering improved environmental performance demands a high-level of coordination and cooperation among project stakeholders. The tone for the interaction between contracting authorities and contractors needs to be well established.

It cannot be denied that contractors have to play an important role in promoting sustainable development in the construction sector (Tan et al., 2011). There is a need to understand how such a role can be strengthened with the aid of partnering. Partnering has been identified as one of the instruments for addressing SPP (Fox et al., 2002; Steurer et al., 2007; Slob et al., 2007). Arts and Faith-Ell (2012) advocate that partnerships between contractors, contracting authorities, non-governmental agencies and communities are needed together with instruments such as GPP to address sustainability issues in construction projects. Partnering highlights the significance of “clear communication, inclusion, exclusiveness and equality” (Alderman and Ivory, 2007). The role of the contractor in the partnering system is progressive, meaning that the contractor or the market party is involved at an earlier stage and participates in the designing process (Kadefors et al., 2007). One of the innovations of the EU public procurement directive (Directive 2004/18/EC) is the introduction of ‘competitive dialogue procedure’ (CDP), which allows the contracting authority to hold discussions with shortlisted contractors regarding the authority’s requirements, before the authority invites final bids (Brown, 2004). It has been suggested that this procedure would enable innovations in GPP (van Asselt et al., 2006; Nordic Council of Ministers, 2010). The CDP involves a staged approach to tendering, with the purpose of ensuring the possibility of holding dialogues with more than one contractor regarding all the aspects of the tender, without favouring one contractor over another (Hoezen et al., 2010). In terms of improving the use of CDP in practice, Hoezen et al. (2013) have suggested that both authority and contractors must investigate opportunities to lower their tendencies to avoid risk. This could be initiated by having open conversations instead of steering the dialogue on the basis of predetermined questions. Further-
more, one of the legal requirements of the implementation of CDP is that the contracting authority can only use most economically advantageous tender (MEAT) award basis (Burnett and Oder, 2009).

As well as environmental, social, legal and contractual perspectives within GPP/SPP, there is a need to consider the economic perspective. For instance, Lundberg and Marklund (2013) show that GPP has limited potential to function as a goal effective environmental policy instrument, whereby goal effectiveness indicates an environmental policy that leads to emissions reductions that are predictable and desirable in advance. The limitation with GPP is due to the contractors themselves choosing whether they will participate in a procurement procedure, and they will do so only if the total cost for delivering the object of the procurement and the investment required to meet the stipulated environmental standards are less than the expected return from winning the contract. Moreover, given that the contracting authority is a significant actor in the market, the market prices of both green and conventional products will be affected by the purchases. Reduced demand for conventional products by authorities will lead to the price of such goods falling, while the price of green products will soar. This implies that the demand among other private procurers for conventional products will rise at the same time as it will fall for green products. Thus, authorities’ GPP will consequently have a counterproductive effect among other procurers (Lundberg and Marklund, 2013). Nonetheless, in terms of the construction sector, a US study reveals that certain environmental considerations applied under GPP policies only to municipal buildings accelerate the use of such considerations among the private-sector developers in the same geographic markets (Simcoe and Toffel, 2013). Moreover, a statistical report by PricewaterhouseCoopers et al. (2009) has concluded that GPP in construction can result in negative financial impact, which indicates that cost reductions can be achieved by procuring green. Similar conclusions have also been drawn in another study conducted by Testa et al. (2011). They surveyed 78 European firms operating in the construction sector, and the results indicated that there is a positive effect of GPP on private companies’ business performance, which led them to conclude that policy makers should strengthen the use and diffusion of policy instruments such as GPP. Furthermore, the OECD has considered GPP to be particularly important in areas where no other policy instruments are feasible, and identified its potential to improve the environmental performance of the construction sector (OECD, 2003).

2.2. EIA and SEA

This study considered theoretical perspectives that examine how EIA and SEA can facilitate the planning process. EIA is generally perceived as an instrument that enables the authorities to make the decisions regarding project approval and also identify the conditions that must be fulfilled for project consent (Leknes, 2001). However, Morgan (2012) has argued in terms of the state of the
art of EIA that there are opportunities to shift EIA thinking away from the approval stages and allow it to influence the critical decisions within organisations. He indicates that EIA should be integral to project development and design processes, thereby not reducing its purpose to some final legal formality before project implementation. This would allow for more constructive work with project proponents and stakeholders. Thus, in terms of EIA, the perspective central to this study can be located in the premises of the “environmental design model” (Cashmore, 2004). The proponents of the environmental design model advocate the conception of EIA becoming a fully integrated component of project design and policy formulation. In this approach, stakeholder involvement is presumably integrated in the broader planning process, rather than as an explicit aim of EIA in itself. Furthermore, the aspiration that EIA should contribute to the wider agenda of promoting sustainable development has provided EIA with its most strategic sense of purpose, but the EIA frameworks or methodologies that would enable the fulfilment of such purpose is not clearly established. Enabling such establishment requires that EIA is given a determinative position in project planning processes (Jay et al., 2007). Lawrence (2001) has highlighted that EIA processes are not closed, but there are several potential links between the process and broader environmental decision-making and related fields and activities. One such example has been illustrated by Arts et al. (2006). They discuss a framework formulated by the Dutch government in which the market parties are involved before the consent decision in a way that they prepare alternatives in competition that are integrated in the EIA. Therefore, the procedures for EIA and procurement/contracting are intertwined

Fig.3. The intertwining of EIA and procurement/contracting by the Dutch government: exchange of information between procurement and EIA procedure. Source: Arts et al. (2006)
very early in the construction procurement process. The exchange of information between the two procedural tracks takes place at certain points in the procedure. These points are referred to as ‘knots’ and are specific instances during the process when decisions are made (see Fig. 3.).

Paper I departs from this illustration to identify the potential opportunities for linking EIA with GPP such that planning for the latter is conducted at the EIA phase. However, this requires the explicit use of sustainability concepts in EIA practice. For instance, the analysis of the likely impacts of proposed development alternatives could be based on the concepts of environmental resources and limits rather than on the relatively narrow assessments being made of the impacts of proposals on their immediate environment (Jay et al., 2007). Moreover, it is important to bear in mind the ultimate role of EIA as one of the instruments to achieve sustainable development. The nature and use of EIA will change as relative perspectives also change (Glasson et al., 2005). Certain studies have promoted the idea of linking EIA with environmental management system (EMS) (Marshall, 2002; Sánchez and Hacking 2002; Marshall, 2005; Ridgway, 2005; Slinn et al., 2007). EMS is a management tool that facilitates an organisation to identify the environmental impacts resulting from its activities and to improve its environmental performance (NCSI, 2009). However, some recent studies have indicated issues concerning the adoption of EMS. For instance, a study by Lundberg (2011) on the Swedish rail projects shows that the EIA follow-up was performed based on the suggestion to link EIA and EMS. Yet, there was the lack of influence from the EIA on project management, indicating that the findings and commitments presented in the EIA were not fully incorporated in the formulation of follow-up activities. She also points out that the follow-up during the construction phase was largely based on the general environmental requirements and construction organisation’s EMS, and thus the EIA follow-up was limited. Lam et al. (2011) have indicated that although EMS is widely used in the construction industry, merely promoting EMS may not ensure addressing sufficient environmental considerations. A Spanish study shows that the EMS at construction sites were considered to be a formality and more as a tactic to gain access to the tender of contracting organisations. This was in contrast to a genuine commitment to improving the environmental performance of companies in the construction sector (Rodríguez et al., 2011).

Nonetheless, a model that has been widely promoted in EMS is of relevance in this study, and is known as the action-aspect-environmental impact model. This model is described by Sánchez and Hacking (2002), and they highlight that in order to predict the environmental changes that a project proposal can cause, it is important to identify the mechanisms by which the project actions can interact with the environment. Such causal mechanisms are the environmental aspects that help in determining the connection between an activity, product or service and their environmental impacts, and can be identified during an EIA process. Furthermore,
Sánchez and Hacking (2002) have emphasised that the EIA report preparation can be structured around such an action-aspect-environmental impact model and that aspects can be effectively identified by subdividing the project into its component activities. The most appropriate level of detail of subdivision can be the one used for overall project planning. EIA is a procedural tool (focusing on procedures and their links to societal and decision contexts) that provide a framework by which analytical tools such as life cycle assessment (LCA) can be used (Finnveden and Moberg, 2005), wherein “LCA is a tool to assess the environmental impacts and resources used throughout a product’s life from raw material acquisition through production, use and disposal” (Finnveden et al., 2003). For instance, Li et al. (2010) have discussed the development of an EIA model for construction processes based on LCA methodology. The model intends to support contractors to select construction plans with reduced environmental impacts. It can be said that EIA assumes several forms. The design of the EIA process can vary depending on the type of proposal, major anticipated effects, context, project proponents, and the need for tiering (Lawrence, 2001). Such flexibility within EIA has allowed Paper I, Paper III and Paper IV to argue for its inter-linking with GPP and SPP. Moreover, tiering has been suggested to minimise the problem of EIA being only a “snapshot in time”, whereby tiering intends to link environmental assessments at different planning levels in order to facilitate a better scoping of the assessment (Arts et al., 2005). This indicates that EIA, which is located at the lower tier of planning, can receive useful information and thus a ‘head start’ from SEA at the higher tier (Nooteboom, 2000).

The ‘big brother’ of EIA is SEA (Fischer, 2003). When conceived with a strategic insight, SEA offers a great potential to incorporate the crucial factors that need to be considered in policy, planning and programmatic decisions to ensure a development that must be sustainable (Partidario and Gomes, 2013). Bina (2007) notes that SEA’s greatest capacity lies more in ‘persuading planners’ at early stages to design ‘environmentally sustainable initiatives’, and less in ‘confronting proponents’ with information on negative impacts. It is vital to develop the “linkages between SEA and other assessment or planning instruments and tools” (Fischer, 2006). For instance, Finnveden et al. (2003) have analysed how various analytical tools can facilitate and improve the SEA process. In the UK, SEA is often integrated into sustainability assessment, which involves not only broadening the scope of assessment to incorporate social and economic issues, but also setting sustainability objectives and analysing whether the policy/plan/programme can achieve them (Glasson et al., 2005).

3. Research Methodology

“The real purpose of the scientific method is to make sure nature hasn’t misled you into thinking you know something you actually don’t know.”

- Pirsig (1974), Zen and the Art of Motorcycle Maintenance
This study included two phases (see Table 1). Both the Phases primarily adopted the qualitative research strategy. The research strategy herein indicates a general orientation to the conduct of research (Bryman, 2001).

**Table 1: Overview of the research strategy/approach, method(s) and/tools adopted in each paper**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Research strategy/Research approach</th>
<th>Method(s) and/or Tool for data analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Phase</strong></td>
<td>Paper I: EIA and green procurement: Opportunities for strengthening their coordination</td>
<td>Qualitative research strategy</td>
</tr>
<tr>
<td></td>
<td>Paper II: Perspectives on inter-linking impact assessment and green procurement: The case of green energy</td>
<td>Qualitative research strategy</td>
</tr>
<tr>
<td></td>
<td>Paper III: Green public procurement (GPP) of construction and building materials</td>
<td>Qualitative research strategy</td>
</tr>
<tr>
<td><strong>Second Phase</strong></td>
<td>Paper IV: Competitive dialogue procedure for sustainable public procurement</td>
<td>Involved core action research approach.</td>
</tr>
<tr>
<td></td>
<td>Paper V: Future trends in sustainable public procurement</td>
<td>Q methodology approach was adopted.</td>
</tr>
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</table>

A sub-module of Web-Hipre tool was used for examining the consequences of the weight for the award criterion “environmental considerations”
to explore why such a link would be advantageous, what could be the possible opportunities for the link considering the current development in the construction sector and how some of the key players view this link. According to Ritchie (2003), there is general argument that the reason for adopting qualitative methods as the only method is centrally related to the objectives of the research. This indicates that it is the nature of the information required, which leads to a choice of a qualitative research strategy. Therefore, if the major purpose of the research is concerned with understanding context or process, then qualitative information solely may be required. The argument put forth by Ritchie (2003) corresponds to the motivation in this research to select a qualitative strategy, whereby the intention in the first phase was to identify opportunities around the processes of impact assessment and GPP for improving the coordination between project planning and construction phases. The qualitative methods used in the first phase involved literature review, document analysis and interviews (see Table 1).

In the first phase, the literature review enabled insights into the development pertaining to EIA and GPP. The review focused on international case studies where EIA had played an active role in planning and establishing environmental requirements, and in certain cases also conducted in parallel to the procurement process. The reason why such case studies were referred was because it aided in understanding and analysing how EIA could set the context for GPP. For instance, Paper I used case studies from Portugal ICLEI, 2007 and Sweden (Varnäs et al., 2009) to argue for the link between EIA and GPP. Furthermore, the literature included previous research on impact assessment and planning, drivers and barriers for GPP, energy planning, and renewable energy policy (Paper II).

The literature review was also useful in identifying “sensitizing concepts” (Blumer, 1954), whereby concepts need to be employed in such a way that they provide a “general sense of what to look for and act as a means for uncovering the variety of forms that the phenomena to which they refer can assume” (Bryman, 2001). These concepts facilitated the detection of some of the priority areas described in Paper II, which could encourage the procurement of renewable energy in the construction sector. These concepts also provide foci for interviews (Holloway, 1997). It must be noted here that Paper II had focused on the procurement of renewable energy to set a context for the interviews. In addition, document analysis was conducted in order to develop an understanding on how GPP has developed over the years. Documents provide a means of tracking development (Bowen, 2009). Such documents included various study reports on GPP/SPP prepared by concerned authorities, and also policy documents such as EU directives and communication. This enabled to provide an overview of the policy contexts with regard to GPP and also its evolution towards SPP in the EU and certain OECD countries (Paper III).
In the first phase, purposive sampling (Wright, 1996) was applied to identify categories of stakeholders in the Swedish construction sector. The logic behind this type of sampling is to identify and select “information-rich” cases or resource-persons. In this study, the intention was to capture the perspectives of the stakeholder categories on impact assessment, GPP and the procurement of renewable energy in the construction sector. Thus, the sampling process mapped three fundamental categories and these involved the contractor, client and energy supplier. Accordingly, these categories signified the construction company, municipality and energy supply company.

Furthermore, three largest Swedish construction companies were selected using the data from the Swedish Construction Federation. The participants from the construction companies involved employees from the senior management level, and were primarily responsible for environmental concerns in their company. One interview was conducted with an employee from the energy supply company, who was a product manager from the marketing department and was also involved in procuring renewable energy. In the municipality, one respondent was interviewed. This respondent was employed at the Stockholm City Development Administration and has been involved as an environmental expert in the Stockholm Royal Seaport project. The interviews focused on the interlink between impact assessment and GPP, and the priority areas for facilitating the procurement of renewable energy.

The interviews were guided by a general interview protocol, wherein interviewees were, beforehand, provided with information on the research project and interview questions. Permission was sought from the interviewees to audio record the interview. The

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1 Based on turnover
2 Proposed large scale construction project in Stockholm
questions were semi-structured using a set of open-ended questions to stimulate discussion. The interviews varied in length from 45 to 90 minutes. Interviews were transcribed and the transcribed data was thoroughly analysed in Paper II. The interviews were analysed with the aid of literature regarding the inter-link and the priority areas for procuring renewable energy (Paper II). In addition, the literature related to the topics raised by the interviewees was also part of the analysis.

3.1.1. Methodological limitation in the first phase

In Sweden, the EIA Directive (85/337/EEC) is primarily implemented by chapter 6 (section 1 to 10) of the Swedish Environmental Code. Chapter 6 (section 11 to 18, 21) also includes most of the provisions of the SEA Directive (Sheate et al., 2005). The Swedish translation of EIA is miljökonsekvensbedömning (MKB) and that of SEA is miljöbedömning. However, both the EIA report or the environmental impact statement (EIS) and the SEA report are termed as miljökonsekvensbeskrivning (MKB) (Fig.4.) in Swedish (SFS, 1998; Naturvårdsverket, 2009). These conflicting terminologies posed limitations during the interview process. This implies that the interviewees might have perceived SEA report as EIS and vice-versa. For instance, when asked about EIA, they might have responded to the question taking the SEA process or the SEA report into consideration. This limits the study by making it difficult to understand whether the interviewees’ perspectives are related to the EIA or the SEA process. Nonetheless, Paper II refers to impact assessment process, and includes discussions from the standpoint of both EIA and SEA.

3.2. Second Phase

The second phase of the study involved the core action research approach (Paper IV) and Q methodology approach (Paper V). In Paper IV, a case was selected to illustrate the implementation of CDP. The selected case involved the procurement of a bridge project by the Nacka municipality. Following Bryman (2001), this case can be categorised as “exemplifying”, the notion of exemplification implying that the case was chosen not because it is unusual, but because it provided a suitable context for answering research questions. According to Bryman (2001), the rationale for selecting exemplifying cases is that they allow the researcher(s) to examine key processes. For instance, a researcher may seek access to an organisation because it is known to have implemented a new technology and the researcher might want to know the impact of the same. In the selected case, access to Nacka Municipality was sought because it was one of the first municipalities in Sweden to use CDP for infrastructure projects (Eriksson, 2012). The Nacka case was identified by collaborating with Caroline Le Lann Roos, who worked as a team member of the consultancy company that facilitated the Nacka municipality or the contracting authority with the implementation of CDP. Moreover, this was an action research approach.
approach, which is an approach that intends to take action and create knowledge regarding that action (Coughlan and Coghlan, 2002). It indicates an “understanding of social research with a specific access to reality” (Müller, 2005). It can be said that the research was undertaken as “part of practice rather than a bolt-on addition to it” (Denscombe, 1998). In a direct sense, the action research helps in producing reflective, scientific, knowledge based on practice (Johnsen, 2005). However, the action research conducted under this study can be considered as “core action research” (Perry and Zuber-Skerritt, 1992). The core action research is conducted when the action researcher is enrolled in an academic programme leading to a master’s degree or a doctorate. In this case, the student action researcher Caroline Le Lann Roos was in a master’s degree programme. Furthermore, it involves the student action researcher within a workgroup of practitioners (Perry and Zuber-Skerritt, 1994; Coughlan and Coghlan, 2002). The action researcher was involved in all the internal meetings held between the infrastructure project director, project manager, the project engineer, procurement officer and the procurement expert. Such meetings lasted for three hours and set the direction for the procurement. Besides, she was involved in dialogues held with the shortlisted contractors. As it has been suggested that there is no specific constraint when it comes to the means for data collection adopted by the action researcher (Denscombe, 1998), the data on the selected CDP case was collected by retrieving the minutes of the meetings, the filled-in questionnaires sent to the contractors for sharing their views on the CDP, and by holding short interviews with the relevant actors from the contracting authority. In addition, the source material for the case also included documents such as reports from the Nacka municipality and online newspapers/magazines coverage of Nacka municipality’s CDP. The rationale for such document analysis lies in its role in data triangulation (Bowen, 2009), which involves the use of different sources of information so that findings may be cross-checked (Bryman, 2001). When the procurement process was completed and the project implementation had begun, a separate interview (not included in action research) was conducted by the author with the project director of the Nacka municipality. The duration of this interview was three hours and it focused on the experiences of the project director with regard to the CDP. Furthermore, when the Paper IV was written, a validating procedure was followed by having the draft sections on the Nacka case reviewed by the project director. Such review procedure is more than a matter of professional courtesy and is a way of corroborating the essential facts presented (Schatzman and Strauss, 1973; Yin, 1994). In the analysis of the data collected from the interviews, action research and documents, specific attention was paid to the involvement of contractors in planning for GPP/SPP as recommended by Lam et al. (2010) and Meehan and Bryde (2011).

4 Focused on public procurement
In addition, a sub-module of the software Web-Hipre was used in Paper IV in order to examine the consequences of the weight for the award criterion ‘environmental considerations’ in the tender evaluation process of the Nacka case. Web-Hipre is web-based general purpose decision analytical software (Mustajoki and Hämäläinen, 2000). It supports different phases of a multiattribute decision analysis process, which includes modelling the problem, weighting of attributes, evaluation of results and analysis of the results (Hämäläinen, 2003). The weights of the attributes can be elicited by different weighting procedures, the simplest of which is direct point allocation. Moreover, the software supports analytic hierarchy process (AHP), which is based on pairwise comparisons of the importance of both the attributes and the alternatives (Mustajoki et al., 2004; Geldermann et al., 2009). Furthermore, sensitivity analysis was applied to illustrate the effect of change in the weight for environmental considerations criterion on the ranking of the tenders. The resulting effects were analysed with the aid of the information gathered during the action research and the separate interview with the project director. The consequences of the weight were also analysed using the findings of Parikka-Alhola and Niissinen (2012), who have discussed the relevance of weights for incorporating environmental considerations in procurement.

In Paper V, Q methodology approach was used. A Q study commences by identifying a concourse, or a body of literature about the topic. A concourse can be operationalised as the population of statements regarding a certain topic (Dryzek and Berejikian, 1993). From the concourse, a sample of statements is strategically selected. Furthermore, participants are identified. These selected individuals are asked to express their opinions about the selected Q statements by ranking them, or “doing a Q-sort” (Weblor et al., 2009). Using the concourse matrix approach, 36 statements (see Paper V) were selected, which were administered to 12 selected individuals. The participants were asked to interpret each of the statement in terms of its relevance to the future trends in GPP/SPP. The participants’ Q sorts are analysed using statistical techniques of correlation and factor analysis to reveal patterns in the way individuals associate views (Weblor et al., 2009). To analyse the Q sorts, PQMethod software (Schmolck, 2012) was used (see Paper V for the details). The results of the analysis were interpreted and narrative was generated. The idea herein was to elicit the accounts or discourses.

3.2.1. Methodological limitation in the second phase

In terms of the CDP case, only the project procurement phase was considered for this study. The study did not cover the project implementation phase. This is due to time constraint as it will take a few more years for the completion of the project. There was a need to document any conflicts or unexpected issues encountered during the implementation phase. For instance, court litigations (if any) between the partners during the project implementation or perhaps an unexpected increase in the cost of the project. Moreover, it was important to document the progress related to the in-
corporation of environmental considerations in the implementation phase. This will provide a basis for analysing how the environmental objectives are “understood and implemented in the project settings” (Gluch and Räisänen, 2012).

This study is also delimited to the partnership between contracting authority and contractors. It does not address the partnership between contractors and sub-contractors and consultants, and the structures within contractor organisations. In Q methodology, two out of the 12 participants had done the Q sort in advance. Although this was allowed (if the participant wished to do so), it was later revealed to be a limitation. This is because the participant’s interpretation of a statement might vary significantly from the way it needs to be interpreted in light of its relevance to the future trends in GPP/SPP. Besides, with certain statements, it was important that the context was explained to the participant before they ranked them. It was not practical to develop an instruction document that provided guidance on the interpretation of each Q statement.

4. Results

4.1. Towards inter-linking impact assessment and GPP

Paper I postulates that the inter-link between EIA and GPP could be one way to improve the coordination between planning and construction phases. It reviews the state of the art to present the postulate. The literature review in Paper I identifies two case studies (ICLEI, 2007; Varnäs et al., 2009), which demonstrate the use of EIA to formulate environmental requirements in the tendering process.

ICLEI's (2007) study exhibits a meticulous process for establishing the necessary environmental requirements in the metro rail system extension project in the city of Porto in northern Portugal. The environmental criteria were based on the results of an EIA study. Moreover, the inclusion of environmental criteria in the tender documents has had an influence on several aspects of the Porto project, such as the use of improved construction methods with reduced energy requirements and the development of an excavation method that has a low impact on the ground surface.

Varnäs et al. (2009) describe another similar example of a city tunnel project in Sweden. The technical specifications for this project were drawn simultaneously with EIA. This facilitated the identification of environmental impacts because the methods (that caused impacts) to be employed in the project were identified and described. Moreover, the information regarding these impacts served in determining the environmental requirements in the tender documents. The tender documents also described the steps that the contractor should take to comply with the environmental requirements and monitoring measures. In addition to the environmental requirements, the procurement process focused on the environmental evaluation criteria. This aided the client in understanding how contractors intended to plan and achieve their envi-
ronmental goals. Therefore, the environmental preferences during the course of the procurement process facilitated the link between the EIA and the contractors’ management of environmental work. Their study also revealed that a factor contributing to this link was that those individuals tasked to the EIA also continued working on the project’s environmental issues after the completion of the EIA. Furthermore, in the context of road construction procurement, Garbarino et al. (2014) highlight the need to establish environmental performance objectives in the preliminary stage of strategic level planning and design development to support the procurement process. They also indicate the importance of both EIA and SEA in planning for GPP. That being said, there is still a need to extend the role of EIA in the context of GPP. Arts and Faith-Ell (2010) have highlighted that GPP is not merely the mandatory environmental requirements that are transferred from the EIA to the tender documents. In Fig 5, they show that GPP is also the extra criteria/ambitions concerning environmental objectives that might be relevant to context-specific issues and can help the bidding market parties or contractors achieve additional advantages in terms of winning the contract. There are still opportunities for improvements to enhance the context-specificity of requirements in contracts by considering issues examined during the EIA process. Therefore, EIA could provide the necessary room for formulating additional goals (Paper I). In a similar vein, Bassi et al. (2012) have summarised certain guidelines for the improvement of the EIA process in the construction sector. They have also indicated the phases within EIA for

![Fig.5. Comparison of EIA, standard contracting and GPP. Source: (Arts and Faith-Ell, 2010)](image)
Seeking sustainability in the construction sector: opportunities within impact assessment and sustainable public procurement

implementing these guidelines. Table 2 provides a snapshot of some of the elements in their guidelines and the corresponding phases of EIA whereby the guidelines need to be followed. For instance these guidelines include ensuring the sustainability of the supply chain and enabling the implementation of environmental assessment and rating tools such as Building Research Establishment’s Environmental Assessment Method (BREEAM) certification.

According to Handfield and Nichols (1999), “the supply chain encompasses all activities associated with the flow and transformation of goods from raw materials stage (extraction), through to end user, as well as the associated information flows. Material and information flow both up and down the supply chain. Supply chain management is the integration of these activities through improved supply chain relationships to achieve a sustainable competitive advantage”. Sustainable supply chain management is defined as “management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements” (Seuring and Müller, 2008). In the construction supply chain (Palaneswaran et al., 2001), the contractor generally subcontracts work packages to subcontractors with specialist skills. For instance, the subcontractors can have a particular expertise in the design, manufacture or installation of components or subsystems (Errasti et al., 2009). The supply chain encompasses material suppliers and other stakeholders. Given that GPP is evolving towards SPP, Pa-

### Table 2: Snapshot of guidelines for the improvement of the EIA process

<table>
<thead>
<tr>
<th>Phase of EIA</th>
<th>Guidelines</th>
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<tbody>
<tr>
<td>Impact analysis: use of resources, waste</td>
<td>Assess quantities of raw materials used during the whole lifecycle of project, land requirements and duration of land use; identify types and quantities of waste expected during construction, operation and maintenance, and favour reuse and recycling</td>
</tr>
<tr>
<td>Mitigation measures</td>
<td>Include provisions for renewable energy; energy efficiency; reduction of the amount of materials; commitment to environmental (BREEAM) certification, use of recycled/biodegradable materials, minimisation of use of raw materials</td>
</tr>
<tr>
<td>Supply chain management</td>
<td>Provide supply chain management specifications so as to ensure implementation of EIA recommendations</td>
</tr>
<tr>
<td>Management of the EIA</td>
<td>Enhance at different levels and stages: company environmental policies; procurement methods and innovative partnering; provision of simple guides for ‘non-technical’ building managers; provision of technical guides for building managers and/or facility managers; commitment to achieve BREEAM certification, and commitment to perform environmental management</td>
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</table>
per V has considered statements related to sustainable supply chain management within the Q methodology. Sustainable procurement has also been discussed from a supply chain perspective (Crespin-Mazet and Dontenwill, 2012).

According to Bassi et al. (2012), one of the aspects to investigate the extent of integration between EIA and sustainability can include its contribution to the implementation of BREEAM. BREEAM is an environmental assessment tool developed for the building sector to improve the environmental performance of buildings. Interest towards rating of buildings in terms of environmental performance has been increasing rapidly in recent years (Haapio, 2012). Although Bassi et al. (2012) suggest ‘BREEAM’ in this regard, it will be important to highlight ‘BREEAM for Communities’ as it captures environmental, social and economic planning issues that have an impact on proposed development projects in the built environment (BRE Global, 2011). The results from Paper II indicate the interest of stakeholders in this tool.

Paper II enquires the role of SEA in the context of GPP. For instance, Tang (2008) describes the integrated principle for SEA, which indicates that environmental assessment should have a broad scope to include all of the strategically critical environmental issues, and should also be tiered to policies in relevant sectors. Fischer (2009) summarises three main functions perceived to be connected to SEA’s capacity to enable the greening of policy, programme, plan and project. These include information function where SEA provides decision makers with better information; changing attitudes function whereby SEA enables perceptions to change through active involvement, and changing routines function in which SEA changes established routines.

Paper II associates the inter-link with one of the purposes of impact assessment. The purpose of impact assessment is to inter alia aid the decision-making process. In other words, along with other documents and plans pertinent to a proposed development activity, impact assessment statement contributes to the approval/disapproval of the procurement of construction project. Hence, from that point, impact assessment plays an important role in procurement. Therefore, there is the potential to extend the influence of impact assessment to where the procurement of services and products are to be made for the project, which indicates that there is a need to inter-link impact assessment and GPP (Paper II). Following Vanclay (2004), it can be said that inter-link may enhance a complete understanding of all the impacts, improve efficiency (cost and time) and help organisations to manage multiple processes. It can also ensure that certain issues achieve greater consideration by allowing them to “piggy-back” on impact assessment that is legally mandated.

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5 based on the definition from international association for impact assessment.
Paper II and Paper III envisage that inter-linking impact assessment and GPP could be one way to adhere to the rule concerning the ‘link to the subject matter of the contract’ while promoting the desired environmental and social objectives. The subject matter of the contract sets out the scope of the content of the procurement contract. The Court of Justice of the European Union (CJEU) has clarified that so-called ‘horizontal criteria’ (used to promote social, environmental, and other societal objectives) must be related to the subject matter of the contract. For instance, in the Concordia bus case, the city of Helsinki called for tenders for operating the urban bus network within Helsinki city. The contract would be awarded to the operator whose tender was most economically advantageous, which was to be assessed by reference to three categories of criteria. The categories included the overall price of the operation, the quality of the bus fleet, and the operator’s quality and environmental management. As regards the quality of the bus fleet, a tenderer could receive additional points on the basis of a number of criteria including the use of buses with nitrogen oxide emissions and noise levels below certain limits. An operator called Concordia that failed to receive additional points for the criteria related to nitrogen oxide emissions and noise levels filed an application to the court. Concordia argued that the award of additional points to a fleet with nitrogen oxide emissions and noise levels below certain limits was unfair and discriminatory. The court affirmed that the contracting authority who decides to award the contract on the basis of MEAT may take into consideration ecological criteria such as the level of nitrogen oxide emissions or the noise level provided that they are linked to the subject matter of the contract (European Court reports, 2002). Horizontal criteria (Arrowsmith and Kunzlik, 2009) that satisfy the ‘link to the subject matter’ rule might be perceived as being located at the intersection between the functional and horizontal (societal, environmental) objectives of the contract. In the Concordia case, the emissions and noise level of the bus services fall within the intersection of the relevant functional and horizontal objectives as the emissions are caused from the bus services procured (ClientEarth, 2011a). In terms of the construction sector, EIA might facilitate in locating that ‘intersection’ where functional and horizontal objectives meet (Paper III).

However, the interview responses in Paper II revealed various perceptions of the inter-link. The respondent from the municipality mentioned two documents, namely, miljöprogrammet (environmental programme) and handlingsprogram (action programme) in the context of an infrastructure project in Stockholm. The environmental programme has set goals to undertake the project’s environmental responsibilities. The goals inter alia include increasing energy efficiency and renewable energy use, and selecting materials and services with reduced environmental impact for construction (Exploateringskontoret, 2010). The action programme for the infrastructure project adopts these goals to develop specific environmental and sustainability requirements for each of the construction phases in the project (Exploateringskontoret, 2011). The
municipality respondent’s overall opinion was that the action programme had contributed more to environmental requirements than the impact assessment. Nonetheless, the respondent also mentioned that impact assessment and the action programme are linked, and that the action programme helps to set environmental requirements for the developer. In terms of the environmental programme, one study that examined the environmental criteria in Swedish and Finnish tender documents has indicated that several contracts included merely referrals to the procuring municipalities’ own environmental programmes. There was no detailed stipulation concerning the extent to which the environmental programme needs to be followed, and thus, from a contract perspective, it hardly served any purpose (Palmujoki et al., 2010). The municipality respondent mentioned that as far as GPP was concerned, the construction companies had to play a major role. The role played by the construction companies in GPP was also highlighted by one of the interviewees from a construction company. This interviewee stated that if projects are proposed by the municipalities, the linking of GPP with impact assessment could be highly challenging. This is because the impact assessments of such projects are often conducted by the municipalities, whereas, the planning for green procurement is largely undertaken by the construction companies. Nevertheless, the case presented in Paper IV indicates that certain procurement procedures such as CDP could provide the room for discussion on considerations related to GPP between the contracting authorities and contractors. It must also be noted from Varnäs et al. (2009) that during the implementation of a particular city tunnel project in Sweden, the information from the EIA report served in determining the environmental requirements in the tender documents.

Another interviewee from a construction company acknowledged that it is important to inter-link impact assessment and GPP. The interviewee added that it will be challenging to do so as there are problems concerning the coordination between project planning and implementation phases. This response was based on the perspective held by the interviewee regarding impact assessment. The interviewee considered impact assessment as a tool that is more active only during the planning phase. According to Isaksson and Storbjörk (2012), there are often different understandings of the goal of impact assessment among various actors in a planning context. In a similar vein, it can be said that there were different views among interviewees regarding the extent of influence of impact assessment on project planning and the implementation process. It is vital to ask what actually “disarms” the impact assessment of its “transformative potential” (Isaksson and Storbjörk, 2012) rather than accepting its closure at the planning phase. The Swedish Environmental Protection Agency’s general guidelines on SEA as such states that the “supporting material produced during the SEA of a plan or programme should also be used, where appropriate, in the work on the EIA for an activity within the area covered by the plan or programme” (SEPA, 2010). Arts et al
(2001) have discussed how the amended EIA regulations in Portugal have specifically provided a post-evaluation phase. The post-evaluation phase focuses on the following: (a) the requirement of a detailed project proposal with an impact assessment compliance report showing that the original EIA decision was considered in the further development of the project and that the design has incorporated the proposed mitigation measures and (b) monitoring and auditing in all cases with an additional procedure under which EIA authority can perform audits to check the compliance of the construction, operation and decommissioning of projects with the original EIA decision, and to verify the accuracy and functioning of monitoring programs. If unpredicted negative impacts are detected, EIA authority may also impose management adjustments and/or additional mitigation.

The interviewee from the construction company suggested the need to adopt a tool that is widely in use during the implementation phase. The interviewee referred to the use of BREEAM for Communities in their company. BREEAM was the first commercially available environmental assessment tool for buildings, and provides the opportunity to benchmark the performance of all new and existing buildings using proven and effective methodologies. The building is awarded credit based on the level of performance against each set criterion (Grace, 2000). In addition, the certification scheme BREEAM for Communities has been developed to facilitate planners and project developers to determine whether the environmental, social and economic sustainability objectives of a development project have been addressed at the preliminary and/or final planning stages of the (applicable) developer planning application process. The central purpose of BREEAM for Communities is to enable planning authorities to confirm whether developers seeking planning permission have met the national, regional and local sustainability targets. The scheme document highlights that it can be used in conjunction with EIAs and SEAs (BRE Global, 2011). However, there are no studies until now that demonstrate such a conjunction. Nevertheless, the interviewee from the construction company gave an example of their company’s employees, who were not so well aware of environmental issues and had recently started to work with BREEAM for Communities. The interviewee emphasised that when such employees would start using BREEAM for Communities, they will also learn how to use the results of impact assessment. According to the interviewee, this certification requires that various environmental needs including GPP are addressed. The interviewee noted that “we ask all the time what is in this product”. However, the interviewee pointed to the problem that when the company purchasing manager asks for green products in a signed contract, the delivering company would return to the purchasing manager reporting that they did not find a product that met such green considerations. If the purchasing manager is persistent, then the delivery company would be forced to search for it. If not, most often, the purchasing manager decides to accept the products that the delivery company wants to provide
and thereby postpone certain green considerations. The interviewee argued that this postponement may have missed the opportunity to procure green products or services, and that there should be a mechanism for a pre-assessment before making any purchase. The pre-assessment needs to consider technology, economy and environmental issues associated with the product or service. In terms of renewable energy, the interviewee claimed that their company buys green for most of their construction sites, and that they pay extra for it. Such a claim was also made by an interviewee from another construction company. With regard to other products, this company had developed a list of demands that were connected to environmental issues. This list of demands has been incorporated into the procurement practice and the product suppliers are supposed to comply with those demands. Although some of those demands have been based on legislation, most of them were internally established by the company. The interviewee stated that their company has a systematic way to track sources when they have to deal with international purchases and suppliers outside Sweden. However, when asked whether their company used impact assessment reports to develop such a list of demands for the product supplier, the interviewee was uncertain about it. Nonetheless, the interviewee acknowledged the need to link impact assessment and GPP, and that impact assessment can serve as an input to develop and improve the procurement process. The interviewee did not elaborate on how impact assessment can serve as an input. The interviewee mentioned that they have not had in-depth experience with impact assessment in order to route it in their procurement process. The interviewee indicated that even though they have considered certain recommendations made in the impact assessment report, the connection between that report and their internal list of demands may not be so clear.

The interviewee from another construction company indicated that the idea to link impact assessment and GPP may only be partially correct. According to this interviewee, it is rather important to focus on life cycle assessment (LCA) of the energy production process and use the analysis to procure energy that is most beneficial from a product’s lifecycle perspective. LCA is a tool used to “assess the environmental impacts and resources used throughout a product’s life from raw-material acquisition through production use and disposal” (Finnveden et al., 2003). However, Grace (2000) argued that LCA evaluates the environmental impacts of a product on the basis of material and energy input-output data, and it only partially facilitates planners. This is because only a fraction of the impacts that are associated with the functional unit are considered, not the whole scenario (Finnveden et al., 2003). The interviewee who endorsed LCA also mentioned that their construction company is attempting to investigate ways for incorporating green procurement.

The interviewee from the energy supply company perceived impact assessment as a ‘working tool’ that in certain ways contributes to the awareness of the environmental impacts of the actions pro-
Seeking sustainability in the construction sector: opportunities within impact assessment and sustainable public procurement

posed. However, according to the interviewee, impact assessment is not the only factor that will contribute to renewable energy procurement. There are other factors such as the awareness among the customers that environmental issues are becoming more important. The interviewee anticipated that there will be an increasing awareness among customers of the environmental impacts of their consumption patterns. The respondent also highlighted that such awareness is the basic driving force for development in the area of GPP, and impact assessment could facilitate in that development process by providing information on the environmental impacts of the services/products they will use in future (Paper II).

4.2. Opportunities to link impact assessment and GPP

It can be argued that even if EIA was weak in its role of advising decision makers, its continuation in the immediate future is justified because of its informative and stimulating role in the planning process (McDonald and Brown, 1995). Bichard and Frost (1988) consider EIA to be a planning tool available for ensuring the identification of all aspects of a project during the design phase. The opportunities to initiate green procurement planning at the stage of EIA could be associated with the integration of project planning and EIA. In other words, the integration of EIA and project planning could provide the opportunity for linking GPP (Paper I). According to Morrison-Saunders and Bailey (1999), EIA involves three phases: the pre-decision, post-decision and transition phases. These phases of the EIA process (see Fig.6) are based upon the

Fig.6. The three phases of EIA and the potential link with green procurement is depicted by dotted lines (Paper I)
timeline of events as related to the principal decision stage of a particular project. The pre-decision phase of EIA involves the following elements: the project’s initial planning and designing, the development of the environmental impact statement and its review by the public and significant decision making. The post-decision phase is the phase after which a project is approved; the transition phase overlaps with both the pre-decision and post-decision phases. Furthermore, Morrison-Saunders and Bailey (1999) discuss that the majority of environmental management activities are initiated during the pre-decision phase of EIA. Therefore, the influence of EIA on the number of environmental management activities is significant during this phase. Considering this statistic, it could be argued that the pre-decision phase is the appropriate phase for the initiation of GPP measures (see Fig. 6). Paper I highlights that the importance of considering certain stages of EIA for proposing the establishment of GPP practices. These specific stages of EIA include those that involve scoping, the study of alternative designs and the drafting of the EIA report. The proposition of GPP in the EIA should focus on answering the question of how the proposed project can be made more sustainable (Paper I).

4.3. Partnerships to link impact assessment and GPP

In Paper II, all the interviewees indicated that it is important to have partnerships for GPP in the construction sector. In terms of procuring renewable energy, an interviewee from a construction company stated that partnerships between a construction company and an energy company can be useful in specific cases wherein the contractor is not an expert on the measures applicable to the project. Another interviewee from a construction company considered the end users as partners and stated that “partnering is important to have dialogue between various partners, both the end users and also constructors”. This interviewee also mentioned that “when end users come with demands, there will be quick changes and so we are talking about environmental certification such as BREEAM”. However, the interviewee from the energy company indicated that the end users are not involved early in the process and highlighted that “there is a movement within the minds of people or end users and they will request more improvement on energy efficiency and renewable energy”. The involvement of end users as partners can altogether be a different priority that leads towards “a more expansive agenda for research on multi-stakeholder collaboration”, or in other words, “a re-invigorated agenda on partnership” (Bendell et al., 2010). According to Bendell et al. (2010), such “a re-invigorated agenda on partnership” could include it being a) interdisciplinary, particularly capturing insights from political science and development studies into management studies b) action oriented, so that research delves into issues that arise due to multi-stakeholder engagement c) critical, so that existing practices are questioned. This agenda resonates with the challenges identified by Arts et al. (2006) and Lenferink et al. (2012) in the Dutch case, whereby procurement and EIA are intertwined. They have discussed the significance of stakeholder inputs to the
procurement process, where the categories of stakeholders may involve members of the public in the project location, local businesses and organisations and others affected by a complex project. When the procurement and EIA procedures are combined, the contractors have the opportunity to refine their bids at each stage based on the feedback provided by the public to the EIA report. However, the challenge here is that during such public review the solutions are vulnerable to being disclosed to the competitors. Therefore, it is necessary to make careful agreements between contractors and the authorities about the type of information that has to be provided during the stakeholder participation in the EIA process. CDP is particularly relevant for intertwining EIA and procurement procedures (Arts et al., 2006). The public procurement directive (Commission Directive 2004/18/EC) defines CDP as “a procedure in which any economic operator may request to participate and whereby the contracting authority conducts a dialogue with the candidate admitted to that procedure, with the aim of developing one or more suitable alternatives capable of meeting its requirements, and on the basis of which the candidates chosen are invited to tender”.

Paper IV provided an insight into the implementation of CDP using a practical case of the Kvarnholmen link project in Sweden. The Kvarnholmen link is an infrastructure project including the construction of a bridge, tunnel, underpass, pedestrian and bike path. Following Brown (2004) and Burnett and Oder (2009), the steps in the CDP of Kvarnholmen link project can be summarised as highlighted here:

- The contracting authority published a contract notice in the EU Official Journal, stating inter alia its requirements, minimum capacity levels needed (from the tenderer) in order to be invited to participate in the dialogue phase, and the award criteria that may not be changed during the award procedure.
- The contracting authority identified a short-list of at least three suitable tenderers, who met the minimum eligibility standards.
- The contracting authority opened a dialogue with those tenderers, whereby the goal was to identify the appropriate means to fulfil the contracting authority’s needs. A consultative dialogue approach was adopted. The approach whereby the contracting authority has tabled its provisionally preferred solution (PPS) as the basis for the dialogue is termed as consultative dialogue. The development of PPS can facilitate the contracting authority to be aware of its preferences and be clear about its needs based on sufficient planning. The contractors were asked to bid on the PPS and also develop an alternative bid based on the contractors’ ideas. Dialogue sessions focused on the alternative bid and were held with each of the contractors. Various aspects of the contract were discussed.
The contracting authority held four dialogue meetings with each contractor until it was certain that it would receive final tenders which are capable of meeting its needs. In the fourth dialogue meeting, the contractors were asked to submit an interim tender. The interim tenders were partly the basis for submissions of final bids. They enable the contracting authority to assess inter alia the acceptability to the contracting authority of the proposed operational methodologies of the contractors and whether there is an indication that the contractor will submit a credible final tender that meets the contracting authority’s needs.

The contracting authority assessed the received tenders and selected the most economically advantageous tender, on the basis of the award criteria specified in the contract notice.

Paper IV explored how CDP can facilitate SPP/GPP with the aid of its key elements such as provisionally preferred solution (PPS), dialogue sessions and interim submissions. The need to develop a PPS is based on the idea that though tenderers/contractors may not necessarily regard it as optimal or the solution for which they would ideally have liked to bid, it is the one against which they are technically capable of bidding. Thus, it provides the contracting authority with a key to manage the procurement procedure. Furthermore, in the context of SPP, it must be noted that the decision about the preferred type of materials should be proposed by the contracting authority in its PPS, discussed between the contracting authority and contractors during the dialogue phase and proposed by the contractors in their interim submissions. In the final tendering stage, the contracting authority should specify the type of construction materials to be used (Burnett and Oder, 2009). If at the stage of developing PPS, the municipality uses EIA inter alia as an interface between the subject matter of the contract and SPP, it could provide direction to the contractors while preparing their alternative solutions. If the municipality is unable to formulate the SPP requirements, it could use the PPS to demonstrate its concern about the application of SPP in the proposed project, and further, discuss its concern during the dialogue process (Paper IV).

Burnett and Oder (2009) have emphasised that the way the dialogue phase is conducted is the key driver of the entire CDP. If a consultative approach to the dialogue phase is not adopted (i.e. without launching the PPS), it might be time consuming for the contracting authority to enter the dialogue phase with the shortlisted contractors. In the consultative approach, the dialogue phase can only be launched when the contracting authority has a clear understanding of the technical solutions to be proposed, the strengths and weaknesses of those solutions and the approximate costs. Hence, in the context of SPP, it is important that prior to the launch of the award procedure, the contracting authority has set its design objectives inclusive of environmental and social requirements, and has done this based on an understanding of avail-
Seeking sustainability in the construction sector: opportunities within impact assessment and sustainable public procurement

able best techniques/practices and assessment of its sustainability requirements. It is also necessary to refer to the recommendation made by Lam et al. (2010), whereby they have indicated that contractors must be involved during the preparation of contract specifications related to GPP/SPP. The dialogue phase can enable such involvement. Furthermore, interim submission is one way to ensure that the outcome of the dialogue in the context of SPP is actually integrated in the tender (Paper IV). In addition to the requirements to be met, the call for interim submission should ask for a compliance table requiring contractors to indicate where in the submission the contracting authority can find details regarding the contractor’s means to meet the requirements (Burnett and Oder, 2009).

In Paper IV, the interview with the project director revealed the interest in involving contractors as early as in the planning phase. This interest resonates with the practice in the Netherlands. Lenferink et al. (2012) have discussed the three models for early contractor involvement with practical cases from the Netherlands. (See Fig. 7). In the EIA procedure or so called route determination procedure in the Netherlands, the Notification of Intent broadly outlines the problem, the project objectives and possible solutions/alternatives, and determines the scope of the EIA. It undergoes stakeholder review to determine the framework for the EIA report. When the contracting authority prepares an EIA report or route plan, it is subject to a second round of stakeholder review on the basis of which the minister chooses a preferred alternative in her standpoint. Subsequently, the project details are elaborated in the draft route decision prepared by the contracting authority, which is again subject to a third round of review. After this review, the minister takes the final route decision. The EIA has three stages at which intertwining may generally commence: the Notification of Intent; the EIA study phase; and the draft route decision (elaboration phase). In Fig.7., Model 1, the intertwining of EIA and procurement procedures occurs at the stage of the Notification of Intent. This allows contractors to propose their own solutions (an outline of the proposed solutions at the first stage and this information is included in the Notification of Intent) (Arts et al., 2006). In practice, the EIA procedure often involves revisions in an iterative manner. This could be due to various reasons such as new insights in scientific knowledge, new developments in the planning area, new stakeholders with different views and others. However, the additional time requirement can affect procurement procedure (Lenferink et al., 2012). Given this situation, Arts et al. (2006) have highlighted the usefulness of an explorative study or reconnaissance study that provides a basis for subsequent planning and can also explore the conditions in which the involvement of contractors is advantageous. Besides, reconnaissance study intends to connect the planning arenas of SEA and EIA. It identifies the relationships between problems of the infrastructure and their
Fig. 7. Three models of intertwining EIA and procurement procedures (Model 1-3) and the traditional approach (Model 4) as applied in the Netherlands. Source: Ven W (2005); Lenferink et al. (2012)

causes by taking a broader perspective than infrastructure alone, including the interests of functions such as housing, employment, recreation and nature (Arts and Lamoen, 2005).

Fig. 7., Model 2 indicates that the intertwining starts after the Notification of Intent, but before the standpoint on the preferred alternative. This is ideal when the scope of possible solutions is so extensive that it would be inappropriate to call in the contractors at an earlier stage. Moreover, under such circumstances, the stakeholder queries are broad and include several issues. The Notification of Intent and guidelines for EIA report must be established before involving the contractors (van Valkenburg and Nagelkerke, 2006). In Fig. 7., Model 3, the procurement commences after the standpoint on the preferred alternative. This model implies that the procurement procedure occurs in parallel (rather than intertwining) with the end of the project study stage. The opportunities for contractors to propose solutions are reduced in this model (Lenferink et al., 2012).
4.4. Key concerns for progress towards SPP

Paper III has highlighted certain concerns for progress towards SPP. In the context of the construction sector, there are several issues to consider. The predominant focus in GPP on certain measures such as maximisation of energy efficiency needs to be investigated for its future consequences. For instance, in terms of the GPP criteria regarding energy efficiency, it is relevant to discuss the study of Brookes (2000). He argues that there is no appropriate reason behind preferentially choosing energy, from among all the resources available, for efficiency maximisation. He indicates that focusing on maximisation of energy efficiency is not a proxy for enhancing social benefit or reducing environmental damage. In the context of action to address global warming, he suggested that it is the level of emission of harmful gases that needs to be abated. Hence, merely concentrating upon energy efficiency improvement will be a blunt approach that is not being aimed directly at reducing consumption of environmentally unfavourable fuels or energy sources. Therefore, SPP should also strive to move beyond energy efficiency and emphasise the procurement of renewable energy. Furthermore, if SPP should transcend the usually adopted criteria (as in GPP) and incorporate social and economic concerns into the procurement decisions, it is important to clarify certain stipulated conditions. One such condition is pointed out by Kunzlik (2009), in which the European Commission accepts renewable energy as a specification; whilst maintaining its position against the permissibility of requirements related to production processes and methods that do not affect consumption characteristics. The consequences of such stipulations on SPP need to be examined. For instance, the employment conditions of those manufacturing the product do not necessarily impact on the physical characteristics or function of the end product but are important from a sustainability perspective. If such sustainability criteria are included as technical specifications, the bidder is required to demonstrate, prior to the contract being awarded, the ability to provide goods and services compliant with the criteria stipulated. On the contrary, specific conditions, which may be included in the contract to specify how the contract is to be performed, are a less reliable mechanism for ensuring that the conditions specified are actually complied with. Thus it is highly questionable whether environmental and social considerations related to the supply chain of the procured goods or services can be linked to the performance of a contract between the contracting authority and the product or service provider (ClientEarth, 2011b). Achieving clarity on such procedural issues would enable better implementation of SPP (Paper III). Nonetheless, under the revised public procurement directive (OJEU, 2014) [replacing the Commission Directive 2004/18/EC], contracting authorities are now required to exclude economic operators (contractors) if they have failed to comply with the cross-cutting social criteria, which will lead to the respective tender being rejected. However, in terms of the social criteria such as the working conditions, it applies only to the staff involved
in the construction, production or supply of goods and services covered specifically by the contract under question. Thus, the company is not required to apply a general social or environmental responsibility policy (EC, 2014).

Another concern can be related to the contribution of weights assigned for environmental considerations in a procurement process. Paper IV has analysed the contribution of weight for environmental considerations in the bid evaluation process of Nacka municipality’s project. The weight assigned for environmental considerations in Nacka case was 10%. The Web-Hipre based analysis in Nacka case indicated the robustness of the contract award decision when the weighting for environmental considerations was increased to 70% (this analysis is described in detail in Paper IV). However, there is a need to discuss the extent to which weighting for environmental considerations promotes GPP/SPP. For instance, Mateus et al. (2010) have argued that although weighting procedure follows a rationale which at first glance seems logical, the definition of weights can be completely inconsistent with the real preferences of the procurer. If the contracting authority pays adequate attention to SPP considerations, then the ways to address such considerations can be discussed between the contracting authority and contractors (bidders) with the aid of procedures such as CDP, thereby improving the consistency between the weight and the actual preferences concerning SPP (Paper IV).

Paper III has discussed the policy contexts related to GPP/SPP in five countries out of the ten that have adopted the code of practice for GPP. They include Poland (Central Europe); the Netherlands (North West Europe); Sweden (Northern Europe); New Zealand and Korea. These five countries were selected in order to represent different parts of Europe and outside Europe. This selection was made with the intention of presenting different approaches involved in managing and developing the policy instrument, and also to highlight some of the issues involved in these approaches. Although the five countries discussed have different levels of achievement and varied approaches, it can be said that they are all moving in the same direction (Paper III). Besides, the introduction of SPP in certain countries should have stimulated a profound change in the implementation of GPP, implying, first and foremost, that the scope of GPP must have expanded. However, certain studies have shown that SPP, in practice, has not triggered the movement beyond the environmental criteria (Meehan and Bryde, 2011; Melissen and Reinders, 2012).

Paper III underscores the importance of ‘values’. There have been various efforts to identify values that are deemed necessary to sustainability. For instance, the earth charter initiative has put forth four general-level values, which include respect and care for the community of life, ecological integrity, social and economic justice, and democracy, nonviolence and peace (ECIS, 2000). “Yet these different efforts are broadly consistent with the conception of values as abstract ideals that define or direct us to goals and provides standards against which the behaviour of individuals and societies
can be judged” (Leiserowitz et al., 2006). Furthermore, value concerns cannot be separated from procedural complexity; they are intertwined (Campbell, 2006).

Paper V also discussed certain concerns for SPP. For instance, it emphasised that the construction sector should reflect on their SPP related actions in the context of various policies relevant to GPP/SPP. One such policy includes the flagship initiative ‘resource-efficient Europe’ (EC, 2011b) and its emphasis on “ecosystem services” and “natural capital” (Costanza, 2012). Given such emphasis on natural capital, it is important to evaluate GPP/SPP relevant criteria/actions against the background of natural capital and sustainability. According to Voget-Kleschin (2013), a certain process or measure can qualify as contributing to sustainability if it strives to meet either direct or indirect claims for justice regarding natural capital or both, and does not violate the claims. If GPP/SPP truly intends to contribute to sustainability, then it could be important to understand if and how far GPP/SPP complies with direct or indirect claims for justice regarding natural capital (Paper V). Direct claims require that all contemporary and future human beings should be able to live a decent human life. Indirect claims involve claims for the treatment of social and natural capital in a way that assures not to undermine contemporary and future humans’ ability to live a decent human life (Voget-Kleschin, 2013).

4.5. Discourses on SPP

The Q methodology study revealed three discourses in terms of the future trend of GPP/SPP (Paper V). They include discourse A: analytical support for pro-environmental action in procurement, discourse B: sustainability value-laden efforts and innovation for GPP/SPP, and discourse C: enabling organisations and partnerships to promote GPP/SPP. In discourse A, the key concern is that environmental issues need to be prioritised in procurement decisions by providing more weight to environmental aspects in tendering process. This view also highlighted the importance of analytical methods and expertise in tools such as life cycle assessment to be better informed about criteria and alternatives. In terms of the future, discourse A relies on providing analytical support to develop criteria, thereby enabling significant weight for environmental aspects, and facilitating the necessary interactions to promote GPP/SPP. Discourse B is distinctive because of its critical views and core belief in sustainability values and innovation. From a supply chain perspective, the discourse argued that the difficulties faced in the traceability of raw materials are overrated. A participant mentioned that “the supplier should know where it [raw materials for the product] comes from; yes it takes time, but not impossible. They do pay money [...] you have traceability of money”. This discourse notes the role of dialogue between contractors and contracting authorities in promoting innovation. Discourse B suggested that there should be no strong distinction between environmental and functional objectives in a procurement process. It
was claimed that this distinction might increase the tendency to prioritise one over the other. In addition, discourse B exhibits interest in the claim that GPP/SPP requirements should be established during the planning phase of the project. Furthermore, discourse C focused on organisation and partnerships. Discourse C emphasised the need to train and educate the procurement staff on a variety of concerns related to GPP/SPP. The training should aim at promoting awareness regarding various environmental and social issues to be covered in GPP/SPP and also the strategies required for implementing GPP/SPP. This discourse was strong on the idea that the procurement and environmental staff should communicate with each other. In addition, this discourse underscored the need for continuous improvement in procurer-contractor relationships. It stressed the importance of incentives to both large and small contractors for developing sustainable practices in a way that enhances their competitiveness. It also indicated how the traditional procurement procedure does not allow the improvement in procurer-contractor relationships. These relationships are necessary to develop realistic solutions in GPP/SPP that can contribute to sustainability. A participant expressing this viewpoint mentioned about the chances of contracting authorities “rewarding illusions” under the pretext of following GPP/SPP. Thus, discourse C calls for more partnerships and dialogue to develop practical solutions in GPP/SPP (Paper V).

5. DISCUSSION

5.1. The practicality of inter-linking impact assessment and GPP/SPP

Paper I, Paper II, Paper III and Paper IV have conceptualised and advocated the inter-link between impact assessment and GPP/SPP. However, the delimitation in these papers was that they largely focused on identifying opportunities and justifying the need for such inter-link. The practicalities related to the inter-link need to be discussed. Hjelm et al. (2011) have indicated three dimensions of inter-link: 'formal', 'learning', and 'interactive'. The formal approach is centered on techniques, whereby two instruments are combined so that outputs of one instrument become inputs for the other, thus avoiding the duplication of activities. In the learning approach, stakeholders associated with the instruments learn from each other (eg: regarding methods). The interactive approach presumes active interaction of the stakeholders and thereby involves transformation of working procedures.

Paper I and Paper IV have explored the formal approach in EIA and GPP/SPP inter-link. However, there are several aspects of the instruments that must be considered when they are combined. Finnveden and Moberg (2005) have highlighted among others the following aspects: 'degree of site-specificity', 'type of comparison', 'system boundaries', and 'impacts included'. These aspects are discussed here in the context of impact assessment and GPP/SPP. As regards the first aspect, EIA may be site-specific or restricted to the project site. The site-specificity can exist even in the context of
SEA of regional plans. Site-specificity may vary in GPP/SPP. For instance, LCA is traditionally site-independent tool (Finnveden et al., 2003). If LCA is used to develop criteria for GPP (Tarantini et al., 2011); it can be considered as site-independent. Nonetheless, GPP/SPP can be site-dependent when, for instance, considered from the perspective of biodiversity issues, such as avoiding minerals or stones from extraction facilities located on native habitat with no concern for biodiversity (Sutton and Preece, 1998). For the second aspect, impact assessment compares alternative proposals (project or plan); whilst, in GPP/SPP, the comparison is between various services or several products that fulfil the same primary function. In the third aspect, the system boundaries are largely determined by the object under study. One of the dimensions of system boundaries is the geographical area (Tillman et al., 1994). In impact assessment, the object under study is a project (in EIA) and policy, plans or programmes (in SEA). Nykvist and Nilsson (2009) argue that the original intentions of EIA included assessments at strategic level, but with the growth of the EIA paradigm, it became the instrument for assessing local (in site) impacts whilst assessment of impacts of plans and programmes assumed the form of SEA. However, the choices about geographical boundaries for impacts and the use of resources are more political choices than analytical. If a certain geographical boundary is used for the impacts considered in impact assessment, it implies that impacts occurring outside that geographical boundary can be neglected. Hence, there is a need to argue for broad system boundaries in order to recognise the international importance of environmental protection (Finnveden et al., 2003). In GPP/SPP, the objects under study are services and products. The choice about geographical system boundaries for purchasing activities has been political in certain cases. For instance, in the United States, the attempts to address issues of discrimination influenced government policies related to purchasing from overseas. The procurement (or non-procurement) from Northern Ireland and South Africa were used as a mechanism to force the UK government to stop religious discrimination and upon the South African government to end apartheid and develop democratic government (Christopher McCrudden, 2004; Walker and Brammer, 2012). The fourth aspect considers the impacts included in the instruments. Impact assessment evaluates the environmental, social and economic impacts of alternatives. The impacts include noise, air, flora and fauna, effects on local population and others (OJEU, 2012). GPP/SPP can discriminate between service/product options on the basis of their demand for land, impacts on native species and ecosystems, and their likely contribution to the achievement of ecological [and social] sustainability (Sutton and Preece, 1998).

Finnveden and Moberg (2005) emphasise that the differences between instruments with regard to these aspects can determine if and how the different instruments can be combined. If two instruments are identical with respect to all these aspects, they might compete with each other. If there are differences, they can answer
different questions. This implies that they can complement each other by providing different types of results.

According to Hjelm et al. (2011), the driving forces for interlinking instruments extend far beyond purely logical arguments regarding how instruments can be accurately linked to each other. They involve the needs and aspirations of the users of each instrument to position themselves more advantageous through creating necessary partnerships, strengthening their position against competitors and improving the performance of their tools. Paper II has discussed the perspectives of relevant stakeholders on the inter-link between impact assessment and GPP by considering the procurement of renewable energy as an example. Besides, Paper II also explored the stakeholders’ perspectives on the priority areas for procuring renewable energy.

One of the priority areas identified in Paper II was policy integration. Policy integration refers to the “combined integration of policy instruments that were devised for different and potentially inconsistent policy objectives” (Persson, 2004). However, policy integration in the context of Paper II did not specifically indicate the inter-link of impact assessment and GPP. It also focused on the policies that intend to promote renewable energy. According to Beck and Martinot (2004), policies that intend to promote renewable energy can be grouped into four categories. They include a) price setting and quantity-forcing policies that mandate prices and require a fixed amount of generation to be renewable b) cost reduction policies that reduce investment costs through subsidies, loans and other such measures c) public investment and market facilitation activities that provide public funds for direct investments or for guarantees, as well as information and training to facilitate investments d) power grid access policies that give renewable energy equal treatment in the access to power grids. An interviewee mentioned that although policy integration is important, it is not what motivates them to act in every project. The interviewee listed other priority areas such as early planning, partnering and technology development over policy integration, and indicated that the lessons learnt from such process would help in shaping policies.

This response can be strengthened with the concept of evidence-based policy (EBP), which implies integrating experience, expertise and judgment with the best available external evidence from research (Davies, 1999; Sorrell, 2007). According to Head (2010), the key features of the EBP approach include the quest for rigorous knowledge and the promotion of its use within the policy process. The quest for rigour is central with the focus on methodological questions of data validity and reliability, and the design of information collection and statistical analysis. Head (2010) also indicates the existence of other voices in the EBP debates, which argue that the relevant evidence must be broadened to encompass other types of knowledge including qualitative evidence such as the perceptions of stakeholders. Moreover, Juntti et al. (2009) reinforce the importance of bridging the gap between lay and expert understandings of environmental issues. They also emphasise the need
Seeking sustainability in the construction sector: opportunities within impact assessment and sustainable public procurement

to address the challenge that the confluence of lay and expert perspectives poses for the validity and legitimacy of evidence generated specifically for policy process. It can be said that stakeholder communication is vital for EBP (Ruddy and Hilty, 2008). The number of cases whereby EIA has enabled GPP (and EIA and procurement are intertwined) should be taken as a basis upon which to learn lessons from the two policy instruments in order to improve the coordination between them. However, the confidential character of procurement provides difficulties for stakeholder communication. Although in planning procedures, the public is formally involved, procurement procedures generally do not involve or limitedly involve the public (Lenferink et al., 2013). Moreover, learning tends to be encapsulated among the participant actors (e.g., involved in impact assessment) and does not diffuse easily into the rest of the governmental actors responsible for policies (Nykvist and Nilsson, 2009).

While discussing the practicality of the inter-link, certain issues must be considered from an impact assessment perspective. As Isaksson and Storbjörk (2012) point out, there are a range of factors that limit the role of impact assessment. One such factor involves the way in which the actual significance of certain irreversible environmental impacts is concealed by inexplicably identifying them as environmental benefits. The inter-link should not stimulate such factors. The inter-link must be established in light of the question whether the integration of impact assessment and other instruments would lead to its aim of achieving sustainability (Tajima and Fischer, 2013).

5.2. Sustainability in the construction sector

“No matter how many times someone talks about what they are doing for sustainability – using green, sustainable, or sustainability to describe a new product or new program to inform their customers – they are still in the world of business almost as usual (BAAU)”

- J. Ehrenfeld in Ehrenfeld and Hoffman (2013)

The aforequoted statement raises new philosophical questions and enables a critical reflection of the four papers (Paper I, II, III, IV) in this thesis. The analysis involved in these papers, the postulates and assumptions, the orientation toward particular instruments for promoting sustainability all require “philosophical reflection” (Becker, 2012). According to Willigenburg (2008), philosophical reflection enables us to enhance our understanding of the “conceptual worlds” or the “houses of concepts and ideas in which we live”. It examines the structures of our thinking and “is a discipline of rigorous argumentation and rational analysis”. The need for such reflection was addressed with the aid of Paper V. Following Becker (2012), it can be said that one of the purposes of philosophical reflection is to understand the role of this thesis work in the context of society and sustainability. The journey from Paper I to Paper IV involved gaining insights into the policy instruments
and the processes around them. Philosophical reflection hinges on these insights, and needs to be conducted in a way that these insights are “unpacked and developed in a process of reflection and deliberation” (Willigenburg, 2003). This process was enabled by the Q methodology adopted in Paper V. The Q statements selected from various sources provided representations of the insights acquired during the study period between Papers I to IV. Besides, Paper V was one way to follow Hjelm et al.’s (2011) recommendation that the inter-link should not be “seen as a goal in itself”. The discourses identified in Paper V aided in expanding the insights on GPP/SPP. The results of Paper V provide an opportunity for reflection on how GPP/SPP can be steered towards the (sustainability) goal that stimulated its establishment. Analytical support is required to develop criteria in a way that enables the evaluation of GPP/SPP against the background of sustainability and justice regarding natural capital. Innovation must be promoted with a focus on sustainability values. Innovation requires more partnerships and dialogues between contracting authorities and contractors (Paper V). The revised public procurement directive (OJEU, 2014) enables such partnerships with its newly introduced procedure called innovative partnership. Paper V emphasises that GPP/SPP should be discussed between contracting authorities and contractors in the light of its contribution to sustainability. The claim made in one of the discourses regarding the contractor’s responsibility to track the source of the raw materials used suggests that GPP/SPP must incorporate the perspective of sustainability in the supply chain management. Krause et al. (2009) have indicated that for the past two decades, purchasing was incorporated into the term supply chain management, which not only encompasses immediate contractors and suppliers, but also subsuppliers and the entities downstream that facilitate the transportation of products and services to markets. They suggest that a parallel can be made between the evolution of the purchasing function over the last two decades and the issue of sustainability in supply chains. In addition, the prevalence of discourse B among the participants shows that discussions in GPP/SPP can move into the “terrain being established by those who are engaging more openly with questions of [sustainability] value” (Richardson, 2005). The findings of Paper V suggest that it might not be necessary to regard GPP/SPP as yet another tool that is “still in the world of business almost as usual” (J.Ehrenfeld in Ehrenfeld and Hoffman, 2013).

6. Concluding Remarks

The primary conclusion related to the aim of this thesis is that impact assessment and GPP/SPP must be enabled with certain key mechanisms to strengthen their roles in promoting sustainability in the construction sector. The concern that initially emerged from an impact assessment perspective is whether it is utilised to its full potential as a planning instrument. Another concern is whether impact assessment is too isolated a procedure and therefore in danger of being ignored. With regard to GPP, several issues have been
discussed in this thesis, which need to be addressed to facilitate its evolution towards SPP. Given these concerns, this thesis concludes with the following summary of the mechanisms it has proposed:

- The first mechanism is the inter-link. The intertwining of EIA and procurement with the aid of CDP has been investigated earlier (Arts et al., 2006; Lenferink et al., 2012). Besides, previous studies also showed the use of EIA in formulating GPP requirements (Varnäs et al., 2009). This thesis departed from these studies to explore the inter-link between EIA and GPP/SPP. The inter-link between EIA and GPP/SPP is suggested with the intention of facilitating systematic planning and discussion of GPP/SPP at the level of EIA (Paper I, II, III). Moreover, it can be a way to ensure that the use of EIA is “not left to the final legal step before project implementation” (Morgan, 2012). However, the inter-link must not stimulate factors that limit the role of impact assessment. This implies that the inter-link should not be used as a pretext for concealing information on adverse impacts. From a GPP/SPP perspective, the inter-link could be one approach to strengthen the relationship between GPP/SPP criteria and the subject matter of the procurement contract.

- The second mechanism is related to the choice of an appropriate procurement procedure. Following the recommendation of a Nordic study, this thesis discussed the ways in which CDP can be used to plan for GPP/SPP (Paper IV). It must be noted that CDP cannot be used on all projects as the reasons for adopting CDP require the project to be technically and legally complex. Nonetheless, the message of the thesis in terms of CDP is that the contracting authorities should pay adequate attention to considerations relevant to GPP/SPP and address them in discussion with contractors.

- The third mechanism is to incorporate sustainability value concerns in procurement decisions. This must be considered important, particularly as GPP is evolving towards SPP in several countries. There is also a need for a paradigm shift (Paper III). Hall and Howe (2010) highlight that a paradigm shift indicates a “complete revolution in the mindset of scientific community”, and involves the consideration of newly discovered realities against established views. If the growing momentum for SPP must introduce the changes that are “worthy of the name paradigm shift” (Hall and Howe, 2010), then explicit consideration should be given to the sustainability values that stimulated its establishment. Sustainability values must also be incorporated in innovations.

- The fourth mechanism is to develop GPP/SPP criteria in a way that enables the evaluation of GPP/SPP against the
background of sustainability and justice regarding natural capital. It could be important to understand if and how far GPP/SPP complies with direct or indirect claims for justice regarding natural capital. Direct claims encompass the need to ensure that all contemporary and future human beings will be able to live a decent human life. Indirect claims calls for the treatment of social and natural capital that qualifies as not undermining contemporary and future humans’ ability to live a decent human life (Voget-Kleschin, 2013).

7. Future research

“Sometimes it's a little better to travel than to arrive”
- Pirsig (1974). Zen and the Art of Motorcycle Maintenance

Future research should examine how the inter-link between impact assessment and GPP/SPP could be facilitated by tools such as BREEAM for Communities. It is claimed that BREEAM for Communities can be used in conjunction with EIA and SEA (BRE Global, 2011). However, more research is needed to understand how SEA/EIA and BREEAM for Communities can complement each other. Further study is also necessary to investigate the need to involve contractors as early as possible in the SEA phase. Focus should be on enabling contractors’ innovation in the early planning phase and also improving stakeholder participation. Research should explore the benefits of this early involvement in terms of SPP. In addition, it needs to identify approaches within CDP for the early start of procurement procedures in relation to the planning process. Future research can also focus on understanding how CDP can enable economic benefits in GPP/SPP. More research is needed to better understand how innovation partnership (introduced in the revised public procurement directive) can promote GPP/SPP. Moreover, there is a need to explore the partnership arrangements between contractors and sub-contractors from the perspective of enabling SPP. Future research may also explore how the areas of GPP/SPP and sustainable supply chain management can be inter-linked to promote sustainability in the construction sector.
Seeking sustainability in the construction sector: opportunities within impact assessment and sustainable public procurement

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Seeking sustainability in the construction sector: opportunities within impact assessment and sustainable public procurement


Seeking sustainability in the construction sector: opportunities within impact assessment and sustainable public procurement


Errata

SEEKING SUSTAINABILITY IN THE CONSTRUCTION SECTOR: OPPORTUNITIES WITHIN IMPACT ASSESSMENT AND SUSTAINABLE PUBLIC PROCUREMENT

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<table>
<thead>
<tr>
<th>Page/section</th>
<th>Reads</th>
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<tbody>
<tr>
<td>Thesis- Page 17, Table 1 (see last row)</td>
<td>Paper V: Future trends in sustainable public procurement</td>
<td>Paper V: Discourses on future trends for sustainable public procurement in the construction sector</td>
</tr>
<tr>
<td>Thesis- Page 19, Fig.4., (see reference)</td>
<td>(Faith-Ell, 2011)</td>
<td>(Faith-Ell C, personal communication, November 2011)</td>
</tr>
<tr>
<td>Thesis- Page 36, Fig.7. (see caption)</td>
<td>ap-plied</td>
<td>applied</td>
</tr>
<tr>
<td>Paper V- sub-section 4.2. (see heading)</td>
<td>Q statement s</td>
<td>Q statements</td>
</tr>
<tr>
<td>Paper V – section 7, Conclusion</td>
<td>SSCM</td>
<td>sustainable SCM</td>
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