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Public Procurement for Innovation as a tool for stimulating sustainable innovation – a cross-country comparison

Master thesis

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Abstract

This thesis aims at determining the main barriers for using Public Procurement for Innovation (PPI) as an approach to induce sustainable innovation in a national context. In order to do this, this thesis firstly examines the link between sustainability goals and innovation. It is concluded that, in order to change production and consumption patterns, innovation policy should aim at implementing approaches and instruments that induce sustainable development – thus effectively integrating the two goals of enhancing the innovativeness of a country and working towards a more sustainable society. Demand-driven innovation, and specifically Public Procurement for Innovation (PPI) seems to hold significant potential to reach this goal. However, as innovation policy traditionally focused on supply-driven innovation, this remains an underexplored field. Furthermore, the scope and *status quo* of different PPI schemes is largely unknown, which makes it difficult to determine the barriers to use PPI to induce sustainable innovation.

Therefore, this research examines three countries' PPI schemes in the context of their own innovation policy. The Netherlands, Sweden and the UK are all considered to be frontrunners in using demand-driven innovation and PPI. In order to provide context for the comparison and to determine the most important actors who influence the PPI policy, the innovation system approach is used. Through an examination of demand-oriented innovation policy theory, the PPI schemes are firstly categorised in terms of their PPI form and the rationales behind them, after which a capacity framework for successful innovation procurement is presented. This capacity framework is linked to several system failures that the PPI policy attempts to address – so as to establish a link between strong and weak points of the policy, and a solution to the system failures. The capacities that are identified in the framework are: coordination capacity, link with private demand, coping with complexity and procurement discourse, activating and enabling the procurement chain, and creating and maintaining a supporting innovation procurement culture.

For all three countries, the development of innovation policy and the national innovation system is described. Secondly, through an examination of policy documents, scientific literature and in-depth interviews with a number of key actors, the PPI schemes of the three countries are reconstructed using a policy reconstruction method. Thirdly, some empirical evidence is provided in the shape of formal evaluations of practice and the revision of flagship cases. Finally, the strengths and weaknesses of each country's PPI schemes are determined using the capacity framework, after which conclusions are drawn regarding the PPI schemes' ability to solve the system failures. In the comparative analysis, the main differences and similarities between the three countries are set forth. Then, the PPI approaches are compared in terms of their forms and rationales. Lastly, the countries' strengths and weaknesses are compared, using the capacity framework again.

It can be concluded that PPI has large potential to solve the system failures and as such facilitate innovation, especially in the environmental field or as a complementary asset to sustainable procurement. Ideally, a pre-commercial procurement scheme should aim at the development of R&D (especially through targeting SMEs), while a central procurement scheme should aim at integrating the innovation rationale throughout the government. Furthermore, sustainable procurement should be supplemented or integrated with innovation procurement, as both can enhance each other.

The barriers for using PPI to induce sustainable innovation are found within all the capacities, although the capacity to create and maintain a supporting innovation procurement culture is least developed in all three countries: many existing rules as well as a lack of financial stimuli hamper the process. Furthermore, the capacity to activate and enable the procurement chain is also not very developed; although tender processes are increasingly based on functionalities rather than designs and a structure in which procurers have knowledge of the (future) needs of the public service is being developed, the incentive structure for procurers remains based on the lowest-cost rationale, and procurers are not sufficiently trained on an operative level. The capacity to cope with complexity and procurement discourse is moderately addressed, although the ambition level is not very high in all three countries. The coordination capacity is medium; most countries provide their departments with information and coordinate the policy from within the innovation department, but the commitment of other departments is mostly not sufficiently guaranteed. Lastly, the link with private demand is insufficient in all three countries, with the exception of sectoral PPI approaches in Sweden.

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1. Introduction and background

1.1. Introduction

Over the past few decades, the importance of overcoming the threats of climate change and its inevitable consequences has triggered the need for sustainable development; or more precisely: the need to build a sustainable society in which sustainable production and consumption play a central role (Robins, 1999; EU, 2010; UNEP, 2011). The most commonly used definition of sustainable development remains the so-called Brundtland definition: "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). Within this definition, there is an implicit connotation about limits to the common notion of consuming in the Western world.

This is more evidently stressed by the same Brundtland, who later stated "it is simply impossible for the world as a whole to sustain a Western level of consumption for all (…) we would need 10 worlds, not one, to satisfy all our needs" (Brundtland, 1994). The global dialogue has focused on sustainable production and consumption since the Earth Summit in 1992 and by 2008, the EU has translated this need into the so-called Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan (Nash, 2009; EU, 2008). Sustainable production and consumption is an important element of any sustainable (strategic) agenda, as the growing energy and resource demand of the world population are driving most environmental problems the world is now coping with and are thus challenging all solutions to these problems even further (EU, 2008).

In order to truly work on a sustainable society, contribution from all parts of society is imperative. In governance literature, a formal distinction is made between three domains within society: government, private sector (or market) and the civil society ((Meadowcroft, 2007; Kjaer, 2004). The role of government in furthering sustainable development is the most straightforward; traditionally the government was seen as the sole party who was responsible for things that are considered common goods (like the environment). Recently however, Tabbush (2005) has identified a shift of frameworks. After the Cold war era, the "process of globalization questioned the foundations of modern states" (Tabbush, 2005, p13) and non-state actors started to participate more in the decision-making process. The role of the state was questioned and the second framework emerged, which stresses, "the states are not the only actors to be taken into consideration" (Tabbush, 2005, p14). A strong civil society induces a better representation of citizen's interests to the state and consequently a better transference of these interests into laws. Furthermore, public deliberation in organised groups helps to constitute an inclusive public space where social problems and priorities can be articulated to political and economic spheres (Fung, 2003).

In addition, there have been several studies that focus on the private sector and its possible contributions towards reaching the sustainability goals. Within this research field, no dominant theoretical approach or methodology can be recognised; the field is highly diversified and the studies focus on different aspects of the concept. These research themes are not only a result of scientific interest, but also of societal and political agendas (Lockett et al., 2006). As for the private sector itself, the idea of corporate social responsibility has become a growing topic in boardrooms in the last few years, with the debate focusing on which obligations companies have to be socially responsible, and what impact it can have on the bottom line (Andersson and Sweet, 2002). The common refrain among managers is that a corporation's primary responsibility is to act on the behalf of shareholders who own the company and who want the best possible return on their investment (Hart et al., 2003). At the same time, managers increasingly face pressure from the government, nongovernmental organizations, media and the public to take action that demonstrates a social conscience. Some say that as the position of the government has been diminishing over the last few decades, the power of companies has increased. Their potential to contribute to furthering sustainability goals has herewith increased as well. Some go even further and argue that, as their power increased; companies' responsibility towards society increases as well (Cumming et al., 2005). But it is not only a matter of societal and political agendas. The concept of CSR or any form of engagement to building a sustainable society can eventually benefit the companies itself: the growing strand of literature focusing on corporate social responsibility has found that CSR provides added value for companies, both in economical terms as in terms of reputation building (Cramer et al., 2004; Grayson and Hodges, 2004; Jenkins, 2009). Consequently, engaging in sustainable practices might be considered an opportunity, instead of an obligation (Grayson and Hodges, 2004; Hart et al., 2003).

1.2. Stimulating a sustainable society through innovation

Now that we have established that all three domains in society have a part to play in the transition towards a sustainable society, it is important to look at the different ways to reach this goal. Evidently, there is a myriad of possibilities, but this thesis will focus on the intimate relationship of sustainability and innovation. Innovation is often defined as the successful implementation of an invention into new products or services (Smits, 2002). As such, the connection between sustainable development and innovation seems straightforward: use innovations' potential to better meet human needs and values to work on the sustainable goals. Indeed, the World Business Council for Sustainable Development (WBCSD) has pointed out that innovation is a unique way to bridge the gap between environmental goals on the one hand, and commercial success through carrying out business in value-creating ways on the other hand (WBCSD, 2011). Furthermore, several authors have demonstrated that innovation is one of the engines behind enabling a sustainable future (Mann and Dekoninck, 2003; Souchkov, 2010; Nash, 2009)[1].

Another important stream of thinking that explores the relation between sustainability and innovation is ecological modernisation. This concept was developed in 1980s and is an environmental-sociological approach that assumes that continuous technological progress eventually solves all environmental problems. Among the main contributors to this approach are Huber, Jännicke and Simonis (Mol et al., 2009). Concepts like energy-efficiency, material efficiency, eco-design, recycling and Cradle to Cradle are all in accordance with ecological modernisation. Jännicke (2008) argues that ecological modernisation (defined as systematic eco-innovation and its diffusion) is one of the best options to reach environmental improvements, as it in line with the market logic of innovation and competition and takes advantage of the market potential of ecological solutions.

However, the context for innovation is often not sufficiently delineated (Dearing, 2000): many sustainable innovation efforts still focus on less pollution or a more efficient way of using available resources instead as opposed to really integrating sustainability into their business strategy and establishing all the necessary conditions for innovation. Moreover, in practice it has proven to be difficult to consciously work on innovation, as innovation more often than not comes "unexpectedly 'out of left field' and have uncertain consequences" (Dearing, 2000, p. 103). Furthermore, linking innovation to the overarching framework of sustainable development presents many challenges as well. This is not in the least the result of an absence of clear market signals and a common language. Furthermore, innovation policy specifically is often seen as an important asset to reaching environmental goals and they are therefore increasingly interlinked. The underlying rationale for innovation policies that aim at environmental goals can be traced back to classic economic thinking, stating that government intervention can be legitimised when a market or system failure occurs (Faber and Kemp, 2005). It is also interesting to look at this relationship from the other way around: how can environmental and sustainable policies stimulate innovation? According to Kivimaa (2008), environmental policies have two important roles to play from an innovation perspective: firstly it can facilitate innovation within dominant technological systems and secondly it can keep options open for other innovations to emerge outside the boundaries of the existing systems (Kivimaa, 2008).

Therefore, in order to truly work towards a more sustainable society and to change production- and consumption patterns through sustainable innovation, innovation policy can play an important role to induce the changes that are needed. Environmental and innovation policies are increasingly interlinked, and in order to be successful, should enforce, rather then hinder each other (Kivimaa, 2008). Environmental policies should be flexible enough to provide room for innovation, while innovation policies should benefit from the opportunities environmental issues and policies offer.

1.3. Changing production and consumption through public procurement

Traditionally, innovation policy focused on supply-side measures. However, more recently, demand-driven innovation has received renewed attention. The most direct form of demand-driven innovation is through public procurement. Edler and Georghiou (2007) discuss the increasing attention public procurement has received as a potential source of innovation.

[1] This claim can be debated, as some would argue that innovation (or more specifically technological progress) is more part of the problem then part of the solution. Indeed, (consequences of) technological progress has lead to many of the environmental challenges that we are faced with now. However, the sustainable innovation I am talking about in this context does have a role to play in solving some of these problems as well – I would argue that the fact that it is aiming at a sustainable future will change the rationale behind the innovation, thus having a chance of avoiding the negative side-effects of earlier (technological) innovations.

Furthermore, they distinguish several forms of public procurement and a taxonomy of innovation policy tools. Numerous sources confirm that public procurement is a powerful force in terms of its buying potential: in the 15 countries of the European Union as a whole; approximately 16% of a countries' GDP was procured by the public sector[2] (Georghiou, 2004; European Commission, 2004). Although most of this huge sum is used for regular public procurement, it does demonstrate the government's power in this respect.

The potential of public procurement for (sustainable) innovation is stressed by many other governments, scientific authors and also the EU – most noticeably through the Lead Market Initiative (OMC-PTP, 2009). Public procurement (or more generally demand-side) policy measures to induce innovation are not a new concept. Already in the 1970s, several initiatives to mobilize demand have taken place in many countries. The US and Japan, who both have a more systematic approach to pre-commercial procurement than many European countries, have shown that mission-oriented approaches to facilitate innovation and cooperation between several sectoral ministries; thus decreasing costs for R&D subsidies (Edler and Georghiou, 2007). Famous examples of this success can be found especially in the military R&D programmes, in which explicit and well-articulated demand was seen as the key to the development and diffusion of many technologies. However, the role of demand in this sector has been debated as some argue that public-private spillovers could be reached more efficiently (Wessner, 2004; James, 2004).

In Europe, the added value of public procurement for innovation has been investigated as well. Rothwell and Zegveld (1981) have studied the effect of general state procurement (without direct R&D procurement) on innovation, and compared this with R&D subsidies. They found that state procurement, over a longer period of time, triggered more innovation and greater innovation impulses than R&D subsidies (Rothwell and Zegveld, 1981). These results were corroborated by Geroski (1990), who found that procurement policy is more efficient in reaching a heightened level of innovation than most R&D subsidies.Despite this evidence, and despite clear successes with sectoral initiatives on PPI (e.g. the Energy Agency in Sweden), the attention for public procurement as a source for innovation has declined after the 1990s. Edquist et al. (2000) have argued that the European Union competition regulations are the main reason for this decline – and the tension between the (EU) competition regulations on the one hand and demand-side measures for innovation remains until this day. However, in the last few years PPI and the demand side in general as a source for innovation has regained attention. This process in itself consisted of several steps before it was adopted fully by multiple countries, [3]but its conclusion was action on both the national member state level as well as on EU level.

In 2006, the so-called Aho Group Report was presented to the European leaders, which was titled "Creating an Innovative Europe" (Aho et al., 2006). This rapport recommended a more active role of the EU in the creation and development of innovation-friendly markets by creating better conditions for innovation. Furthermore, in this report the concept of lead markets was presented (Aho et al., 2006). Based on this report, the European Commission launched the Lead Market Initiative for the Innovativeness and Competitiveness of Europe (European Council, 2006; Blind et al., 2009). This was a part of the EU's 2006 broad based Innovation Strategy (Blind et al., 2009). The Lead Market Initiative rests on four pillars: public procurement, standards, other legislation and complementary actions. In 2007 it was adopted by the Commission and in May 2008 endorsed by the European Council (Edler, 2009). In the Lead Market Initiative, six markets are identified which offer strong potential for a greater competitiveness of Europe and which could improve economic growth: eHealth; Sustainable construction; Protective textiles; Bio-based products: innovative use of renewable raw materials; Recycling: proper and effective waste management; and Renewable energy: CO2-neutral energy sources (European Commission, 2009). Although the emphasis of the rationale behind the Lead Market Initiative is very much on competitiveness and innovativeness of Europe, it can be observed that many of the identified lead markets are sustainable markets (markets of sustainable, ecological or energy-efficient products and services). Consequently, societal aims (i.e. striving for a more sustainable society) seem to have played a role in the choice of the markets. The Lead Market Initiative is supposed to provide context for several European member states' efforts in the area of Demand Based Innovation Policy (DBIP) and thus support the emergence of lead markets in Europe (European Commission, 2009). Blind et al. (2009) have designed an evaluation concept for the Lead Market Initiative, showing its

[2] Note that this 16% represent general public procurement, i.e. procurement of all kinds, including standard products bought 'off the shelf' (Edquist, 2009). Furthermore, this number is an average for all EU countries; its share differs between the individual EU countries, e.g. Audet (2002) has shown that it ranges from 5% in Belgium to more than 13% in Sweden.

[3] For a full description of this process, see Edler and Georghiou, 2007.

complexity in terms of instruments and multi-steps effects (see Appendix 1 for a visual overview of the evaluation concept). Although the Lead Market Initiative is not the focus of this thesis, it is an important contribution to the resurrection of demand-based innovation policy and as such is a crucial context-factor for member states' (demand-based) innovation strategies. The European Commission itself (2009) states that it is the "first comprehensive effort at EU level for a coordinated demand-side innovation policy approach" (European Commission, 2009, p. 3). As can be observed in Appendix 1, public procurement for innovation and the bundling of demand across Europe is one of the intermediate effects that are aimed for in the Lead market initiative.

In this thesis I will focus specifically on the Public Procurement for Innovation (PPI) approach. According to Edquist (2009) PPI, "occurs when a public organization places an order for a product (a good or a service - or a system) that does not exist at the time, but could (probably) be developed within a reasonable period of time. However, R&D and innovation are needed before delivery can take place" (Edquist, 2009, p. 7). This is contrasted to both private procurement – in which the buyer is a private partner – and to regular ('off the shelf') procurement – in which only ready-made products are bought. The concept of PPI that will be studied in this thesis is further delineated below, in the sections that deal with the theoretical background of this thesis and the research methodology.

1.4. Problem definition

In order to change production- and consumption patterns, innovation policy should aim at implementing instruments that induce sustainable development. Demand-driven innovation policy seems to hold potential to reach this goal, and as the main focus has traditionally been on supply-driven innovation policy, it remains a rather unexplored field. Public Procurement for Innovation (PPI) has proven to be a promising tool in this respect.

However, the potential of the PPI approach to induce sustainable innovation in a national context remains unexplored. Furthermore, the scope and stage of different approaches of the implementation of PPI, as well as the advantages and disadvantages of the different approaches are largely unknown.

1.5. Research objective

This thesis will aim at exploring the different national policy approaches to implementing PPI as an approach to induce sustainable innovation, and determine its potential to do that through the identification of factors that determine its success or failure. In order to determine this potential, three different national governments' policy approaches to implementing PPI for sustainable development will be examined and the strengths and weaknesses of each approach will be identified.

The central research question can be formulated as follows:

What are the main barriers for using Public Procurement for Innovation (PPI) as an approach to induce sustainable innovation in a national context?

1.6. Scientific and social relevance

Public procurement and its potential for stimulating a score of different goals have received a lot of attention lately (Edler, 2009; Edquist, 2009; EU, 2010; OMC-PTP, 2009). This is a result of many different pursuits. Firstly, many European countries are searching for new ways to maintain the lead position in the increasingly global market, and thus to increase their competitiveness through inducing more innovative economies (Edler, 2009). Secondly, mainstream innovation policy is changing and is focusing more and more on the interactions between different actors within the innovation systems, and on how to establish links between them in order to facilitate the innovation process (Smits and Kuhlmann, 2004). Public procurement (or demand-side policy measures in general) presents an interesting source of innovation that many believe has not yet reached its full potential. Thirdly, due to its enormous power in terms of buying potential, public procurement has been a hot item on the environmental agenda (more commonly referred to as Green Public Procurement). It presents enormous possibilities for the environmental sector to gain momentum. Moreover, it can give the private sector the incentive it needs to start working towards the sustainability goals. Using public procurement to induce sustainable innovation can thus increase the innovativeness of environmental sectors, create interactive knowledge spillovers within those sectors, and stimulate companies to become more active in the field of environmental products and services. As a result, more sustainable products will be available for customers. Consequently, production and consumption trends can be changed. Indeed, Edquist (2009) states "the potential of using public procurement for innovation (PPI) as an instrument to

satisfy hitherto unsatisfied humans needs and to solve societal problems is enormous" (Edquist, 2009, p. 18).

It seems that everyone agrees on the importance of exploring public procurement for (sustainable) innovation: scientists, politicians (both on national and on EU level), media are all very positive about this idea. However, as it turns out there are many challenges associated with this instrument as well. It involves the whole chain from needs, problems and demand to the development and supply of actual products (Edquist, 2009). Therefore, the usability and use of PPI is not very high at the moment. As this thesis will explore different approaches to using PPI, and will then attempt to distinguish strong and weak points of these approaches, it might contribute to the usability of PPI and point out ways to improve existent approaches. In terms of scientific relevance, this thesis will contribute to the growing body of literature on demand-oriented measures for innovation. Furthermore, it will hopefully present new insights for researchers studying policy measures to improve the environmental performance of a country. Lastly, it will hopefully provide direction for policy makers on all levels to improve their existing public procurement system.

1.7. Overview of this thesis

In this thesis, I will firstly discuss the theoretical background for this thesis, ending with an analytical framework that will be used in the analysis of the three countries. Then I will shortly explain the methodology I will use, after which I will proceed with the actual analysis of the PPI schemes in the Netherlands, Sweden and the UK. Subsequently, I will combine the findings in a comparative analysis, after which I will draw a conclusion, provide directions for policy improvement, discuss the results and design of this research, and provide recommendations for further research.

2. Theoretical background

2.1. Innovation System approach

2.1.1. Traditional innovation policy: supply-side focus

Traditionally, the way forward for innovation policy seemed evident: the stimulation of (technological) research and development (R&D) through supplying universities, research centres and large R&D-based companies with financial incentives. This argumentation has been clustered under the name the 'linear model'; it implies that innovation is a direct result from a technological invention and that an innovation will be diffused more or less automatically. One of the most influential theories on diffusion and adoption of innovations is the diffusion theory by Rogers (2003). It describes the diffusion and adoption process of an innovation over time. His famous S-curve (see Appendix 2) assumes that a successful innovation will be slowly adopted at first, then more rapidly as the majorities adopt the innovation as well, and finally the market share will reach a maximum when the market is saturated. In order words, the linear model assumes that technological change happens in a linear manner (Ortt and Smits, 2006). If one follows this line of reasoning, it seems logical to prioritise scientific research and development as a basis for innovation. Traditionally, the linear model has initially heavily influenced innovation policy. This is demonstrated clearly in Sweden – where a notion of a 'Swedish paradox' has been formulated. Edquist and McKelvey (1998) have revealed that the high R&D intensity in Sweden has coincided with a comparatively[4] low share of high-tech (R&D-intensive) products. The paradox that has been observed is the high input of money for R&D subsidies on the one hand and a low output of innovative products on the other hand, as measured by specific indicators. The paradox was specified further in later research (Edquist and Hommen, 2008) and the earlier results were corroborated: the conclusion was that the Sweden was "not as capable, as some other small industrialized countries, of transforming the resources invested in R&D and innovation activities on the input side into product and process innovations on the output side" (Edquist and Hommen, 2008, p. 243). However, this paradox is not only observed in Sweden. Kuhlmann (2003) has identified a similar trend in Germany and the ministry of Economic Affairs in the Netherlands has found a comparable paradox in the Dutch innovation system – which has funnily enough been dubbed the 'Dutch paradox' (EZ, 2003).

Moreover, more recently several authors have generated evidence that innovation is not linear. Innovation is more accurately described as a non-linear, multi-level and multi-actor game with many interactions or feedbacks among those actors (Smits and Kuhlmann, 2004). Therefore, innovation is more than an invention: it is a systemic process that involves actors from all parts of society, which function within a (dynamic) context (the innovation system). This point of view can be summarised as the 'Innovation System approach'.

2.1.2. The essence of the Innovation System approach

The innovation system approach is a very well known concept among innovation researchers; as it provides a clear and coherent context for any research into innovation, and can function as a good starting point to understand the interaction between actors and institutions in innovation processes. The innovation system approach is based on the systems approach, which was developed by Freeman, Lundvall and Edquist (Freeman, 1987; Lundvall, 1988; Lundvall, 1992; Edquist, 1997). Nelson and Nelson (2002) stress that the innovation system approach is a result of the combination of institutional and evolutionary theories.

The essence of the innovation system approach is that innovation and diffusion of technology are simultaneously an individual and a collective act. This entails that innovations within organisations are not isolated but occur in the context of a system, the so-called innovation system (Lundvall, 1988). As such, organisations are dependent on the (national) context of the innovation system. Especially the subsystems and the coordination between subsystems are important (Freeman, 1997). According to Freeman (1987) an innovation system can be defined as the network of institutions and organisations in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies. 'Organisations' signify "formal structures that were consciously created and that have a certain objective" (Arnold and Kuhlmann, 2001). These organisations are often called actors. The relations and interactions between these organisations, but also between individuals and groups in the system, are regulated by a set of norms, routines, practices, habits, rules and/or laws; these are called 'institutions' (Arnold and Kuhlmann, 2001).

[4] Compared to the average of the OECD (Organization for Economic Co-operation and Development) member countries (Edquist and McKelvey, 1998).

In Appendix 3 a generic model of a National Innovation System interpreted by Arnold and Kuhlmann (2001) is depicted. In this model, the different blocks represent subsystems of the National Innovation System. The arrows represent (possible) connections between the subsystems. It is important to note that this concept is not used as a descriptive theory but rather as a heuristic tool.The different actors/subsystems can be distinguished:

- Demand (end- or intermediate users); the role and value of users are increasingly augmented in the innovation literature. As it is the main focus of this thesis, this subsystem will be addressed in more detail later.
- Industrial system; here all the companies of every size are located, multinationals to SMEs to start-ups.
- Education- and research system; the actors that focus on public research and education.
- Intermediaries; between the industrial and research system there are several research institutes that link these two systems.
- Infrastructure; especially the 'soft' infrastructure, e.g. investment capital, property law, standards and norms.
- Political system; not only the government, but also governmental measures and directives are located here. The political system has the power to create certain prerequisites or conditions and will use this power from time to time, when intervention is legitimised.

The traditional innovation system approaches focused on the components of the systems (Lundvall, 1992). Recently however, there has been more focus on what happens *within* the innovation systems (Edquist, 2009). The success of a technological development is dependent on factors like social acceptance, specific strategic policy, an institutional infrastructure, rules and characteristics of a country and the industrial entrepreneurial climate. One of the characteristics of the innovation system approach is its ability to demonstrate which parts of the system are functioning below standard or are less developed. There are several levels in which one can study the innovation system. Generally however, the main purpose of any innovation system is to develop and diffuse innovations (Edquist, 2009). The connection that I will study in this thesis is specifically the connection between the Industrial System and the Demand side. However, in this case the Political System will be the consumer, which entails a rather unique relation between the Industrial System and the Political System. However, the other subsystems and the framework conditions of the National Innovation System also influence the success of the connection. As such, the innovation system approach is very useful to display the dynamics of the context of PPI policy. When intervening in the innovation system, the government has a variety of roles to play in innovation policy – especially in innovation policy that specifically focuses on stimulating environmental innovations. Faber and Kemp (2005) distinguish three roles for the government in this context: assisting in technology push, demand-pull or functioning as a broker between different parties in the innovation system. In this thesis I will focus specifically on the role of the government in the demand-pull.

Edquist (2005) has identified several determinants of the development and diffusion of innovation, i.e. the factors that influence innovation processes. See Appendix 4 for a list of the ten most important determinants. They can be structured into four categories: (1) The provision of knowledge inputs to the innovation process; (2) Demand-side activities; (3) The provision of constituents of innovation systems; and (4) Support services for innovating firms (Edquist, 2005).Furthermore, several authors claim that a well-functioning innovation system should fulfil certain functions in order to lead technologies to broader acceptance and market introduction. A function is defined as a positive or negative contribution of one or multiple components or actors in the innovation system to the overarching goal of developing, diffusing and using innovations that emerge around a certain technology (Hekkert et al., 2007). Hekkert et al. (2007) have defined seven functions that – when present in an innovation system – enable a successful trajectory of a technological development. These seven functions are depicted in Table 1.

F1. Entrepreneurial activity	At the core of any innovation system are the entrepreneurs. These risk takers perform the innovative (pre-)commercial experiments, seeing and exploiting business opportunities.
F2. Knowledge development	Technology and R&D are prerequisites for innovations, creating variety in technological options and breakthrough technologies.
F3. Knowledge diffusion	This is important in a strict R&D setting, but especially in a heterogeneous context where R&D meets government and market.
F4. Guidance of the search	This function represents the selection process that is necessary to facilitate a convergence in technology development, involving policy targets and expectations about technological options.
F5. Market creation	This function comprehends formation of new (niche) market by creating temporary competitive advantage through favorable tax regimes, consumption quotas, or other public policy activities.

F6. Resource mobilisation	Financial and human resources are necessary inputs for all innovative activities, and can be enacted through, e.g. investments by venture capitalists or through governmental support.
F7. Creation of legitimacy	The introduction of new technologies often leads to resistance from established actors, or society. Advocacy coalitions can counteract this inertia and lobby for compliance with legislation/institutions.

Table 1: Functions of innovation systems (source: Hekkert et al., 2007)

In order to build a well functioning and successful innovation system, these seven functions need to be fulfilled over time. Thus, for the successful development and introduction of an upcoming technology, these functions need to be forcefully present in the emerging innovation system (Hekkert et al., 2007). Furthermore, interaction between the different functions is needed in order to create impulse and synergy. However, it is not necessary for every function to be strong at every moment in time. In the first phase of technological development, especially knowledge development, knowledge diffusion and availability of (financial means) are important; while later in the development the stronger focus should be on market formation and lobbying activities. The interaction between the functions flows through different patterns and through different moments in time. Hekkert et al. (2007) call these patterns motors (of change): functions that enforce each other and that can grow simultaneously over time and can add to the development of the technology. The PPI policies aim specifically at the 1st, 5th and 6th function: stimulating entrepreneurial activity through the creation of markets and the mobilisation of resources. To a lesser extent it also aims at stimulating the 6th function: through public procurement, a certain legitimacy of a technology or market can be created.

Due to the influence of the linear model in innovation policy, it is clear that innovation policy has centred mostly on the supply side. As this has not yielded satisfactory results compared to the amount of money that was put into these instruments, we can conclude that the innovation system is not working efficiently, which may lead to poorly functioning companies and a comparatively unattractive innovation climate. Therefore, it seems justifiable to have a look at other measures to stimulate innovation. In this thesis, I will focus on the demand-side of the innovation system and explore the opportunities it might hold. However, it is important to note that although policy instruments that focused on the supply side have not delivered sustaining results, they should not be discarded. Rather, demand side measures should complement the instruments already in place. Ultimately, it is imperative to look for a mix of policy instruments, which include both supply- and demand-side measures.

2.2. Demand-oriented innovation policy theory

Edler (2009), Edler and Georghiou (2007) and Edler (2007) and several other authors have focused on the demand side of public procurement and innovation. They stress that demand is a major potential source of innovation, and as such needs to be further examined. In their argument, they take three steps: (1) they devised a taxonomy of innovation policy tools in which demand measures are conceptualised; (2) they distinguish between several forms of public procurement; and (3) they determine several rationales for governments to engage in public procurement for innovation (Edler and Georghiou, 2007; Edler, 2007; Edler, 2009).

2.2.1. Taxonomy of innovation policy: conceptualising the demand side

Demand-driven innovation is an umbrella-concept that incorporates all policy measures and instruments designed to stimulate demand of innovation. The role of state actors can also vary greatly: from direct buyer or user to facilitator, informer or even co-financer. Edler (2009) defines demand-based innovation policy (DBIP) quite broadly as "a set of public measures to increase the demand for innovations, to improve the conditions for the uptake of innovations and/or to improve the articulation of demand in order to spur innovation and the diffusion of innovations" (Edler, 2009, p. 3). The reason behind the broadness of the definition is mainly to include both the encouragement or stimulation of innovation and the diffusion of innovation. Apart from that, the articulation of demand is mentioned, which signals the importance of both a clear definition of societal demands and a translation of these demands into articulated market needs (Edler, 2009).

In Appendix 5 a taxonomy of innovation policy tools is depicted, with on the right hand side the demand-side measures, devised by Edler and Georghiou (2007). Although it is of course a simplified picture of reality, it shows the wide array of innovation policy tools that can be used to promote innovation. As I have stated earlier in this thesis, it is important to note that in most cases, a combination of policy tools (both from demand- and supply-side) will be used. Furthermore, although I will be focusing especially on public procurement for innovation in this thesis, the other demand-side tools play an important role as well (Blind et al., 2004; Georghiou, 2007), and should be used alongside public procurement when aiming at reinforcing the demand-side. As these instruments are thus often used in a mix that seems optimal for the specific context, a policy's individual effects can be difficult to determine.

However, there are some admirable efforts in this area. Aschhoff and Sofka (2009) looked at the effectiveness of public procurement as an instrument to provide public support for innovation, compared to other options for public support, namely: co-public funding for private innovation projects, knowledge spillovers from publicly funded universities and intervention through regulation. Furthermore, they studied the question: if it works, for which firms (firm-type)? Aschhoff and Sofka (2009) conducted an empirical research in a broad sample of more then 1100 firms, and found that public procurement and knowledge spillovers from universities stimulate innovation equally. However, although the benefits of university knowledge apply to all firms, the effects of public procurement are especially noticeable for smaller firms in regions under economic stress and in distributive or technological services (Aschhoff and Sofka, 2009).

2.2.2. Forms of public procurement for innovation

The state can have many roles when engaging in PPI approaches. In this thesis, I will focus on direct public demand, in which the state has a buy and use- or a buy/use moderation role, as opposed to financing, informing or regulating, or facilitating private demand. Even then, there are many different forms of PPI. Edler (2009) has refined the demand-side measures further in a typology of demand-oriented measures (which will be used to describe the final relations in the policy theory reconstruction) – the whole typology can be found in Appendix 6. The part regarding direct public demand is, slightly adjusted from its original form, depicted in Table 2:

Direct public procurement		
General innovation procurement	Buy and use	State actors consider innovation in general procurement as main criterion (e.g. definition of needs, not products, in tenders)
Strategic procurement (technology-specific) or technology procurement	Buy and use	State actors specifically demand an *already existing* innovation in order to accelerate the market introduction and particularly the diffusion. This can include the targeted co-ordination of different government bodies and moderation with manufacturers.
		State actors stimulate deliberately the *development* and market introduction of innovations by formulating new, demanding needs. This can include the targeted co-ordination of different government bodies and moderation with manufacturers.
State procurement in connection with private users		
Co-operative procurement or aggregate procurement	Buy / use moderation	State actors are *part of a group of demanders* and organises the co-ordination of the procurement and the specification of needs.
	Buy/use moderation	*Catalytic* procurement: the state does not utilise the innovation itself, but organises only the private procurement.

Table 2: Three forms of direct public demand: (1) general procurement; (2) strategic procurement; and (3) co-operative procurement (source: Edler (2009) with slight adaptations).

In most literature and even policy documents, the distinction between the different forms of direct public procurement is not clearly made. However, there are several important differences, which I will address here. Firstly, although they are both forms of direct public procurement, there is a difference between general procurement and strategic procurement. General procurement for innovation is, as the name says, generally organised "such that innovation becomes an essential criterion in the call for tender and assessment of tender documents" (Edler and Georghiou, 2007). It is important to note that this form of innovation procurement goes further than so-called innovation-friendly procurement. Innovation-friendly procurement entails that "under normal procurement procedures, it is important that procurement is carried out so that new innovative solutions are not excluded or disadvantaged" (SOU, 2010:56, p. 28). Although in principle all public procurement should be innovation-friendly, unfortunately it happens quite often that many procurement specifications are designed in such a way that the contracting public institution are seeking the same solution that was used for the latest contract (SOU, 2010:56), thus unconsciously hampering innovation.

However, as I said, general innovation procurement goes further than that as it considers innovation a central criterion in the tender. Usually, central procurement departments or agencies are responsible for this form of procurement, not the ministries responsible for innovation policy. General procurement can therefore be contrasted with strategic procurement, in which the state actor either specifically demands an already existing innovation in order to accelerate market introduction and diffusion or in which the state actor deliberately stimulates development and market introduction of innovations by formulating new, demanding needs (Edler, 2009). In general, strategic procurement is associated with sectoral policy and is therefore also not managed by the ministry responsible for innovation,

but rather by different sectoral ministries. Another term that is used often in this context is technology procurement. It is similar to strategic procurement as it is mostly used to create or transform markets. Sectoral ministries or agencies often use it as "a market-transformation tool used to stimulate the development and commercialisation of new products that meet specific functional requirements (e.g. energy efficiency) not fulfilled by existing products on the market" (TemaNord, 2008:567, p. 11). It seems that the technology procurement is the oldest form of public procurement for innovation, and is therefore difficult to separate clearly from other forms of demand-tools.

The second important distinction that should be made conceptually is direct public procurement versus state procurement in connection with private users. In this case, the government is still the buyer, but cooperates with private users. This so-called cooperative procurement occurs "when government agencies buy jointly with private purchasers and both utilise the purchased innovation" (Edler and Georghiou, 2007, p. 954). As such, the state actor is part of a group of demanders. Typically, the state actor is the one organising the coordination of the procurement and everything associated with it (specification of needs, bringing together the group of demanders, etc.). Cooperative procurement is sometimes also called aggregate procurement, but seems to entail the same things. A special form of state procurement in connection with private users is catalytic procurement. In this case, the state actor is involved in the procurement process and sometimes even initiates it, but eventually does not utilise the innovation itself. As a rule, it plays a role in organising the private procurement (Edler, 2009). As Edler and Georghiou (2007) argue, the "crucial feature of catalytic procurement is that while the state often itself appears as a buyer, the real market penetration effect is achieved by subsequent private demand" (Edler and Georghiou, 2007, p. 954).

A third distinction that is important to make is a distinction that does not have anything to do with the role of the state, but with the degree of maturity of the innovation: commercial versus pre-commercial procurement. Pre-commercial procurement is procurement of innovative products or services that are already developed but not commercially available and thus need further R&D. By engaging in this type of procurement, the technological risk is shared between procurers and potential suppliers (Edler and Georghiou, 2007). Pre-commercial procurement mostly boils down to an R&D service contract with multi levels, as the possible producer has to undertake an R&D for a feasibility study and to build a prototype, after which field studies can lead to commercialisation of the product or service.The main difference between commercial, off-the-shelf procurement and pre-commercial procurement is that within the pre-commercial stages the WTO General Procurement Agreement and the relevant European Directives to not apply[5], which brings forth advantages in terms of freedom of selection, definition and interaction (Bos, 2008; Bos and Corvers, 2007).

2.2.3. Rationales for using PPI

The rationales behind using public procurement as an innovation tool can be divided into two levels (Edler, 2009). The first level is a more theoretical approach, and the conceptual core or legitimisation for governmental intervention, namely market and system failures. The other level is a more practical approach of political target orientation and stimulating political objectives. This can in itself be divided into public procurement to reach societal goals, and public procurement to create markets and stimulate (national) growth and competitiveness (Edler, 2009; Edler and Georghiou, 2007).

2.2.3.1. Market and system failures

According to classical economic principles, governmental intervention should always be legitimised. Legitimisation is generally acquired through adhering to three requirements: (1) it has to be in societal interest, in general society has to need or want it; (2) there is no company, person or organisation who wants or is able to do it, so the only party that is left to do it is the government; and (3) the government should be able to do it, i.e. the government should be able to enforce the policy and implement it. Although these requirements seem clear, they are very much open to debate. When is something in societal interest, and how can you ever be sure that there is no other institution willing to implement the same policy? Generally, the private sector is better adapted to articulate demand and to determine which innovations have a better chance of success than others, thus it would as a rule lead to better products and a balanced supply-demand chain (the free-market principle). Some argue that by interfering in this system, the government would thus distort the market.

[5] Only if the innovation is in the pre-commercial stages and given that the benefits of the R&D contract are not solely for the contracting authority and the contract is not entirely paid for by the contracting authority. Furthermore, there are several other requirements in place that prevent the pre-commercial procurement scheme from turning into a monopolistic structure.

Therefore, the norms and values of politicians who write the policies have a large influence on the design and implementation of the policy (Hogwood and Gunn, 1984). This principle is called the primacy of policy. According to neo-classical economics, governmental intervention is only legitimised if there is market failure. Market failure is a term that encompasses a situation where, in any given market, the quantity of a product demanded by consumers does not equate to the quantity supplied by suppliers. This is a direct result of a lack of certain economically ideal factors, which prevents equilibrium, e.g. a monopoly would be a market failure. Furthermore, it can mean that the market is not efficiently allocating goods and services or where market forces do not serve the perceived public interest. A typical instrument for reinstating equilibrium in the market would be breaking up a monopoly in several smaller firms. However, evolutionary or systems theory argues that errors in the system also legitimise governmental intervention. A system failure entails that an innovation system as a whole isn't functioning. A lack of infrastructure or a too narrow focus on the supply side could cause a system failure[6]. A typical instrument to solve system failures would be the creation of intermediary institutions or using the clusters approach. The evolutionary theory thus offers more flexibility to legitimise governmental intervention as it allows a wider variation of causes to implement a policy.

In the case of applying public procurement for innovation, a range of system failures that can legitimise governmental intervention can be identified (Edler, 2009). They are all related to a *mismatch between supply and demand*. A strong, articulated governmental intervention in the form of public procurement in an early phase of the diffusion-cycle could be legitimised if the market is not fulfilling this demand articulation on its own. As such, this rationale behind PPI is reasoned from the *perspective of the market*: emphasising the problems for companies willing to innovate, as opposed to political target-oriented rationales in which the government is using its capacities to work within an overarching strategy. In Table 3 the system failures are listed, with an explanation of the potential of PPI to solve them.

System failure	Elaboration	Why PPI can solve it
Insufficient user-producer interaction (Moors et al., 2003; Smits, 2002).	Insufficient user-producer interaction and communication between the suppliers and demanders of innovative products and service.	Public procurement in general enforces the user-producer interaction; PPI in particular stimulates this as producers are often included in the tender process and network effects. PPI induces critical mass, which can structure manufacturing branches connected with the innovation in question.
Insufficiently articulated demand (Edler and Georghiou, 2007).		PPI stimulates the articulation of demand, as it ensures a public procurement process in which the tender is dependent on a clear demand or societal challenge. Furthermore, the government can organise demand and as such facilitate the articulation of demand.
Lack of awareness (Edler and Georghiou, 2007).	Demand side: unaware of potential supply (both private and public) Supply side: unaware of the needs and wants of the buyers.	Articulation of demand and user-producer-interaction lead to increased awareness on both supply- and demand side. PPI leads to clear incentives for manufacturers.
Uncertainty vs. risk *deadlock* (Edler, 2009).	The more radical an innovation is, the more suspicious potential buyers are, hence the more risk for the suppliers.	Creation of critical mass through size of public procurement or organise demand, including private buyers. Create interest in private markets – catalytically creating a market. PPI enables early economies of scale and learning. Purchasing power of the state might create standards that reduce the risk of innovative products and provide an incentive to invest in R&D.
Costs vs. risk *deadlock* (Williamson, 1981: transaction costs economics).	A (radical) innovation brings forth costs. The selection of a partner needs to be a trade-off between the costs of the risk involved in forming an alliance with this partner (assuming that agents are subject to a 'bounded' rationality and thus can become opportunistic) and the gains from access to new opportunities. This holds true also for the user-producer interface: a new innovation brings forth not only entry costs, but also transaction costs, especially for products whose values rises as their diffusion goes quicker, i.e. in areas in which network effects occur, like ICT.	Creation of critical mass through size of public procurement or organise demand, including private buyers. This leads to both technological and increased production capacities, which makes it more effective than R&D subsidies (Geroski, 1990). Create interest in private markets – catalytically creating a market. PPI supports the solution to the costs vs. risk *deadlock*, as the gains of a more innovative procurement process outweigh the risk of increased costs. Furthermore, pre-commercial procurement (financially) supports the purchasing of R&D and (radical) innovation.

Table 3: System failures that legitimise governmental intervention in the form of PPI

[6] As the market or private sector is a part of the innovation system, a market failure is automatically also a system failure.

However, as noted before, the opinions on when something is a market failure, e.g. when there truly is a gap between supply and demand, lie very wide apart and there is rarely consensus on when governmental intervention is legitimised. Obviously, policy makers who have a political target orientation (as will be discussed in the sections underneath) often have a strong motive to declare a market or system failure. Especially sectoral policy makers who believe in an ecological crisis will perceive the market as moving too slowly in the 'right' direction and thus will argue that the governmental intervention through public procurement is legitimised. However, other policy makers, especially the ones who aim at ensuring fair competition, might be unconvinced of the hurry with which the proponents of PPI seem to want to intervene in the market. Concluding, the rationale that stems from a belief in market and system failures is at best vague. Nonetheless, the vagueness does not prevent it from being a very valid rationale.

2.2.3.2. Political target orientation: national competitiveness

As depicted in the national innovation system I have shown above, demand is one of the crucial elements of a national innovation system (Edquist, 2005). As such, demand (and more specifically public procurement) has increasingly become part of any government's strategy towards a competitive national innovation system. As Porter (1990) very acutely pointed out, demand is one of the key variables that determine the attractiveness and performance of nations as a location for business and innovation to flourish. Public procurement can be a useful tool to promote national competitiveness and improve the national innovative climate. It can be more effective than R&D subsidies, especially with the increasing globalisation, as R&D subsidies are foot-loose. This means that the money can be passed on to anyone. The internationalisation of R&D and innovation makes it easier to distribute the R&D subsidies to R&D-based alliances of companies from different countries, thus not benefiting their own national innovation system. Thus to keep the competitive position and to ensure that money would not be channelled out of the national economy, it is more effective to use systemic instruments.

Apart from the advantages compared to R&D subsidies, PPI can also play an important role in the creation of lead markets. Ebersberger (2007) pointed out that in some countries, like Finland, consumers and government have traditionally acted as lead users in the buying and implementation of new products and services – thus creating a very attractive environment for innovations and enabling the country to literally lead the market. This lead-market concept is derived from Von Hippel's (1986) concept of lead users. Von Hippel (1986) defined lead users as those whose present strong needs will become general in a marketplace months or years in the future. In order for this to extend to lead markets, an innovation has to be adopted early and then become widespread through multiple users or through a single powerful user who is able to transform or create a market on its own (e.g. public procurement in which the government is that powerful buyer). It is not only the direct advantage of the first group of users willing to buy the innovation that makes this into a lead market, but also the learning benefits from this first group of users and a subsequent reduction of risk in the R&D investments (Edler and Georghiou, 2007). Ideally, the lead market will eventually present a so-called dominant design, which will be adopted later by other markets as well. Concluding, the state can play a role in the creation of a market and as such have the means to bridge demand and supply, therewith boosting the national innovation system, but it can also act as a lead user through its sheer buying power.

Boosting national competitiveness and the national innovation system is obviously not only reached through demand-stimulating measures, it needs much more. However, it goes beyond the scope of this thesis to look at the variety of instruments to boost national competitiveness. Nonetheless, the political target of stimulating national competitiveness is in many cases definitely an important rationale behind PPI.

2.2.3.3. Political target orientation: sectoral policy targets

Another often used rationale for using PPI is political target setting for sectoral policy targets. Sectoral government departments at all levels, as well as governmental agencies, are using a wide array of tools to reach their sectoral goals. In this case, Edler (2009) points out that governmental intervention through public procurement is legitimised when the articulation of demand is "insufficient, as human and social needs are not automatically translated into clear market demands and it is within the realm of public policy to turn needs into articulated demands" (Edler, 2009, p.4)[7]. Edler and Georghiou (2007) describe this rationale as using PPI to improve state functions and contribute to achieving public missions. Public procurement has a big role to play here, because it can facilitate the articulation of societal needs into

[7] Herewith he incorporates the three rules for legitimisation of governmental intervention: no one else is able to do it, government can do it, and it is in the interest of society.

articulated demands or translate these perceived needs into a concrete demand for products and services (Edler, 2009; Edler and Georghiou, 2007). As Gregersen (1992) points out, PPI in all its forms can help meet societal targets, especially those for which innovative solutions are called for.

However, this last rationale – understanding demand-oriented policy as a part of innovation policy while striving to reach policy goals like sustainability etc. – is not sufficiently examined in literature (Edler, 2009). Indeed, this thesis is aiming to contribute to that understanding. However, as the link between sectoral goals and demand- and innovation policy is not yet made clear, public procurement in sectoral policies that aim to satisfy societal needs are often not facilitating innovation. In fact, many times they aim at public procurement of off-the-shelf products. The most straightforward example in this respect is green public procurement, which strives more for the diffusion of existing green technologies then for a next generation of eco-innovations (Edler, 2009).

Mostly, there is not one rationale that influences the normative relations behind a policy theory. Rather, it is a mix of rationales. However, not all the rationales may have the same value in the policy makers' mind. The governmental department that is responsible for the policy will automatically leave its mark on the policy. Furthermore, the rationales can also be conflicting, especially the rationales of national competitiveness and the procurement rationale (procuring the best, cheapest solution) (Edler, 2009; OMC-PTP, 2010).

2.2.4. Capacity framework for successful innovation procurement

Edler and Georghiou (2007) describe the need for an implementation framework for PPI policy, i.e. certain circumstances that are conducive for its success. From the literature on demand-based innovation theory, I have derived a capacity-framework (see Table 4); in which the five dimensions of successful innovation procurement are listed (Edler and Georghiou, 2007; Edler, 2009; Neij, 1999). The dimensions are governmental capacities that are needed to make the PPI policy work in practice. They are further refined in key problems and proposed solutions. Subsequently, I have linked these governmental capacities to the system failures I have discussed in the paragraph before. Note that some blocks are empty, this is because not all governmental capacities directly have the potential to solve a system failure. Rather, they are important to make the PPI policy work in practice across all levels of government[8]. Some of them directly link to the system failures and have the potential to solve them. I will use this capacity framework later in this thesis in the analyses of the strengths and weaknesses of the countries' PPI policies and their ability to solve the system failures. Underneath the table I shortly elaborate on each dimension.

Dimensions	*Key problems*	*Proposed solutions*	*System failures*
Coordination capacity	No general understanding across administrations in place; no integrationof the innovation rationale within sectoral policy rationales.	Main management of the policy should be innovation department.	
		Provide sufficient background information to ensure understanding.	Lack of awareness
		Create and maintain a concrete strategic implementation plan.	Lack of awareness
		Create the plan with stakeholders (from industry).	Lack of awareness;
		Guarantee commitment of the other (sectoral) departments (through: political backing at the highest level; implementation roadmap with clear targets; regular co-ordination meetings of working groups).	Lack of awareness
Link with private demand	Needs of private buyers are not systematically ascertained and the policy measures are not designed accordingly.	Ascertain needs of private buyers through user-producer interaction and take these into account when designing policy measures.	Insufficiently articulated demand; Lack of awareness; Uncertainty vs. risk *deadlock*; Costs vs. risk *deadlock*
	The PPI policy is not accompanied by further demand measures (especially if the policy is designed to change consumer behaviour).	Embed PPI policies in framework of other demand measures (coordination between public PPI, cooperation with private demand).	Insufficient user-producer interaction; Uncertainty vs. risk *deadlock*; Costs vs. risk *deadlock*

[8] Of course, ideally, a successful policy always induces a better solution to market and system failures, but this might not be the original intention behind it.

Coping with complexity and procurement discourse	No link between public needs and suppliers' capacities; no effort to detect user needs and translate them into meaningful market demands	Establish selective discourses that define mid- and long-term public needs (derived from policy goals and administrative strategies).	Insufficiently articulated demand; Lack of awareness; Uncertainty vs. risk *deadlock*; Costs vs. risk *deadlock*
		Set up foresight strategies to develop common visions between producers and users (Georghiou, 1996).	Insufficient user-producer interaction; Insufficiently articulated demand; Lack of awareness; Uncertainty vs. risk *deadlock*; Costs vs. risk *deadlock*
Activating and enabling the procurement chain	'Low-cost' rationale of public procurers (no incentive to change this); no change of the procurement system on the operational level; no effort to reduce risks as much as possible.	Change incentive structures for procurers (replace lowest-cost rationale with MEAT: Most Economically Advantageous Tender).	Costs vs. risk *deadlock*
		Create a structure in which procurers have up-to-date knowledge of future needs and potential improvement of public service.	Insufficiently articulated demand; Lack of awareness
		Tender process needs to be based on specifying functionalities rather than designs.	Costs vs. risk *deadlock*
		Facilitate organisational change and systematic training of procurers at operative level.	
Creating and maintaining a supporting innovation procurement culture.	No supporting innovation procurement culture in which PPI is embedded.	Embedding PPI in the existing innovation policy.	
		Ensure support of existing norms and regulations.	Uncertainty vs. risk *deadlock*;
		Create sufficient financial support.	Costs vs. risk *deadlock*

Table 4: Capacity framework derived from demand-oriented innovation policy theories, interpretation of papers by Edler (2009), Edler and Georghiou (2007) and Edler (2007), with own additions and with a link to the system failures they have the potential to solve.

The first dimension, coordination capacity, mainly deals with the degree of integration of the innovation rationale across procurement offices on all levels of government. The PPI strategy should be coordinated in such a way that it is comprehensive and interdepartmental. The main problems that arise are target conflicts: PPI will leverage most results in other departments and can thus interfere with sectoral goals (Edler and Georghiou, 2007). Related to that, the optimal purchase in terms of innovation might not be the optimal purchase in terms of the sectoral goal. This can also create problems in terms of economic benefits: these might be realised outside the jurisdiction of the purchasing governmental body. Lastly, any change requires some adjustment time and subsequent money, and the administrative burden might increase, especially in the case of PPI. In order to overcome these issues, Edler and Georghiou recommend implementing "a *strategic commitment* to change rationales across and within administrations, to integrate the innovation rationale within sectoral policy rationales and subsequently a *strong co-ordination* of efforts to create inter-administrative win–win situations" (Edler and Georghiou, 2007, p. 958). The system failure that is mostly associated with this dimension is the lack of awareness of both suppliers and demanders.

The second dimension, link with private demand, is a step that is necessary in order to really transform markets and change production and consumption patterns. Integrated procurement strategies (combining public and private procurement) presents organisational challenges, but can hugely increase the effects of demand-side innovation policy (Edler, 2009). This dimension is associated with the potential to solve many system failures: insufficiently articulated demand, lack of awareness, insufficient user-producer interaction, uncertainty vs. risk deadlock, costs vs. risk deadlock. Thus, it would seem that this dimension, which strongly links to the needs of companies within the innovation procurement process, has a large potential to solve system failures.

The third dimension, coping with complexity and procurement discourse, mainly relates to demand articulation, or to bring in line supply and demand. The challenges are to link public needs and suppliers' capacities; and to detect user needs and translate them into meaningful market demands. There is a constant tension between the need for early signals of (future) public demands for suppliers, and the need for a clear overview on what suppliers are able to provide (in the future) (Edler and Georghiou, 2007). This also has to do with reducing risks: if the suppliers are sure and confident about future demands, they are more willing to invest in R&D and innovation. Obviously, it is very complex to detect needs in time and translate them into meaningful market demands. However, through establishing discourses and setting up

foresight strategies (like private companies do in supply-chain management procedures), the public sector might develop a better demand articulation. Like the 2nd dimension, this dimension also has a strong potential to solve all the identified system failures through focusing on long-term user-producer interaction and strategies.

The fourth dimension, activating and enabling the procurement chain, relates mainly to making the organisational change to a more innovation-oriented procurement process and systemic training of procurers at the operative level as smooth as possible. Two important steps in this change trajectory are the replacement of the 'low-cost' rationale of public procurers and to reduce the risks as much as possible. As innovation often requires higher initial costs and a longer payback time, it is imperative for procurers to consider the life-cycle costs of a product instead of the initial costs. This relates to the notions of lock-in, path-dependency and creative destruction in innovation literature. As a rule of thumb, it is cheaper to produce more of the same and an integrated network works only with a certain technology, which induces economies of scale (as a classic example: the infrastructure of petrol stations that are dependent on fossil fuels). However, this allows one certain technology to dominate an economy, which is called the dominant design. The consequence is a historically irreversible path, i.e. path-dependency (Bergh, 2005). The public sector is historically a complex system that is reluctant to embrace change, thus increasing the probability for lock-in and path-dependency in its service and infrastructure. In order to break this gridlock or even stimulate creative destruction[9], the public procurement protocol has to change to truly incorporate innovation and to prevent undesired and untimely lock-in. Still, innovations run the risks of not (or not sufficiently) delivering the service that is expected – the more radical the innovation, the higher the risk (Edler and Georghiou, 2007). As this dimension is mostly focusing on internal processes, it does not have a large potential to directly solve system failures, although it of course plays a role in articulating demand, increasing awareness and reducing risks compared to costs.

The fifth and last dimension, creating and maintaining a supporting innovation procurement culture, seems, compared to the other dimensions, trivial and obvious; it includes embedding PPI in the overarching innovation policy, providing for financial support for PPI and ensuring that the existing norms and regulations do not hamper the innovation procurement process. This dimension can solve, if executed correctly, important system failures related to uncertainty and costs. However, although it seems trivial, this dimension is very difficult to carry out in practice and will require constant attention.

[9] Creative destruction is a process first described by Schumpeter (1934), and entails purposely destroying the old products and services and existing routines and replace them with new ones that are developed as a result of innovation.

3. Methodology

3.1. Choice of countries

In this thesis, I will focus on a cross-country comparison between three countries: Sweden, the Netherlands and the United Kingdom. This choice has been made mainly because all three countries are *frontrunners* in using PPI, and thus I will be able to extract the most interesting results. Furthermore, as this thesis will be carried out partly from the Netherlands and partly from Sweden, and the UK's information will naturally be available in English, the choice for these countries is also a *pragmatic one due to the availability of information*. Furthermore, this thesis will be carried out under supervision of the International Institute for Industrial Environmental Economics (IIIEE) at Lund University, and will as such be *part of a bigger research project* the IIIEE is running at the moment; the choice of these three countries is therefore also made in collaboration with them. Moreover, many research projects and publicity concerning demand-driven innovation in general and PPI in particular has *centred on these three countries*. Finally, as the EU is focusing on demand-driven procurement and PPI in particular, this thesis might provide *lessons in a EU context*.

3.2. Research design

3.2.1. Research scope and demarcations

In order to be able to draw specific conclusions, the scope of this research needs to be delimited. This research will focus on:

- A *national context*; in which the national government is seen as the main actor, but 'lower' state actors (such as provinces etc.) are also considered. In fact, one of the aims of the research is to determine where and at which level PPI initiatives are initiated. Although the Lead Market Initiative is clearly an important factor for member states to engage in PPI initiatives, the European context is not the focus of this paper.
- *Public procurement*; as opposed to private procurement.
- *Sustainable innovation*; although I will focus on innovation in general, the goal is to determine the potential for public procurement to induce *sustainable* innovation, so as to change production and consumption patterns.
- *Demand-oriented measures for innovation*; although supply-oriented measures are assumed to be used simultaneously, and while emphasising that demand-oriented measures only cover a small fraction of the whole array of innovation policy tools.
- Within the spectrum of demand-oriented measures for innovation, the research will be further delineated. These delineations are made based on the typology of demand-oriented measures by Edler (2009). I will focus on:
    - *Direct public demand*; in which a state actor is the buyer or applicant of the innovation; as opposed to the state actor as a supporter for private demand (e.g. through subsidies, taxes or awareness building measures) or regulation of demand (formal regulations or standard-setting) and *cooperative demand*; in which the state is bundling its demand with private buyers (but the state still has the facilitating/leading role in the procurement process).
    - Related to the previous point; a *buy and use role of a buy/use moderation role* of the state, as opposed to for example a financing, informing or regulating role.

3.2.2. Research questions

The central research question is formulated as follows:

What are the main barriers for using Public Procurement for Innovation (PPI) as an approach to induce sustainable innovation in a national context?

The following sub-questions are structured along the chronological framework of this thesis and build up to answer the main question:

<u>Establishing context</u> *[For each country]:*

1. Using the innovation system approach, how can the history and practice of innovation policy be characterised?
2. What is the status of demand-side innovation policy, and public procurement for innovation in particular?
3. Using the national innovation system as a framework, which are the main actors influencing PPI policy?
4. Which formal PPI programmes can be identified?

<u>Policy reconstruction and evaluation</u> *[For each country[:*

5. What are the policy problems that induced the use of PPI policy, and how can the causal relations be described?
6. What are the objectives in the PPI policy and what are the means to reach them, and how can the final relations be described?
7. What are the norms or rationales behind the PPI policy, and how can the normative relations be described?
8. Can the practice of the PPI schemes be established through reviewing empirical evidence in the form of formal evaluations and flagship cases?
9. Is the PPI policy efficiently designed and what are its strengths and weaknesses in terms of their governmental capacity and their potential to solve system failures within their specific national contexts?

Comparative analysis:

10. What are the differences and similarities between the countries in terms of their national innovation systems, their innovation policies and the status of demand-side innovation policy?
11. What are the differences and similarities between the countries in terms of their PPI approaches in terms of the PPI form and the rationales behind them?
12. What are the differences and similarities between the countries in terms of the strengths and weaknesses of the different PPI approaches?

Concluding:

13. What can be learnt from this comparison in terms of the barriers for PPI to induce sustainable innovation?

3.2.3. Research perspective

In order to determine the three different countries' approaches to PPI, an analytical framework has been devised, derived from three strands of literature. Firstly, innovation system theories to provide a context for the PPI approach. Secondly, demand-oriented innovation theories, which form the main background for the analysis, especially the capacity framework for successful PPI, based on papers by Edler (2009), Edler and Georghiou (2007); and Edler (2007).

3.3. Research strategy

The research strategy of this thesis is qualitative, through a cross-country comparison using desk-research complemented by interviews, followed by some empirical evidence through the examination of relevant flagship case studies. I have chosen a qualitative research as PPI policies and their implementations are quite new. As such, there is not much evidence available and a quantitative research would most likely be premature.

The research material that will be used in this thesis will consist of different sources (source triangulation): scientific literature, policy documents (if available supplemented with memos and/or (inter) departmental correspondence, minutes of meetings, etc.) and interviews with key actors (e.g. ministry officials, researchers in the field, stakeholders from industry, NGO/citizen groups etc.). This material will be supplemented by media documents and information that is freely available on the Internet.

The research will consist of three phases (summarised in Figure 1 at the end of this section):

PHASE I [conducted for each country and consisting of four steps]

Firstly, for each country, the *history and development of innovation policy* will be shortly reviewed, so as to obtain a context in which the results can be placed. In this phase the *national innovation systems* of the three countries will also be mapped, with the explicit aim to provide *context* for the PPI approach and to *identify the main actors that influence it*. Furthermore, policy documents and specific strategy documents will be studied in order to get a picture of the working of the national governments and to get a clear picture of the current PPI programmes.

Secondly, for each country, the PPI approaches will be analysed using the *policy reconstruction method* by Hoogerwerf (1990). In order to be able to examine the governments' policy approaches to PPI, the policy theories behind these approaches will be reconstructed – the causal, final and normative relations of the PPI policies. When these relations are mapped, the reconstructed policies will give a clear overview of the structure of the policy and the linkages between the norms, the problems and the objectives of the policy, and I will be able to assess the quality of the reconstructed policy theories. This in turn will enable me to pinpoint more clearly: 1) what exactly is going on in terms of PPI in each country; and 2) which factors

determine the success or failure of the PPI policy. The reconstruction of policy theory consists of three steps (Hoogerwerf, 1990):

1. Mapping the *causal relations*; which describe the relations between cause and effect, reconstructing the policy problems. In the PPI policy theory the cause-effect relations are the consequences brought about by EU governments when they engage in public procurement that does not use PPI as an instrument for sustainable innovations or that does not consider innovation an element of public procurement (cause), which will lead to several policy problems (effects) that have to be solved.
2. Mapping the *final relations*; which describe the relations between policy objectives and the means to reach these objectives (i.e. policy instruments). This is the most extensive and detailed part of the reconstruction. Edler (2009) has devised a typology of demand-oriented measures (for an overview, see Appendix 6), thus differentiating between various types of state-functioning and categorizing types of policy instruments. This typology will be used when reconstructing the final relations.
3. Mapping the *normative relations*; which describe the underlying norms of the policy theory. These norms can be very explicitly stated in the policy document, but can also be implicit. The norms need to be clearly related to the underlying problems (causal relations) and the main objectives (final relations) of the policy.I will relate the policy norms to Edler's (2009) and Edler and Georghiou's (2007) description of different rationales for applying public procurement as an innovation tool. This rationale plays an important role in the architecture of the policy.

Thirdly, for each country, some empirical evidence (through the *analysis of formal evaluations* of the practice of PPI and *several flagship examples*) will be discussed.

Fourthly, the *countries' governmental capacities for implementing PPI* will be evaluated. I will use the capacity framework I have developed based on Edler (2007, 2009) and Edler and Georghiou (2007) (see Table 4). There are *five dimensions* through which the 'quality' of the PPI policies is judged. As explained in section 2.2.3, all of the dimensions can be linked to a potential solution of certain *system failures*. I will determine the *strong and weak points* of the situation in the three countries, i.e. the level of their governmental capacity (as a rule, I will always first mention the strong and then the weak points). Lastly, I will shortly reflect on the findings and the *degree to which the countries address the associated system failures*.

PHASE II

I will firstly compare the countries in terms of their national innovation systems, their innovation policies and the status of sustainable innovation. Subsequently, I will compare both the policy theories behind the national PPI approaches and the strengths and weaknesses of the PPI approaches.

PHASE III

In this phase I will be able to generate some general conclusions about the main barriers and opportunities of using PPI as an instrument to induce sustainable innovations in a national context. This will then enable me to give some directions for policy improvement and some recommendations for policy improvement in the three countries.

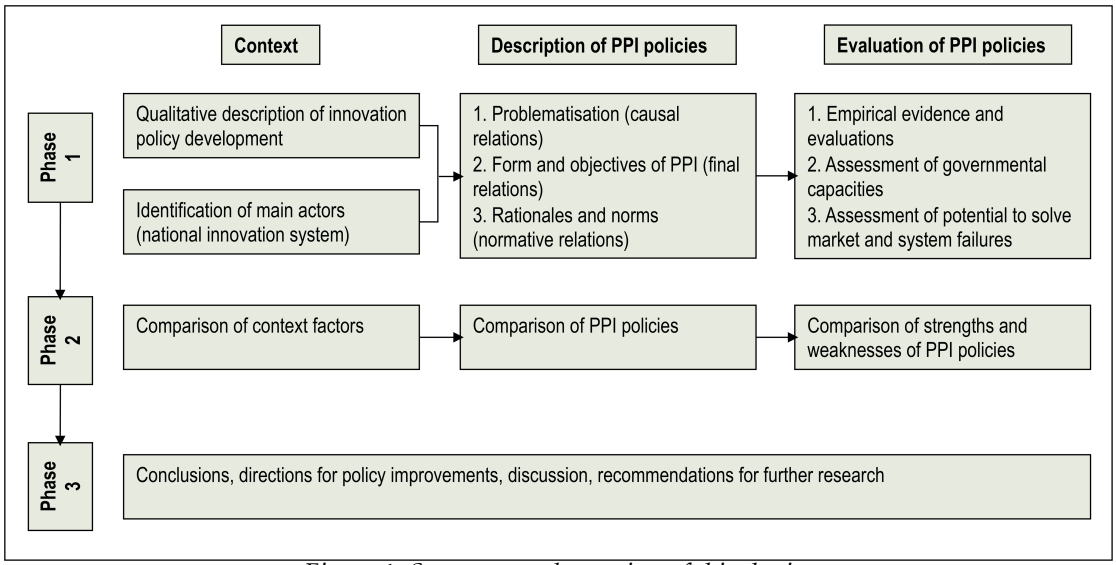

Figure 1: Structure and overview of this thesis

4. The Netherlands

4.1. Introduction

The Netherlands is a very densely populated country (over 16.5 million inhabitants) and is located on the Northwest coast of the European continent. Approximately 25% of the Netherlands' land area lies below sea level, including its capital and main economic area, which makes it vulnerable to the possible consequences of climate change. The Netherlands' governmental system is divided into three levels: national, provincial and municipal. The Netherlands' capital is Amsterdam, but the central government resides in The Hague. In the World Economic Forum's Global Competitiveness Report 2010-2011, the Netherlands are ranked 8th (World Economic Forum, 2010). However, although the Netherlands' innovative performance is ranked in a 13th place (World Economic Forum, 2010), the European Innovation Scoreboard[10] ranks the Netherlands as an innovation *follower* with a performance just above average[11].

4.2. Development of innovation policy

The Dutch innovation policies have been subject to a large number of changes over the past few years. Traditionally, it was more or less limited to the linear approach as explained earlier in this thesis – with a large focus on subsidising R&D in research institutes and big R&D-based companies like Philips. However, around the change to the new millennium, the Netherlands became one of the countries that seem to have fully embraced the innovation paradigm (Biegelbauers and Borrás, 2003). Around 1999, the innovation paradigm coincided with the government formulating an explicit goal to be a professional buyer, i.e. the creation of a professional, effective and innovative procurement process. In 2003, it was decided that the correlation between many instruments within the innovation policy was insufficient. Therefore, many specific policy measures were discarded, and a larger focus on generic instruments was developed. In general the innovation policy has shifted its focus from a theme-oriented approach (separate approaches for each sector, department or policy goal) to an approach based on cooperation and knowledge exchange (Faber and Kemp, 2005). This shift was a direct result of the identification of the 'innovation-paradox' in the Netherlands and was supposed to strengthen the Dutch innovation system and focus on innovations. The 2003 strategy identified promising areas within the Dutch innovation system and devised policies to promote innovations within those areas, the so-called 'backing winners'-principle (Faber and Kemp, 2005).

In 2005 the innovation policy was renewed again. The 2003-rationales were largely maintained, but some of the old theme-oriented instruments were brought back into the mix. The innovation policy document stated, "a generic level of innovation supporting instruments is supplemented by specific support on a limited amount of theme-oriented key-areas" (EZ, 2005). In the new strategy, the innovation policy had a programmatic package (which was supposed to be an interactive approach, driven by users) and a generic, basic package. The programmatic package, which aimed at an improved national competitiveness, rested on three pillars. The first one is Strengths in innovation, or Key area approach, in which key areas in the Dutch innovation system were identified, (technology) areas in which the Netherlands has already distinguished itself. The second pillar is Energy transition. This package is relatively specific for the Netherlands and is still an important factor in the Dutch policy mix. Energy transition is one of the Dutch 'transition management' areas, in which the policy makers attempt to restructure the energy system into a more sustainable form[12]. As Kern and Smith (2008) argue, the energy transition management has created long-term visions and high ambitions by aiming for system innovation in the energy system. Furthermore, these goals are combined with a process aiming at learning and stakeholder involvement. However, Kern and Smith (2008) also state that the approach risks capture by the incumbent energy regime, with which the original policy ambitions would be undermined. The third pillar of the programmatic package focused on reinforcing innovativeness in regions. However, the responsibility for this package was mostly transferred to lower government bodies. Indeed, the motto behind the overall 2005 strategy was: centralise what you must, and decentralise what you can (EZ, 2005). The responsibility to create a good climate for innovation was therefore as much as possible relocated to regional governments and municipalities. One of the explicit goals was to reduce the number of instruments and measures within the overall innovation policy, and to make the

[10] PRO INNO EUROPE, an initiative of Directorate General Enterprise and Industry which aims to become the focal point for innovation policy analysis and policy cooperation in Europe. Available on: http://www.proinno-europe.eu/inno-metrics/page/netherlands

[11] Compared to EU27.

[12] For more information on (energy) transition management, check Kemp and Rotmans (2004).

instruments more coherent (EZ, 2005). The set of instruments was aiming at being more flexible and customisable and as such would demand less acquisition costs and administrative burdens.

In the beginning of 2007, the 'Balkenende IV'[13] government was installed. Within this coalition agreement, 10 strategic policy programmes had been set up, of which a strong focus on innovation was one: the project "Nederland Ondernemend Innovatieland"[14] (NOI). Within NOI, the cabinet wanted to initiate a couple of different projects, all aiming at strengthening the competitive position of the Netherlands while simultaneously tackling societal problems (EZ, 2007). This strategy was to be supported by the Innovation Platform (more information on the NOI project and the Innovation Platform in Appendix 7). An important part of the NOI agenda was the development of Societal Innovation Agendas (MIAs), which were long-term strategies in subject areas that were considered relevant for society (NOI, 2010). Furthermore, the key areas approach was to be continued: several projects were set up in technology areas in which the Netherlands has distinguished itself, and that could contribute to solving societal problems (EZ, 2007). These key areas were identified by the Innovation Platform and were defined as a cluster or combination of activities and knowledge in which the Netherlands distinguishes itself (Innovation Platform, 2011). As Wintjes (2007) argues, these key areas have led to the development of innovation programmes that were the core of the new policy approach.

Apart from the NOI, the 2007 coalition agreement also already mentioned public procurement and its potential to induce innovation. In the intervening years, many of the goals are accomplished or at least addressed. Firstly, the goal to promote innovative entrepreneurship through the government's buying potential was formalised in this coalition agreement. Secondly, procurement rules have been harmonised and simplified in a new public procurement law. Thirdly, the publication of tenders were centralised at one Internet site (TenderNed)[15] – which has developed into a user-friendly and free 'market place' for public procurement. Fourthly, the Launching Customer programme was started, which aimed at launching innovative markets (more about this programme later in this chapter). Fifthly, the pre-commercial procurement programme SBIR (will be elaborated on later) was cited and continued with an increased budget. Furthermore, several parallel procurement initiatives that aim at innovation were started in different places and on different levels in the Netherlands. Several different innovation policy instruments are used (see Appendix 7 for an overview and more detailed explanation). Of these, the largest is the WBSO-regeling', an R&D Promotion Act, which is basically an R&D-stimulating instrument. It offers a discount on the wage taxes for R&D employees within private companies (Agentschap NL, 2011a). The WBSO instrument encompasses more than two third of the budget for innovation-stimulating instruments, which entails that the largest part of the budget for innovation-stimulating instruments is still used in the more traditional technology-push way.

The Balkenende IV-government fell at the end of February 2010. After the general elections, the new Rutte-government was installed in October 2010. This central/right-wing minority government decided to close down the NOI-programme and many of the associated policy instruments, although some of the former NOI-programmes (including the PPI programmes) are still running, but no longer under the NOI-umbrella (Dekker, 2011). Recently, the government has undertaken steps to strengthen the innovation in the business sector. The Rutte-government is pursuing a 'top-sectors approach', which focuses on the development of 9 strong and internationally prominent clusters (Agentschap NL, 2011b). These top sectors are: Food, Horticultural industry and starting materials, High-tech, Energy, Logistics, Creative industries, Life sciences, Chemical Industry and Water. Of course, this approach is similar to the earlier key-areas approach, and concentrates once more on the 'backing-winners' principle. The ministry of Economic Affairs, Agriculture and Innovation manages and attempts to optimise all relevant conditions conducive for innovation for the top sectors, including rules and regulations, procurement policies, sustainability, taxation, corporate headquarters, research and innovation, export promotion and financing (Agentschap NL, 2011b). Within this strategy, the government aims at encouraging innovation through adjustments of the basic innovation package so as to better suit the need of companies. Furthermore, the WBSO has been given additional funds to support the private sector (OECD, 2010a). In addition, TNO and the NWO will fulfil a stronger, demand-steered role and restrictive rules will be revised. Finally, from 2015 onwards, €1.5 billion a year will be available for the 9 top sectors (Agentschap NL, 2011b). The top sector strategy revises the innovation programmes and will keep the valuable elements that strengthen the approach,

[13] Referring to the 4th government chaired by then Prime Minister Balkenende.
[14] Direct translation: Enterprising Innovative Netherlands.
[15] For more information, see: http://www.tenderned.nl/

with the top sectors' agendas as the leading force behind this revision. As such, 2011 is seen as a transition year for the innovation programmes to the new policy.

4.3. National innovation system

In this section I will give an overview of the Dutch national innovation system and its main actors, with the explicit aim of providing context for the PPI policy. As such, it will not aim at providing evidence of the strengths and weaknesses of the system, but of course I may refer to something related to the performance of the innovation system in the course of providing context. In Figure 2, the Dutch national innovation system is depicted. This figure is based on Van Putten, 2011; Dekker, 2011, Bruring, 2010; Boekholt and Den Hartog, 2005; INNO-Policy, 2009a; TIG, 2004; OECD, 2010a; and the various websites of the agencies and institutions depicted in the figure.

The Dutch innovation governance system consists of several levels and multiple actors. Recently, the structure of the government has changed: responsibilities have, where possible, been shifted to regional governments and even municipalities. Furthermore, the current economical climate forced the government to make budget-cuts in all departments. One of the specific goals of the Rutte-government was to also make cuts in the governmental system in general. Traditionally, there has always been a strong division of science on the one hand and technology and innovation on the other hand. For a long time, scientific research took place in the so-called 'ivory towers' of the universities, while the private sector worked on in 'the real world'. This was also reflected in the policy system: the ministry of Economic Affairs devised policies that aimed at stimulating innovation and growth, while the ministry of Culture, Education and Science was aiming at stimulating scientific research. Gradually, these two components of the innovation system are moving towards each other: the universities are conducting more context-related research (by looking at the needs of society) and the relationship between universities and the private sector is also increasing (also because universities increasingly need private funds to be able to continue their research). The creation of the Innovation Platform has facilitated this process as well. Furthermore, research and innovation policies are steadily becoming integrated (Boekholt and Den Hartog, 2005). However, the academic research system is quite independent, while the applied public research centres are often attached to certain sectors or ministries, or conduct research for private actors.

Furthermore, there is a myriad of (public) intermediaries, which are mostly organised on a sector basis (TIG, 2004). These intermediaries are increasingly used to execute policy programmes, mostly by the ministries of Economic Affairs and Education, Culture and Science. Furthermore, the governmental departments increasingly work together and often form special bodies to execute programmes in certain technology areas (Boekholt and Den Hartog, 2005). Moreover, a trend of using external bodies and committees to formulate and implement policies can be observed. Furthermore, the participation of civil society in policy-making through a myriad of NGOs, foundations and initiatives is also increasing in the Netherlands. Despite the complexity and multi-level character of the innovation system, the different organisations and people deal with each other rather easily on an informal basis. The system has many formal linkages and funding routes, but in practice the non-hierarchical culture enables the informal way to handle things to prevail in many (complex) situations; the Dutch economy is famous for its consensus policy and decision-making, it is common to include a wide array of actors in a decision and cooperate despite differences in opinion.

The governmental departments that are important in the PPI context are the Ministry of Economic Affairs, Agriculture & Innovation (EL&I), the Ministry of Education, Culture & Science (OCW) and the Ministry of Infrastructure & Environment (I&M). EL&I is responsible for industry-oriented R&D and innovation policy, and OCW for scientific research and education. The two main policy executive organisations are Agentschap NL (innovation policy) and the research council NWO (research policy). Public procurement in general is managed by the Ministry of Internal Affairs through programmes like TenderNed (an electronically managed system for public procurement) and governmentally organised networks like PIANOo[16] (which is a part of EL&I). VNO-NCW (represents 90% of the Dutch private sector, and is considered the main representative for large companies) and MKB-NL (represents Dutch SMEs) represent the private sector[17].

[16] For more information on general public procurement in the Netherlands, visit http://www.pianoo.nl/english or http://www.epractice.eu/en/cases/pianoo for excellent descriptions in English.

[17] For a more complete overview and a more elaborate description of the main actors in the Dutch innovation system, see Boekholt and Den Hartog (2005).

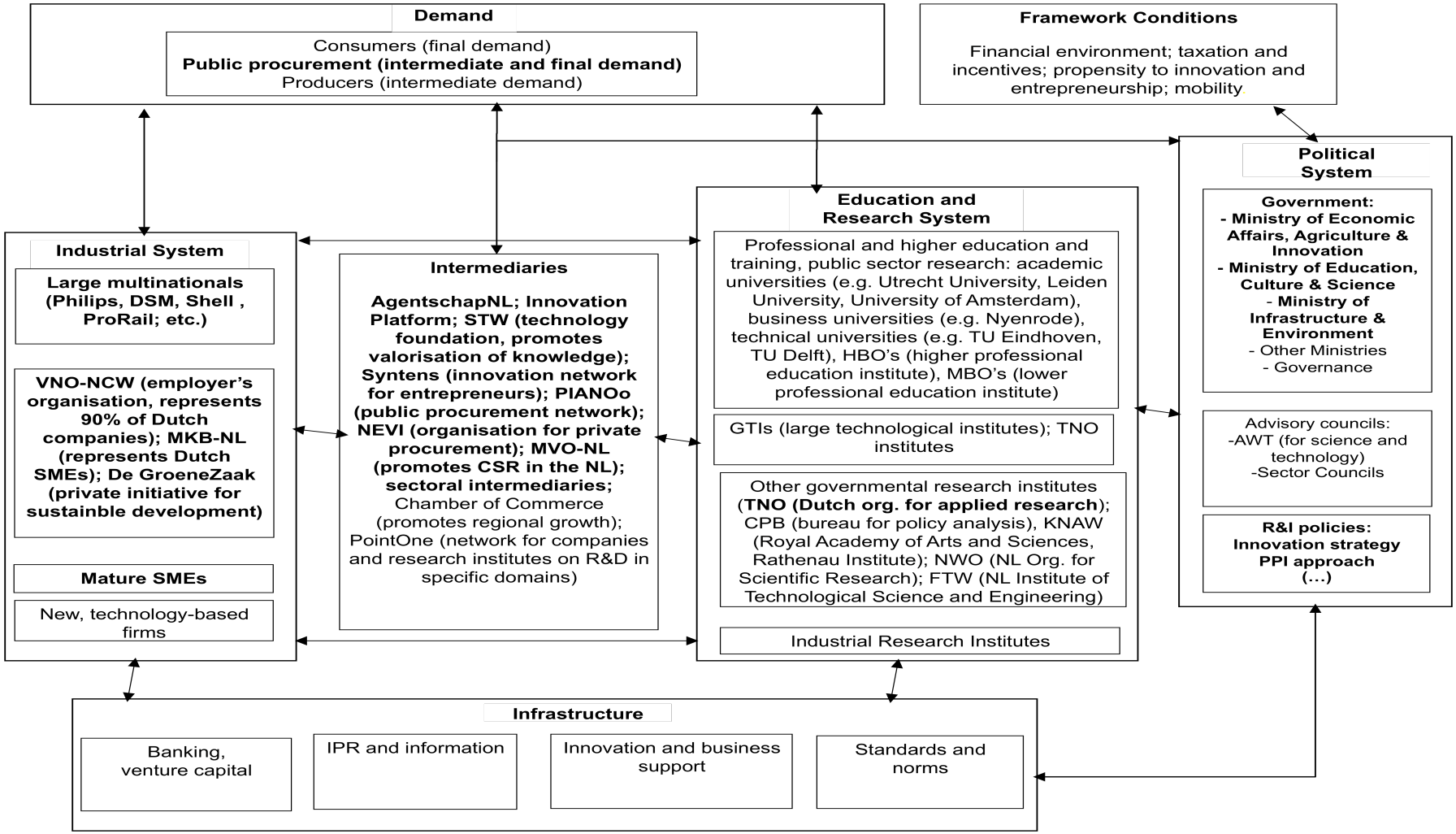

Figure 2: the Dutch National Innovation System, mapping context for PPI policy approaches (the actors in bold are considered to be influential in the PPI policy)

4.4. Reconstruction of PPI policy theory

4.4.1. Pre-commercial procurement: the SBIR-programme

The Small Business and Innovation Research (SBIR) programme is a strategy that has its origins in the United States. The US started this pre-commercial procurement programme in 1982 with the establishment of the Small Business Innovation Act (EPA, 2011). After successfully strengthening the role of small businesses through Federal funds, while at the same time help creating innovations and subsequent knowledge spill-over's, many other countries were looking to copy the successful policy programme. Among the copies, the most noticeable are the Netherlands, the UK and Finland (Denekamp, 2010). The Netherlands' SBIR-programme is based on the US version, but tailored to the Dutch situation and policy context. In 2003, the government commissioned an investigation into the successful US programme. The results of this investigation combined with recommendations from the Innovation Platform, kick-started the Dutch SBIR-programme (Technopolis, 2010).

The first thing to note is that the SBIR-programme is designed to promote pre-commercial procurement, which entails the procurement of R&D, and *not* products and services (Dekker, 2011; Holland, 2010a). The Dutch SBIR-programme is specifically aiming at developing solutions to societal issues through innovation, while giving the government an active role in the innovation process – thus effectively combining the experience of the US SBIR-programme with the European line on pre-commercial procurement of innovations (Holland, 2011). In short, it has three main objectives: (1) to create solutions for societal issues; (2) to encourage innovation in businesses, in particular SME's[18]; and (3) valorisation and enhancement of knowledge (by companies) (Dekker, 2011; Technopolis, 2010; Holland, 2010a). The approach is quite straightforward and has been running since 2004 with a first SBIR-tender by the Ministry EL&I. In 2005 and 2006, other departments and governmental bodies started SBIR pilot projects as well[19]. From 2007 onwards, SBIR was housed within the interdepartmental NOI- programme. In 2008 it was decided that across all governmental bodies 3% of the MIA's (Societal Innovation Programmes, see Appendix 7) should be used for SBIR-tenders, so as to anchor SBIR as an innovation policy instrument (Dekker, 2011; Technopolis, 2010). As the NOI-programme was shut down, the SBIR-programme is currently housed within the CSR-department under the Ministry of Economic Affairs (EL&I), but is still executed and facilitated by Agentschap NL (Dekker, 2011).

The Dutch SBIR-programme has three different variations, which are all based on the different ways in which SBIR is used by various Federal Agencies in the U.S (Technopolis, 2010):

1) ***Departmental SBIR***
   This programme is mainly aiming at combining the first two goals of the overall SBIR: solving societal problems and strengthening the innovative power of companies and SMEs in particular. Within this variant, a knowledge question of the government (whichever department or agency) is answered by an SBIR-tender (Technopolis, 2010). The aim is to use a clear knowledge question to provoke innovative ideas of particularly SMEs. This SBIR-variant is mainly meant for existing companies that have innovative ideas and enough innovative capacity to develop these ideas further. Large companies are welcome to join the tender-competition as well, there is no selection based on company size. The agency responsible for the departmental SBIR is Agentschap NL (Dekker, 2011).
2) ***STW Valorisation Grant***
   The technology foundation STW is the responsible agency for the STW Valorisation Grant. This Grant aims at valorising knowledge that is produced by (university) knowledge institutes, i.e. commercially exploiting promising knowledge. A side-goal is the strengthening of SMEs' innovative capacity. Solving societal goals is not an explicit goal (Holland, 2010a). The grant is meant for researchers at Dutch universities and the valorisation process can be carried out by existing companies or start-ups that were created for this goal (Technopolis, 2010).

[18] Although the tender process is open for any company (so also large companies) 90% of the winning proposals come from SMEs (Holland, 2010a). The SBIR-programme actually prefers to benefit smaller companies, but that cannot be a criterion in the judging process because of EU competition rules. These rules require that applications from companies of any size and from any EU country should be accepted.

[19] Among them the technology foundation STW (www.stw.nl/Default.htm), which aims at realising knowledge transfer between technical scientists and users and finances technical-scientific research; the governmental technology institute TNO (www.tno.nl), which attempts to connect people and (scientific) knowledge; and the Ministries of Transport, Public Works, Agriculture, and Defence.

3) ***TNO-SBIR***
The TNO-SBIR combines all three SBIR-objectives, but in particular valorising knowledge that is created by the technology institute TNO. This SBIR encourages TNO to bring forth promising product ideas while at the same time stimulating SMEs to use, develop and commercialise these product ideas. It is mainly designed for existing companies (especially SMEs) that have sufficient absorptive capacity to develop TNO's product ideas for the market (Holland, 2010a; Technopolis, 2010).

However, all three SBIR-variants follow more or less the same routine: the Dutch government invites companies in an open tender to develop products and services to help solve societal issues (Dekker, 2011; Holland, 2010a). The targeted beneficiaries are thus society and companies that have the will to innovate but not the financial capacity to develop their innovative ideas further or to start-up an R&D phase, which in practice often boils down to SMEs (Dekker 2011; Holland, 2010a). The idea is that the SBIR programme thus finances the risky stages of the product- or service development. Concerning PPI classification, SBIR is clearly a *pre-commercial procurement* instrument, entailing that its goal is not to launch, create or transform markets – as it merely *finances the R&D stage* of the innovation and not the commercialisation phase. However, as it does have strategic goals like stimulating the solutions for societal problems and enhancing the innovative power of SMEs, it can sometimes be linked to *strategic procurement* as well. Furthermore, the government is the sole buyer, so the SBIR-programme is considered to be *direct public procurement* as opposed to cooperative procurement.

4.4.1.1. Causal relations

Causal relations describe the relations between cause and effect, reconstructing the policy problems. In Figure 3, the causal relations behind the SBIR-programme are depicted, the arrows indicating the cause-effect relations.

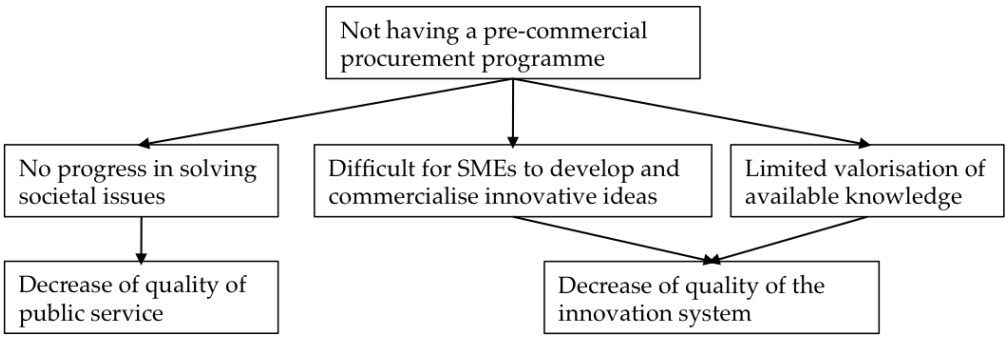

Figure 3: Causal relations of the Dutch SBIR-programme

Although Holland (2010) states that the SBIR-programme is not set up as a result of a particular gap in support or a perceived need, but rather on the basis of the successful US scheme, the effects of not having a pre-commercial procurement programme are multilayered. The three direct consequences of not having a pre-commercial procurement programme (no progress in solving societal issues; difficulties for SMEs to develop and commercialise their innovative ideas; and a limited valorisation of available knowledge) may not immediately cause a gap in support, but left unattended, they have long-term effects of their own. A decrease of the quality of public service and of the quality of the national innovation system is a serious issue but very often difficult to attribute to a particular lack of policy (Dekker, 2011).

4.4.1.2. Final relations

Final relations describe the relations between policy objectives and the means to reach these objectives. In Figure 4, these relations are depicted. The objectives of the SBIR-programme as I have described above are visible at the top of the figure. Additionally, I have added the implicit objective of increasing the quality of the public service. Although there was no perceived gap in the public support, the wish to create a pre-commercial procurement programme clearly illustrates the objective to increase public service.

The SBIR-programme's main outcomes are depicted in the lower part of the figure. The three obvious outcomes that are clearly related to the objectives are of course the progress in tackling societal challenges, the increased output of SMEs and the increase in knowledge valorisation, i.e. more existing knowledge is commercialised in products and services (Technopolis, 2010; Dekker, 2011). However, the knowledge valorisation also induces an increased number of innovative start-ups (most of those are the result of the TNO-SBIRs).

Furthermore, one of the most important assets of the SBIR-programme is the creation and development of a network between knowledge institutes on the one hand, and public authorities and private companies on the other hand (Dekker, 2011). This is mainly a result of the way the SBIR-process is designed (see further in this section for a description of the selection process etcetera). The tender's are judged and there is always someone from the demanding department and someone with expertise in the subject from the private sector present. As the cooperation between these different bodies is on areas that are important to society and prone to benefit from innovation (as they are the result of an SBIR-tender), this can foster more innovation and creates opportunities for private and public demand of the innovations (Dekker, 2011).

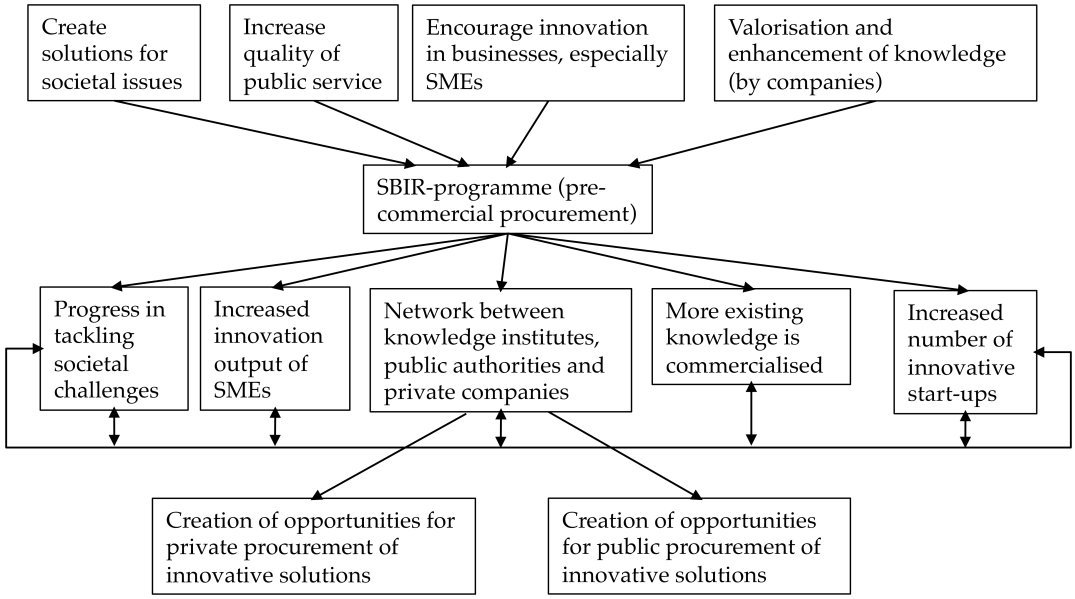

Figure 4: Final relations of the Dutch SBIR-programme

The Dutch SBIR programme consists of three stages, which are described by Holland (2010) (see Appendix 8 for an overview of the internal process and protocal of the Dutch SBIR programme):

1) First technical experiments and a study into the technical, economic and organisational feasibility of a project idea. The maximum duration of this phase is six months.
2) R&D up until a first, non-commercial prototype. The R&D has to conform to the European definition and the maximum duration of a phase 2-project is two years.
3) Commercialisation phase: developing a market-ready product (however, for all SBIR-variants, this last phase is <u>not</u> financed by SBIR programme) (Dekker, 2011).

The governmental departments choose to apply their societal issues through a tender process; Agentschap NL merely coordinates the SBIR-process but does not initiate this, but the selection process is completely in the department's hands as well. The demanding department selects the societal theme, and it also allocates the budget for an SBIR tender (Holland, 2010a). The selection process then proceeds as follows: companies respond to an open tender that is issued on the website, through web-release and through e-mail (Dekker, 2011). A jury will rank the project proposals and make the final selection based on the selection criteria. The selection criteria are quite straightforward: the innovation should contribute to the solution of public demand and entrepreneurship; it is judged on its (technological) quality and degree of innovation; its economic perspective is assessed; and of course it should have an added value for society (Holland, 2010a). The jury consists of 4-5 people and is mediated by someone from Agentschap NL. The companies with the best proposals are awarded a contract (Dekker, 2011). Funding will only go to the costs made in phase 1 and phase 2. However, the SBIR needs to be financed, and the money needs to come from the demanding governmental department. Although it depends on the SBIR at hand, Dekker (2011) and Van Putten (2011) estimate that an SBIR costs between €0.5-1.5 million, and it is uncertain how much the governmental actor will gain by buying the SBIR, and both costs and uncertainty increase risk.

4.4.1.3. Normative relations

The normative relations describe the underlying norms of this policy theory. They are depicted in Figure 5 below.

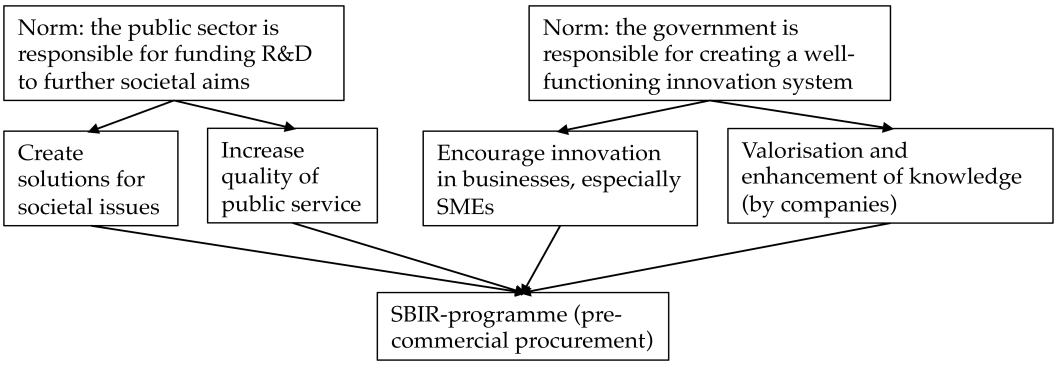

Figure 5: Normative relations of the Dutch SBIR-programme

Both Holland (2010a) as Dekker (2011) indicate that there was no perceived gap in public service before the SBIR-programme. The norm about the government being responsible for a creating a well-functioning innovation system leads to two objectives: ensuring, through financial support, an active participation of SMEs and enhancing the valorisation of knowledge (both elements are crucial elements of a well-functioning innovation system), which relate to the innovation rationale as well as solving the system failures *insufficient user-producer interaction, lack of awareness* and *costs vs. risk deadlock*. The other norm about the public sector's responsibility to further societal aims through funding R&D is less pronounced in the policy documents and is not directly motivated through linking it to system failures. However, as it signals the government's belief that societal aims are important, it can be concluded that this is a form of the sector-rationale, and although the sectors might vary, as such the SBIR programme can be used as a means to an sectoral end.

4.4.1.4. Reconstructed policy theory of the SBIR-programme

The causal, final and normative relations of the SBIR-programme are combined as follows:

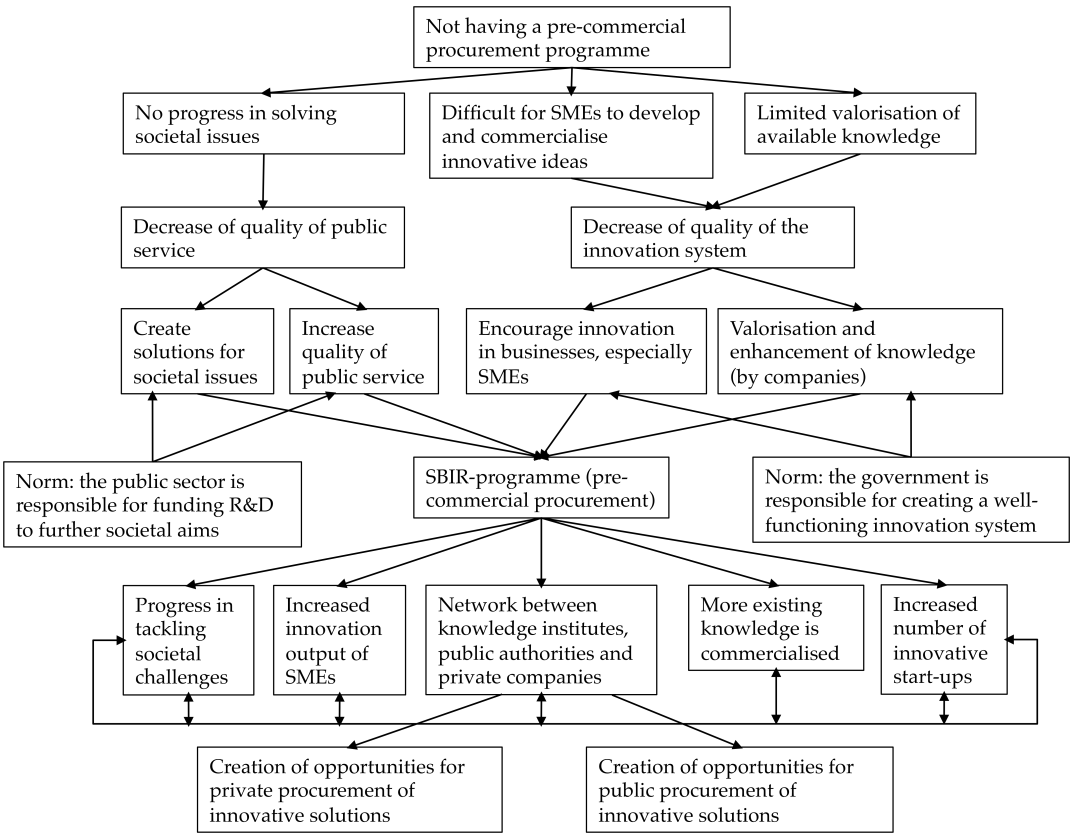

Figure 6: Reconstructed policy theory of the Dutch SBIR-programme

Since the SBIR-programme has been running for quite some time, the policy theory is quite refined. The policy problems relate clearly to the objectives, and the means to reach the objectives are quite thought through as well. From the recent SBIR-evaluation it can be

concluded that the empirical value of the programme was definitely apparent, as the number of projects has been steadily rising since 2004 (Technopolis, 2010).

4.4.2. Central Innovation-driven Procurement (national level)

Already in the 1980s, people in the Dutch governmental circles talked about the topic of innovative public procurement. No one actually turned these talks into action until 1997, when the Ministry of Economic Affairs took charge and shaped a policy around the intention of using the government's buying power to induce innovation (Van Putten, 2011). In 2006, a formal programme called "Launching customer" was started. This programme aimed at using public procurement to *create, develop and launch markets for innovative products that were relevant for society and helped solving societal problems* (Van Putten, 2011; OMC-PTP, 2010). The goals of this project were twofold: firstly, the government was supposed to act as a *first customer* for innovative products and services (as a lead-buyer). Secondly, the government could function as a *launching customer*, creating a lead market through the large-scale procurement of innovative products and services (the rationales were derived from the European Lead-Market project, which was also developing at that moment). The main activities of the Launching Customer programme were *creating awareness and informing policy makers and governmental procurers*. In November 2009, the name of the programme was changed from Launching Customer to the more internationally recognised Innovation-driven procurement (Factsheet PPI, 2011). The goal of this project is to *stimulate governmental bodies to purposefully look for an innovative solution or to offer ample space for the contractor to offer an innovative solution* (Van Putten, 2011; Factsheet PPI, 2011). This *may* result in the government as launching customer. The overarching objectives are to stimulate the innovative power of the Netherlands while at the same time professionalise the demanding power of the government (Van Putten, 2011). The Innovation-driven Procurement programme is the responsibility of the Ministry of Economic Affairs (EL&I). Furthermore, the programme coordinates and monitors the cooperation between the three PPI programmes (central PPI, Sustainable Innovation procurement and SBIR) and maintains close contact with the procurement network agency PIANOo (Van Putten, 2011; Dekker, 2011).

Up until now, the Innovation-driven Procurement office has worked to stimulate PPI within all levels of government, in a broad variety of ways. Cooperation with other governmental bodies plays a role in many of them (Factsheet PPI, 2011):

- In collaboration with Sustainable Innovation Procurement, the development of sustainable innovation policy instruments. The most recent efforts are focused on developing a "Display window" for sustainable procurement, in which demand and supply of innovative solutions will be displayed (Van Putten, 2011).
- Creating and maintaining a network of politicians who articulate demand and general procurers within the procuring network agency PIANOo.
- Promoting possibilities for PPI within different governmental bodies through publishing articles in a broad array of magazines, and through presentations and personal meetings within governmental bodies at all levels.
- Supporting innovative solutions in tenders, in cooperation with the Ministry responsible for general public procurement (Ministry for Internal Affairs).
- Regional meetings in Amsterdam and soon also Eindhoven and Enschede with the larger municipalities, provinces and water boards (in Dutch: "waterschappen", regional agencies responsible for water management in the broadest sense of the word). The goal of these meetings is to inform about public procurement for innovation in the region, and to stimulate supply and demand of innovations[20] (Dekker, 2011; Van Putten, 2011).
- Cooperation with trade associations/agencies, Syntens[21] (innovation network for entrepreneurs in SMEs) and various regional organisations. This cooperation mainly consists of meetings for procurers and meetings about societal theme's – which are always initiated by either the SBIR people or the Innovation-driven Procurement office (Van Putten, 2011).
- Publishing manuals on PPI that are spread across the procurement departments of different governmental departments and agencies. Examples are the formal publications on "Innovation-driven procurement" in collaboration with the PIANOo PPI department.

[20] Ideally, this will expand to other regions in the Netherlands as well. But at the moment, the central PPI organisation is mainly addressing regions that are asking for more information on their own initiative. Hopefully, the success of PPI in these regions will stimulate other regions to engage in PPI as well (Van Putten, 2011).

[21] For more information, see: http://www.syntens.nl/default.aspx.

- Compose case studies and examples from practice of successful PPI in the Netherlands. These examples were analysed and form the basis for future changes in the Innovation-driven Procurement strategy (Factsheet PPI, 2011).
- International bench marking of PPI, often in conjunction with pre-commercial procurement (in the Netherlands' case: SBIR).

Furthermore, the Innovation-driven Procurement programme cooperates with the Portfolio/category managers of the ministry of Internal Affairs. This programme has been running since 2008 and focuses on professionalising the operational management of the central government. A part of this objective is streamlining the tender process on certain categories (Van Putten, 2011). In 2007, EL&I appointed a Chief Procurement Officer. The goal was to coordinate procurement of several national departments and ministries. The main objective of the category management was increasing horizontal coordination and cooperation of procurement between different departments. This category management is based on three pillars: (1) organising procurement based on government-wide categorisation of products and services; (2) good sourcing strategy by category (customised); and (3) no centralisation and division but specialisation (DGOBR, 2011). The advantages of category management and horizontal interdepartmental procurement are both financial (through economies of scale and a decrease in similar tenders), and to stimulate knowledge spillovers and innovation through a new line of thinking (DGOBR, 2011; Van Putten, 2011; OMC-PTP, 2010).

Concerning PPI classification, the programme direction does not buy anything itself. However, it facilitates other governmental bodies in their buy-and-use-role. Therefore, the programme is mostly stimulating general innovation procurement, i.e. considering innovation in general procurement as the main criterion, through the definition of needs instead of products in the tenders. However, as some ministries are using PPI to further their (sectoral) aims, it can also be stimulating strategic procurement or even technology procurement (e.g. in the case of the category managers).

4.4.2.1. Causal relations

The causal relations are depicted in the figure below:

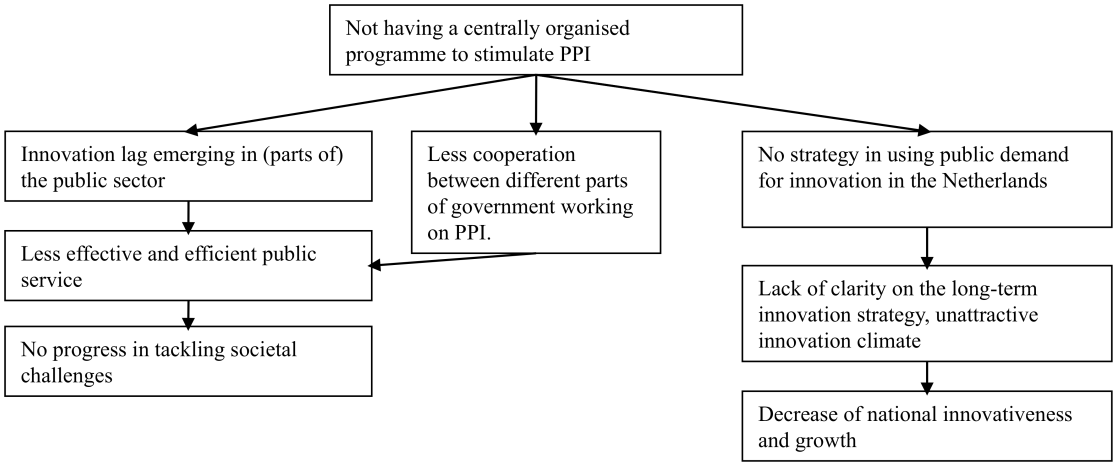

Figure 7: Causal relations of the Dutch central Innovation-Driven Procurement programme

The cause-effect relations of the central Innovation-Driven Procurement programme are quite straightforward and relate back to two main policy problems: an ineffective or less effective public service, which in turn produces a lack of progress in tackling societal challenges, and a decrease of the quality of the innovation system, thus a decrease of the national innovativeness and growth. The public service problem is in turn caused by two problems: a general innovation lag that can emerge in parts of the public sector if the public procurement is not organised to include innovative products and services, but also, a lack of cooperation between different parts of the government that are working on PPI. The central Innovation-Driven Procurement programme is putting specific emphasis on solving this last problem.

4.4.2.2. Final relations

The objectives of the central Innovation-Driven Procurement programme are a direct result of the policy problems as depicted in the previous paragraph (see figure underneath).

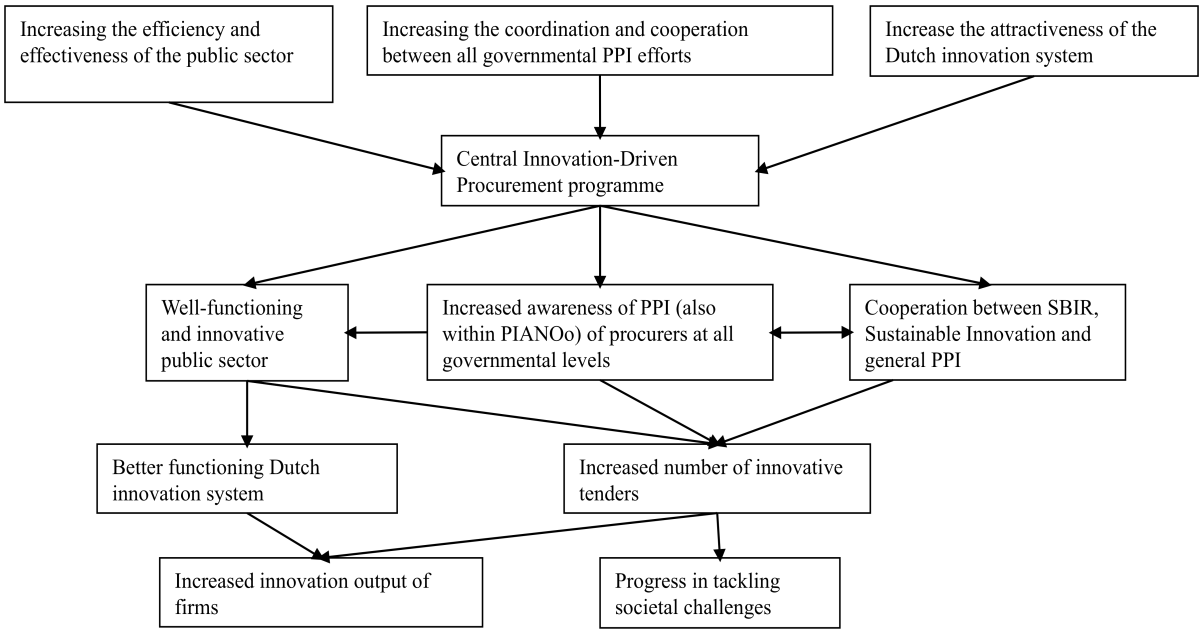

Figure 8: Final relations of the Dutch central Innovation-Driven Procurement Programme

The focus of the central programme is on improving the internal mechanisms of the public sector, which leads to the objectives of increasing the effectiveness of the public sector, and increasing the coordination and cooperation between all governmental PPI efforts. This last objective is a result of a perceived gap in public service in this area (Van Putten, 2011) – the PPI efforts were scattered through different governmental bodies and on different levels, thus this programme's aims to function as a central rallying point. Furthermore, as the Innovation-Driven Procurement programme is essentially a part of the overall innovation policy, increasing the attractiveness of the Dutch innovation system is obviously an objective as well.

The means to reach these objectives are multileveled. On a first level, the programme increases the functioning of the public sector, awareness of PPI and cooperation between the three PPI schemes. On a second level, the Dutch innovation system functions better, and the number of innovative tenders increases, which ultimately leads to an increased innovation output of firms and, as a result of a better functioning public sector, progress in tackling societal challenges.

4.4.2.3. Normative relations

The normative relations are mostly implicit in the Innovation-Driven Procurement Programme, but they do relate directly to the objectives as follows:

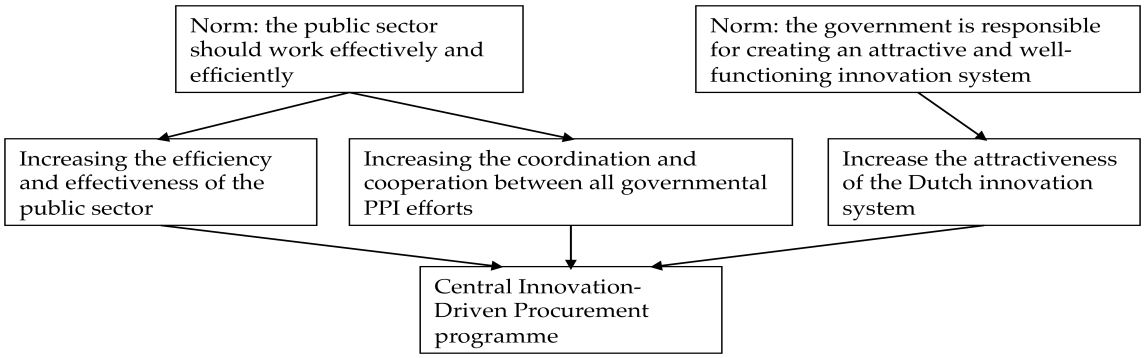

Figure 9: Final relations of the Dutch central Innovation-Driven Procurement Programme

The programme formally aims at stimulating the Netherlands' innovative power (Van Putten, 2011). The norm behind this continuous aim is that the government is responsible for creating and maintaining a well-functioning innovation system, thus fitting with Edler's (2009) notion of political target-orientation of stimulating national growth and innovation. However, Van Putten (2011), project leader for this programme states that the norm concerning the effective and efficient public sector is the strongest norm behind the programme. The goal is to professionalise public procurement from the demand-side, starting with the question: what is necessary and/or wanted? As I explained before, the central programme attempts to fill up a

gap between all governmental PPI efforts, and act as a pivotal figure. As such, the programme mostly adds coordination improvements and the build-up of networks. This does not relate clearly to the rationales developed by Edler (2009)[22].

4.4.2.4. Reconstructed policy theory: central Innovation-Driven Procurement

In the figure below, the causal, final and normative relations are combined:

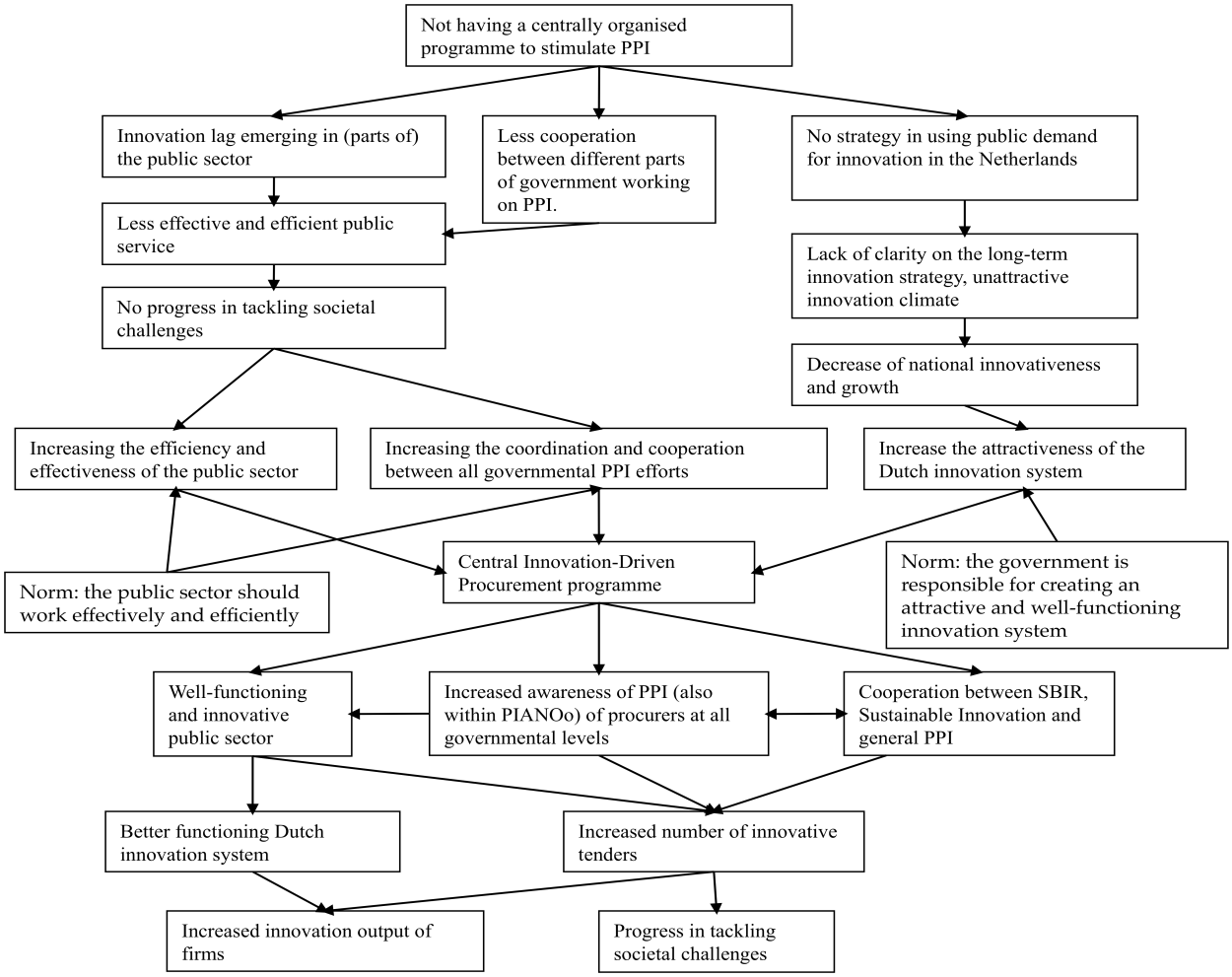

Figure 10: Reconstructed policy of the Dutch central Innovation-Driven Procurement Programme

In order to evaluate the quality of the reconstructed policy theory, Hoogerwerf (1990) provides several criteria with which the quality of the policy theory might be assessed: the "precision of formulation, the differentiation, the integration, the empirical value, and the legitimacy of policy theory" (Hoogerwerf, 1990, p. 289). I have discussed the legitimacy of demand-based policy theory already. The integration of this policy theory within the background of existing policies has also been touched upon – the Innovation-Driven Procurement programme seems to fill a (coordinative) gap in the innovation procurement landscape. However, the programme in its current form is too new to really tell if it will be able to fill up this gap. As such, this policy differs from other innovation programmes as it functions clearly in the realm of the demand-side instead of the traditional supply-side. Furthermore, it coordinates existing programmes and aims at building and maintaining procurer-private sector networks, which might be of value for this programme as well as other procurement-related policy programmes. The policy programme has been revised recently, which entails that the formulation of policy theory is changing as well (Van Putten, 2011).

4.4.3. Sustainable Innovation Procurement

Green or sustainable public procurement has recently become a very popular concept in a very short time. On EU level, it was first introduced in 2003. The idea and rationale behind it is similar to that of innovation procurement: to use the government's purchasing power to

[22] Although Edler and Georghiou (2007) do mention the professionalisation of the public sector, it is not theoretically separated as one of the main rationales, as professionalisation is not clearly related to demand-side action.

choose for goods and services that *also respect the environment*, therefore making an important *contribution towards sustainable development*. Green public procurement can be defined as a process whereby *public and semi-public authorities* meet their needs for goods, services, works and utilities by seeking and choosing outcomes and solutions that have a *reduced impact on the environment throughout their whole life-cycle*, as compared to comparable products/solutions (PwC et al., 2009). In the Netherlands, the Green Public Procurement policy is quite advanced, but has also received a lot of criticism lately. The Green Public Procurement programme was developed as a result of *EU directives*, but also because of a *perceived wish of private companies* to contribute to environmental problems. Furthermore, it was an attempt to provide more *long-term clarity* on government's vision and strategy on sustainability. According to Meijer (2008), Dutch sustainable energy projects that were running at the time were having difficulties continuing because of *political uncertainty*. The largest problem in this context was that sustainability issues were not clearly outspoken and, because of many (unexpected) changes in policy dealing with sustainability, the *reliability of governmental decisions* was not considered high. The programme "Duurzaam Inkopen" (literal translation: Sustainable Procurement) attempts to change that.

Under the auspices of the Ministry of Economic Affairs, Agentschap NL has developed sustainability criteria for 45 product groups. These criteria have been established in cooperation with people from the private sector and included both environmental and social criteria. In 2009, the first phase of criteria development was finished (Agentschap NL, 2011c). The former Balkenende IV-government's objective was to use sustainable procurement for 100% of these 45 product groups in 2010. For regional governments it was supposed to reach 50%. However, different actors have criticised the Sustainable Procurement programme for being bureaucratic and ineffective. Therefore, a new strategy for the Sustainable Procurement programme was outlined in November 2009 (SenterNovem, 2009). The programme is under revision again at this moment, and all actors involved will provide advice on the intermediate versions of the renewed policy, so as to deduct possible bottlenecks early. Furthermore, it is the importance of further strengthening the relationship between sustainable and innovation-driven procurement is stressed. The programme Sustainable Procurement is currently managed by the interdepartmental programme direction "Duurzaam Inkopen" (PDI, Sustainable Procurement), the criteria have been developed by Agentschap NL and PIANOo and MVO Nederland carry out the communication and the implementation of the programme. The interdepartmental programme direction will be abolished at the end of 2011. It is unclear at the moment in which form the new organisation will be shaped. There is no clear preference for a future outline; it all depends on available budget and course content (Bruring, 2011; Van Putten, 2011).

Within the Sustainable Procurement programme, there are different *sublevels of activities*, which are run through four different tracks (Kensmil, 2010):

1. Defining, implementing and updating sustainability criteria for the short-term.
2. Defining sustainability levels with a gradually increasing ambition, with a long-term view.
3. *Realising sustainability- and innovation breakthroughs and making large and needed environmental successes work through the coordination of large public procurement projects.*
4. *Offering chances to innovative products and services through scalable pilot projects within the public procurement practice: sustainable innovation procurement*

All these tracks are integrated in a system within Sustainable Procurement, but the 3rd and 4th track are the innovation parts of the programme, called Sustainable Innovation Procurement. Within this programme, the focus is on creating prerequisites that are necessary to successfully, efficiently and easily procure innovations for sustainable issues. There are three phases in this programme:

- Pre-phase: the ministry for Economic Affairs, Agriculture & Innovation (EL&I) coordinates this phase. They identify input for the next phase through policy questions and demands (of other departments), development projects and recent innovations that are considered beneficial for the Netherlands as a whole in terms of innovation and sustainability impact. Based on this input, they conduct a market exploration to identify possible solutions and suppliers of this solution (Kensmil, 2010). EL&I considers the following issues:
    - Which possible solutions are developed in the market and/or registered as a patent?
    - Which (potential) suppliers/governmental contractors are available?
    - What can these suppliers/governmental contractors contribute?
    - Which specific rules and protocols are applicable to the situation?

The initial input by the demanding governmental body combined with the results from this market exploration result in a short business case. Subsequently, EL&I makes the output of the pre-phase available through different channels. Recently, the Sustainable innovation procurement management has cooperated with the central Innovation-Driven Procurement programme, and has developed a 'Display window' for sustainable procurement, in which demand and supply of innovative solutions will be displayed (Kensmil, 2010; Van Putten, 2011).

- Implementation phase A: this is track 4. The ministry for Infrastructure and Environment (I&M) coordinate this phase. In this phase, the formerly mentioned Display-innovations are facilitated by setting up implementation projects and making sure these projects are undertaken by governmental actors that are willing to act as a first-user. Subsequently, I&M drafts an assessment of the pilot phase results in order to determine if the results are viable enough for admission to implementation phase B (track 3) or even for track 2 (long-term sustainability standards). Criteria for admission include payback time, efficiency, risk management, entry conditions and added value for governmental bodies.
- Implementation phase B: this is track 3; the phase is which sustainable innovation pilot products are scaled up through a large coordinated public procurement tender. Bruring (2010) explains that these large-scale projects require extensive coordination: the innovative product is 'plugged-in' simultaneously at many governmental bodies and sometimes even private actors as well. A first step in these track 3-projects is to bring together a wide array of partners: apart from the supplying company, the Ministry of I&M brings together (semi) governmental buyers (ministries, governmental agencies, but also schools, the police or fire departments or hospitals are possible actors in the buying process), private buyers (if needed), financial partners (banks, insurance companies), knowledge institutes (PIANOo, Agentschap NL), applicable intermediate institutes, and, if needed, representatives of civil society (NGOs, community organisations, etc) (Bruring, 2010).

All this requires major coordination, cooperation and commitment skills (Bruring, 2010; Van Putten, 2011). The pre-phase is coordinated by EL&I (and can be financed through SBIR!), track 4 and track 3 are coordinated by I&M, and these phases need to be seamlessly integrated in order for the Sustainable Innovation Procurement programme to work properly. The Display of demand and supply of sustainable innovations is a step in the right direction, as is the informal contact between the people who are currently running these programmes (Bruring, 2010; Van Putten, 2011; Dekker, 2011; Kensmil, 2010). Furthermore, the financial support of these programmes is crucial – but existing financial instruments can likely be used in this programme (Kensmil, 2010).

Concerning PPI classification, the Sustainable Innovation Procurement programme has a very strong societal aim, and can thus be classified as strategic procurement. Sometimes the government is the single buyer, but often there are several governmental bodies that cooperate in a large tender so as to create a large demand base. In other (rarer) cases, the government cooperates with private buyers as well. However, the Dutch Sustainable Procurement programme does not engage in catalytic procurement, i.e. facilitating buying processes for others. Furthermore, the programme covers both pre-commercial procurement (through track 4) and commercial procurement (track 3). In the last case, the implicit objective is to stimulate, transform or create a market for a specific technology.

4.4.3.1. Causal relations

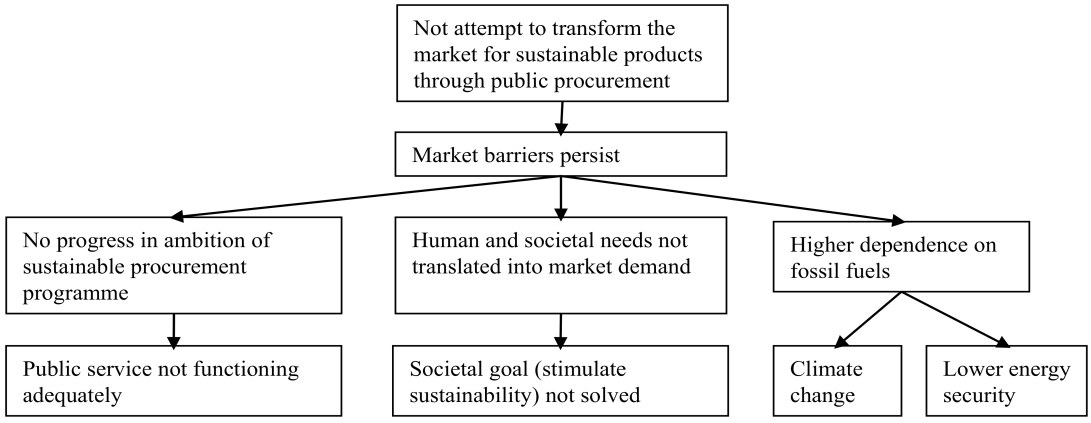

Figure 11: Causal relations of the Sustainable Innovation Procurement programme

The policy problem is to not attempt to transform the market for sustainable products through public procurement, i.e. to not have track 4 with a specific focus on innovation for sustainability and to not have track 3 which scales up existing innovations through large-scale public procurement projects.

The initial policy problem causes the market barriers for sustainable innovations to persist. These market barriers are mainly financial barriers, an inability to generate enough money to develop a product to a pilot version (track 4) or to find enough buyers willing to invest in a pilot project so as to enable it to become commercially viable (track 3) (Bruring, 2010). If these market barriers persist, human and societal needs are not translated into market demand, thus the societal goal of stimulating a sustainable society is not solved. Furthermore, the government will not progress in their Sustainable Procurement programme, thus allowing public service to decrease. Lastly, as the Sustainable Procurement programme is essentially designed from a sector rationale (namely: stimulating a sustainable society), the connection to energy-use is always there. Persisting market barriers for sustainable products induce a higher dependence on the status quo, which in turn leads to a higher dependence on fossil fuels. This in turn leads to both climate change and a lower energy security in an increasingly globalising world.

4.4.3.2. Final relations

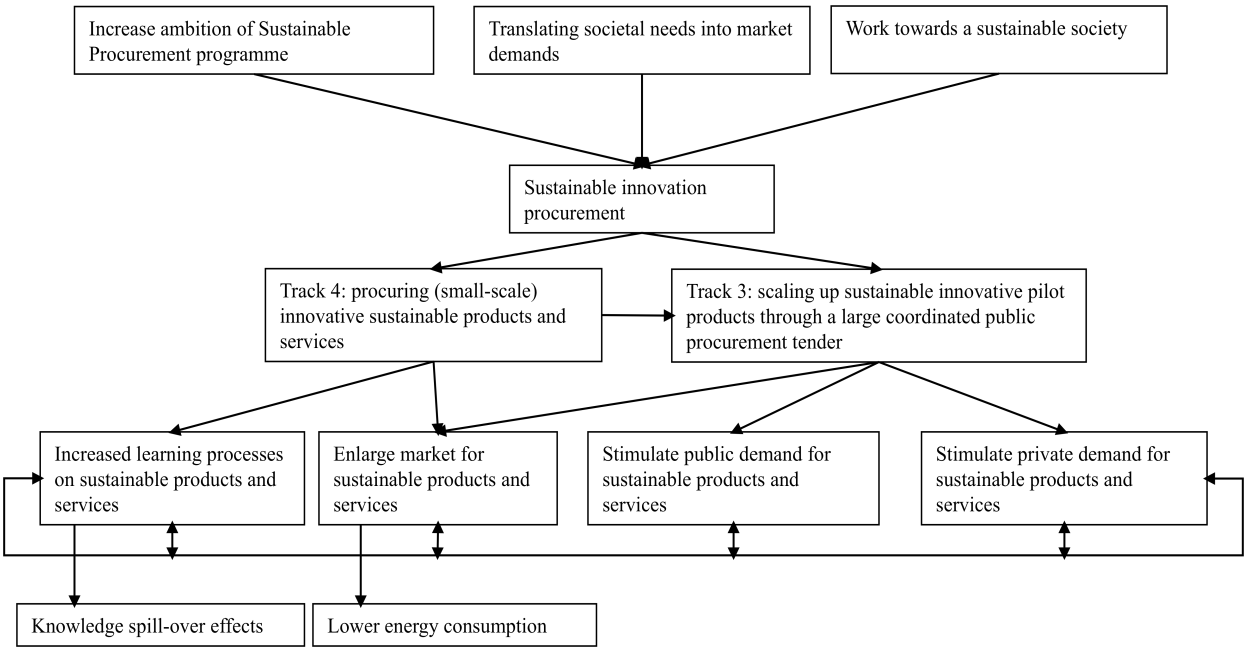

Figure 12: Final relations of the Sustainable Innovation Procurement programme

The objectives relate back to the policy problems: increase the ambition of the Sustainable Procurement programme (as a result of criticisms and earlier revision recommendations), translating societal needs into market demands (as the market is too slow to articulate demand properly, the government can play a significant role here through its buying potential, and the general overarching goal: working towards a sustainable society. The Sustainable Innovation Procurement programme works towards these objectives by increasing learning processes on sustainable products and services and (through direct public procurement) enlarging the market for sustainable products and services. Furthermore, the programme stimulates both public and private demand for (innovative) sustainable solutions. In the scaling-up track (track 3), many actors sit together to buy innovative solutions for sustainability issues in a large coordinated tender. Ideally, the (private) actors who are part of the tender are triggered by the buying process and subsequently increase their demand for sustainable innovations.

4.4.3.3. Normative relations

The norms behind this policy are quite straightforward and stem from the sector rationale (government is responsible for setting an example for creating a sustainable society) and system failures (solving societal needs if the market is not sufficiently able to). In addition, an implicit, not-PPI related norm behind this policy is that the public sector needs to respond to the heavy criticism of the overarching Sustainable Procurement programme and improve the policy where needed.

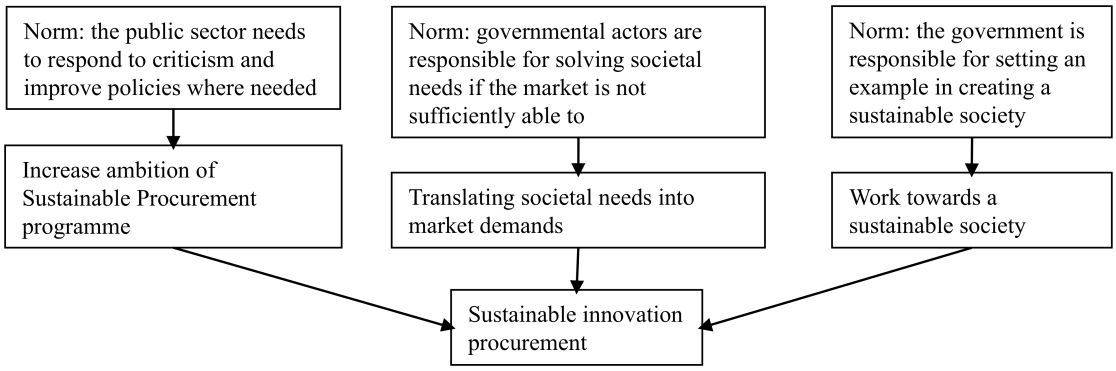

Figure 13: Normative relations of the Sustainable Innovation Procurement programme

The sector rationale is a norm behind the Sustainable Procurement programme in general, but the system failures induce the innovation parts of the programme. Trough track 4, they tackle *insufficient demand-articulation* and *lack of awareness* (e.g. through the Display window), and through track 3 they tackle the *risk vs. uncertainty deadlock* and *user producer interaction* (through bundling demand with other public and private actors).

4.4.3.4. Reconstructed policy theory: Sustainable Innovation Procurement

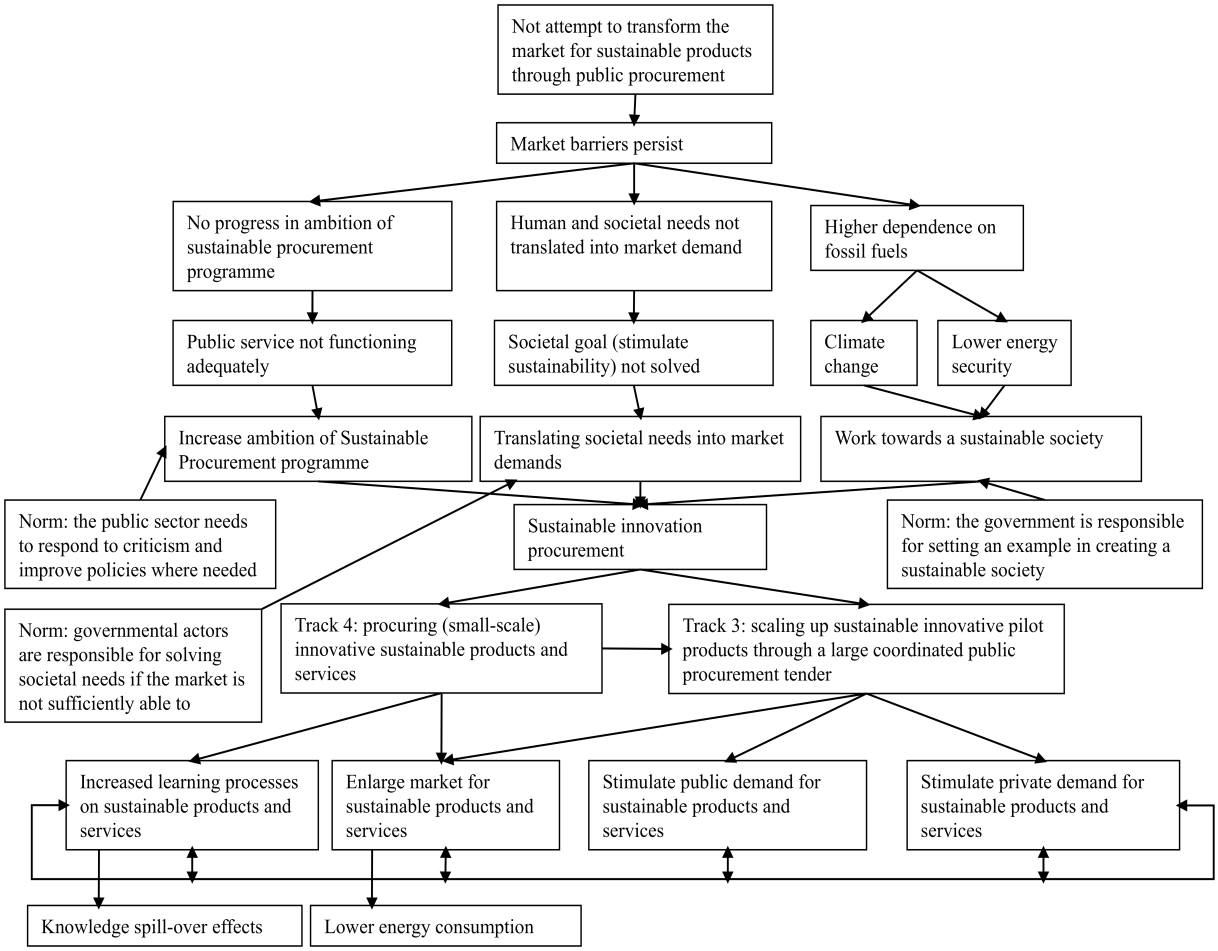

Figure 14: Reconstructed policy theory of relations of the Sustainable Innovation Procurement programme

This policy theory is quite advanced in the sense that its legitimisation, integration, and embeddedness in the policy arena can all be directly derived from the original general Sustainable Procurement programme. The innovation parts are in that sense merely adding to the already existing Sustainable Procurement programme and are as such refining it.

4.5. Empirical evidence: evaluations and flagship cases

As the central Innovation-Driven programme has only been running for a few years, it is too early to tell if the public sector really increases their functioning through this programme, but the first signs seem positive (Van Putten, 2011). It currently mainly focuses on promoting PPI across different levels of government, and it is starting to expand its activities in regional governmental bodies as well (municipalities are displaying interest in PPI, and some of the water boards as well as several governmental agencies and departments have started up pilot projects). As a result, awareness is rising. Furthermore, it is starting to play a role in coordinating and rallying all the PPI efforts that are going on in the Netherlands – which would, if successful, fill up an important gap. It is proving to be especially fruitful to work in close collaboration with the already existing network agency PIANOo; in fact, the project leader of the Innovation-driven Procurement programme works part-time at the ministry of Economic Affairs, and part-time at the PIANOo office. This illustrates the level of engagement of the programme with the network agency (Van Putten, 2011). Apart from the networking and collaboration with procurers on different levels, the programme direction of Innovation-driven Procurement also attempts to explore the private market, especially on important societal issues or issues related to the top-sectors. In 2009, the programme direction presented success stories of innovation-driven procurement to the wider government, indicating its progress. Furthermore, they reported on the impact of the central government-wide indicator 'innovation-driven procurement': the number of innovative tenders within the central government is increasing (Factsheet PPI, 2011). Due to the increased cooperation between SBIR, sustainable innovation and general PPI, it is easier for procurers to find information and participate in the network. As a result of this improved access to information and networks, the programme direction hopes to truly embed innovation in the general procurement protocol (Van Putten, 2011).

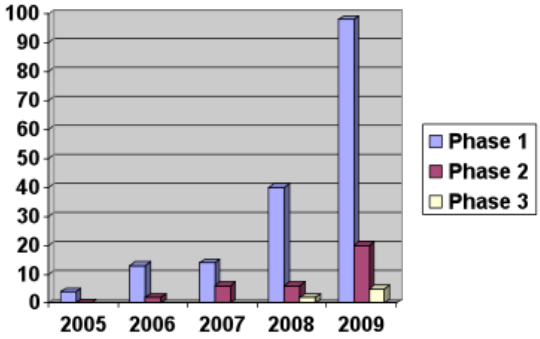

Figure 15: Number of SBIR projects 2005-2009, divided by phase

From the evaluation of the SBIR-programme in 2010, it could be concluded that the SBIR-programme is rather successful. Both public bodies (governmental departments that worked with the SBIR-tenders) and the private sector (mainly SMEs that responded to the SBIR-tenders) were enthusiastic about the way the SBIR-programme is organised and the facilitating and supporting role of Agentschap NL (Technopolis, 2010). This success is also illustrated by the increase in the number of projects over the past few years. The SBIR-budget has also grown significantly (Holland, 2010a). In Figure 15, this development is depicted graphically. A successful example of a commercialised SBIR-project is a dyke inspection system through the use of satellites. The Ministry of Infrastructure is aiming to integrate the new satellite invention throughout their dyke-inspection system. However, this is proving to be quite difficult (Dekker, 2011). The SBIR programme direction is currently developing a pamphlet that illustrates the 'success stories' or flagship cases of the more than 5-year experience with SBIR (Agentschap NL, 2011d). Curiously, although the overarching goal is essentially to stimulate innovation in small businesses, the SBIR direction (which is supervised by the CSR department of the Ministry for Economic Affairs) is emphasising the role SBIR and innovation in general can play in stimulating sustainability. This emphasis is demonstrated in the pamphlet as most of the flagship cases are related to sustainability: energy-saving SBIR projects, solutions to accelerate the transition to a bio-fuel economy, etc. There are large differences between the number of SBIR tenders the different departments have issued. Especially the Ministry of Health (VWS) has issued large and costly SBIRs. Other ministries that have used SBIR quite a lot are the Ministries of Agriculture (LVS), Infrastructure (V&W) and Economic Affairs (EZ). Curiously, Agentschap NL's 'success stories' pamphlet does not mention any flagship SBIR-case issued by the Health department.

Although the number of projects has increased, there are only 5-7 projects that have reached Phase 3 (commercialisation of the innovation) (Holland, 2010a; Technopolis, 2010; Dekker, 2011). As Holland (2011) argues, the expectations of companies should be managed better in this respect: the government should indicate better that the commercialisation phase is not the responsibility of Agentschap NL but rather lies with the participating company itself. Of course, it can also be argued that the responsibility to link SBIR to the department's innovation procurement lies with the government, and should be increased (Van Putten,

2011). This is one of the things that the central Innovation Procurement programme is aiming to do. However, in the Netherlands this is done on a voluntary basis. Holland (2011) argues that the departments should have a stronger incentive to think about innovation procurement and integrate the innovation rationale in their procurement processes, e.g. through a financial incentive: by judging the departments' procurement plan in terms of innovation, they could be granted a higher budget.

The scale-up problem is also perceived in the Sustainable Innovation Procurement programme: track 3 (scaling up existing sustainable innovations) and the connection to track 4 (developing a pilot version of innovative ideas, comparable to SBIR) is still difficult. However, one of the larger PPI initiatives of successful commercialised innovation is the Formule E-team project, which was the result of a scale-up project (track 3) from the Sustainable Innovation Procurement programme. This large public procurement tender included 3000 electric cars and several buying governmental parties (Bruring, 2010). The success of the procurement tender induced the formation of a consortium called the Formule E-team, which aims to stimulate the market for electric cars in the Netherlands (see Appendix 9 for an overview of the project). Concluding, both in the SBIR-programme and the Sustainable Procurement programme, linkages between pilot- and commercialisation-phases are missing. Of course, the innovation parts of the Sustainable Procurement programme are quite new and may still be developed, especially since its 'mother policy', the Sustainable Procurement programme is being criticised heavily at the moment. In Appendix 10, a short overview is given on the current developments of the overall Sustainable Procurement programme.

4.6. Strengths and weaknesses

In this section, I will assess the situation in the Netherlands in terms of the five capacities for successful PPI I have set out in the capacity framework presented earlier in this thesis. For each proposed solution, I also summarise the strong and weak points of the Dutch situation. Strong points are indicated with this symbol: ✔ while weak points are indicated with this symbol: ✖. In some occasions, the strong or weak points are considered to be less important – in those cases the symbols are put between brackets like this: (✖). Later in this thesis, I will use the same symbols to indicate the strong and weak points in the approaches of Sweden and the UK.

4.6.1. Coordination capacity

Proposed solutions	Situation Netherlands	Strong and weak points
Main management of the policy should be innovation department.	The main management is the Innovation-Driven Procurement programme, which operates under the jurisdiction of the Ministry of Economic Affairs, Agriculture and Innovation (EL&I). This programme, which in its current form exists only since 2009, has strong links with the procurement expertise agency PIANOo and takes the lead in the cooperation with the other PPI programmes (SBIR and Sustainable Innovation procurement). Moreover, all three programmes use the same networks and build upon this network, thus facilitating each other's activities. Although the cooperation is arranged through formal structures, an important asset is also the informal contact between the PPI programme directors and policy makers.	✔ (Both formal and informal) coordination and cooperation between different PPI programmes and procurement expertise agency PIANOo, managed by central Innovation-Driven Procurement programme
		(✖) Fragmented management, thus many stakeholders, can compromise cooperation.
Provide sufficient background information to ensure understanding in the sectoral ministries.	The central Innovation-Driven Procurement programme has started coordinated 'PR'-activities for PPI. Furthermore, the programme direction produced manuals for PPI and organises workshops, seminars and network activities for procurers. The SBIR-programme has been running longer and is better known across ministries, and the SBIR-programme direction raises the profile of the SBIR-projects within the government so as to market the SBIR-tender in general and the innovations that were produced by earlier SBIR's specifically (Dekker, 2011). This is done through internal governmental channels, but also through more formal meetings of bringing procurement officials together.	✔ Information supply through different channels is available and being developed.
		✔ PPI 'success stories' are used to 'market' innovation procurement.
		✖ The 'marketing activities' happen occasionally, and are not truly embedded in procurement protocols.
Create and maintain a concrete strategic implementation plan.	In practice the PPI implementation is more bottom-up then the result of a coordinated strategy, although there are step-by-step manuals on implementing PPI and network meetings for procurers. This can be useful as the demanding department has more knowledge on the topic at hand and is intrinsically motivated, but it also requires an active attitude and openness to innovations on the different governmental departments (Holland, 2010a; Dekker, 2011). This relates to the issue of responsibility; it	✔ Bottom-up implementation approach creates motivated and knowledgeable participants.
		(✖) Bottom-up approach requires active and open governmental bodies, is sometimes an overly optimistic

	is not always clear who is responsible for the implementation process: the PPI programme or the demanding governmental department or agency. Furthermore, although the three programmes coordinate their activities and thus reach quite a large part of the different innovation phases, the programmes are not sufficiently connected.	expectation.
		(✖) Allocation of responsibility is not always clear.
		✖ The connection between the different PPI programmes is not good enough.
Create the plan with stakeholders (from industry).	The SBIR-programme has established good relations with the private sector (especially as actors from the private sector are included in the tender-competition), but the programme was not developed with actors from industry. Sustainable Innovation Procurement (under responsibility of the Ministry of Infrastructure & Environment) has connections with the private sector through the overarching Sustainable Procurement programme, but the innovation parts are not developed with actors from industry. The Innovation-Driven Procurement programme is mostly a result of the wish to professionalise the public sector, and is therefore not created with stakeholders (from industry).	✖ Only the implementation of the overarching Sustainable Procurement programme was specifically created with private sector actors (and is currently being revised); but all three innovation procurement schemes were not.
Guarantee commitment of the other (sectoral) departments.	The necessity and role of innovation is not embraced throughout the Dutch government, and therefore the public service might be lagging behind the market-standard. Furthermore, innovation policy is still mainly focusing on supply-side measures. However, the PPI scheme is backed at the highest political level, and regular coordination and evaluation moments are scheduled. As the implementation is mainly bottom-up, a roadmap with clear targets is still missing.	✔ PPI is backed on high political level.
		(✔) Regular coordination and evaluation moments are planned.
		✖Necessity and role of innovation still not embraced throughout Dutch government (or at least secondary to 'own' sectoral policy goals).
		✖Innovation policy still more focused on supply-side.
		✖ Implementation roadmap with clear targets is missing.

4.6.2. Link with private demand

Proposed solutions	Situation Netherlands	Strong and weak points
Ascertain needs of private buyers through user-producer interaction and take these into account when designing policy measures.	Through the public-private networks of PIANOo and occasional market explorations by the Innovation-Driven Procurement programme, the needs of private buyers are assessed, mainly on important societal issues or issues related to the top-sectors. However, this is hardly a systemic approach and the private buyers' needs are not formally taken into account in the design phase. However, the SBIR-programme always includes private actors in its tender-process, and Agentschap NL also organises activities to create dialogues with the market before an SBIR-tender is issued (Dekker, 2011). As such, the people at Agentschap NL have a close contact with private actors and thus are more or less informed about the market's potential supply (Dekker, 2011), which can facilitate the articulation of demand.	(✔) The SBIR-programme includes private actors in its tender-process and also consults the private sector before issuing a tender.
		✖ No systematic approach to ascertain the needs of private buyers.
		✖ Needs of private buyers are not taken into account in the design of the PPI policies.
Embed PPI policies in framework of other demand measures.	Cooperative procurement (combining public-private procurement) and catalytic procurement (facilitating private procurement) is not done on large scale in the Netherlands. Mostly, the government is the sole buyer and in some cases (e.g. Sustainable Innovation Procurement scale-up projects and the category management), several public bodies combine demand to create a larger demand base.	(✔) Combination of demand of various public bodies is occasionally done.
		✖ Cooperative or catalytic procurement is almost never done in the Netherlands.

4.6.3. Coping with complexity and procurement discourse

Proposed solutions	Situation Netherlands	Strong and weak points
Establish selective discourses that define mid- and long-term public needs (derived from policy goals and administrative strategies).	The MIAs (Societal Innovation Agendas) formulated long-term strategies and policy goals on societal issues, and many programmes derived from the MIAs are still running. Furthermore, public procurement discourses are initiated by network agency PIANOo – through public procurement alliances departments increasingly purchase together, bundling demand. This requires a longer term vision and	(✔) Long-term vision on societal issues through the innovation programmes of the MIAs.
		✔ Public procurement alliances through PIANOo are requiring long-term common vision.

	common goal, which is formed through discourses on public needs. Also, the category managers are forecasting public through streamlining the tender processes on certain categories. Lastly, the Sustainable Innovation Procurement programme specifically aims at the mid- and long-term definition of needs through their track-methodology. However, the recent changes in the PPI and Sustainable Procurement methodologies are making	✔ Category management at the Ministry of Internal Affairs (streamlining tender processes) creates long-term vision in certain categories.
		✔ Track-methodology of the Sustainable Innovation Procurement programme ensures long-term vision on public needs for sustainable innovation.
Set up foresight strategies to develop common visions between producers and users.	The new top sectors approach pinpoints the areas in which demand of innovation will be expected on the mid- and long-term. The top sector approach is largely based on an advice by VNO-NCW, the employers' organisation. The Rutte-government emphasises collaboration with the private sector more then the former governments. However, the government does not directly take the lead in developing a foresight strategy for better supply-demand alignment.	✔ Development of common long-term vision between private sector and government, partly through the top sectors approach.
		✖ No specific effort in developing a foresight strategy through user-producer interaction.

4.6.4. Activating and enabling the procurement chain

Proposed solutions	Situation Netherlands	Strong and weak points
Change incentive structures for procurers (replace lowest-cost rationale with MEAT: Most Economically Advantageous Tender)	Traditionally, the public sector is a difficult structure to change. The lowest-cost rationale is still dominating the Dutch procurement structure, and the incentive structure of public procurement in general also still supports this lowest-cost rationale. The risk vs. money controversy seems to be the largest barrier for governmental actors to use PPI (Dekker, 2011). Recent budget cuts as a result of the economic crisis make this even more difficult (Dekker, 2011). Furthermore, there are many examples of risks being avoided and not managed, causing viable innovations to not be procured (Van Putten, 2011; Dekker, 2011).	✖ Incentive structure of general public procurement still backs the 'low-cost' rationale.
		✖ No sufficient risk management, no incentive to take the 'risk' of using innovative procurement instead of 'normal' procurement.
Create a structure in which procurers have up-to-date knowledge of future needs and potential improvement of public service.	This is an obstacle already in general procurement and especially with innovation: the procurers often are not in touch with what is happening in the fast-changing markets, and are not sufficiently in touch with future developments of public needs. In the Netherlands, the procurement agency PIANOo facilitates debates and organises workshops etc. to ensure awareness of this problem. Furthermore, the category managers of the ministry of Internal Affairs are specialising on certain categories and invest in market-exploration in these categories.	✔ Debates and workshops etc. are organised through procurement agency PIANOo.
		✔ The category management enables specialised procurement, which facilitates knowing (future) needs.
		✖ It depends on the procurers' own initiative to be up-to-date with future needs, no coordinated strategy.
Tender process needs to be based on specifying functionalities rather than designs.	In the SBIR-programme, the tender is based on procuring R&D, the solution to a (perceived) problem. In the Innovation-Driven Procurement programme, the focus is on basing tenders on demand, instead of specific products – but the tender processes sometimes still asks for design instead of functionalities. The Sustainable Innovation Programme is presented as one of the solutions to the too design-based Sustainable Procurement programme. Track 4 is based on demand, but the scale-up projects (track 3) are based on technologies that are perceived as needing a market-pull. If track 3 and track 4 were well connected, this would not be so much of a problem.	✔ Demand/R&D-based SBIR programme.
		(✔) Development of more functionality/demand-based tender process through the Innovation-Driven Procurement programme.
		(✔) Demand-based track 4 within Sustainable Innovation Procurement programme.
		✖ Due to badly connected track 4 and track 3, the tender-process of the Sustainable Innovation Procurement programme is too much based on specific technologies.
Facilitate organisational change and systematic training of procurers at operative level.	In the Netherlands, the procurement agency PIANOo provides and facilitates procurement networks, through which experiences, new approaches and good practices are shared. This is done through electronic exchange, an electronic platform, annual events and regional procurement sessions that are dedicated to certain (societal) topics.	✔ The professional procurement expertise agency PIANOo facilitates organisational change and training of procurers.

4.6.5. Creating and maintaining a supporting innovation procurement culture

Proposed solutions	Situation Netherlands	Strong and weak points
Embedding PPI in the existing innovation policy.	The PPI programmes are officially embedded within the Dutch innovation policy landscape and are as such complementary to the existing instruments. Furthermore, the Dutch TenderNed, a digital market place for public procurement, is perceived as a good facilitator to the procurement process. However, the programmes are quite new and are therefore not yet fully developed, and the share and overall implementation of the PPI programmes is still small. Furthermore, PPI needs to be embedded more firmly in the 'normal' procurement practice.	✔ The position of the PPI programmes is slowly increasing and is officially embedded in innovation policy.
		✔ The digital market place for public procurement, TenderNed, facilitates the procurement process.
		✖ Share of the PPI programmes is small, and they should be more embedded in "regular" procurement practice.
Ensure support of existing norms and regulations.	This is considered one of the main barriers to successful PPI implementation: both national and European (competition) norms and regulations are seen as one of the main obstacles to engaging in a PPI tender: either the norms are too stringent (and then specifically SMEs do not feel inclined to apply for the tender), or they are too light (and then the companies do not feel inclined to engage in innovation, as they already comply with the rules). Furthermore, the rules are contradictory or overlap each other and favour low risk-taking.	✖ Dutch procurement rules are often too stringent, contradictory and inefficient in terms of innovation, or too light to induce extra action in terms of innovation.
		✖ European competition regulations make it difficult to successfully implement PPI policies.
Create sufficient financial support.	With the termination of the Netherlands Entrepreneurial Innovation programme and the phasing-out of the Societal Innovation Agenda's, the extra budget for innovative tenders is terminated, and most likely the recent overall budget cuts do not make it more attractive for departments to engage in PPI. This presents a problem because the incentives to engage in an SBIR-tender or risky innovation procurement are missing. However, the PPI programmes are embedded in the Dutch innovation policy in such a way that they can mostly be combined with existing financial instruments (e.g. WBSO).	(✔) PPI programmes are embedded in Dutch innovation policy so existing financial instruments can be used.
		✖ No extra budget for innovative tenders is available for governmental bodies willing to invest in PPI, and recent budget cuts make it even more difficult.

4.7. Conclusion

Three PPI programmes are currently running in the Netherlands:

1. SBIR (Small Business and Innovation Research) – which is pre-commercial procurement, thus mainly procurement of R&D. This programme is coordinated by the ministry of Economic Affairs, Agriculture and Innovation.
2. Public Innovation Procurement – which is a broad programme focusing on all levels of PPI, and focuses on bringing together public and private parties and stimulates the articulation of demand in different policy areas. This programme is coordinated by the ministry of Economic Affairs, Agriculture and Innovation as well, in cooperation with procurement expertise agency PIANOo. (It is important to note that the procurement expertise centre PIANOo is not procuring innovations itself, but only works to create public-private partnerships, expertise and a network for procurers.)
3. Sustainable Public Procurement – in which a specific part focuses on sustainable innovation. This is an interdepartmental programme direction (with the main responsibility at the Ministry of Infrastructure and Environment). However, this programme is currently being revised. It is unclear who will be coordinating Green Public Procurement in general and the sustainable innovation part specifically. However, a greater emphasis on innovation seems to connect well with the other 2 PPI programmes. Moreover, an innovation approach also seems to fit the dynamic nature of sustainability issues far better then any criteria-development, regulatory scheme or labelling scheme could do, due to the static nature of the latter policy instruments.

Overall, the Dutch capacities for implementing a successful PPI scheme are quite good. The *coordinative capacities* are doing well in terms of management and information supply. The commitment of other (sectoral) departments could be better and the innovation-rationale is still not embraced throughout the government, although PPI is backed from the highest level. The PPI implementation strategy is mostly bottom-up and the policy is not created in cooperation with stakeholders (mostly, it was created as a result of the public sector's wish to professionalise) and both of these things make the policy vulnerable in terms of its coordinative capacity. However, the bottom-up approach does allow for the *increase of awareness* of the demand on public sector side and the supply on the private sector side, as the

link and subsequent contact between the two parties is much stronger than in other innovation-stimulating measures. Therefore, it can be concluded that the system failure of *lack of awareness* is addressed through the Dutch PPI schemes, especially through SBIR and the network activities of PIANOo.

The *link to private demand*, which is crucial when the aim is to truly transform markets, is *not sufficient*. The only true efforts in this direction are SBIR's strong links to industry, and the attempts to bundle public demand. However, in general, the system failures *articulation of demand* and *user-producer interaction* that could be improved were this capacity better developed are not addressed properly. Moreover, considerations of *risk vs. uncertainty and costs* are also not eased, since the link to private demand is too weak. On the other hand, the Dutch government's capacity to *cope with complexity and procurement discourse* (third capacity), which mainly entails articulating (long-term) demand, is doing quite well. Through several long-term strategies and foresight meetings, *(long-term) demand articulation* is stimulated, and *awareness* of what is offered in terms of supply and demand is increased. Although the development of long-term visions and strategies usually alleviates concerns regarding *risk in terms of uncertainty and costs*, it is hard to tell if they are sufficient in this case. There is no supporting evidence or evidence to the contrary.

The fourth capacity, *activating and enabling the procurement chain*, is fairly well developed, mainly due to the activities of procurement agency PIANOo and the recent development of the digital market place TenderNed. However, the incentive structure of general public procurement still backs the 'low-cost' rationale, which seriously hampers the alleviation of the *costs vs. risk deadlock*. Furthermore, existing rules and norms are sometimes perceived to be either too strict or too light. Both are hampering PPI to be successful and are increasing *uncertainty deadlocks*. The fact that existing financial support systems can be integrated with the PPI programmes is supporting the solution to the *costs vs. risk deadlock*, but it is uncertain if and how this will change as the government is cutting budgets wherever possible. Lastly, in general, the Dutch innovation system with its flexible and informal way and its tendency to include many stakeholders in its decision-making process is quite sophisticated. This in general brings a supportive culture and management to the PPI policies, and alleviates *uncertainty*.

5. Sweden

5.1. Introduction

Sweden has, in contrast to the Netherlands, a very low population density. It is located in the Northern part of Europe and is part of Scandinavia[23] and the often-collaborating partnership of The Nordic Countries[24]. Sweden is the third largest country in the European Union by area, but most of the population is concentrated in the southern half of the country. The total population amounts to approximately 9.4 million inhabitants. Sweden's capital is Stockholm, but the Southern region of Skåne generates the most economic value. In the World Economic Forum's Global Competitiveness Report 2010-2011, Sweden is ranked 2nd. It has reached this prominent spot only last year. Furthermore, the European Innovation Scoreboard[25] ranks Sweden one of the innovation *leaders* with an above average performance[26].

5.2. Development of innovation policy

One of the first major policy reforms that can be connected to the later development of innovation policy in Sweden dates back to the early 1970s, in which the social democratic government of the time launched an industrial offensive which focused on the importance of governmental interventions for technical development and innovation (Persson, 2008). In this sense, the Swedish overall industrial policy was focused on *correcting market failure* and many motives for policy change were related to projects of national importance (Marklund, 1994). The policy system in Sweden was at that point benefiting "a small number of large actors at the expense of domestic heterogeneity, competition and entrepreneurship" (Roos et al., 2005). This resulted in a technology policy that developed a *balanced and intimate relationship* with a *small number of Swedish R&D intensive* and engineering companies. Therefore, Sweden became a country that boasted a *close collaboration relationship between government and industry*. Later, the industrial policy was refocused on deregulation, privatisation of public companies and support for the creation of new companies (Persson, 2008). The main policy instrument that was left after these reforms was direct R&D support.

The second half of the 1990s was dominated by an economic recession. Many policy instruments focused on collaboration and co-funding of research, thus strengthening the ties with business even further. The social democrat government that was in power again in that period attempted to strengthen the role of the universities and establish *more contact between universities and society and business*. Furthermore, there was a large focus on the development of a new growth policy, which aimed at stimulating *regional* growth. In general, the policies became more *generic*, which made them more difficult to implement (Persson, 2008). However, as the restrictions on the international mobility of goods, services, capital and labour were reduced because of *globalisation*, the weaknesses in the Swedish system became clear (Roos et al., 2005). This brought about a crisis in the Swedish innovation system, as the Swedish multinationals suffered from global competition and jobs were moved out of the country. Therefore, Sweden had to radically adjust their policy system and work towards creating a more (internationally) favourable business environment (Roos et al., 2005; Persson, 2008). This induced a change in *technological, research and industry policy* in 2000, as the policy started to change into what we now call innovation policy. This start was most notable with the creation of Vinnova, the Swedish Agency for Innovations Systems in January 2001 (Widmark, 2011), which was the result of an initial proposal by a governmental commission called Research 2000, which promoted a stronger focus on *basic research* and the *decrease of the number of governmental sectoral or applied research agencies* (Eklund, 2007).

Vinnova was to become a new R&D agency, which would focus more on *societal relevance*, and would as such conduct 'needs-oriented' research (Ds, 1999:68). In fact this new approach bridged the gap between the existing sectoral agencies and the proponents of a more general, innovation focused research agency, driven by the development of industry and society (Persson, 2008). However, Vinnova interpreted its mission even more broadly; they also initiated *extensive collaboration* with other agencies (not only in research programmes, but also industrial and labour market policy programmes) and as such functioned as a network-

[23] Denmark, Sweden and Norway.
[24] Denmark, Finland, Iceland, Norway and Sweden and their associated territories, the Faroe Islands, Greenland and Åland.
[25] PRO INNO EUROPE, an initiative of Directorate General Enterprise and Industry which aims to become the focal point for innovation policy analysis and policy cooperation in Europe. Available on: http://www.proinno-europe.eu/inno-metrics/page/sweden
[26] Compared to EU27.

oriented agency (Persson, 2008). Furthermore, it has lobbied for a stronger *centrally governed innovation policy* and has actively pursued this goal by creating alliances with other actors, not only from policy but also from industry and the civil society. Vinnova has established itself as a relatively strong actor in the Swedish national innovation system. According to Persson (2008), Vinnova seems to build its innovation policy on established innovation theories, and includes all three domains in its objectives: *government, industry and the civil society*. The creation of Vinnova ran in parallel with the development of a formal innovation policy (Proposition 2001/02:2), which focused on three things mainly: (1) the creation of Vinnova and the allocation of funds to the new agency; (2) competence-building at the universities, especially the ones that were industry-oriented; and (3) funding for holding companies at universities (which enabled companies to develop specific projects and commission education) (Proposition 2001/02:2). This proposition formed the basis of the innovation policy and was aimed at enabling an *effective innovation system*, mainly through instruments that promoted *coordination and collaboration of actors* within the system (Persson, 2008).

In 2002, an initiative called 'The future for Swedish industry' was set up by a group of mixed actors from industry and government, with recommendations to strengthen the Swedish innovation system, and most of these were incorporated in the new innovation policy. Another reason for the innovation policy to change was the development of the EU's Lisbon strategy, which emphasised the *role of R&D and innovation* for economic growth. As an answer to this, the government developed the *Innovative Sweden Strategy* in 2004. This strategy was aiming at dealing with long-term growth issues and again, its main objective was to create a *good climate for innovation*. In the strategy the Swedish national innovation system was analysed, and the challenges for the future identified (Ds 2004:36). It aimed also to integrate research policy with innovation policy, and to promote *linkages* between the larger companies and SMEs, and between the private sector and knowledge institutes. Consequently, it broadened the scope of the previous technology or research policy by emphasising *'soft' policy instruments*, e.g. creating a good climate for innovation, building networks and social capital and stimulating cooperation between the different actors in the system (Ds 2004:36). Public procurement was mentioned in this document, but no national policy was developed as a result of it (OMC-PTP, 2010). In line with this new strategy, an *innovation policy advisory council* was set up at the end of 2004, after the Finnish example. The Minister of Industrial Affairs chaired this council, and the goal was to establish stronger ties and dialogue with business and research representatives. Another aspect of the innovation strategy was the *provision of risk capital and commercialisation of new ideas*, especially as the private companies were very cautious at that time (Persson, 2008). However, dissatisfaction among many actors remained, mainly because of the perceived *lack of political steering* in this area. Vinnova is one of the main actors who promoted a coherent innovation policy council led by the prime minister (again, after the Finnish example) and a stronger focus on needs-oriented research, but other parties have also been lobbying for these reforms (Gergils, 2006). They mainly argue that the new Innovation Strategy is *not radical enough*.

The government requested an investigation into the issue of PPI in 2006 and found that there were some regional efforts going on in this area already. Vinnova then published a report in 2007, called *Public Procurement as a Driver for Innovation and Change*, which really put public procurement on the political agenda, especially in the areas of environment, health care and transport (Vinnova, 2007). It is considered the *first real strategic document on public procurement* and its possibilities for innovation in Sweden (OMC-PTP, 2010). The report included a field overview of PPI and a policy advice on the subject (Fineman, 2011) and suggested that PPI should become incorporated in all the *public procurement procedures* of the Swedish governmental agencies. Furthermore, it provided suggestions for incentives and supporting structures, as well as recommendations on an information source on public procurement to evaluate the concept and its scope and innovation capacity (Vinnova, 2007). In 2008, another bill on Research and Innovation was launched (Proposition 2008/09:50), in which most of the governmental R&D funding was allocated to academic institutions, while introducing a competition-based system for the universities to get the money. In addition, the new strategy is focusing on "strategic programmes for key industries, a better structure for seed financing, focused R&D investments in engineering, life sciences and natural sciences combined with measures to strengthen the industrial institutes and innovation activities in SMEs" (INNO-Policy, 2009b, p. 22). Furthermore, it includes an initiative aiming at increasing the commercialisation of research results (thus innovations for community and business) (Edquist and Hommen, 2008). The 2008 bill does not incorporate the suggestions of the Vinnova strategy report, but does address opportunities associated with public procurement (OMC-PTP, 2010). In 2010, the Swedish government commissioned an inquiry, which investigated the conditions for public innovation procurement in Sweden and "put forward proposals for measures to increase the application of innovation procurement" (SOU, 2010:56,

p. 27). This inquiry stated that, although a broad and long-term knowledge base is paramount for a country's innovative potential, the translation into products and services (shortly: commercialisation) of this research was insufficient in Sweden at the moment, and that a manifest and articulated demand for this products could stimulate this process (SOU, 2010:56).

5.3. National innovation system

In this section I will give an overview of the Swedish national innovation system and its main actors, with the explicit aim of providing context for the PPI policy. In Figure 16, the Swedish national innovation system is depicted. This figure is based on Chaminade et al., 2010; Widmark, 2011; Sandqvist, 2011; Roos et al., 2005; Sandberg, 2008; INNO-Policy, 2009b; and the various websites of the agencies and institutions depicted in the figure.

An important characteristic of the Swedish policy system is that it is very fragmented – local authorities and county councils as well as governmental agencies are very independent and manage their own budgets (OMC-PTP, 2010; Widmark, 2011). This fragmentation and decentralisation has its benefits, i.e. it provides freedom for the organisations and it lessens bureaucracy, but it impedes implementing a coordinated policy and makes it more difficult to govern the myriad of organisations (OMC-PTP, 2010). Furthermore, Sweden is, like many countries, very internationally oriented. This is also reflected in the national innovation system; as most of the R&D comes from the small pool of large multinational firms in Sweden, they have a lot of influence. Furthermore, Chaminade et al. (2010) identified a trend of mergers and acquisitions of Swedish technology intensive firms by foreign companies.

The decentralised system seems to be working fairly well. The World Economic Forum's Global Competitiveness Report 2010-2011 states that Sweden "benefits from the world's most transparent and efficient public institutions, with very low levels of corruption and undue influence and a government that is considered to be one of the most efficient in the world: public trust of politicians is ranked a high 3rd" (World Economic Forum, 2010). Sweden's national innovation system is very sophisticated and complex, but also one of the most innovative and productive ones in the world (World Economic Forum, 2010). In general, the institutionalised system of state commissions of inquiry in Sweden is found to be very strong, and seems to have facilitated the communication between experts, interest groups and the state (Persson, 2008). Furthermore, in a recent evaluation of the performance of the Swedish national innovation system, the Swedish system scores relatively high (INNO-Policy, 2009b).

The Swedish innovation policy (under the umbrella of research or enterprise policy) is managed by the Ministry of Enterprise, Energy & Communications. Vinnova implements innovation policy on a national level mainly through financing needs-driven research and developing and strengthening networks (cooperation between actors) that are a necessary part of innovation activities. Tillväxtverket (Swedish Agency for Economic and Regional Growth), Tillväxtanalys (Swedish Agency for Growth Policy Analysis), the Environmental Management Council, Knowledge Foundation and the Foundation for Strategic Research are all intermediaries who complement the work by Vinnova. The Ministry of Education & Research handles policy issues relating to universities, which is where most of the publicly funded R&D in Sweden is conducted. Vetenskapsrådet (the Swedish Research Council) funds basic research in all domains that is located outside universities. The Energy Agency is a very advanced and mature agency that plays an important role in the energy field, through a myriad of policies. Konkurrensverket (the Swedish Competition Authority) is a state authority working to safeguard and increase competition, but this is also the agency that coordinates general public procurement in Sweden. The private sector is represented by Teknikföretagen (represents Swedish engineering companies, the main part of the Swedish private sector) and Svenskt Näringsliv (Confederation of Swedish Enterprise).

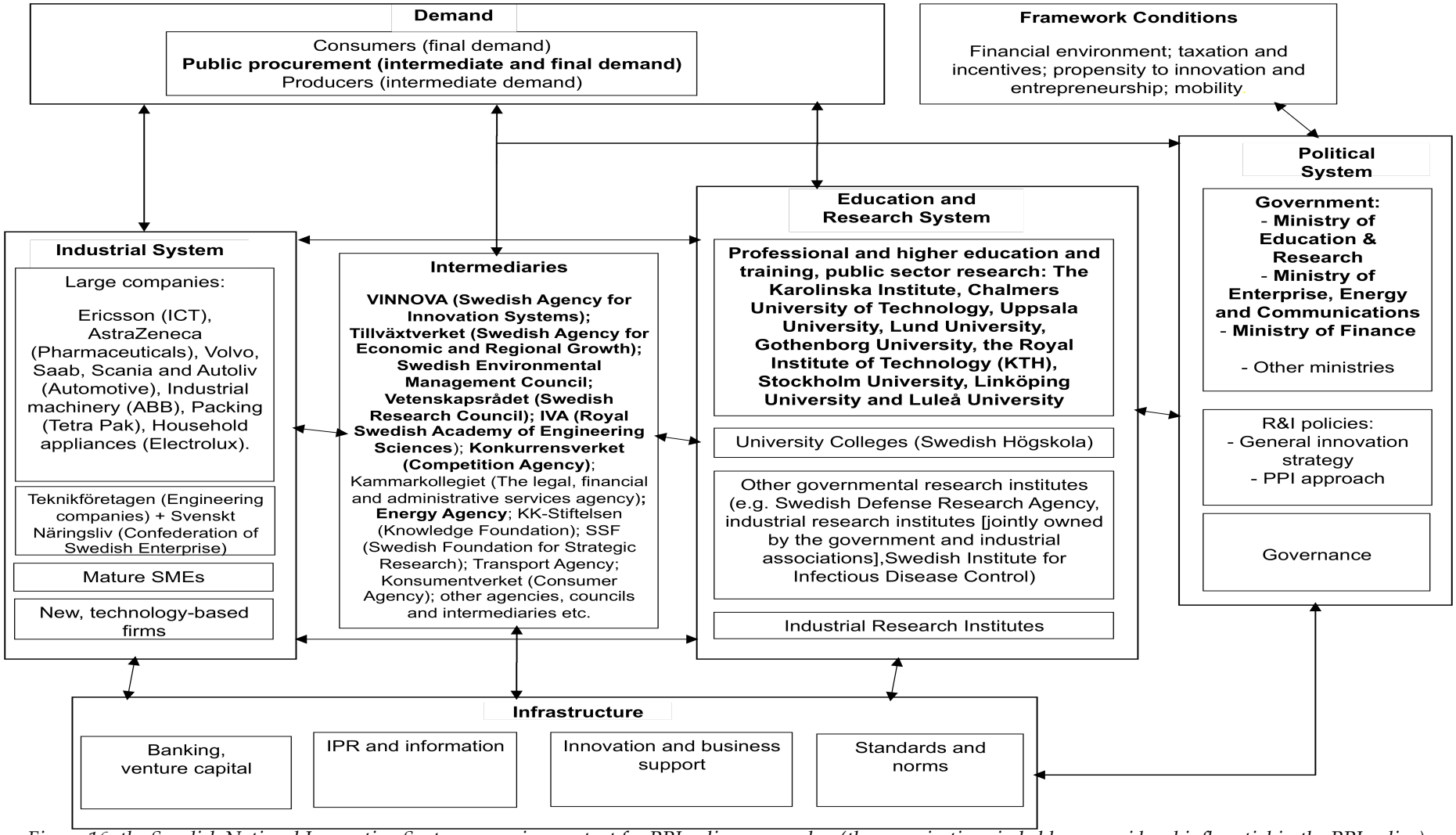

Figure 16: the Swedish National Innovation System, mapping context for PPI policy approaches (the organisations in bold are considered influential in the PPI policy)

5.4. Reconstruction of PPI policy theory

5.4.1. Decentralised PPI approach

The Swedish example of early PPI approaches has been discussed in many places (Neij, 1999; Suvilehto, 1997; Neij and Öfverholm, 2001; Edler and Hafner, 2007). It is one of the classic examples of a successful case of PPI policy and has been evaluated in several studies. In more recent efforts, the Energy Agency continues to invest in PPI as a policy. The main difference with the earlier initiatives is that the agency focuses more on discourse, i.e. demand articulation through establishing user groups (Edler, 2009; Berggren, 2011). The user groups are discussing and identifying common needs, while market intelligence groups are investigating the potential for technological improvements and the ability of the Swedish producers to turn these technological improvements into successful innovative products. Furthermore, the Energy Agency focuses more on so-called system solutions; our society is increasingly dependent on major, complex systems, which require involvement of many actors and financiers (Dalhammer et al., 2011). This makes it more complicated to intervene in, or steer or change the systems that are already in place – hence system solutions are needed. The strategic intelligence that is used in the new PPI approaches lies mainly within the Energy Agency itself (Swedish Energy Agency, 2011; Edler, 2009). Furthermore, Edler (2009) argues that, more than before, the focus in the tenders lies on *technological innovation*; mere diffusion of existing energy-efficient technologies is not aimed for. Because of the way the tender-process is organised, not only the winner of tender, but also the whole sector is driven towards technological innovation (Berggren, 2011; Edler, 2009).

The main aim of the PPI approach is to *transform the market for more energy-efficient technologies*. For each technology, the Energy Agency employs a mix of various policy instruments, thus streamlining and adjusting the policy mix to the *specific needs* of the different markets. The other policy measures are quite traditional and are spread over the whole spectrum of both supply- and demand-side measures. They include (Neij and Öfverholm, 2001; Kiss, 2011):

- Energy taxes: raise energy prices to encourage efficiency measures and to promote the adoption of energy efficient products in the long run; and internalise externalities like climate change, health effects of fossil fuels, etc.
- R&D programmes: public investment in R&D in energy efficiency, which resulted in an improved awareness of potential energy efficiency and the introduction of some energy efficient technologies in industry.
- Subsidies: public money for energy-efficient products, thus enabling a price reduction of the product for the consumers.
- Consumer information, education and training programmes: demonstrations, campaigns, seminars, education programmes, advisory programmes, labelling, etc.
- Efficiency standard setting[27]: promoting and ensuring a base level of energy efficiency, eliminating the worst products and increase the general level of performance of the products.
- Basic demand-side-management: mostly isolated publicity-oriented campaigns and in case of a very new innovation, demand subsidies were granted.
- Voluntary agreements: contracts between government actors and a company or association aimed at achieving a negotiated goal. In return the company may receive tax credits, technical support, energy surveys, etc.

The PPI programmes are linked to all these other instruments. However, especially the marketing and support measures to raise awareness were imperative for the success of the public procurement approach. Other complementary measures were used whenever it fitted the specific market (Edler, 2009; Neij and Öfverholm, 2001). The Energy Agency very much stresses that the form of PPI they use is *technology procurement* (Berggren, 2011). However, as it also has a strong societal aim it can be classified as strategic procurement[28]. Technology procurement can be defined in a narrow way: to buy an article or a service that does not exist on the market, which requires development to fulfil the purchasers' objectives and demands (STU, 1980). However, the Energy Agency uses a broader definition: "a bidding process to stimulate and promote the development and market introduction of a new technology" (Swedish Energy Agency, 2011). Both technology procurement and strategic procurement are utilised by sectoral ministries or agencies and aim at market transformation in a certain sector, using innovation to get there. The difference between strategic procurement and technology procurement is mainly technology procurement's focus on a specific technology.

[27] This particular instrument requires a continuous quality revision by the government, as actors generally do not have the incentive to go beyond the standard that has been set.

[28] In fact, I would say that every form of technology procurement is a form of strategic procurement, but as it focuses so much on a specific technology it is reasonable to make the distinction.

However, as Edquist (2009) points out, technology procurement can also be considered an older, narrower version of strategic procurement. Edquist et al. (2000) were the first to exclusively describe public technology procurement, but in the more contemporary vocabulary, 'technology' has been replaced by 'innovation', thus *broadening the definition*.

Concerning further PPI classification, the Energy Agency uses mostly public procurement in connection with private users (*co-operative procurement*). In some cases, they even use *catalytic procurement* and just facilitate the buying process, bringing together groups of buyers but not actually buy the technology themselves (Berggren, 2011). Furthermore, depending on the technology (its position in the innovation diffusion cycle and the specific development-goal associated with the technology) the Energy Agency employs both *pre-commercial* and *commercial* procurement, but always aims at supporting the innovation to a commercialised stage (Kiss, 2011). The decentralised PPI programme attempts to be all encompassing and as such has the potential to solve *all system failures* identified earlier in this thesis.

5.4.1.1. Causal relations

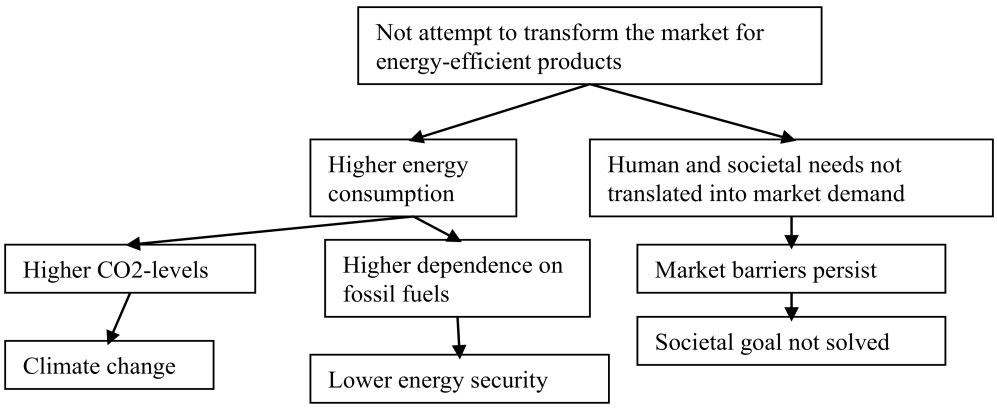

Figure 17: Causal relations of decentralised PPI in Sweden

In this policy theory the cause-effect relation are the consequences brought about by the state actor (in this case the Energy Agency) when they do not attempt to transform the market for energy-efficient products (cause) that leads to two policy problems (effects) that have to be solved. The first problem is a higher energy consumption, which leads to climate change and a lower energy security for Sweden. The second problem is unarticulated demand (no translation of human and societal needs into market demand), which leads to not solving societal goals. In the case of the Energy Agency this entails that it does not accomplish the directive that the central government gave it, thus endangering the funds that are allocated to the Agency, and that it does not serve society by helping to bring them energy-efficient technologies of high quality.

5.4.1.2. Final relations

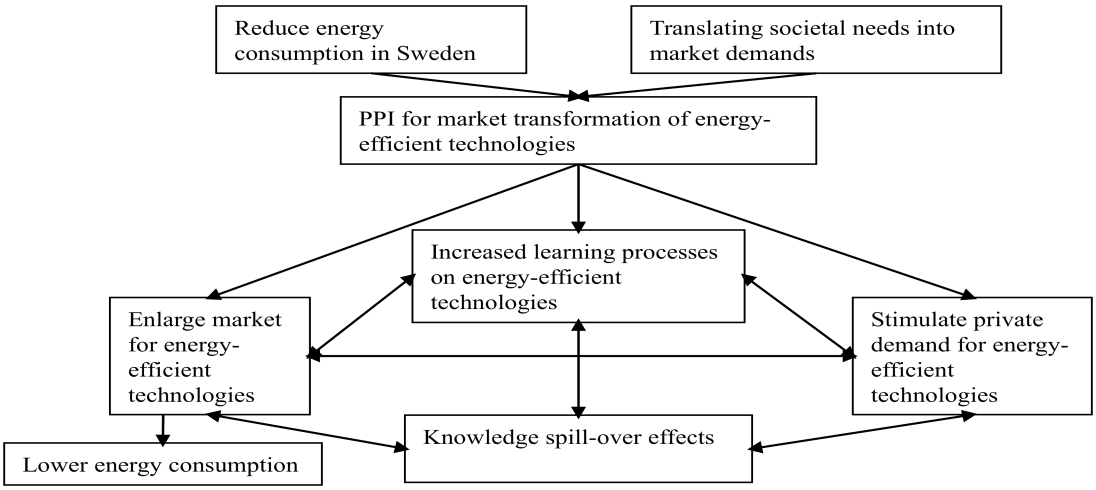

Figure 18: Final relations of decentralised PPI in Sweden

The objectives of this policy are twofold: on the one hand, it strives to use the government's purchasing power to articulate demand through translating societal needs into market

demands. The perceived societal need would be to bring society cheap energy-efficient products of high quality. On the other hand the Energy Agency aims at reducing the energy consumption in Sweden. Through using the PPI approach for market transformation of energy-efficient technology (note the specific sectoral objective), there are three immediate effects: if large volumes of the new product are procured, the market for energy-efficient technologies will be enlarged (Kiss et al., 2011; Neij and Öfverholm, 2001), the learning-processes on energy-efficient technologies will be increased (Kiss and Neij, 2011), and private demand for energy-efficient technologies will be stimulated (Edler, 2009). Furthermore, long-term effects when technology procurement acts as a market catalyst are lower energy consumption as a result of a larger market for energy-efficient technologies, and knowledge spill over effects (Stigh, 2007).

The buying process and the intermediate measures taken to reach these objectives are different for every technology (depending on what the technology-specific problem is). However, the model that is being used by the Energy Agency always includes the following steps (Stigh, 2007): (1) A pre-study; (2) Formation of a purchasers group; (3) Formulation of a requirement specification; (4) Tendering process; (5) Evaluation of tenders; (6) Announcement of the winner; (7) Dissemination of information about the new product; (8) Further development. In every case, to stimulate the development and commercialisation of a new innovative energy-efficient technology, the gap between buyers and manufacturers must be bridged: the buyers should get products that better suited their needs and the manufacturers should have a reduced risk to develop innovative products. In addition to the general buying process, similar for all technologies, the Energy Agency brings together and mobilises potential purchasers (both public and private) and establishing a discourse with actors on the whole value and demand chain (Edler, 2009; Stigh, 2007). This chain includes intermediate suppliers like wholesalers and craftsmen, etc. From this discourse, a technology with a high energy-efficiency potential can then be defined.

Then the buying process continues with a specification of the desired product (Lögdberg, 1995). This specification is developed by a purchaser-group, i.e. dedicated purchasers and specialists in cooperation with the Energy Agency. Usually, the targets are ambitious both in energy savings and in cost savings (Berggren, 2011; Kiss et al., 2011; Kiss, 2011). For instance, for the heat pump case, the specification "required a heat pump 30% more effective and 30% cheaper than the existing models on the market, high quality and reliability standards, and did not allow products using CFC/HCFC" (Kiss et al., 2011, p. 3). As a second step, a competition is announced in which manufacturers can enter their prototypes (naturally, the prototypes must comply with the requirements in the specifications). The Energy Agency, who monitors the process, ensures that at least a certain amount of units from the winning technology will be purchased. The Energy Agency then appoints a jury who will decide on the final model. In some cases, a third party tested the prototypes as well, to ensure credibility. After the winner is announced, information about the product is spread, and the product is developed further.

5.4.1.3. Normative relations

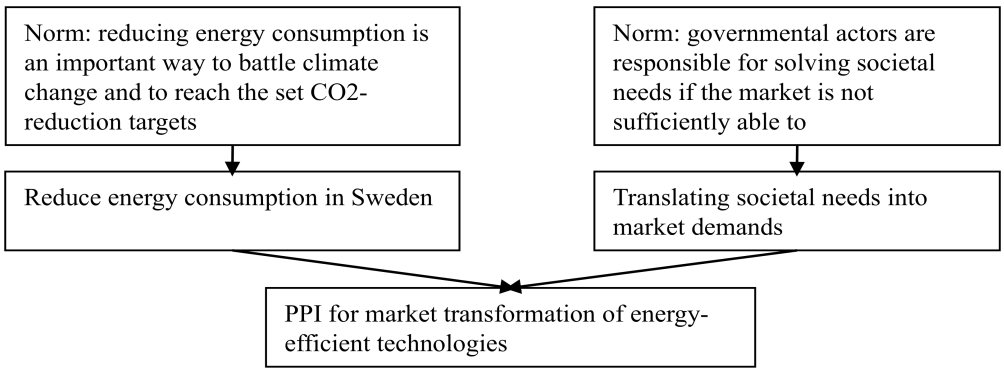

Figure 19: Normative relations of decentralised PPI in Sweden

Sustainable development has become more important over the past few decades and is perceived as being important for our future. The importance of sustainable development is stressed in the Energy Agency policy documents, after which they also mention that the reduction of energy consumption is an important way to reduce CO_2 and through this battle climate change. This is also a result of the policy framework in which this policy is embedded. This norm is clearly a form of what Edler (2009) and Edler and Georghiou (2007) call political target orientation, through the stimulation of sectoral policy objectives, in this case energy

reduction. The other conceptual side of political target orientation, the stimulation of growth and competitiveness is not mentioned at all in the policy documents, and is therefore not assumed to be a norm behind the policy. The other norm is not mentioned in the policy document, but is an implicit norm behind the policy: governmental actors are expected to solve societal needs if the market is not sufficiently able to. In this case, the system failure is an inability to translate societal needs into market demands – which incorporates all the system failures identified earlier in this thesis.

5.4.1.4. Reconstructed policy theory of decentralised PPI approach

In the figure below, the causal, final and normative relations of decentralised PPI approach are combined.

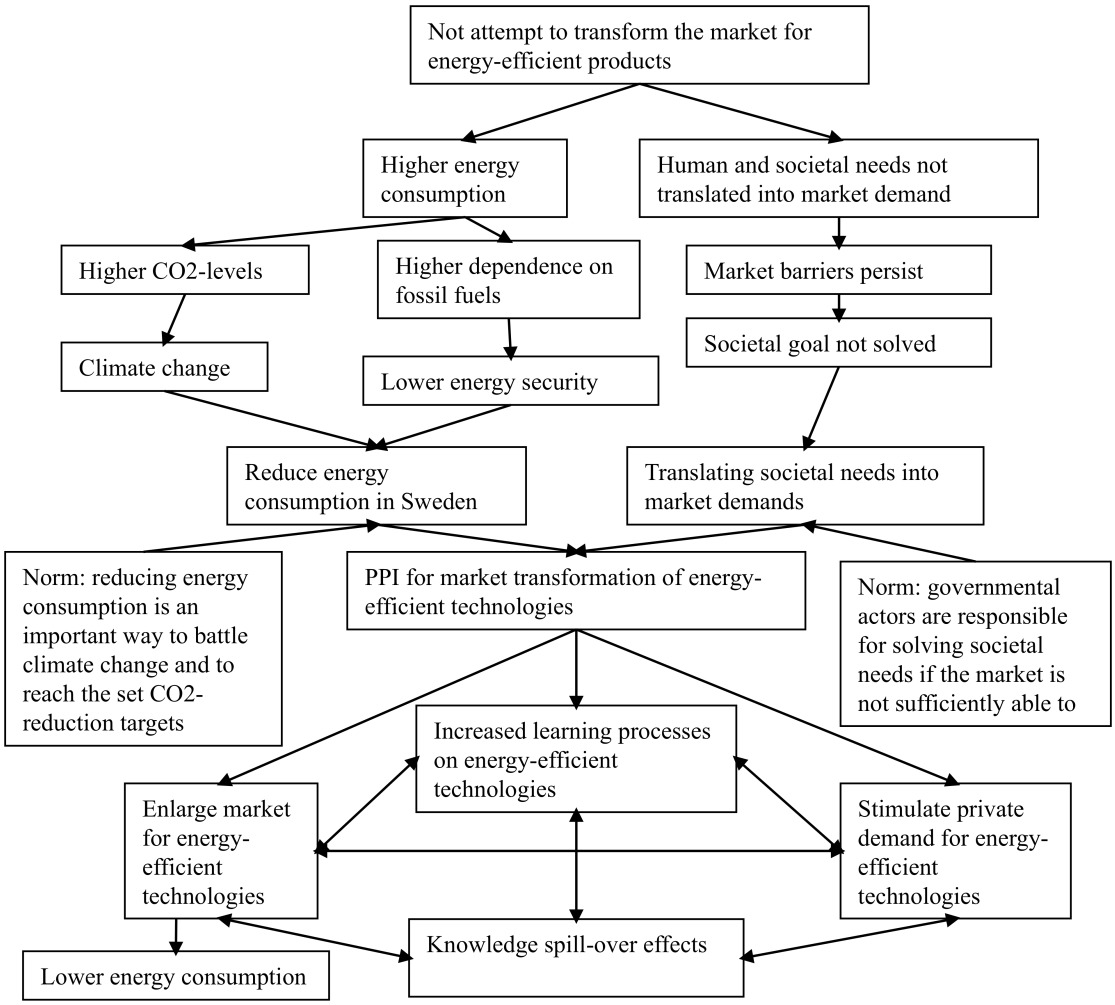

Figure 20: Reconstructed decentralised PPI policy theory

The policy objectives (reducing energy consumption in Sweden and translating societal needs into market demands) are clearly related to the policy problems (respectively: climate change, lower energy security and not solving societal goals). The policy instruments also relate back directly to the objectives and therefore the causes of the policy problem.

5.4.2. Centrally governed PPI approach

Apart from these decentralised PPI activities, of which the Energy Agency is the most notable actor, a fairly well organised and systemic centrally governed PPI approach is being set up as well. This initiative was a result from both a perceived Swedish Paradox and pressure from Vinnova. Especially the environmental field could benefit from innovation procurement, as the public sector's considerable buying power could then help finance the development of new environmentally friendly goods and services while increasing the innovativeness of the sector (SOU, 2010:56). The 2010 public inquiry recommends a prominent role for Vinnova to coordinate and initiate innovation procurement in Sweden. The inquiry is carried out with consultations at Kammarkollegiet (Administrative Services Agency), Konkurrensverket (the Competition Authority who manages general public procurement) and Regelrådet (N2008:05). Furthermore, consultation took place with relevant authorities: Vinnova, the Growth Agency (Tillväxtverket) and the Energy Agency, and followed any applicable EU directives (Dir, 2009:104). Lastly, the inquiry consulted with relevant interest groups, including Swedish municipalities and regional governments.

Vinnova would set up their own PPI projects, but also coordinate existing projects so as to bundle expertise and obtain an overview of Sweden's activities in this particular area. Furthermore, they would have to build up a competence centre on innovation procurement, which would be able to support individual agencies with expertise, marketing and a clear-cut PPI roadmap (SOU, 2010:56; Widmark, 2011; Fineman, 2011). At the moment, Vinnova still has not received the official assignment by the government that the recommendations of the 2010inquiry will be implemented. However, the reasonable expectation is that this official assignment (and of course, the subsequent funding) will be granted somewhere later this year (Fineman, 2011). In the meantime, Vinnova has taken some steps to implement the recommendations already. In 2009, Vinnova funded some pilot projects that experimented with PPI, so as to demonstrate a forward commitment. These pilot projects were on very diverse areas, e.g. food for the elderly and PVC-free blood bags[29] (Widmark, 2011). Furthermore, Vinnova has started an award-funding programme for R&D projects carried out by innovative companies, which can be considered a forerunner of pre-commercial procurement (Widmark, 2011). Moreover, Vinnova itself has allocated some small funds from its own budget to start more pilot projects on PPI (Widmark, 2011; Fineman, 2011). The 2010 inquiry recommends further funds to be allocated to Vinnova, stating "in some cases, when the socio-economic value of the new solution expected to be generated is significant, Vinnova should also be able to provide grants also for the contract costs. This should be applicable to pre-commercial procurement, especially during the prototype phase" (SOU, 2010:56, p. 35).

Following the 2010 inquiry's recommendations, Vinnova is at the moment defining a programme concept on PPI, in which pre-commercial procurement has a prominent role. The inquiry further proposes an Act on Pre-commercial Procurement that should change the Swedish legislation so as to facilitate pre-commercial procurement. Vinnova would have the mandate to coordinate pre-commercial procurement assignments for other governmental agencies (see Appendix 11 for a full description of the inquiry's proposal on pre-commercial procurement). In fact, the Swedish pre-commercial procurement system would be similar to the SBIR-programme in the Netherlands. Furthermore, the government has issued another public inquiry on PPI, which is scheduled to be ready in 2012. This inquiry focuses more on the legislative side of PPI (which is currently believed to partially obstruct PPI in Sweden) and also on ethical, economical and social aspects (Widmark, 2011). The aim of this inquiry is to "investigate if the procurement rules adequately allow for the contracting authorities and entities to make good economic business by using the competition in the market as well as using its buying power to improve the environment, taking social and ethical considerations, and provide for increased business opportunities for small and medium-sized businesses" (Upphandlingsutredningen, 2011). Apart from this main mission, the inquiry will review the collection of procurement statistics, in order to improve access to forecasting the impact of reforms, so as to better monitor and evaluate the procurement policies of the European Union and Sweden. Furthermore, Fineman (2011) sees room for improvement in the incentives for PPI.

Although the official assignment has not yet been granted, the centrally governed PPI approach can be distilled from the 2010 public inquiry and from the roadmap that is being developed within Vinnova now. The main goal of the centralised approach is quite clear: to function as a rallying point for all PPI initiatives, and to provide service and expertise for all these initiatives, so as to stimulate the country's innovative businesses and professionalise the public service. Naturally, Vinnova will employ more policy instruments than just public procurement; most likely PR-, information- and network activities, as well as a continuation of the innovation subsidies (supply-measures) that exist now (Widmark, 2011). However, it is difficult to determine the exact approach and policy mix at this point, as Vinnova has not formally started with their activities.

This also holds true for a classification of PPI-type that will be used by Vinnova. The first thing that is important to note is that Vinnova will not be buying an innovation itself. Rather, it will *facilitate* the buying process or the pre-commercial procurement for other governmental agencies. As such, Vinnova will have a *buy/use moderation* role. However, Vinnova will stimulate other actors to buy innovations (either pre-commercial or strategic procurement) and may as such also invest money in PPI-projects. Although they will thus not be a direct

[29] However, in the PVC-free blood bags case, technology procurement was not deemed feasible as the lead time for full PVC-replacement is long and the products that were developed in the pilot project were too far from market introduction. Still, in the pilot project it became clear that customer demand played an important role in the development of alternative products and that an enlarged purchaser-group could change the status quo. For more information in this pilot project, see: http://www.jegrelius.se/images/stories/innovationsupphandling/Bloodbags/bloodbags_final_report.pdf.

buyer, this can be considered *general innovation procurement* (embedding innovation as a criterion in the procurement practice) or *strategic procurement* (as it will be generally aiming at enhancing national innovativeness). In the following sections I will attempt to reconstruct the policy theory of the centrally governed PPI approach, although it must be noted that at this moment, the programme is mostly merely plans and *not yet actions*.

5.4.2.1. Causal relations

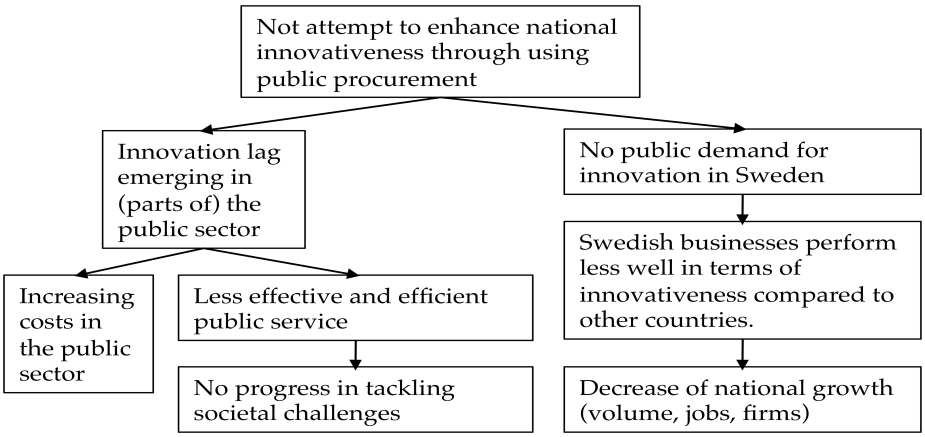

Figure 21: Causal relations of centrally governed PPI approach in Sweden

The policy problems in the centrally governed PPI approach brought about by the cause (not attempting to use public procurement to enhance the national innovativeness) are twofold. On the one hand, not having public demand for innovation will cause the Swedish businesses to perform less will in terms of innovativeness compared to other countries, which will eventually lead to a decrease of national growth. This is a danger especially for Sweden as it is an open economy that is very dependent on the global market. On the other hand, the public sector will become less innovative, which will lead to increasing costs and a less effective public service and a lack of progress in tackling societal challenges.

5.4.2.2. Final relations

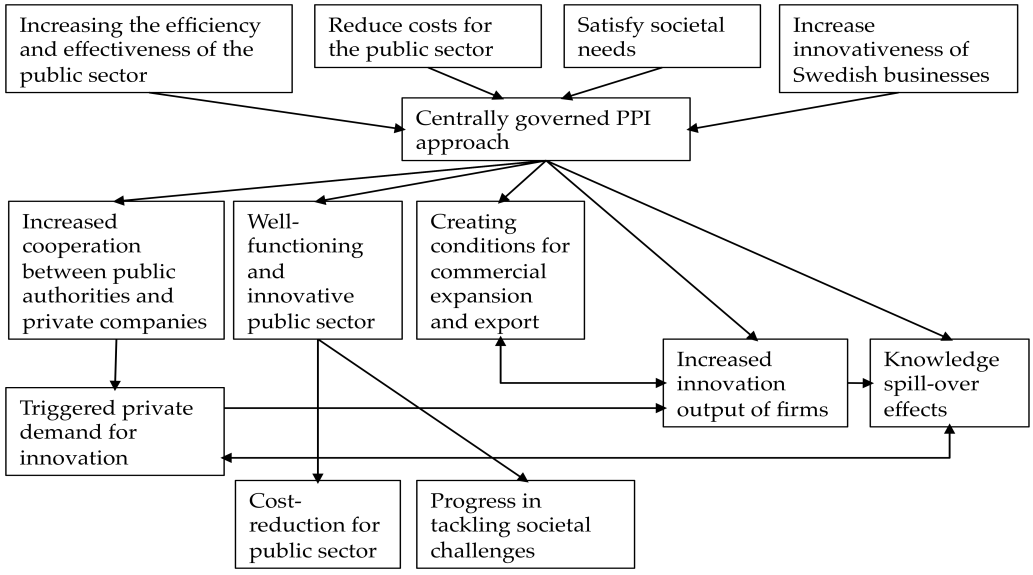

Figure 22: Final relations of centrally governed PPI approach in Sweden

The centrally governed PPI approach is more complicated and is a more integrated approach than the Energy Agency's sector-oriented approach. The objectives range from increasing the effectiveness of and reducing costs for the public sector, to satisfying societal needs and increasing the innovativeness of the Swedish businesses. As a result, the (aimed for) effects and the means to reach these objectives are also manifold. Through the central PPI approach, the cooperation between public and private bodies will be increased, the public sector will become more innovative (Vinnova, 2007) and good conditions for commercial expansion and export will be created (SOU 2010:56). On a second level, the increased public-private cooperation will trigger private demand for innovation (Edler, 2009), all these first effects will

increase the innovation output of firms and, as a result of the increased activities around the innovation and the increased public and private demand, knowledge-spill over effects will be generated. These effects are all greatly interlinked and thus the magnitude of their impact is also interdependent. This makes the PPI approach vulnerable, but also more effective if it works. Finally, the more efficient and innovative public service induces progress in tackling societal challenges and a reduction of the costs for the public sector in the long term (SOU 2010:56; Vinnova, 2007).

However, the use of innovation to further a certain societal goal (sector rationale) is something the public inquiry is recommending only *cautiously*. They state "engaging in a catalytic procurement constitutes a digression from the principle that public bodies should not recommend products or services from certain producers. Therefore, the catalytic procurement should only be used when there are strong reasons, and any such process must be conducted with great care" (SOU 2010:56, p. 33). However, they do emphasise the potential for innovation procurement in three areas in particular: health, environment and infrastructure (SOU 2010:56). In the environmental area, the inquiry would suggest PPI as a part of the current developments in *green public procurement*, as well as *pre-commercial procurement* where the public sector can "help finance the development work of new environmentally friendly goods and services" (SOU 2010:56, p. 34). Fineman (2011) stressed that the starting point of Vinnova's yet to define PPI programme concept would be *pre-commercial procurement.* However, the inquiry also mentions the potential of *Forward Commitment Procurement* (FCP), which basically entails stating certain intents regarding its future procurement contracts. This is not legally binding, but signals a promise that is morally binding, and the potential is large especially for environmental innovations (SOU 2010:56) (more on FCP in the UK section).

5.4.2.3. Normative relations

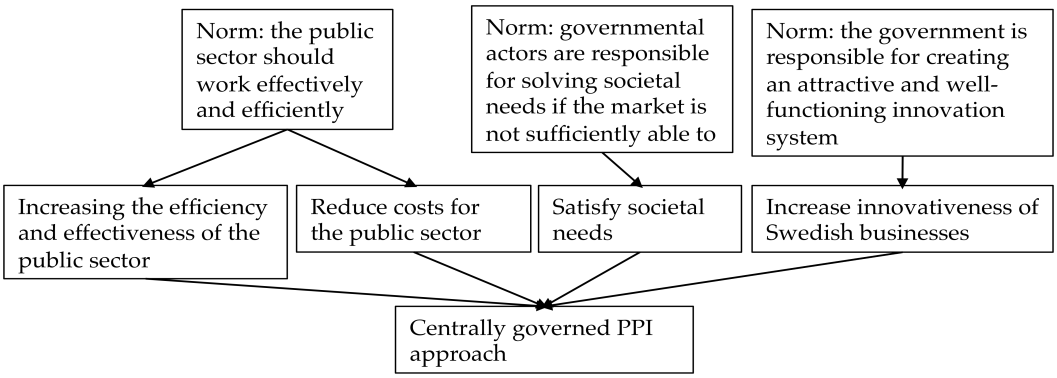

Figure 23: Normative relations of centrally governed PPI approach in Sweden

The complexity of the centrally governed PPI approach is reflected in the mix of rationales. The inquiry states, "the task is to take advantage of the opportunities to develop the public sector while at the same time strengthening competitiveness of innovative businesses" (SOU 2010:56, p. 28). This sentence reflects a *mix between two of the normative relations* depicted in Figure 24: the norm that the public sector should work effectively and efficiently, and the norm that the government is responsible for creating an attractive and well-functioning innovation system. The *effective and efficient public sector-norm* is probably the dominant rationale behind the centrally governed PPI approach, as it is a direct result from the underlying reason the inquiry was conducted in the first place. In the inquiry's directions from the government it is stressed that "the proposed measures should aim to strengthen the quality and efficiency of public services in its broadest sense with the support of innovation procurement. Such a process can also stimulate innovation and thus enhance conditions for structural changes in the private sector" (SOU, 2010: 56, p. 27). This last part of the directions relates to the rationale stemming from political target orientation: *public procurement to create markets and stimulate (national) growth and competitiveness*.

On the other hand, the inquiry also stresses the importance of PPI's potential to *solve societal needs* (with health, environment and transport as main areas of interest), which indicates its role in *solving system failures*, leading to the norm that governmental actors are responsible for solving societal needs if the market is not sufficiently able to. However, as the policy is not yet developed, it is *unclear at this moment* to which extent it will play a role in solving the system failures.

5.4.2.4. Reconstructed policy theory of centrally governed PPI

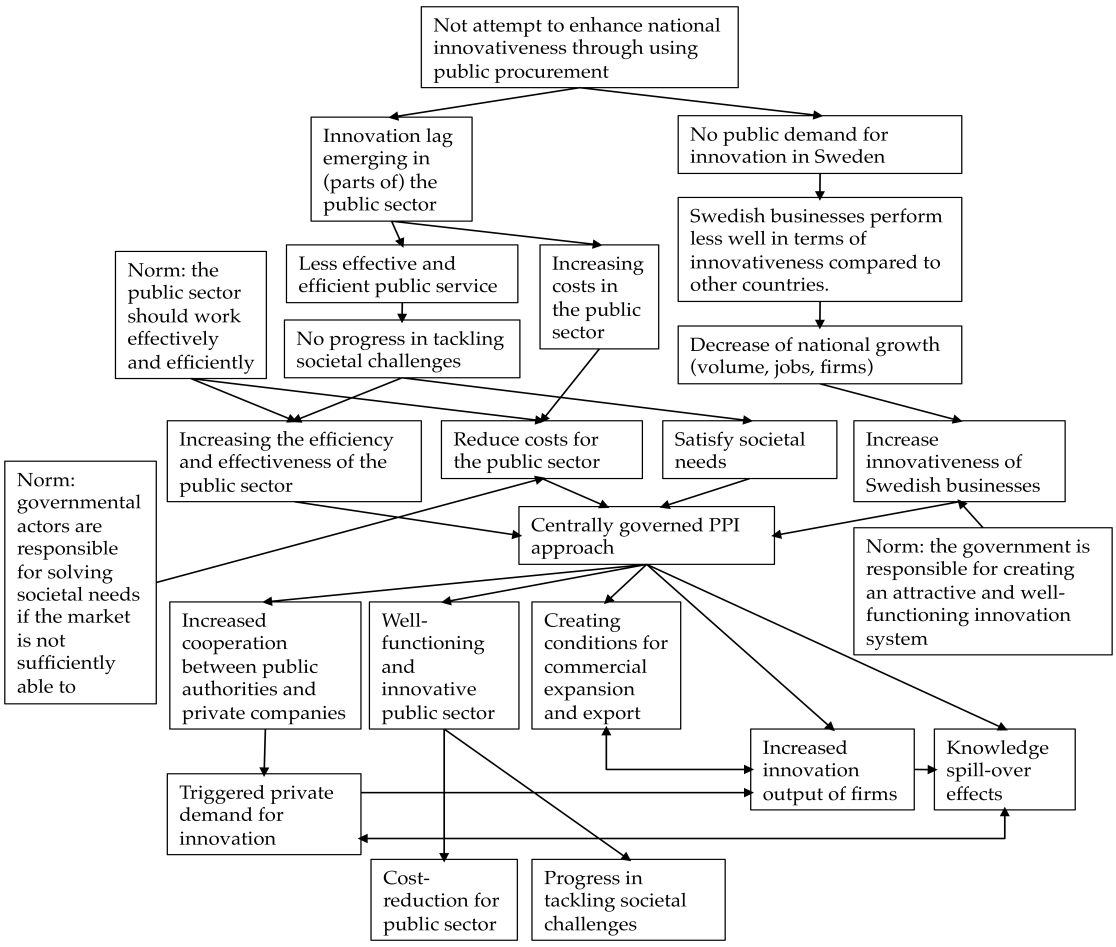

Figure 24: Reconstructed centrally governed PPI policy theory in Sweden – a complex interplay of objectives and a much-encompassing mix of rationales and norms

This policy theory is much more complex than the decentralised sector approach of PPI. Furthermore, it is unclear how this effort will work out in practice. Most likely, the centrally governed PPI approach will eventually have to be split up in different parts in order to make it more manageable. However, the policy objectives relate clearly to the policy problems. The instruments that will be used are a bit unclear still, but this is a direct result from the broad spectrum of the policy problems and subsequent objectives.

5.5. Empirical evidence: evaluations and flagship cases

The centrally governed PPI policy is not yet developed at the moment. However, it seems that the centrally governed PPI approach is more complicated and is a more integrated approach than the Energy Agency's sector-oriented approach. This is mainly a result of the broader aim of the policy. The goals of the policy are ambitious: on the one hand they want to professionalise the public service (and a subsequent consequence is also a very welcome cost-reduction) and work on satisfying societal needs, on the other hand they want to use public procurement to enhance the competitiveness of Swedish innovative businesses, so as to create a better-functioning national innovation system (SOU 2010:56). Especially this last objective encompasses a very broad target. However, apart from the reports on some pilot projects; there is no real empirical evidence yet.

In 2006, the government found that although there was no coherent national policy for PPI yet, some governmental agencies were already using the concept in different forms (OMC-PTP, 2010), e.g. the Energy Agency, the Swedish Road Administration (Vägverket) and Swedish Rail (Banverket) (the last two agencies, together with another governmental agency, merged into Trafikverket recently). It seems that in practice, most of the PPI efforts in Sweden are on a local, regional or sectoral level, on agencies' or municipalities' own initiative (Dalhammer et al., 2011). Most evidence available is on the Energy Agency's technology procurement, which was discussed earlier in this chapter. Both the earlier PPI cases as the more recent efforts are not the result of successful national governance. Rather, these are isolated cases initiated by the Energy Agency, who implemented PPI as a part of their

strategy to boost the production, improvement and diffusion of energy-efficient technologies (Neij and Öfverholm, 2001). As such, the Energy Agency pioneered the employment of demand-based policy instruments to stimulate a societal goal. The evaluations of the Energy Agency's early PPI projects have shown that the policy worked and the markets have transformed, i.e. the number of energy-efficient products went up, and the criteria of purchasers have become more ambitious (Neij and Öfverholm, 2001; Suvilehto, 1997; Edler, 2009, Berggren, 2011). Furthermore, the awareness measures coupled with the increased demand have resulted in a broader understanding of the meaning and availability of energy-efficient technologies in Sweden (Edler, 2009). The long time experience, internal competence of the people working within the Energy Agency and the long-standing networks they have built are conducive for its success (Berggren, 2011). More recent efforts are focusing on a stronger user-producer discourse and on the challenge presented by system solutions. However, Neij (2010), who reviewed the rules for tendering processes and detailed criteria for different product-groups (especially those with the main environmental impacts), found that the Energy Agency encounters many barriers still. These barriers are related to a lack of financial autonomy, a lack of available resources and hindering (EU) procurement rules, but also a lack of information about energy efficient solutions and their evaluations, insufficient data (e.g. baselines, 0-scenario), split incentives (between Energy Agency and private partners in demand) and in general insufficient priority and lack of clear mandates by the national government.

Fineman (2011) and Widmark (2011) argue that PPI can only be adopted by an agency when they are 'ready', which mainly entails that they are professional enough to supplement their current policies with PPI. Apart from the Energy Agency, there are several municipalities, regional governments and agencies that are currently implementing PPI (e.g. Stockholm municipality, the Transport Agency, Göteborg municipality and the regional government of Skåne in the South of Sweden), mostly on their own initiative. In 2010, the city of Stockholm and Vattenfall AB (one of Europe's leading energy companies) conducted a detailed and forward pre-study for a collaborative initiative to promote the market development of electric vehicles through procurement[30] (Stockholm & Vattenfall, 2010). They identified a public-private buyer-group and contacted potential suppliers. The study very clearly indicates the potential for the accelerated market introduction of electric vehicles and sets out a path to use public procurement to reach their goal, through a collaboration between public (regional) authorities and private companies, who both bring networks of their own (Stockholm & Vattenfall, 2010). This is a hopeful trend that could be picked up by more agencies/regional governments that are not willing to wait for the central approach to be developed fully (Dalhammer et al., 2011).

5.6. Strengths and weaknesses

5.6.1. Coordination capacity

Proposed solutions	Situation Sweden	Strong and weak points
Main management of the policy should be innovation department.	This is largely unclear at the moment. Sectoral agencies like the Energy Agency have much more experience with PPI then Vinnova, but every agency is mainly operating on its own without a centralised strategy. However, this enables flexibility and a non-bureaucratic process. Vinnova is aiming to provide the main management for PPI, but they do not have the formal assignment yet (although it is expected to be granted very soon) and do not have much expertise in this area yet. However, they aim to work together with a myriad of actors (among which the Energy Agency) to quickly build expertise and a cooperative approach. Vinnova is the innovation agency and functions under the Ministry of Enterprise, Energy and Communications.	(✔) Flexible, expert governmental agencies who manage their own PPI policies.
		(✔) A central management under Vinnova is being developed, which cooperates with many actors.
		✖ Much uncertainty about (the developments of) the management of the PPI policy.
		✖ No main management yet, fragmented efforts, all with their own approach.
Provide sufficient background information to ensure understanding in the	At the moment, this is a non-issue in Sweden, as any initiative to engage in PPI is located at the sectoral ministries or agencies. Vinnova is planning to build a competence centre on PPI, and they are preparing to	(✔) Information supply and competence centre is being developed.

[30] Sweden has very favourable conditions for electric vehicles: low energy costs with low CO_2-emmissions, an open production and transmission system and an existing infrastructure that can be modified to the needs of electric charging quite easily. Furthermore, Swedish people are proven to be early technology-adaptors and have a relatively high environmental awareness. Lastly, financial incentives to encourage the purchasing of electric vehicles are in place (Stockholm & Vattenfall, 2010).

sectoral ministries.	support procuring governmental bodies with background information, but this is not realised yet. They have developed some competence through pilot projects and discussions with stakeholders. As it is, the background information is available at very active agencies like the Energy Agency, and sectoral agencies can find it if they are looking for it, but only then.	(✔) Information supply and competence centre is being developed.
		✔ There is abundant information available at active agencies like the Energy Agency, but this will only be found if another agency is looking.
		✖ There is no coordinated effort on PPI yet. If agencies want information, they have to take the initiative themselves.
Create and maintain a concrete strategic implementation plan.	The sectoral initiatives' implementation plan is very advanced and even includes additional, supporting measures and a follow-up through additional (private) demand. Furthermore, if the 2010 inquiry is to be believed, there is definitely an implementation plan on the central level as well, but as it this plan is not actually carried out yet, and as it is quite broad, it is likely this plan will have to be adapted later.	✔ Very advanced implementation plan at sectoral agencies like the Energy Agency.
		(✖) Central implementation plan has not been carried out yet and most likely will have to be adapted.
		✖ The connection between the sectoral and central PPI programmes is not yet established.
Create the plan with stakeholders (from industry).	The sectoral schemes like the Energy Agency's technology procurement are created in full cooperation with experts in the field, including stakeholders from industry (e.g. producers) but also (end) users. The central 2010 inquiry is created with relevant interest groups, including municipalities and regional governments and many involved agencies and stakeholders from industry. However, the danger is that by including many stakeholders, there are many trade-offs as well, which decreases the potential of innovation procurement.	✔ The mature technology procurement strategies of the Energy Agency involve all relevant stakeholders.
		✔ The central Vinnova-strategy is created with many relevant stakeholders.
		(✖) With too many stakeholders involved, there is a danger of too many interests that have to be protected, which decreases the efficiency of the policy.
Guarantee commitment of the other (sectoral) departments.	Although officially the PPI approach is backed politically, Dalhammer et al. (2011) argue that true political will is missing, as the government does not really see the need to change their ways (although of course, this is not officially said so). This is also indicated by the long time it takes to grant the official assignment to Vinnova. Furthermore, most of the sectoral ministries are not truly embracing the innovation rationale, but if they are using PPI, they are using it merely as a means to get to their (sectoral) goals. Still, some (independently-running) agencies are interested in using PPI and, overall, if they are ready for such an organisational change, they are committed. However, this really depends on the readiness of the agency. Until now, the Energy Agency is by far the furthest; there are not many other agencies that are implementing PPI at the same level. But Vinnova is pushing this topic quite hard into the political arena, and this is inducing the interest of many (sectoral) governmental bodies.	(✔) Independent agencies show interest for PPI and take initiative out of their own accord.
		(✔) Vinnova is pushing the topic of PPI in the political arena.
		✖ Necessity and role of innovation not embraced throughout the Swedish government (or at least secondary to 'own' sectoral policy goals).
		✖ True political will is missing.
		✖ There aren't many agencies that are successfully implementing PPI (mainly Energy Agency).

5.6.2. Link with private demand

Proposed solutions	Situation Sweden	Strong and weak points
Ascertain needs of private buyers through user-producer interaction and take these into account when designing policy measures.	In the sectoral approach by the Energy Agency, they clearly aim at cooperative or catalytic procurement and are thus systematically ascertaining the needs of private buyers. The central PPI approach mostly recommends pre-commercial procurement but it does not specifically mention the needs of private buyers. The 2010 inquiry states that "contracting authorities are usually looking for innovations to solve a problem related to their own operations. (…) It will however also create new opportunities for innovative companies to develop a product that is also suited for other potential purchasers (SOU, 2010:56, p. 30). This indicates that if the product suites other (private) purchasers as well, this is more coincidence than intentional planning.	✔ The sectoral approach definitely incorporates the needs of private buyers into their scheme, and other independent agencies take over this strategy.
		(✖) No systematic approach and no specific wish to ascertain the needs of private buyers in the central PPI approach.

Embed PPI policies in framework of other demand measures.	The sectoral agencies' cooperative and catalytic procurement is definitely anticipating further demand measures. Moreover, sometimes the Energy Agency even facilitates or at least follow-up private demand. However, the central scheme is emphasising the prerequisites for catalytic procurement to be legitimised, thus discouraging the preparation for further demand measures. Although it does not oppose further demand measures, it does not encourage them either.	✔ Cooperative and catalytic procurement (and in some cases: facilitation of private demand) is done by the sectoral agencies (especially Energy Agency).
		(✖) Central PPI scheme does not encourage the stimulation of further demand by governmental bodies.

5.6.3. Coping with complexity and procurement discourse

Proposed solutions	Situation Sweden	Strong and weak points
Establish selective discourses that define mid- and long-term public needs (derived from policy goals and administrative strategies).	Vinnova is devising long-term strategies on innovation and maintains a discourse with several actors from society (academic and private sector, civil society). Furthermore, the government designated several key areas for research; and the governmental agencies all have their own long-term strategies and work on a formulation of their future needs as a matter of course. However, there is no central effort to establish discourse, so it will largely depend on the agency in question if long-term needs are in fact formulated.	✔ Efforts by Vinnova to maintain a discourse on long-term innovation strategies.
		✔ Long-term strategies by all the independent governmental agencies automatically identify long-term needs.
		(✖) No central effort to establish discourse on long-term public needs, so uncertainty on how well the public needs will be identified.
Set up foresight strategies to develop common visions between producers and users.	The Energy Agency is currently investing in user-producer discourses, but this is not done in the whole array of Swedish governmental bodies. Vinnova will most likely set up a foresight group as soon as they receive the assignment, but the foresight strategies are most effective when sectoral bodies conduct them, and they will only do this on their own initiative, depending on how far they are implementing an PPI approach (setting up foresight strategies is one of the more advanced steps in PPI).	✔ Strong example of user-producer discourse by the Energy Agency.
		✖ No specific effort in developing a foresight strategy through user-producer interaction by other agencies.

5.6.4. Activating and enabling the procurement chain

Proposed solutions	Situation Sweden	Strong and weak points
Change incentive structures for procurers (replace lowest-cost rationale with MEAT: Most Economically Advantageous Tender)	Konkurrensverket (2011), who manages public procurement, states that the procuring department must accept the tender that either offers the lowest price or is most economically beneficial in terms of price, delivery time, operating costs, quality, function, service, environmental impact, etc. This is a bit ambiguous, as the agency does not indicate anything about life-cycle costs or a longer investment-payback time. However, the Swedish government recently gave the Swedish Agency for Public Management the task of submitting proposals for the reorganisation of the procurement support and advice service; they might take initiative in incentive change, but this is unclear at the moment (SOU, 2010:56).As in the Netherlands, the risk vs. money controversy is a barrier for governmental actors to use PPI, and purchasing is just a routine procedure, there is no incentive to change this towards a more innovative practice (Dalhammer et al., 2011).	(✔) Swedish Agency for Public Management will submit proposals to reorganise procurement support.
		✖ Incentive structure of general public procurement does not explicitly support MEAT-rationale including longer payback times for innovative products and services.
		✖ No incentive to change 'low-cost' routine towards a more innovative practice.
Create a structure in which procurers have up-to-date knowledge of future needs and potential improvement of public service.	In Sweden, the sectoral policies are mostly managed by the governmental agencies. Generally, the agencies function efficiently and independently, which ensures good communication between public officers within the agency and good general knowledge on the sectoral topic. This in turn induces a structure in which procurers are up-to-date with future needs of the agency. Centrally, there is no coordinated strategy for this, but it seems like this is not necessary.	✔ Governance structure with independent, efficient agencies that have good communication and large general knowledge, which generally entails knowledgeable procurers.
Tender process needs to be based on	In the sectoral approach, the tenders are based on a specific demand (this demand is carefully articulated in	✔ Demand- and functionality-based sectoral PPI approach.

specifying functionalities rather than designs.	cooperation with many stakeholders) and functionality. The pre-commercial programme that still needs to be developed will also be based on a specific demand. The central approach, stimulating PPI in other (sectoral) departments, which is being developed at the moment will most likely profit from earlier experiences and also base the tenders on functionalities. However, at the moment most of the tendering processes are still not actively stimulating innovation, and many of the standard procurement rules are based on standards and norms.	✔ Demand- and functionality-based sectoral PPI approach.
		(✔) Development of functionality/demand-based tender process of pre-commercial procurement and innovation procurement.
		✖ Only some agencies have implemented functionality-based innovation procurement.
Facilitate organisational change and systematic training of procurers at operative level.	Vinnova wants to fulfil this role, and is currently setting up a competence- and training centre, but has not realised this yet.	✖ This is being developed at the moment, but not realised yet.

5.6.5. Creating and maintaining a supporting innovation procurement culture

Proposed solutions	Situation Sweden	Strong and weak points
Embedding PPI in the existing innovation policy.	The public procurement system in Sweden is rather scattered and decentralised, with a developing stronger focus on innovation procurement through the involvement of Vinnova. However, this is not embraced throughout the innovation policy landscape yet. Incentives to engage in innovation procurement are missing and it seems more is needed to really get PPI going in Sweden. However, the strong historical tradition of collaboration between public agencies and Swedish companies may work as an enabling basic condition for this development.	(✔) Historic collaboration between Swedish public bodies and companies might facilitate PPI.
		✖ PPI not embraced throughout Swedish innovation system
Ensure support of existing norms and regulations.	Both national and European rules are considered a major barrier to successful PPI implementation. However, the new inquiry into PPI-obstructing rules and regulations can facilitate the embeddedness of PPI in the general procurement practice.	(✔) Inquiry into PPI-obstructing rules and regulations might alleviate obstacles.
		✖ Both Swedish and European rules are making successful PPI implementation difficult.
Create sufficient financial support.	There is no extra budget available for regional/sectoral governmental bodies to engage in PPI, and expected budget cuts make this even more difficult. Furthermore, Vinnova still did not get their official assignment and subsequent budget to start the central PPI programme.	✖ No extra budget for innovative tenders is available for governmental bodies willing to invest in PPI.
		✖ Long waiting time for Vinnova to get the official assignment and budget of their central PPI programme.

5.7. Conclusion

Two programmes related to PPI are currently running in Sweden:

1. Sectoral, decentralised PPI approaches. These are run by individual agencies, municipalities or regional governments and are mostly focused on a sectoral goal. The agency that is by far the furthest in this field is the Swedish Energy Agency (Energimyndigheten). They have developed a very mature PPI approach (*technology procurement*) that is supplemented by an array of policy measures and has proven to work: the share of energy-efficient technologies they have targeted with the policy has gone up and a long-term user-producer discourse on future (public) needs is being developed. Furthermore, the Energy Agency invests heavily in contacts with the private sector, which induces further (private) demand and ensures an up-to-date knowledge of the status quo in the market, *increasing awareness*.
2. Central PPI approach. This approach is not yet realised, but will very probably officially start later this year. It is the result of the recommendations of a governmental inquiry (SOU, 2010:56) that promotes the implementation of innovation procurement on a larger scale. Innovation agency Vinnova is supposed to assume an important role in the establishment of the central PPI approach, and develop a competence centre as well as support and network for governmental bodies willing to engage in PPI. Furthermore, it is likely that Vinnova will also promote PPI within the governmental spheres. In the creation of the policy, Vinnova will work together with a myriad of relevant actors, including the Energy Agency. The 2010 inquiry mainly recommends innovation-friendly procurement and pre-commercial procurement, but is cautious about cooperative and catalytic procurement.

The sectoral approaches, with the Swedish Energy Agency in the lead, are generally working quite well. They are almost always mainly set up from a sector rationale and operate in this sector and with a lot of knowledge and commitment. In many cases, they have been running for quite some time, which ensures a mature policy that is supplemented by an array of other policy measures (support measures, supply-side measures, awareness raising, etc.). Furthermore, the legitimisation of governmental intervention of these sectoral approaches is mostly a result of the underlying norms, e.g. in the case of the Energy Agency the agency feels it is legitimised to intervene in the market since they perceive a clear system failure (namely: a gap between supply and demand) and they feel they cannot wait for the market to solve this problem as they believe an ecological crisis is happening. This is very different than the central approach, which mostly operates from objectives to professionalise the public sector and to enhance national competitiveness, and is less convinced of the urgency of an ecological crisis and will thus be less inclined to intervene in the market in the way the Energy Agency does. However, the central approach, managed by Vinnova as soon as they get the official assignment, can play an important role in supporting other agencies with the implementation of PPI.

This challenge to bridge the sectoral and central approach is reflected in the assessment of the Swedish capacities for PPI-implementation. Sectoral approaches like the Energy Agency's are very advanced in their own field; their coordinative capacity is strong (but as they are only operating in their own field and not attempting to coordinate PPI in other governmental bodies this is not surprising) and as they are investing in cooperative and catalytic procurement mostly, their *link with private demand* is very strong as well. In terms of their *capacity to cope with complexity and procurement discourse*, mature agencies like the Energy Agency are doing particularly well through the establishment of user-producer discourse and the creation of foresight strategies. As such, they effectively work towards the solution of almost all identified system failures, especially the ones that are associated with and manageable within their 'own' sector/field: *user-producer interaction, increasing awareness and demand articulation*. The *risk deadlocks of costs and uncertainty* are also influenced greatly by the central government's behaviour as well as developments in the global market. However, the Energy Agency's approach decreases the *risk in terms of costs* through organising demand, thus creating critical mass and a decrease of (transaction) costs). Furthermore, their foresight strategies and definition of long-term needs decreases the *risk associated with uncertainty*.

However, although the design of the central approach is attempting to learn from examples of good PPI practice, Vinnova will still have to develop most of these capacities, and so will other governmental bodies eventually. And especially the *link to private demand* will be subject to debate, as it will spur discussion on whether or not a governmental intervention is legitimised. Furthermore, *political backing* on higher levels of government and *long-term innovation strategies* in which PPI is incorporated are still missing at the moment, as are *incentives* (both sticks and carrots[31]) to engage in PPI. All these elements are crucial for the central approach's potential to solve *system failures*.

The fourth capacity of *enabling and activating the procurement chain* is something that cannot be done effectively by sectoral agencies and has to be steered by a central body like Vinnova or by each agency seperately, as it is mostly effective if spread throughout the government. In that sense, the Swedish system of fragmented, independent agencies is both an advantage and a disadvantage: as the agencies are generally functioning well and have a lot of knowledge in their field, it generally means less bureaucracy and knowledgeable procurers. However, it also means that it is more difficult for a centrally operating body like Vinnova to truly embed PPI in the agencies' routine, especially as the innovation rationale (which assumes a very cautious role for governmental intervention) can clash with the sectoral rationales. Therefore, it seems a more promising route for the sectoral and regional agencies and governments to implement PPI themselves and not to wait for Vinnova to finish their approach (Dalhammer et al., 2011). The fact that the central approach is not developed yet is also recognisable in the fifth capacity: in terms of supporting regulations and sufficient financial support for PPI initiatives, Sweden is not doing very well, thus increasing the *risks and costs* associated with innovation in general and PPI in particular. However, the Swedish innovation system overall functions well and it offers a flexible and non-hierarchical culture. Historically, the cooperation between actors in the innovation system has been very good and even today the trust between the actors is high as well. All of this facilitates the diffusion of PPI as a complementary policy.

[31] Sticks and carrots is jargon for policy makers, referring to using both punishments and rewards to change or induce behaviour.

6. The United Kingdom

6.1. Introduction

The United Kingdom of Great Britain and Northern Ireland (in short: the United Kingdom, the UK or Britain) is located off the North Western coast of continental Europe. The UK is a sovereign and unitary state under a constitutional monarchy and a parliamentary system, and incorporates the island of Great Britain (including England, Scotland and Wales), the North Eastern part of the island of Ireland and many smaller islands. The UK's government resides in it's capital London, but there are also three devolved national administrations (with varying political and organisational power) located in Belfast (capital Northern Ireland), Cardiff (capital Wales) and Edinburgh (Scotland). In mid-2009, the UK's population was estimated to be 61,792,000. In the World Economic Forum's Global Competitiveness Report 2010-2011, the UK is ranked 12th. Furthermore, the European Innovation Scoreboard[32] ranks the UK as one of the innovation *followers* with an above average performance[33].

6.2. Development of innovation policy

For quite a long time, the UK was seen as economically lagging behind other European countries and the US. This was described in 2000 by the Labour government in a document titled *Productivity in the UK: the evidence and the Government's approach*. The Labour government concluded that the UK had a productivity gap compared to France, Germany and the US and set out to close this gap (HM Treasury, 2000). They identified a deficit in physical and human capital, and a lower rate of innovation. In 2004, the Department for Trade and Industry and the Department for Education and Skills presented a 10-year strategy to stimulate science and innovation in the UK (DTI and DES, 2004). The main goal set out in the strategy was to increase the level of knowledge intensity in the UK. Research Councils and Regional Development Agencies were to supply public support for business innovation. Furthermore, an R&D tax credit was introduced, which aimed at SMEs to stimulate innovation in the private sector. This increase in R&D expenditure was to be supplemented by activities to support commercialisation of inventions: innovation. In addition, the DTI published a report called *Competing in the Global Economy – The Innovation Challenge* in 2003, which advocated action in the public sector to boost innovation and to stimulate the UK as a key knowledge hub in the global economy. Public procurement was underscored as an approach to stimulate and enable innovation (OGC, 2004).

Lambert (2003) who, on assignment of the government, reviewed the links between universities and businesses concluded that the universities should identify their areas of competitive strength in research, businesses should learn to exploit the innovative ideas from the university sector and the government should support the business-university collaboration through a set of policy measures. The best way to reach these goals was to increase knowledge transfer through human interaction and improvement of distribution of intellectual property rights between universities and businesses (Lambert, 2003). As a result of these recommendations, the Higher Education Innovation Fund was created, which is to facilitate this process. Since it was founded, the university staff at all major British universities has increased (Straw, 2009). Furthermore, the government established the Enterprise Capital Funds[34], which aimed at ensuring the financial backing for the innovation progress. Although it is debatable if the quantity of knowledge transfer offices or equity finance truly change business performance, there are indications of this happening, among which an increase in spin-off companies.

Apart from the increases in basic science research, incentives to commercialise and apply research in the private sector and enhance institutions to induce knowledge transfer, the UK government also invested in policies to improve regional science clusters. The objective behind this last goal is to link human capital and infrastructure to innovation (Straw, 2009). This was done by making (designated) cities attractive to live in and for businesses to settle in, but also to improve the ecosystem around a university so as to link the existing human capital to the regional spot.

In 2006, the next steps of the 10-year strategy Science and innovation investment framework 2004-2014 (DTI, DES and DH, 2006) are set forth. The original objective of creating an

[32] PRO INNO EUROPE, an initiative of Directorate General Enterprise and Industry which aims to become the focal point for innovation policy analysis and policy cooperation in Europe. Available on: http://www.proinno-europe.eu/inno-metrics/page/united-kingdom

[33] Compared to EU27.

[34] Based on the US Small Business Investment Company (Straw, 2009).

attractive innovation system and facilitating innovation and research within that system was maintained firmly, but within this strategy five key policy areas were identified: maximising the impact of public investment in science on the economy through increasing innovation; increasing Research Councils' effectiveness; supporting excellence in university research; supporting world-class health research; and increasing the supply of science, technology, engineering, and mathematics (STEM) skills (DTI, DES and DH, 2006).

However, as the UK is increasingly relying on services instead of pure technology and R&D, they have started to view innovation policy in a broader sense. In the same year, following the Next Steps of the 10-year strategy Report, the National Endowment for Science, Technology and the Arts (NESTA) broadcasted the need for a broad-based innovation policy that reached beyond science and technology to embrace the 'hidden innovation' that happens in all sectors (NESTA, 2006). Sectors that were highlighted in the report are financial services, retail, consultancy, and the public sector where innovation does not show up in measures of R&D expenditure or patent filings. In 2007, Lord Sainsbury reviewed the government's science and innovation policy, in order to identify bottlenecks and allow the UK to compete more effectively globally. The Sainsbury review pointed out that innovation should complement value for money rationales in public procurement, and recommended improving departmental procurement capabilities and the use of outcome-based specifications. Furthermore, departmental R&D budgets were to promote innovation as well, e.g. through the SBRI-programme and the use of Forward Commitment Procurement (FCP) (Sainsbury, 2007).

In the same year, NESTA studied this hidden innovation more closely and concluded that the government should develop an annual sector-relevant Innovation Index. The government published a report called *Innovation Nation*[35] in 2008, in which NESTA was given the formal assignment to develop this innovation index (DIUS, 2008a). The index should guide (innovation) policy development through pointing out knowledge gaps in current measures, embedding innovation measures in a broader portfolio of innovation indicators, improving understanding of the service sector and user-led and public sector innovation, and building on measures that are found to be useful. Furthermore, in the *Innovation Nation* report, it is again argued that innovation is essential to the UK's competitive advantage and its ability to tackle major societal challenge. Furthermore, the paper explicitly mentions demand-side innovation and the potential for the government spending to create demand for innovative products and services (DIUS, 2008a). It also sets forth implementation plans for innovation procurement (more on this in the following sections).

In 2010, the new government was installed. The coalition government between the Conservative Party and the Liberal Democrats has a different view on many issues than the preceding Labour Party, and both parties emphasise the importance of individual liberty (Euractiv, 2010). This is illustrated by the Blueprint for Technology that was published in 2010. The Blueprint highlights the importance of the government's role to create and maintain framework conditions for growth and innovations, and emphatically 'only where necessary' support from government for businesses, thus decreasing the legitimisation for governmental interventions in the market (HM Government, 2010). However, public procurement for innovation, and most notably the pre-commercial procurement programme SBRI, is mentioned in the Blueprint as well, as the government indicates the plan to encourage greater adoption of SBRI across the public sector. Furthermore, the government published its Growth Review, *The path to strong, sustainable and balanced growth*, which argues (among other things), that the current procurement system works against a competitive market, and in particular as a barrier for SMEs. Both the Blueprint and the Growth Review are storing much potential in SMEs, and see a role for the PPI schemes that exist already to direct public money towards innovative SMEs (BIS, 2010). Lastly, the Science Council has produced a set of priorities for UK science and innovation policy 2010-2015. This document still emphasises traditional supply-side although it also stresses the importance of a renewed focus on translating research into valuable outcomes for society and it lists creative procurement policy as a mechanism that could maximise the impact of science and its applications (Science Council, 2010).

6.3. National innovation system

In this section I will give an overview of the UK's national innovation system and its main actors, with the explicit aim of providing context for the PPI policy. In Figure 25, the UK national innovation system is depicted. This figure is based on Creese, 2011; Golding, 2011;

[35] The term 'Innovation Nation' is copied from the eponymous book by author and innovation expert John Kao, which was published in October 2007. See for more information: http://www.johnkao.com/nation.html

NESTA, 2010; INNO-Policy, 2009c; OMC-PTP, 2010; and the various websites of the agencies and institutions depicted in the figure.

The UK's innovation system is quite complex, as it has to navigate its administrative and organisational power across all its territory. It performs very well in terms of lifelong learning and early-stage venture capital provision, but the overall innovation activity in enterprises is relatively weak. Furthermore, they are having trouble to translate knowledge into new marketable products and intellectual capital, and are in need of better skills at the basic and intermediate levels, in order to boost the UK's knowledge base (INNO-Policy, 2009c). The UK's government resides in it's capital London, but there are also three devolved national administrations (with varying political and organisational power) located in Belfast (capital Northern Ireland), Cardiff (capital Wales) and Edinburgh (Scotland). Each of the 'countries within the country'[36] has their own administrative and local organisation of lower governmental bodies – this is not and will probably not be organised in a uniform matter. This makes it difficult for coherent innovation policy to 'filter through' to all of the UK. On the other hand, Scotland for instance, is quite active in pursuing it's own innovation policy, within the boundaries of the overarching UK (Roper et al., 2006). On the other hand, Creese (2011) indicates that most innovation policy is only pursued on a national government level, and can on the municipal level only be encouraged, but not enforced. The UK governmental departments work quite independently from each other, and organise their own procurement. The UK boasts some of the world's top universities, with multiple leading research institutes (the larger part of public research is conducted at universities).

In 2009, the Department for Innovation, Universities and Skills (DIUS) (responsible for the design and implementation of innovation policy) and the Department for Business, Enterprise and Regulatory Reform (BERR) were merged into a new Department for Business, Innovation and Skills (BIS) whose key role will be to build Britain's capabilities to compete in the global economy. BIS is also responsible for innovation policy, and works in close collaboration with other departments. Other important departments in this context are the Department for Environment, Food and Rural Affairs (Defra), who first initiated procurement through FCP (later in this chapter more on FCP), and the Department of Energy and Climate Change (DECC) (merger of energy parts of BERR and climate change parts of Defra). Furthermore, the Ministry of Defence (MoD) and the Department of Health (DH), responsible for the National Health Service (NHS) are important as they have a large procurement budget.

BIS also incorporates the Government Office for Science, which is headed by the UK Government Chief Scientific Adviser (CSA). The Government CSA has a prominent role as the government's most visible scientific expert, and personally advises the Prime Minister and the Cabinet on science and technology-related activities and policies. In addition, since 2011, each individual governmental department also has its own departmental CSA, who is responsible for determining the department's long-term needs (Creese, 2011; Golding, 2011). Furthermore, BIS works with a range of other organisations that promote and partly implement innovation policy, including the Technology Strategy Board (TSB), the UK Intellectual Property Office (UK-IPO), National Endowment of Science Technology and the Arts (NESTA, an independent innovation research agency), the Design Council, the National Measurement Office (NMO) and the BSI British Standards. The TSB is an important actor whose role is to stimulate technology-enabled innovation in the areas where there is a clear potential business benefit and which offer the greatest scope for boosting UK growth and productivity. The TSB has established Innovation Platforms, which each focuses on major policy and societal challenges; through working with a myriad of stakeholders, the Innovation Platforms define the scope of the challenge and set out a strategy on how to respond (OMC-PTP, 2010). Furthermore, several individual departments have their own innovation agencies, e.g. the Ministry of Defence has the Centre for Defence Enterprise (CDE), who acts as a gateway between the MoD and the 'outside world', enabling the MoD to obtain new ideas and solutions that could be developed into innovative technologies (NESTA, 2010).

Regular procurement is coordinated by an agency called Government Procurement Service (formerly 'Buying Solutions'), who falls under the responsibility of the Cabinet Office (CO), in cooperation with the departmental CSAs.

[36] It is politically sensitive how to denote the 'countries within a country'; Scotland, Wales and England are called countries even though the overarching UK is also called a country. The terminology often depends on one's political stance. Northern Ireland is mostly designated as 'region' or 'province'.

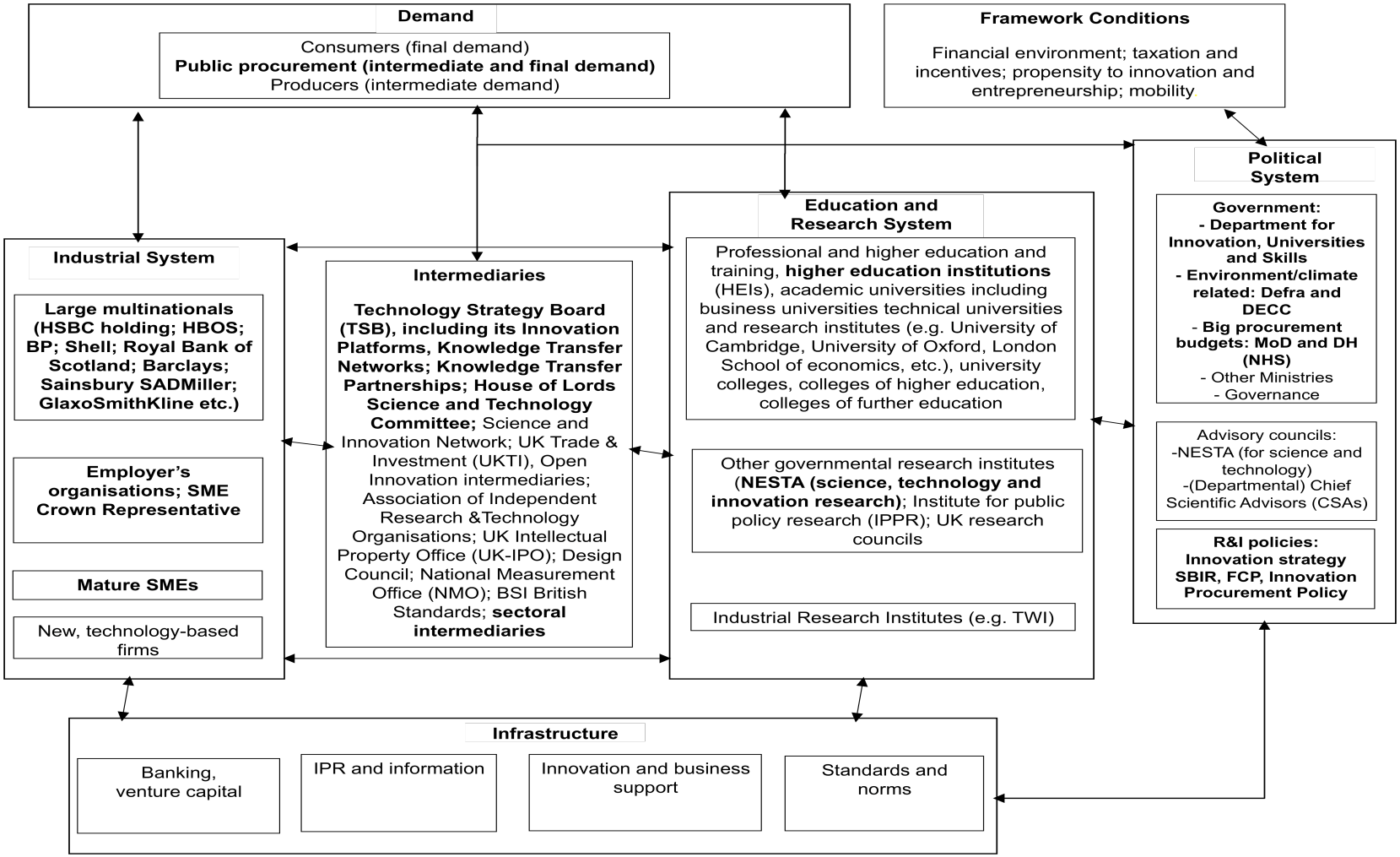

Figure 25: the UK's National Innovation System, mapping context for PPI policy approaches (the actors in bold are considered to be influential in the PPI policy)

6.4. Reconstruction of PPI policy theory

6.4.1. Pre-commercial procurement: the SBRI-programme

The UK Small Business Research Initiative (SBRI) already existed in 2001; under the SBRI programme, the larger departments were obligated to procure 2.5% of their external research from SMEs. However, the old scheme SBRI scheme did not require much extra effort from the governmental departments, and the impact on innovation was thus not significant. Therefore, the SBRI programme was reformed in 2008, after which the new SBRI scheme was started in 2009. This new SBRI scheme is in many respects comparable to the Dutch departmental SBIR-programme (Denekamp, 2010; Holland, 2010a, 2010b, 2011). This also becomes clear when revising the policy documents and SBIR and SBRI evaluations (Holland, 2010a, 2010b; NESTA, 2010) and it entails that the main rationales, objectives and philosophy behind it is the same as the Dutch approach (Holland, 2011). It was created within the framework of the overarching European Pre-Commercial Procurement approach, but like the Dutch scheme, it is derived from the US.

The SBRI programme is managed by the Technology Strategy Board (TSB), which is the UK's national innovation agency, under the auspices of the Department for Business, Innovation and Skills (BIS). The TSB (which employs many people who worked in the private sector before) has an elaborate network of companies and it reaches out through this network to broadcast the tender offer. The TSB has established Knowledge Transfer Networks (in which at least 80.000 participants are enrolled) that are very useful in this respect (TSB, 2011). The UK now has many examples of SMEs[37] developing innovative products and services with the SBRI and the new structure of the SBRI seems to be successful. The governmental departments as well as the participating companies are positive about the scheme. The SBRI is very flexible, offering room for both top-down approaches (when an SBRI-tender is part of an overall strategy) and bottom-up approaches (when a government official initiates the process when he identifies a need) (Holland, 2010b). Like in the Dutch situation, there are multiple projects that are running in phase 1 (feasibility studies) and in phase 2 (development of winning project to pilot-version). However, there is not much follow-up of the pilot projects in phase 3 (commercialisation) – and it seems that the TSB is not really focusing on getting the projects to phase 3 either. As Holland (2011) states, phase 3 and the government's role in it are largely unclear. Procurement after the pilot phase is tricky in general, as the pre-commercial procurement is insulated from the EU competition laws, but the commercialisation of products is not. In any case, it would be profitable to connect the SBRI phase 2-projects more firmly to the UK central Innovation Procurement Policy, although in many of the departmental Innovation Procurement Plans (see next section for more info), SBRI is mentioned as a viable instrument to enhance their goals in an innovative way (Creese, 2011).

Concerning PPI classification, SBRI is, like the Dutch variant, a *pre-commercial procurement* instrument; stimulating the (high technology) *R&D stage* of the innovation to meet public demand's future needs and to stimulate start-ups and SMEs. However, as it does have strategic goals like stimulating the solutions for societal problems and enhancing the innovative power of SMEs, it can be linked to *strategic procurement* as well. Furthermore, the governmental departments are the sole buyers of an SBRI tender, so the programme entails *direct public procurement* as opposed to cooperative procurement.

6.4.1.1. Causal relations

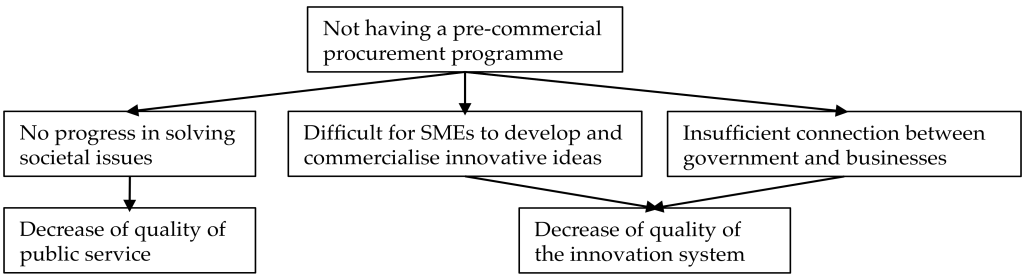

Figure 26: Causal relations of the UK SBRI-programme

[37] About 74% of the total amount of contracts was awarded to SMEs. This number is lower than the share of SMEs in the Netherlands (there it was 90%). In the policy documents, the UK SBRI scheme is not emphasising the objective of including and stimulating SMEs as much as the Dutch SBIR does.

The causal relations of SBRI are in many respects comparable to the Dutch departmental SBIR-programme (Denekamp, 2010; Holland, 2010a, 2010b, 2011): on the one hand the policy problems entail a decrease of public service through a lag of progress in solving societal issues, on the other hand it focuses on the decrease of the quality of the innovation system. This last problem is emphasised heavily in the policy documents, much more than in the Dutch version of the scheme. Furthermore, the SBRI stresses two reasons for the innovation system's decline: the difficulties SMEs face when attempting to develop and commercialise innovative ideas, and the insufficient connection between government and businesses.

6.4.1.2. Final relations

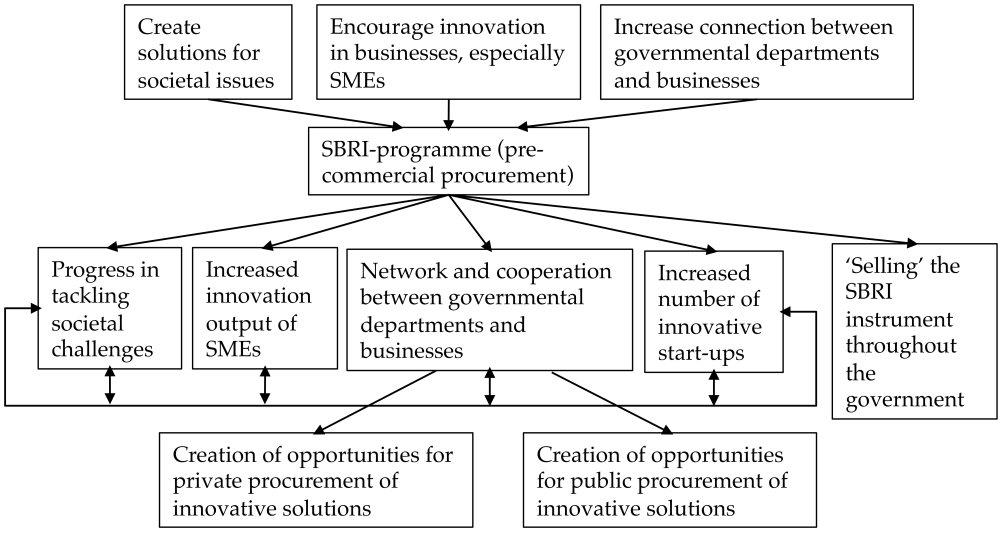

Figure 27: Final relations of the UK SBRI-programme

The objectives of the SBRI programme are comparable to the Dutch scheme equivalent, but I have chosen to exclude the objective of increasing the public sector's quality, as it is not emphatically mentioned in the policy documents or interviews with the TSB. Furthermore, I have added the objective about increasing the connection between governmental departments and businesses. Furthermore, the SBRI does not specifically aim at valorisation of knowledge, and does not specifically include knowledge institutes in the policy. It has a stronger focus on the business-government relationships. Like in the Dutch version, it is expected that through strengthening this relationship, opportunities for private and public procurement of innovative solutions developed through an SBRI tender will arise. The SBRI is organised much like the Dutch version, starting from a concrete public demand, need for R&D services as a result of a societal challenge. However, the TSB is, much stronger then Agentschap NL in the Netherlands, also busy 'selling' the SBRI instrument throughout the UK government (more on this in the comparative analysis later in this thesis).

6.4.1.3. Normative relations

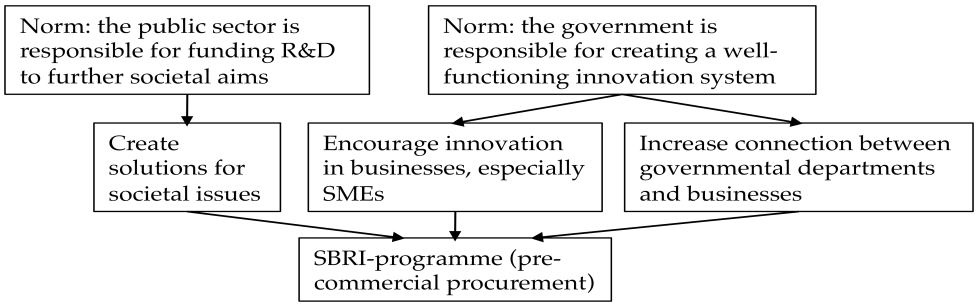

Figure 28: Normative relations of the UK SBRI-programme

The norms behind the UK SBRI seem to be exactly the same as the Dutch SBIR ones, namely (stemming from the political target orientation rationale): both the sector rationale (striving for the solution of societal goals) and the innovation rationale (enhancing national growth and competitiveness). The norm about the government being responsible for a creating a well-functioning innovation system relates to two objectives: ensuring an active participation

of SMEs and increasing the connection between governmental departments and businesses. These in turn relate to solving several of the system failures: *insufficient user-producer interaction*, *lack of awareness* (in making demand side aware because of the TSB's more active role in spreading SBRI throughout the government) and *costs vs. risk deadlock*.

6.4.1.4. Reconstructed policy theory of the UK SBRI-programme

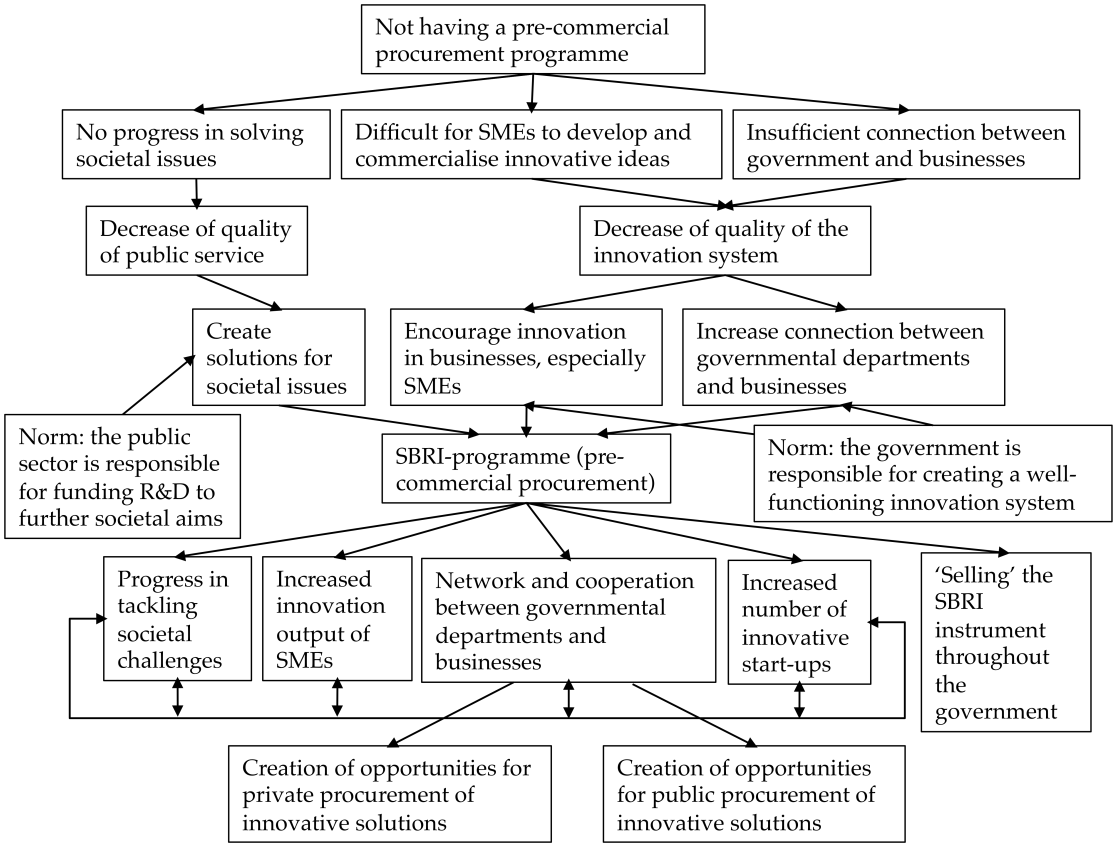

Figure 29: Reconstructed policy theory of the UK SBRI-programme

Although the UK SBRI in its current form has only been running since 2009, the policy seems quite thought trough and refined. Of course, the SBRI has had the US as well as the Dutch example, but still it is quite impressive that the new scheme is running so smoothly.

6.4.2. UK central Innovation Procurement Policy

The Department of Business, Innovation and Skills (BIS) coordinates innovation policy. Since recently, formal centralised Innovation Procurement Policy is a part of this. The BIS Ministry functions like an intervention ministry, trying to implement their innovation policies and instruments in other ministries. Since the DTI 2003 report advocated public procurement as a means to reach the overarching goal of *stimulating innovation* and working towards *turning the UK in a knowledge hub*, public procurement received serious attention. The UK Office of Government Commerce (OGC, now under Cabinet Office), looked into the topic and published a paper called 'Capturing Innovation: Nurturing suppliers' ideas in the public sector'. This guide stimulated governmental procurers to truly embed innovation in their procurement practices, with the double goal of purchasing innovative products and services that deliver *high-quality public service* and *support innovation* in supplying businesses (OGC, 2004). In August 2007, the Department for Innovation, Universities and Skills (DIUS, forerunner of BIS) and the OGC supplemented the earlier publication with a guide called 'Finding and Procuring Innovative Solutions', which provides *practical advice* on innovation procurement: detailed approaches for finding and procuring innovative solutions. Special attention is directed at the earlier stage of innovation procurement: the *identification and communication of a public need*. Thus far innovation procurement was merely a voluntary approach and the DIUS provided support and direction for governmental departments who were active enough to engage in innovation procurement (DIUS and OGC, 2007).

However, in 2008 the DIUS took another step and published the white paper 'Innovation Nation', which, among other things, dictated for each Governmental Department to publish an *Innovation Procurement Plan (IPP)* as part of its commercial strategy. In an IPP, the

departments have to set forth their strategy on how to *embed* innovation at the heart of their procurement practices and through this, how to *engage with UK businesses* in the earliest possible phase. The plan should not merely reflect the existing initiatives, but should be a *forward-looking* document that illustrates what the department will do, and *provide guidance* for managers and procurement practitioners within the department (DIUS, 2008b). In some departments, the OGC has carried out a Procurement Capability Review, which should be taken into account when the department is creating its IPP. As such, the creation of the IPP can also be viewed as a chance to critically consider and review the procurement practice (DIUS, 2008b).

The IPPs are thus obligatory and most of the departments have already published their IPPs by now[38], but the form, depth and the level of detail of the plan is dependent on the department at hand (Creese, 2011). The IPPs that are published now provide an indication of the extent to which the procurement practice of the department at hand is incorporating innovation. Furthermore, they illustrate the different types of activities through which the departments are going about the business of innovation procurement. On the official Innovation Procurement Policy website, it is stated "all plans will be regularly reviewed and renewed to ensure that robust procedures and up to date information on innovation procurement are in place across Government" (BIS, 2011A). BIS attempts to ensure *uniformity* by providing guidance on the drafting of these IPPs. Departments for whom public procurement is very big and consequently have a large budget (e.g. Departments of Health and Ministry of Defence) have quite detailed, robust IPPs (BIS, 2011a). This makes sense, as the functioning of these departments is dependent on their procurement structure.

Concerning PPI classification, the central Innovation Procurement Policy is mainly aimed at *guiding other departments* to produce robust IPPs, which stimulates the departments to think about PPI through their own IPPs, which in turn improves the departments' *lack of awareness*. Furthermore, BIS works on *skills and training of procurers*, especially in key areas of public procurement like construction and IT procurement (BIS IPP, 2009). Thus, the central policy scheme can be classified as *general innovation procurement.*

6.4.2.1. Causal relations

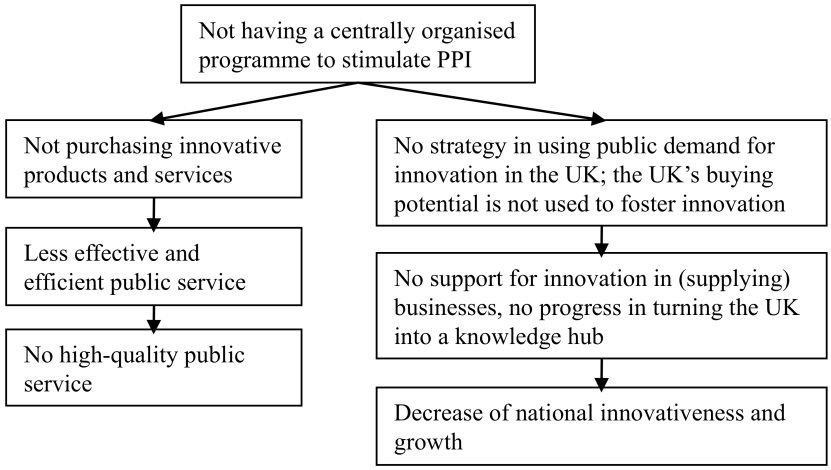

Figure 30: Causal relations of the UK central Innovation Procurement Policy

The main problem that the BIS PPI policy is trying to solve is the decrease of national innovativeness and growth. The policy problem of having a low-quality public service is mentioned in the policy documents but is not the main issue behind the policy.

[38] For an overview of the UK department's IPPs, see:
http://www.bis.gov.uk/policies/innovation/procurement/procurement-plans

6.4.2.2. Final relations

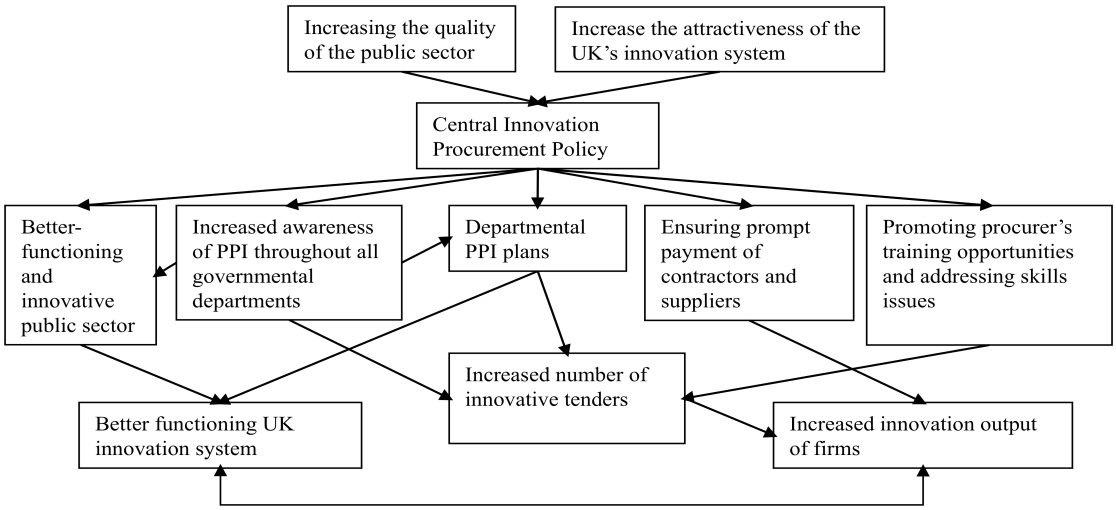

Figure 31: Final relations of the UK central Innovation Procurement Policy

The BIS' central Innovation Procurement Policy's main (intermediate) objective is to ensure that other departments are engaging in innovation procurement (Creese, 2011). One route is through the creation of robust Departmental Innovation Procurement Plans. To this effect they have published an official IPP Guidance document (DIUS, 2008b), which aim is to make the governmental departments realise the benefits of innovation in their procurement practice, and to provide a clear structure for an IPP. This guidance document is quite far-reaching, e.g. through the inclusion of a suggested model and table of contents for the IPP: (1) Objectives; (2) opportunities for Innovation; (3) Key Targets; (4) Implementation; and (5) Reporting, Management and Governance. The guidance document is supplemented by a Toolkit that follows the same structure of the IPP model, and which provides practical advice on the completion of the empty model, through supplying online sources of information and examples of existing resources and projects. These rather practical and concrete guidance documents (which focus completely on the creation of the IPPs) are supplemented by an additional and more general pamphlet called *Driving innovation through public procurement*, which focuses on both buyer and supplier innovation on the various stages of the procurement process, using several examples from practice (see Appendix 12 for an overview of the procurement process and the activities of innovation procurement before, during and after the procurement process). Furthermore, this pamphlet illustrates different strategies of innovation procurement, and subsequently different forms of procurement to use in these strategies (partly following the distinctions made earlier in this thesis as well) (BIS and OGC, 2009).

However, there are two other (intermediate) objectives that are associated with stimulating good departmental IPPs, namely: creating increased awareness of PPI throughout the UK government (done through network and PR activities, producing guiding pamphlets, etc.) and promoting training for procurers and addressing skills issues (this is especially done in key areas of public procurement, i.e. IT and construction, as the impact of public procurement is very large in these sectors). The training and skills objective is done through cooperation with the Government Procurement Service (under responsibility of the Cabinet Office). Another (side) objective is to ensure that contractors and suppliers are paid promptly. All of these also promote the more implicit objective of creating a better-functioning public sector (BIS IPP, 2009). Good IPPs, training of procurers and an increased awareness of PPI across the governmental system in the UK increase the number of innovative tenders. All of these intermediate objectives then lead to the two final objectives: an increased innovation output of firms and, ultimately, a better-functioning UK innovation system (the last two also influence each other).

6.4.2.3. Normative relations

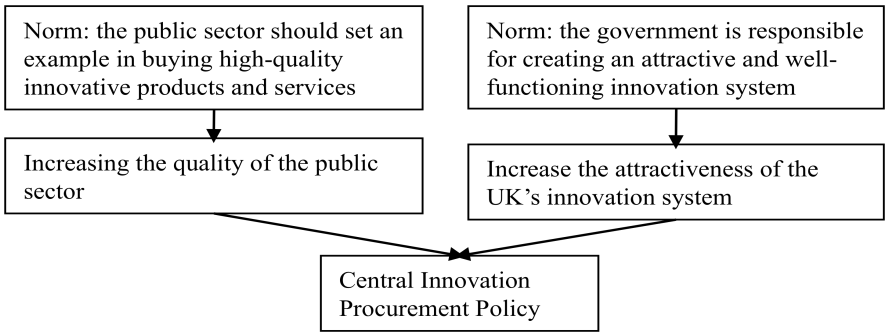

Figure 32: Normative relations of the UK central Innovation Procurement Policy

The main norm behind this policy is very straightforward: the government is responsible for creating an attractive and well-functioning innovation system – fitting in Edler's (2009) political target-orientation of *stimulating national growth and innovation*. In the UK this norm is very visible in the policy documents. The other norm is that the UK government envisions a strong role for the government as an *example-setter to buy high-quality innovative products and services* – which relates to having a high-quality public sector.

6.4.2.4. Reconstructed policy theory of the central Innovation Procurement Policy

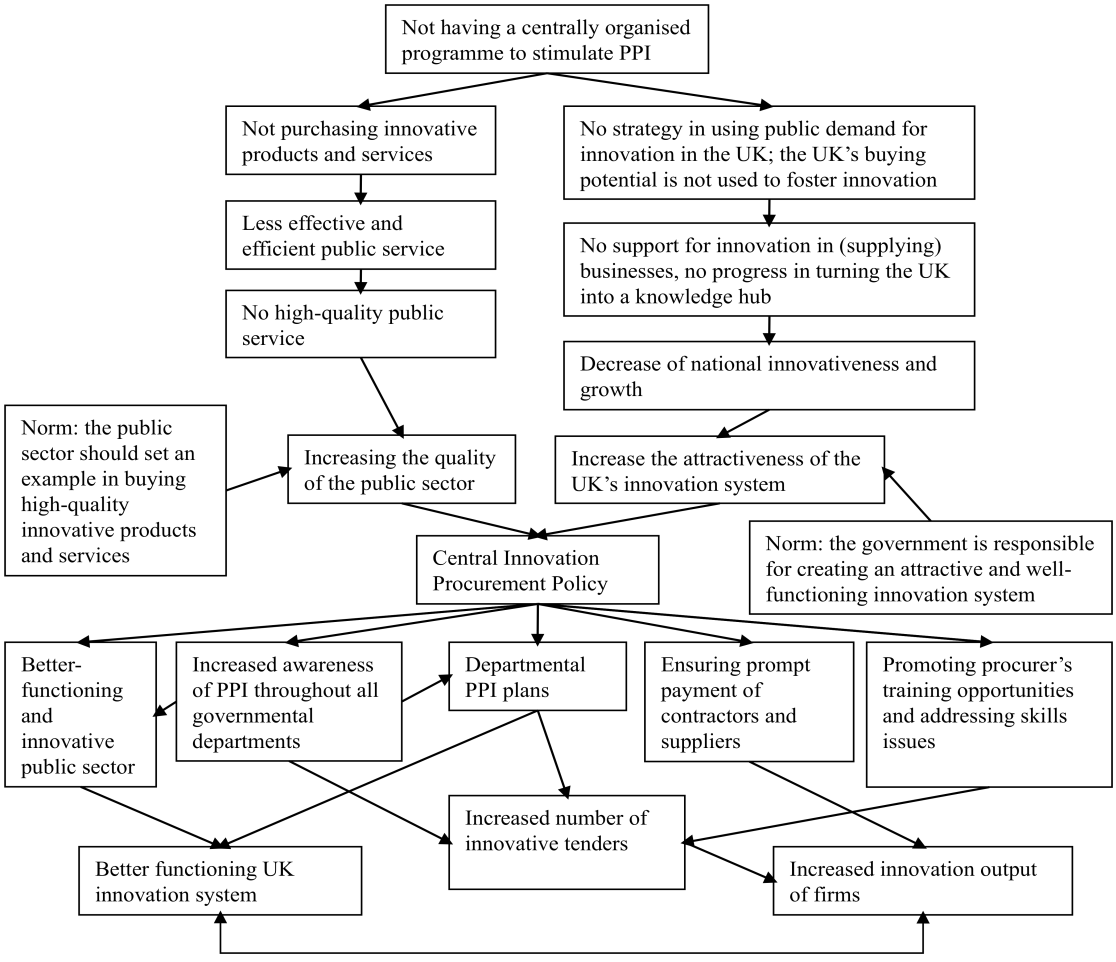

Figure 33: Reconstructed policy of the UK central Innovation Procurement Policy

The reconstructed policy shows a complex interplay of instruments that is a direct result of the broad overarching goal of stimulating the UK's competitiveness and innovation system. The central Innovation Procurement programme's role in the UK's landscape of innovation policies is fairly set, and it differs from other innovation policies. However, it is unclear to what extent the BIS can really determine the ambition-level of the department's engagement

to innovation procurement (general, FCP or SBRI) and this is the crucial part of the Innovation Procurement Policy. Moreover, Sue Creese of the Innovation Procurement Policy team has indicated that the new government is not pursuing the departmental procurement plan-route anymore (Creese, 2011)[39]. The reason for this remains rather vague but when asked, Ms Creese indicates it mainly has to do with a "general change of policy, and because drawing up the IPPs cost a lot of resources and they did not deliver what was hoped" (Creese, 2011). However, the IPPs that are currently in place are still being followed up and the departments can continue in that route on their own initiative.

6.4.3. Forward Commitment Procurement (FCP)

In 2007, a business-led Sustainable Procurement Task Force confronted the government with the sustainable development goals it set itself, and the progress towards achieving them. It stressed the potential of the government's buying power, thus public procurement, to work towards the goals. As a reaction to this report, the Department for Environment, Food and Rural Affairs (Defra) published a report called *UK Government Sustainable Procurement Action Plan*. In this plan, the Defra set out their plans to make sustainable procurement more effective and increase the awareness of sustainable procurement across the UK government. Specifically, they identified ways to harness the purchasing power the Task Force underlined, to diffuse sustainable innovations more widely and consequently make them more affordable while working towards a more sustainable society. In the centre of these efforts is the Forward Commitment Procurement (FCP) model (Defra, 2007). FCP is defined as follows:

> "Forward Commitment Procurement is a procurement model, designed mainly for the public sector, which looks at purchasing from the outcome based specification need instead of purchasing for the immediate perceived need. It addresses the common stalemate where organisations require products or services that are either not available or are at excessive cost. By using this model it alerts the market to the procurement need and offers to purchase the solution, if the needs are met, once they are available, at an agreed price and specification. This provides the market pull to create the conditions needed to deliver innovative, cost effective products and services and unlocks investment to deliver the requirement." (BIS, 2011b).

The 2007 Sustainable Procurement Action Plan outlined a strategy for DTI (forerunner of BIS) and Defra to work together to implement the FCP model across the public sector. Specifically, they were to focus on areas in which cost-effective solutions are needed to reach the sustainable development goals (Defra, 2007). At the same time, the interdepartmental Commission on Environmental Markets and Economic Performance (CEMEP) published a report that focused on enhancing the UK innovation system to make it among the best locations in the world to develop and launch low-carbon and energy-efficient products, products and services (CEMEP, 2007). The CEMEP consisted of a wide array of stakeholders (people from business, trade unions, universities and NGOs across a wide range of sector) and in the report the FCP model is heavily emphasised. One of the recommendations lists clear-cut steps to scale up and replicate the FCP model in the public sector: through the identification of demand (establish where cost-effective solutions are needed to achieve environmental policy objectives), through the development of the public sector's capabilities to engage in FCP effectively (e.g. through the establishment of a 'Challenge' scheme), and through adopting the FCP model for the 'Zero Waste Places' initiative[40] (CEMEP, 2007). The Defra responded to this report in 2008, mainly following the CEMEP-recommendations and setting out a strategy towards a 'low-carbon economy', with a much more pronounced focus on innovation as a way to reach this goal (Defra, 2008). Demand-side activities to supplement the current supply-side measures to foster innovation are mentioned as one of the four challenges to be met.

Concerning PPI classification, FCP can be characterised as strategic procurement, as it is used to transform markets. In the UK's case, all of the FCP projects that are currently running are focusing on making society more sustainable (thus effectively using public procurement to induce innovation); aiming at innovative as well as *sustainable* solutions, which is of course a direct result of the origins of FCP. The UK approach is working from a demand or challenge, and depending on this challenge, it can involve both pre-commercial and commercial procurement.

[39] This information is not yet officially put out or published (Creese, 2011).
[40] The Zero Waste Place initiative strives for a holistic approach to waste and resources. More information can be found on: http://www.wrap.org.uk/go.rm?id=32723

6.4.3.1. Causal relations of the FCP policy

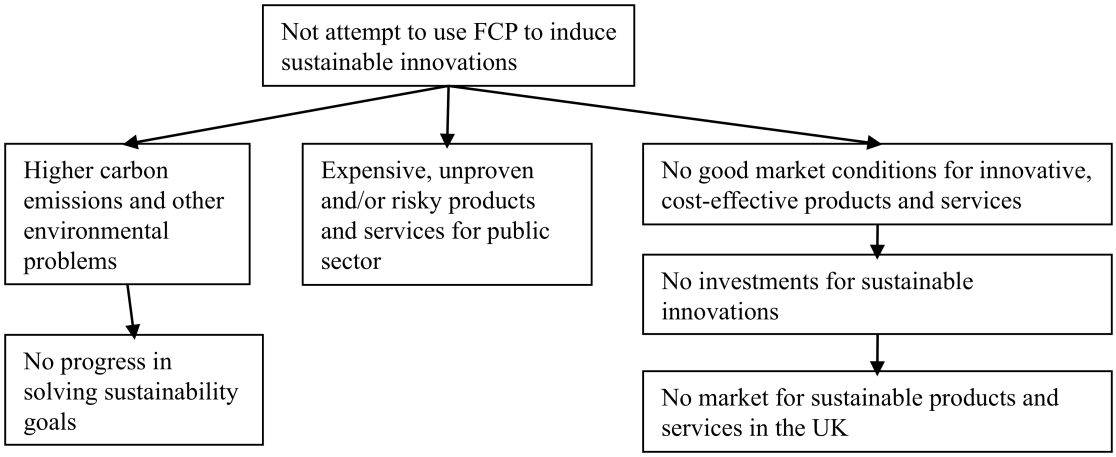

Figure 34: Causal relations of the UK FCP policy

There are three main problems causing the need for the FCP policy: higher carbon emissions and other environmental issues, an inefficient public sector which needs help to procure innovative and sustainable products and services in an efficient way, and the need to build a market for sustainable products and services in the UK, thus ensuring that the UK will reap the benefits of the potential of the growing global sustainable market.

6.4.3.2. Final relations of the FCP policy

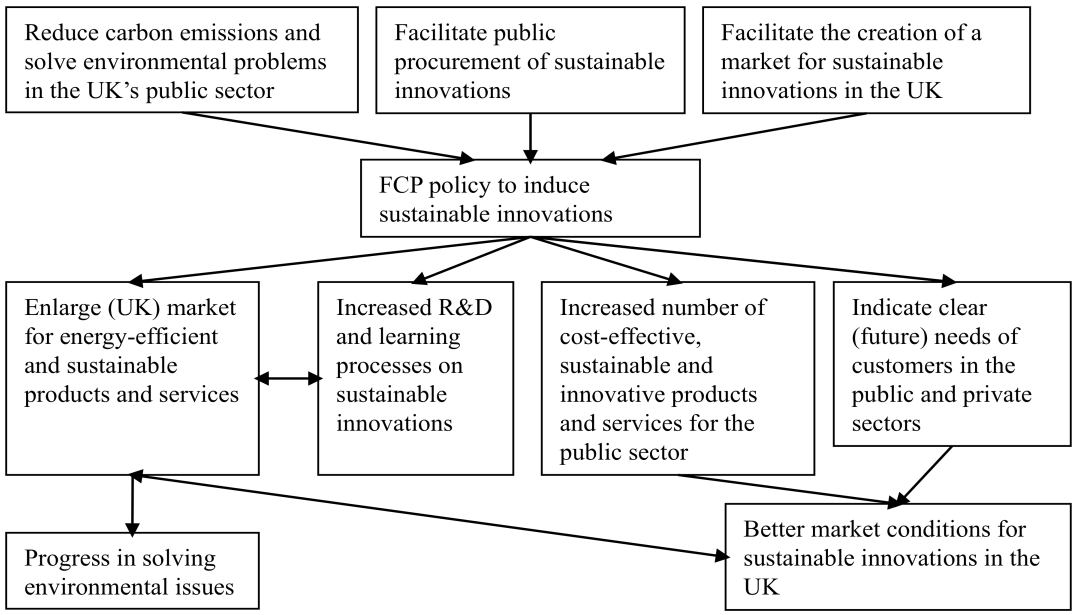

Figure 35: Final relations of the UK FCP policy

The objectives of the FCP policy relate back to the policy problems and are depicted on the top of Figure 35. FCP, if implemented well, can enlarge the UK market for energy efficient and sustainable products and services, which (on the long run) lowers carbon emissions and solves environmental problems and increases R&D on sustainable innovations. Furthermore, the public sector is more effective and thus procures more sustainable and innovative products and services and it indicates and forecasts (future) needs of consumers (both in the public and private sectors). These last effects create a final effect of better market conditions for sustainable innovations in the UK, which in turn also enlarges the market for sustainable products and services.

In November 2008, the DIUS launched an 'Innovation for Sustainability' Competition, to create awareness for and access to FCP as a tool and support innovative flagship projects,

with the aim to replicate them across the public sector. Departments merely had to express a general interest in FCP, and DIUS would coach the departments that showed their interest, through the provision of resources and know-how to implement an 'Innovation for Sustainability' FCP project and develop in-house FCP capability, as well as through providing access to funding streams for technical support and lead market deployment. In July 2009, the projects to be developed further were announced (BIS, 2011). Although the goals are clear, FCP is not widely adopted at the moment. Currently there are four FCP-projects running within the scope of the BIS department:

- Wakefield MDC looking into a sustainable park drainage solution
- HM Prison Service looking at a Zero Waste Prison Mattress System
- Rotherham NHS Trust looking at future Ward lighting solution
- Nottingham University Hospital low carbon energy solution

Note that the projects are not only focusing on reducing carbon emissions, but also on solving other environmental problems. The BIS has published several pamphlets that outline the success of the four flagship projects, but it seems that it is voluntary for other departments to implement FCP in their procurement practice. The current focus is twofold: the FCP model is being developed for use across the public sector, and BIS is also investigating the use of FCP in partnership with the private sector (at the moment this is not done yet). Furthermore, BIS is coordinating the LCB-Healthcare project[41], which aims at stimulating innovation for low-carbon building solutions in the Health Service Sector across Europe.

6.4.3.3. Normative relations of the FCP policy

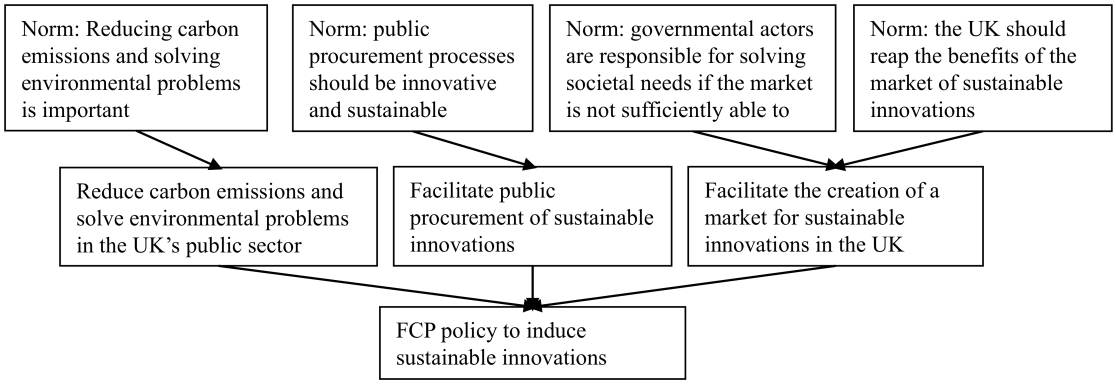

Figure 36: Normative relations of the UK FCP policy

The norms behind the FCP policy are rather complicated as they have a broad range. First of all, there is the *sector rationale of sustainability*: reducing carbon emissions and solving environmental problems is important. Furthermore, engaging in FCP policy will *enhance public procurement processes* to make them both more innovative and more sustainable; thus improve public service. The sector rationale is in this case related to the norm of public responsibility and *example setting*: the government should act if the market is not sufficiently able to – and this in turn relates to the system failures related to the mismatch between supply and demand. By engaging in FCP, the future demands of the public sector are *articulated* through foresight strategies, and the *interaction between suppliers and the government* is increased (House of Lords STC, 2011). This induces *awareness* and also reduces *risk as a result of uncertainty*. Lastly, the global market of sustainable products and services is growing rapidly, and the UK government would like to *reap the benefits of this growth* and use them to enhance the UK's national competitiveness. This is slightly different then in central Innovation Procurement Policy, as in that case the focus is on innovation in general – and the UK's enhanced competitiveness if the country's innovation output is increased. In the FCP policy the focus is emphatically on the market for *sustainable* products and services, and innovation is *merely a way* to keep up with that market as it is changing rapidly.

[41] This is one of the three EU Public Procurement Networks that are established under the EU Lead Market Initiative, see for more information: http://lowcarbon-healthcare.eu/main/

6.4.3.4. Reconstructed policy theory of the FCP policy

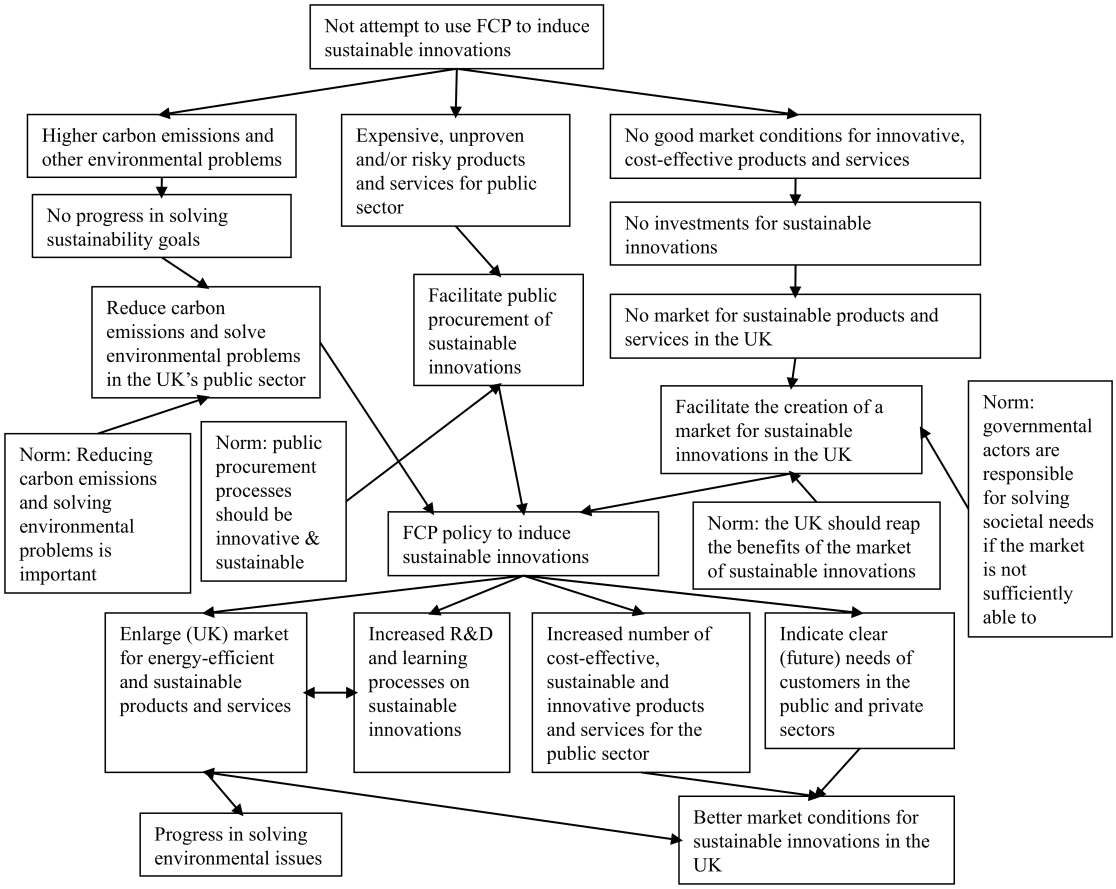

Figure 37: reconstructed policy theory of the UK FCP policy

The FCP policy is clearly stemming from a sector rationale as the norms behind the policy are all related to sustainability: from recognising the importance of reducing carbon emissions to the responsibility to act through governmental interference and a norm to feel the need to participate in the market for sustainable products and services. Innovation is truly *integrated in the sector rationale* here, as it is, more than with the other PPI programmes, considered a *means to an end*. The FCP policy therefore brings a new shape to the policy arena, as it successfully *merges environmental and innovation policy* (considering sustainable procurement efforts can be categorised as environmental policy). However, in practice the FCP policy is merely running in some flagship cases, and it is not embedded throughout government yet (Creese, 2011; House of Lords STC, 2011).

6.5. Empirical evidence: evaluations and flagship cases

The number of SBRI contracts has increased considerably over the past few years. In June 2010, 373 SBRI-contracts were concluded (Holland, 2010b). In the fiscal year 2010-2011, the budget has increased to £35 million, but as the departments engaging in SBRI are the ones paying most of the outsourced R&D contracts, and budget cuts are expected as a result of the financial crisis, the interest in SBRI is declining. As a result, the TSB is 'subsidising' departments' SBRI contracts, e.g. through paying 50% of the costs (Golding, 2011). Overall, like in the Netherlands, the response from both governmental departments and business is positive. SBRI brings about innovative solutions to public problems and provides access to new companies from different sectors, thus expanding the government's network beyond 'the usual suspects' (Holland, 2010b). The SBRI-demand and challenges are mostly created through a top-down strategy (sometimes as a result of a department's overall IPP), but sometimes also bottom-up when a government official or procurer takes the lead. However, the TSB supports the engaging public body, according to the department's capacities. Still, this also indicates that support for SBRI throughout the government is crucial for its success. This last conclusion is also one of things noted by NESTA in their formal SBRI evaluation (NESTA, 2010). NESTA also noted that the SBRI programme helped public bodies to

communicate their needs more effectively to the private sector, and the solutions that were developed would in many cases not have been reached if the SBRI did not exist. Furthermore, the private sector finds SBRI provides an effective and non-bureaucratic tool, which also provides access to TSB's elaborate networks and pays all of the R&D costs while still offering flexibility. However, it goes further then R&D, because it ensures close contact between supplier and consumer, increasing *user-producer interaction* and *demand articulation* (Holland, 2010b). Furthermore, companies can put in a bid for the contract without being a company yet, which of course then induces the number of start-up firms and technology development within sectors that are important for society (NESTA, 2010). Another plus is that the intellectual property stays with the company and having an SBRI-contract can even offer allure to private investors as well (Holland, 2010b).

In Appendix 12 the growth of the number of SBRI-competitions is graphically shown, per participating department or agency. There are many successful SBRI contracts and examples of start-up companies that were set up as a result of it. NESTA (2010) has studied seven of the most advanced SBRI-competitions. As the Department of Health (DH) and Ministry of Defence (MoD) have the most procurement budget and thus impact, it seems logical that these departments are furthest in implementing innovation procurement and have consequently also participated most in SBRI-contracts (see Appendix 12). Therefore, it seems logical to look at one of the competitions organised by them, while maintaining the focus on *sustainable* innovations. Defence departments globally have traditionally induced many groundbreaking innovations. The UK MoD has launched a 2-year programme called "Reducing the Burden on the Dismounted Soldier Capability Vision", of which the SBRI-contract "Energy Efficient Soldier" is one. The main goal here is to alleviate the burden soldiers have to carry while in the field. Of these burdens, power supplies cover quite a large part: for some missions, the battery sources contribute up to 30% of the load (NESTA, 2010). The SBRI competition called for radical innovations, and a wide array of solutions was generated: from energy scavenging to alternative energy sources – most of which are also applicable in other areas. This demonstrates the importance of spin-off knowledge: R&D that was originally conducted for a certain purpose can often be applied in other innovative products and services.

Although they are still in early stages, this is also demonstrated in the FCP cases. FCP clearly has potential to solve system failures, as it provides the market with advance information on future needs (in outcome terms, instead of conventional specifications of products). This also causes early engagement with suppliers and provides public bodies with an incentive to engage in sustainable innovation procurement (House of Lords STC, 2011). The example of the Ultra Efficient Lighting project (part of a 7-year programme of ward reconfiguration by the Rotherham NHS Foundation Trust) illustrates this. This project brought forward highly efficient, smart lighting systems that delivered carbon reduction in a cost-effective way, while maintaining a healthy environment for both patients and staff (BIS, 2011b). This is another example of a system that could be easily transferred to other applications, like other hospitals, but also schools or offices. However, although the UK is taking the lead in promoting FCP across Europe, it is still in its infancy and only four projects are running. Furthermore, as the House of Lords Science and Technology Committee (2011) critically points out, "to date FCP has been has been operating on a much smaller scale than SBRI with most projects yet to reach the procurement stage. The only completed FCP project is the HM Prison Service procurement of a fully managed Zero Waste Mattress system" (House of Lords STC, 2011, p. 38).

This is corroborated by David Golding of the Technology Strategy Board, who points out that in order to integrate and embed FCP across (national) government, the TSB together with BIS will have to take the lead and invest in this. There is a similar need within the SBRI scheme: in order for SBRI to be truly successful, it has to be scaled up to spread across the national governments, and optimally to municipalities as well. Currently, the SBRI accounts for a total value of less than £25m a year in the context of a total public sector spend of £236 billion (House of Lords STC, 2011). One of the main goals for the future is enable more public bodies to effectively utilise SBRI, and thus to promote SBRI among public bodies and reach more innovative SMEs (Golding, 2011). However, the TSB will have to keep a watchful eye on the implementation of SBRI and ensure the quality of the instrument as it is increasingly spread out over the government. Moreover, both Golding (2011) and Creese (2011) strongly emphasise the need to bring SBRI and FCP together and create a linkage between the two programmes. To this effect, Mr. Golding is, apart from the SBRI division at TSB, also a member of the FCP Steering Board. However, plans to truly create this linkage and help governmental departments forward are still under construction (Golding, 2011). NESTA

(2010) also points out the need to embed SBRI within a wider system of demand-side policy levers, in which a long-term innovative potential and capacity should be considered, rather than short-term efficiency.

The Innovation Procurement Programme, in which every department was obligated to draw up their department's ambition towards implementing innovation procurement and the way they planned to reach this, was the former government's attempt to bring together all PPI efforts. As in the other PPI programmes, the Department of Defence and Health have the most advanced IPPs (Golding, 2011), other departments have far less detailed plans. Furthermore, the departmental IPPs ensured that all departments know about innovation procurement and thought about how to implement it in their departments. However, as Golding (2011) puts it, "the new government [installed last May] is less keen on artificial targets" and the IPPs are considered to have very little follow-through. Therefore, the TSB and BIS are currently considering a more tailor-made, customised approach in which they sit down with each department's Chief Scientific Advisor, and individually determine the potential for either SBRI or FCP in the department in question (Golding, 2011). However, all these plans are still under development. In fact, the House of Lords STC (2011) has concluded "it is striking the number of documents and reports published in recent years that make recommendations about innovation in public procurement. Yet it is disappointing that we have seen no evidence of a systematic and coherence use of public procurement as a tool to stimulate innovation" (House of Lords STC, 2011, p. 41). BIS is planning an evaluation of SBRI and FCP in 2012 – it is likely that the evaluation will also identify ways of improving the policies (House of Lords STC, 2011).

6.6. Strengths and weaknesses

6.6.1. Coordination capacity

Proposed solutions	Situation UK	Strong and weak points
Main management of the policy should be innovation department.	BIS, in cooperation with the TSB is main driver behind PPI policies, takes an active role in enhancing the quality of the departmental IPPs. SBRI is managed by TSB. The FCP policy is coordinated by BIS, but with input from Defra. BIS develops the PPI step-by-step procedures in close cooperation with the Government Procurement Service, who is responsible for general procurement.	✔ Strong, central role of BIS to coordinate the three PPI policy programmes.
		✔ Active role of BIS in defining high-quality departmental IPPs.
Provide sufficient background information to ensure understanding.	The 2008 white paper ensured the development of departmental IPPs, which induced understanding of PPI across the government. The pamphlets, guides and toolkits published by BIS, TSB and CO facilitate understanding further. 'Success stories' and flagship cases are published so as to provide details on the practice of innovation procurement, but this could be done much more (House of Lords STC, 2011).	✔ Clear information supply through step-by-step guides, pamphlets and toolkits.
		(✖) PPI 'success stories' should be used more to 'market' PPI and to point out good practice.
Create and maintain a concrete strategic implementation plan.	Guidebooks and pamphlets for the IPPs provide clear direction on how to implement PPI. However, in general the national government has a "laissez-faire" attitude towards the ambition level of the IPPs and the local governments are often not targeted in the policy documents. SBRI can be integrated in the IPPs and has a clear implementation plan. FCP is not yet widely used or implemented, although BIS provides guidance on FCP policy and implementation on a department's own initiative. However, the connection between the different programmes, especially between the SBRI-pilot phase and the commercialisation-phase (within general or innovation procurement) is not sufficient.	✔ Top-down approach of mandatory IPPs with corresponding guidebooks ensures participation throughout the UK government.
		✖ Ambition level of IPPs is insufficiently guaranteed.
		(✖) Little flexibility of individual departments as IPPs have a set format.
		✖The connection between the different PPI programmes is not good enough.
Create the plan with stakeholders (from industry).	TSB employs many people who worked in industry and boasts a good connection with industry (e.g. through the Knowledge Transfer Networks). The Innovation Procurement Policy of BIS is developed through recommendations of people of industry, but the implementation plan is not created with stakeholders as the issues that are concerned with this scheme are mostly internal affairs. The FCP model is implemented by BIS, but it was created following the recommendations in	✔ The SBRI-coordinator TSB has strong ties with industry and an extensive network, and these stakeholders are also included in the SBRI process.
		(✔) The FCP policy is devised following the CEMEP report, in which stakeholders from all over society participated.

	the 2007 CEMEP report, in which stakeholders from industry, civil society and government cooperated.	✖The Innovation Procurement policy mainly focuses on internal government processes.
Guarantee commitment of the other (sectoral) departments.	PPI is officially backed at the highest political level, and has a central place in the UK innovation policy. SBRI is mostly used by departments with high procurement budgets, but the TSB is very active in collaborating or guiding the engaging departments. However, the innovation rationale is still not embraced throughout the government, although the FCP policy provides clear incentives to use innovation to reach sectoral objectives. BIS ensures regular coordination and evaluation moments, especially with TSB. The implementation plan mostly guides and does not guarantee commitment.	✔ Political backing for PPI.
		✔ TSB very active in guiding/supporting departments.
		(✔) Departments with high procurement budgets are engaging in SBRI and FCP.
		✖ Innovation rationale is not embraced throughout government.
		✖ Implementation plan only guides, does not induce commitment.

6.6.2. Link with private demand

Proposed solutions	Situation UK	Strong and weak points
Ascertain needs of private buyers through user-producer interaction and take these into account when designing policy measures.	This is not properly done in the UK. Through SBRI and FCP the public bodies and companies are getting closer and TSB has strong ties to industry, and the user-producer interaction is thus stimulated, but there is no focus on the *needs* of private buyers.	(✔) User-producer interaction is increased through SBRI and FCP.
		✖ Needs of private buyers are not taken into account when designing the PPI policies.
Embed PPI policies in framework of other demand measures (coordination between public PPI, cooperation with private demand).	There is no strong link between PPI and normal procurement (only on departments' own initiative, e.g. in departmental IPPs). TSB wants to start with a customised approach in which they work with each department's Chief Scientific Advisor. BIS and TSB are working on bringing FCP and SBRI closer together, but this is not done now. Within FCP, they are interested in linking public-private demand. There are hardly any examples of coordinated demand projects within public procurement (e.g. departments buying something together).	(✔) TSB is developing a customised approach through individual plans with departmental Chief Scientific Advisors.
		(✔) Efforts are underway on linking FCP and SBRI; to establish public-private demand projects within FCP
		✖ At the moment the PPI policies are not sufficiently embedded in a framework of other demand measures, and coordinated PPI projects within the public domain are hardly ever done.

6.6.3. Coping with complexity and procurement discourse

Proposed solutions	Situation UK	Strong and weak points
Establish selective discourses that define mid- and long-term public needs (derived from policy goals and administrative strategies).	This is in the hands of Chief Scientific Advisors (CSA), who, for each department, determines the short- and long-term public needs. The TSB intends to work with individual Chief Scientific Advisors to ensure a greater share of innovative products and services. General innovation and technology Foresight strategies provide general direction in this matter. Lastly, the House of Lords STC (2011) recommends establishing a Minister responsible for Innovation and Procurement, thus bridging the gap that currently exists between policy makers and procurers.	✔ Foresight strategies and Chief Scientific Advisors are in place to roughly determine future needs.
		(✖) The CSAs should include innovation more in their practices, and more attention should be paid to competence building.
		✖ One person should be responsible for innovation procurement, to bridge the gap between policy makers and procurers.
Set up foresight strategies to develop common visions between producers and users.	BIS conducts Foresight meetings in which, supposedly, the latest scientific and other evidence is combined with future analysis to tackle complex issues and help policy makers make decisions affecting our future. However, these efforts could be expanded and should be linked more closely to strategic procurement. Furthermore, they should be connected to the long-term planning of the departmental CSAs and with stakeholders from practice.	(✔) Foresight Strategies conducted by BIS.
		✖ Current Foresight efforts should be expanded and linked more closely to the CSA's procurement strategies.
		✖ Current Foresight efforts should include stakeholders and producers from the private sector.

6.6.4. Activating and enabling the procurement chain

Proposed solutions	Situation UK	Strong and weak points

Change incentive structures for procurers (replace lowest-cost rationale with MEAT: Most Economically Advantageous Tender)	According to David Golding (2011), and despite political will, this has not been done properly in the UK. Procurers' rationales are still low-cost and risk-averse. There is a gap between people pushing PPI and the procurement people.	✖ Still no incentive for procurers to engage in PPI.
Create a structure in which procurers have up-to-date knowledge of future needs and potential improvement of public service.	This is ideally done through the CSAs. However, the CSAs should work more closely together with the TSB and with Foresight exercises organised by BIS, as well as with policy makers who drive innovation.	✔ Each department has a CSA who determines future needs,
		✖ There should be more cooperation between the CSAs, Foresight and policy makers.
Tender process needs to be based on specifying functionalities rather than designs.	This is done in the SBRI and FCP programmes. However, this is but a small portion of the total procurement budget, so the key is to change the general, "normal" procurement strategies of the departments.	✔ SBRI and FCP are based on functionalities, and their share is increasing.
		✖ General, "normal" procurement is still based in designs rather than functionalities.
Facilitate organisational change and systematic training of procurers at operative level.	The Cabinet Office provides training, but the innovation rationale is not sufficiently pushed through there. However, some areas/sectors participate in European networks for training and education of procurers, and they can thus find their information there. However, this is not a regular or standard part of the procurement training, most of the training is done on a procurers' initiative.	(✔) Some areas/sectors engage in European networks to obtain info on future needs and developments.
		✖ The Cabinet Office provides general procurement training, in which innovation should be much more embedded.

6.6.5. Creating and maintaining a supporting innovation procurement culture

Proposed solutions	**Situation UK**	**Strong and weak points**
Embedding PPI in the existing innovation policy.	This is done in name, e.g. through including PPI in the Blueprint for Technology. However, the share of the PPI programmes (FCP and SBRI) is still very small. Furthermore, since the departmental IPPs are not continued as a formal policy anymore, the UK needs to embed the FCP and SBRI programmes more into "regular" procurement practice.	(✔) Increasingly, PPI has a more important and prominent place in innovation policy.
		✖ Share of the PPI programmes is small, and they should be more embedded in "regular" procurement practice.
Ensure support of existing norms and regulations.	This is, like in the other countries, considered one of the main barriers to successful PPI implementation: many rules are contradictory or overlap each other and favour low risk-taking. The Cabinet Office has appointed an Efficiency and Reform Group, which should simplify the procurement process (how this will be done is largely unclear). However, European competition regulations also present a barrier to PPI implementation.	(✔) The CO's Efficiency and Reform Group is planning to simplify procurement processes.
		✖ UK procurement rules are often contradictory and inefficient in terms of innovation.
		✖ European competition regulations make it difficult to successfully implement PPI policies.
Create sufficient financial support.	This is an important issue of the new UK government: budget cuts in public service are eminent and will be conducted throughout the government. This hampers the departments' willingness to take risks and engage in a FCP or SBRI contract. Furthermore, the TSB, who is crucial in the PPI programmes, will get more responsibilities but fewer resources. However, the TSB is not abandoning the SBRI instrument and has devised schemes in which they financially support departments engaging in an SBRI tender.	(✔) TSB is devising schemes to support departments to engage in SBRI.
		✖ Budget cuts throughout government hamper the willingness to engage in PPI programmes.
		✖ TSB, who is crucial in furthering PPI programmes, will get more responsibilities, but fewer resources.

6.7. Conclusion

Three PPI programmes are currently running in the UK:

1. SBRI (Small Business Research Initiative) – which in its current form has been running only since 2009 and is a pre-commercial procurement programme, coordinated by the TSB.
2. Central Innovation Procurement Policy – which is a centrally coordinated effort to include innovation in the procurement process throughout the national government, under responsibility of the department of Business, Innovation and Skills (BIS), in close cooperation with the TSB. This is currently done through the mandatory

departmental Innovation Procurement Plans (IPPs), although this route will not be pursued much longer.

3. Forward Commitment Procurement (FCP) – which is a model originating from sustainable procurement efforts, and which entails outcome-based specifications of needs instead of purchasing for the immediate need, under the responsibility of the department of BIS, in cooperation with TSB and Defra (Ministry for Environment). Successfully implemented FCP entails the *early articulation of (long-term) demand*. Furthermore, it allows for early *user-producer interaction* and can *alleviate risks associated with costs and uncertainty*. However, there are merely a handful of FCP pilot projects running at this moment.

The UK seems to be in a transition period; mostly resulting from the recent government change. On paper, the UK seems to be doing exceptionally well, but when delving deeper on what is actually happening, the success stories are more insubstantial than they first appear. The UK's *coordinative capacities* are doing well in terms of management and information supply. BIS and TSB work together quite closely, both on SBRI and FCP, and both BIS and TSB take the lead in 'marketing' PPI throughout the UK government, which *increases awareness* as through SBRI and FCP, the government gets in closer contact with the private sector than they get through other policy instruments. Departments that have high procurement budgets are engaging quite successfully in SBRI and FCP. However, the ambition level of the IPPs is *not sufficiently guaranteed*, and the top-down approach offers little flexibility nor does it induce departments' initiative, commitment or embracing of the innovation rationale. Furthermore, although BIS attempts to work on this, the *connection* between the PPI programmes is not good, and especially as the *IPPs are apparently terminated*, this connection will require a lot of attention in order for the PPI schemes to work properly.

The *link to private demand* and the attached system failures it could solve are not properly addressed. The SBRI-coordinator TSB has strong ties with industry and an extensive network, and these stakeholders are also included in the SBRI process, inducing *user-producer interaction*, but apart from that the PPI policies are not sufficiently embedded in a framework of other demand measures. FCP has great potential in linking with private demand, but this is not done yet. The capacity to *cope with complexity and procurement discourse* is stimulated through foresight strategies conducted by BIS. Furthermore, each department has a Chief Scientific Advisor, who should roughly determine the department's future needs. Both are inducing *demand articulation* and *awareness*. However, the House of Lords STC (2011) points out that these foresight efforts should be expanded, should include stakeholders and (private) producers, and should be linked more closely to the departmental procurement strategies. As the foresight strategies are not far-reaching enough, they do not really decrease the risk associated with *uncertainty* and *user-producer interaction*, which can be greatly improved through this capacity, is also not sufficiently addressed.

The fourth capacity, *activating and enabling the procurement chain*, is in theory well taken care of, but in practice the most important elements are missing. Although the SBRI and FCP schemes are based on functionalities and societal demands, instead of design, their share is still very small (though steadily increasing). In the larger government, there is no incentive for procurers to engage in PPI, apart from the IPPs that are now phased-out. This hampers PPI's potential to solve the *costs vs. risk deadlock*. The TSB is planning to start customized training and advice for the departmental Chief Scientific Advisors, which would greatly improve the chances of PPI spreading on an operational level. At the moment, the training of procurers does not include anything about innovation, although some departments (e.g. construction, health sector) are enrolled in European networks and obtain training there.

Lastly, as the UK's PPI policy is currently under revision and development, it is difficult to say anything about their capacity to *create and maintain a supporting innovation procurement culture*. The FCP and SBRI schemes are both built very well, and when the two schemes would be connected, the potential of the UK's PPI policies to solve the system failures would be great. However, the connection is at this moment not good enough, and the largest problem is that the share of the PPI programmes is small, and they should be more embedded in 'regular' procurement practice. TSB is working hard in this direction, but at the moment the efforts are not enough to overcome the barriers of *risk due to uncertainty and costs*, and of barring (EU) regulations. Furthermore, the UK generally only influences the national government, and is *very isolated from municipalities or other governmental actors*. This entails that even if the national government is changing its procurement practice, the lower governmental level might not.

7. Comparative Analysis

7.1. Context: differences and similarities

Compared to EU average, the Netherlands and the UK both have a high share of *service-sector* (business services) and this share is increasing. Within this share, a large part is *knowledge intensive-based service* (Arundel et al., 2007). This high share of knowledge-intensive service companies appears to induce a higher innovative performance (Arundel et al., 2007). On the other hand, some argue that the strong focus on the service-sector is not beneficial in terms of innovation. The few multinational companies that are investing in R&D are moving their R&D divisions to low-wage countries. Sweden has one of the highest R&D spending in the world (in 2009, 3,75% of the Swedish GDP (well above the 2,77% of the US) was invested in R&D). For a long time, the country benefited from its strong public-private relationships, especially with the larger engineering companies[42]; parts of the companies were for a long time publicly owned (Sandqvist, 2011). However, because of this close collaboration, the concentration of economic power was in the hands of the government and a small number of larger companies. As a result, over time the costs rose and growth declined because of the lack of entrepreneurship and competition. Although this problem had already been noticed in the 1970s, it was not addressed sufficiently as a result of the successful lobby of various interest groups who wanted to keep the system intact (Roos et al., 2005). However, this trend changed slightly; many large engineering companies have split up their tasks: while the infrastructure of many systems remains in public hands (e.g. traffic, telecommunication), the technological systems or products in it are privately owned (Sandqvist, 2011). Furthermore, the national innovation system has become more market-economically oriented, with a larger focus on efficiency and a technology development that focuses more on systems than on specific products. This entails that the implementation of inventions, and in a later stadium the successful market introduction of innovations, has become more complex (Sandqvist, 2011). Sweden has not fully adjusted to this change yet.

All three countries benefit from a stable macroeconomic environment, state of the art scientific performance and a well-educated workforce. However, all three countries are having trouble to maintain their levels of output and high quality in higher education, which is a worrying trend, as it decreases the attractiveness of the national innovation systems. Lastly, in all three countries, the entrepreneurial activity is relatively low, although it has been improving over the last few years; especially the innovativeness of the SMEs is relatively low and the relationships between knowledge institutes and SMEs could be improved as well, although Sweden and the Netherlands have a higher percentage of public-private co-publications, and the UK has a higher share of innovative SMEs collaborating with others (INNO-policy, 2009a; 2009b; 2009c). The number of spin-off companies, especially from universities, is also higher in the UK; the UK does not seem to have as much trouble as the other two countries to commercialise their R&D. This is probably the result of policies tackling this problem in the last few years, resulting among other things in crystallised regional science clusters, in which there are strong links between universities and business. In Sweden and the Netherlands, many talks centre around the so-called innovation paradox, as the output in terms of growth, productivity and competitiveness is not in accordance with the R&D spending (OECD, 2010b; Edquist and Hommen, 2008). Furthermore, in all three countries, the high-technology sector is relatively small and R&D is mostly concentrated in a few multinational firms.

The results from INNO-Policy (2009b) show that compared to EU average, Sweden does not have a formal innovation policy. If innovation is mentioned, it is located within the research policy budget umbrella or the enterprise policy budget umbrella, or in framework conditions that are spread over a myriad of departments. In Sweden, demand-side innovation is not emphasised in the central innovation policy, although Vinnova is pushing the topic onto the political agenda. The Netherlands and the UK both do have a formal innovation policy and officially emphasise demand-side measures in it (UK even more than the Netherlands, although for both countries not all the talk is turned into action). In terms of organisation, the Swedish governmental system is slightly different from the other governments in the sense that the governance is organised in two layers: the government (who is itself accountable to

[42] These are the engineering companies that are represented by Teknikföretagen (the Association of Swedish Engineering Industries), which represents more than 3,500 engineering companies. For more information about the engineering companies that are represented by Teknikföretagen, see: http://www.teknikforetagen.se/Documents/Teknikforetagen/Swedens_most_important_companies.pdf

the parliament) governs Sweden, but the government agencies take and implement decisions on individual matters (Sandberg, 2008). As such, the government decides on the goals, guidelines and a general allocation of resources for the agencies, but the way agencies apply the laws, how they will allocate their resources exactly and which decisions they will make on various items of their operations is decided by the agencies independently, which gives them a lot of freedom and flexibility (Sweden, 2011; Widmark, 2011; Sandberg, 2008).

Both Sweden and the Netherlands have an economy that both traditionally emphasises trade, export and distribution and therefore depend heavily on the global market (Van der Duin, 2010). In the contemporary economic climate, this is very noticeable. In all three countries, governments have attempted to reorganise their own functioning and reduce the number of government officials while maintaining an effective public sector. As a result, some departments have merged and responsibilities have been shifted around. Policy programmes that are perceived 'inefficient' are being phased-out or have been terminated altogether.

The UK has, much more than the other countries, a *laissez-faire* approach to the diffusion of innovation policy in general and PPI in particular. The House of Lords STC (2011) claims that this appears to be overly optimistic, and recommends that the government should take a stronger lead in sharing PPI-success stories and implementing PPI throughout the government, instead of expecting the departments to do this on their own initiative. Especially local government is not reached at this moment. Furthermore, Straw (2009) suggests that the UK's government policy has been too much focused on addressing market failures instead of creating market opportunities. As a result, there are few subsidy instruments in the UK that finance companies directly (as opposed to the Netherlands and Sweden), which is of course a crucial part of successful PPI. The TSB is supporting governmental departments and agencies how to deal with knowledge-supplying companies, e.g. by helping them articulate their tenders, or operational support through expertise on selecting proposals (Technopolis, 2010).

Considering general procurement, it seems that the Netherlands are less inclined to follow rules than Sweden, they do not put much effort in making their tender processes more transparent for other EU countries. This has lead to several infringement cases by the European Commission (EU Infringements, 2011). In contrast, Sweden has put extra effort in ensuring all their procurement procedures comply with EU rules and attempt to provide tender competitions in English as well as Swedish. The inquiry currently conducted in Sweden attempts to point out ways for improvement of the procurement rules in order for them to better allow for PPI ((Upphandlingsutredningen, 2011).

7.2. Comparison of PPI approaches

7.2.1. Forms of public procurement for innovation

	Direct public procurement				**State procurement in connection with private users**
Procurement form	*General innovation procurement*		*Strategic procurement/technology procurement*		*Co-operative or catalytic procurement*
Innovation phase	*Pre-commercial procurement*	*Commercial procurement*	*Pre-commercial procurement*	*Commercial procurement*	*Almost always commercial procurement*
Netherlands	SBIR (Agentschap NL)	Innovation-Driven Procurement (PIANOo and Ministry of Economic Affairs)	SBIR; Sustainable Innovation (track 4)	Innovation-Driven Procurement; Sustainable Innovation (track 3)	Very rarely done, on initiative of separate departments
Sweden	Under development (Vinnova)	Under development (Vinnova)	Sectoral approaches e.g. Energy Agency	Sectoral approaches e.g. Energy Agency	Sectoral approaches e.g. Energy Agency
UK	SBRI (Technology Strategy Board)	Departmental Innovation Procurement Plans (and central PPI direction at BIS).	Forward Commitment Procurement (BIS)	Forward Commitment Procurement (BIS)	Under development (BIS)

Table 5: Overview of different PPI forms in the Netherlands, Sweden and the UK

In Table 5, an overview of the different PPI forms in the Netherlands, Sweden and the UK is depicted. As I already pointed out when discussing the UK SBRI scheme, the UK SBRI and the Dutch SBIR are very comparable: the main rationales, objectives and philosophy behind it is the same as the Dutch approach (Holland, 2011). Unlike the Dutch scheme, the SBRI does not specifically aim at valorisation of knowledge, but it does start from a concrete public demand or need for R&D services as a result of a societal challenge. Both schemes aim at pre-commercial procurement, stimulating early-stage, high technology and innovative products and services, to meet public demand's future needs and to stimulate start-ups and SMEs (NESTA, 2010).

The UK central Innovation Procurement policy functions partly in the same way as the Dutch central Innovation-Driven procurement programme. The main difference is the UK's obligatory IPPs, but of course, they are being phased out at the moment, leaving a hole in the UK's approach. The Dutch approach is more characterised by networking, the procurement agency PIANOo fulfils an important role in that respect. Sweden's central PPI policy (Vinnova) would like to function like the TSB considering pre-commercial procurement. In general, Vinnova wants a heavier focus on innovation than the Dutch central approach has; they want to clearly separate the fact that they are working from a needs-approach as opposed to an issue's socio-economic value. Furthermore, Vinnova is focusing more strongly on the EU and showing their best practices in EU context, which hampers the speed of their programme-development on a larger scale.

Sweden's regional approach seems to be the only scheme that is successfully using cooperative and catalytic procurement and as such linking to private demand. However, there are only a few agencies that are successfully doing this. The Netherlands are simultaneously revising the Sustainable and Innovation Procurement programmes and through adding the innovation parts within Sustainable Procurement, it seems that the two programmes are finally, slowly, merging. However, it will take more time to see if the new approach is actually working. In general, the linkages between the programmes are insufficient, in all three countries. This is mainly a result of separate governmental actors working separately from each other, and building PPI competences in their own way. Consequently, they build their PPI schemes according to their own rationales, which makes it more difficult to merge them together into a coherent strategy. In the next section, I will take a closer look at these rationale-mixes.

7.2.2. Rationales for public procurement for innovation

In Table 6, the different rationales and rationale-mixes for PPI in the Netherlands, Sweden and the UK are depicted:

	Solving system failures					**Political target orientation**		**Additional rationales**
	Insufficient user-producer interaction	*Insufficiently articulated demand*	*Lack of awareness*	*Uncertainty vs. risk deadlock*	*Costs vs. risk deadlock*	*Innovation/ national competitive ness*	*Sector rationale*	
Netherlands								
SBIR	**x**		**x**		**x**	**x**	**(x)**	
Central PPI						**x**		Effective public service
Sustainable Innovation Procurement	**x**	**x**	**x**	**x**			**x**	Respond to criticism, increase ambition
Sweden								
Sectoral approach	**x**	**x**	**x**	**x**	**x**		**x**	
Central approach	**?**	**?**	**?**	**?**	**?**	**x**		Effective public service
UK								
SBRI	**x**		**x**		**x**	**x**	**(x)**	
Innovation Procurement Policy						**x**		Effective public service
FCP	**x**	**x**	**x**	**x**		**x**	**x**	

Table 6: Overview of rationales for PPI in the Netherlands, Sweden and the UK

The table clearly shows that the PPI programmes always have *mixed rationales*. Moreover, the PPI programmes within a country do mostly not have the same rationales, as they originated

as the result of different reasons and were designed by different governmental actors. The PPI programmes in the Netherlands and the UK both follow more or less the same reasoning. The SBIR and SBRI programmes have the same rationales: they are the results of the search for *solutions for concrete system failures*, as well as the *innovation rationale*. The sector rationale is less strong, the policy documents merely point out that SBIR can be used to reach societal aims, but it was not designed *for* that. The Central PPI programmes in both the UK and the Netherlands are the result of the *overarching goal of stimulating the Dutch innovation system*, although the Netherlands puts more emphasis on the additional rationale of *increasing the quality of public service* (of course, an effective public service will eventually also increase the functioning of the innovation system). However, the central programmes do not reason from the theoretical argument of solving system failures, although they eventually do contribute to solving the *lack of awareness* failure through promoting *user-producer interaction*. Finally, both the Netherlands and the UK have a PPI programme that originates from the *environmental perspective (sustainable procurement)*. However, the UK's FCP is much more derived from theory (the FCP model already existed), while the innovation parts of the Dutch Sustainable Procurement programme are more a result of a *refinement of the 'old' programme*, and an attempt to increase the ambition of the programme. Both sustainability-related programmes are designed to *solve system failures* though, although the FCP model provide for more opportunities to expand (e.g. to include cooperative procurement, or to decrease risk due to *uncertainty* and *costs* because of its long-term outlook), and includes the rationale of reaping the benefits of the growing market of sustainable products.

In Sweden, the maturity of the sectoral approach is reflected in the fact that it covers almost all rationales; it truly integrates innovation and sustainability in the sense that its policy is motivated by solving the system failures, and, as I found earlier in this thesis, the sectoral PPI approach, combined with additional policy measures does solve the system failures rather efficiently. However, the only rationale that is not mentioned in the sectoral approach is the innovation rationale – the approach is *sectoral and regional and bottom-up*, and as such is not fit to aim for enhancing innovation and national competitiveness, although it of course does strengthen it bit by bit. Therefore, the central approach that Vinnova is starting could fill up this gap. However, although it is clear that the rationales behind that policy *is* enhancing national competitiveness and innovation, as well as increasing the quality of public service, it is at this point unclear which other motives might play a role (i.e. solving system failures).

In general, the ideal situation would be to integrate the different PPI approaches in a country, so it reaches most governmental agencies and innovation is truly embedded in the procurement practice as well as integrated within societal aims like sustainability. However, as the rationales of the different programmes lie so far apart this can be problematic.

7.3. Comparison of strengths and weaknesses

In Table 7, an overview is given of the strengths and weaknesses within the three countries' governmental capacities and their abilities to solve the associated system failures. Through this table, one can roughly compare the strengths and weaknesses of the countries' PPI schemes. The judgement of the schemes is done on the basis of the assessments of the countries' strengths and weaknesses in terms of the capacity to successfully implement PPI earlier in this thesis. However, one should keep in mind that this is a very simplified judgement of the situation, and it is perfectly possible that one of the PPI schemes or a regional agency is doing very well in terms of a governmental capacity, but the overall capacity of the countries' PPI schemes is doing poorly. In this table, I have assigned symbols ranging from very poor (——), to poor (—), to medium (±), to good (✚), to very good (✚✚).

Dimensions	*Proposed solutions*	*Associated system failures*	*Netherlands*	*Sweden*	*UK*
Coordination capacity	Main management of the policy should be innovation department.		✚✚	—	✚
	Provide sufficient background information to ensure understanding.	Lack of awareness	±	±	✚
	Create and maintain a concrete strategic implementation plan.	Lack of awareness	±	±	±
	Create the plan with stakeholders (from industry).	Lack of awareness;	—	✚	±
	Guarantee commitment of the other (sectoral) departments	Lack of awareness	—	——	±

Link with private demand	Ascertain needs of private buyers through user-producer interaction and take these into account when designing policy measures.	Insufficiently articulated demand; Lack of awareness; Uncertainty vs. risk *deadlock*; Costs vs. risk *deadlock*	–	+	–
	Embed PPI policies in framework of other demand measures (coordination between public PPI, cooperation with private demand).	Insufficient user-producer interaction; Uncertainty vs. risk *deadlock*; Costs vs. risk *deadlock*	– –	+	– –
Coping with complexity and procurement discourse	Establish selective discourses that define mid- and long-term public needs (derived from policy goals and administrative strategies).	Insufficiently articulated demand; Lack of awareness; Uncertainty vs. risk *deadlock*; Costs vs. risk *deadlock*	+	+	±
	Set up foresight strategies to develop common visions between producers and users (Georghiou, 1996).	Insufficient user-producer interaction; Insufficiently articulated demand; Lack of awareness; Uncertainty vs. risk *deadlock*; Costs vs. risk *deadlock*	±	±	–
Activating and enabling the procurement chain	Change incentive structures for procurers (replace lowest-cost rationale with MEAT: Most Economically Advantageous Tender).	Costs vs. risk *deadlock*	– –	– –	– –
	Create a structure in which procurers have up-to-date knowledge of future needs and potential improvement of public service.	Insufficiently articulated demand; Lack of awareness	±	+	±
	Tender process needs to be based on specifying functionalities rather than designs.	Costs vs. risk *deadlock*	±	±	±
	Facilitate organisational change and systematic training of procurers at operative level.		+	–	–
Creating and maintaining a supporting innovation procurement culture	Embedding PPI in the existing innovation policy.		±	–	–
	Ensure support of existing norms and regulations.	Uncertainty vs. risk *deadlock*;	–	–	–
	Create sufficient financial support.	Costs vs. risk *deadlock*	–	– –	– –

Table 7: Comparing the strengths and weaknesses of the PPI schemes of the Netherlands, Sweden and the UK

From this comparison, it can be concluded that the first dimension, *coordination capacity*, is quite good in all three countries (although Sweden is lagging behind in terms of a central PPI organisation), but the commitment of other departments is not sufficiently guaranteed. It is quite curious that none of the countries has implemented some sort of strategy to tackle this problem – apart from information and network activities; there are no coherent measures in place to work on this issue. The second dimension, *link with private demand*, is only doing well in Sweden's regional approach – in all the other countries this is only done marginally through the SBIR/SBRI schemes, in which the public body has close contact with private actors, but a link to private *demand* is not made.

The third dimension, c*oping with complexity and procurement discourse*, is carried out quite well – all three countries have some sort of foresight and long-term technology outlook to determine the government's future needs. However, it is very difficult to determine how far-reaching these activities are; on paper they might look advanced but it is unclear how ambitious this capacity is aimed for. The UK is lagging behind a bit in this respect, but the TSB's new plan to work with the departmental CSAs and determine a customised approach has much potential.

The performance of the fourth dimension, *activating and enabling the procurement chain* is medium. It is clear that in all three countries, the incentive structure for procurers is still not adjusted to a more innovation-inducing one. One the one hand this is surprising, as it seems such a logical step to tackle, but on the other hand this is quite understandable, as it is very difficult to drastically change the patterns that procurers are used to. On the other hand, the facilitation of change through training the procurers at an operational level is also not tackled sufficiently. In all three countries there are some steps in this direction but there are no large-scale training programmes for procurers in place. Finally, the capacities for the last dimension, *creating and maintaining a supporting innovation procurement culture*, are very poor in all three countries, especially in terms of supporting and non-barring rules and regulations and financial support. This last issue is especially difficult in the current economic climate, with countries cutting budgets throughout the whole government. Furthermore, the difficult economic climate also makes it more difficult for procurers to take risks.

8. Conclusion

8.1. Using PPI to induce sustainable innovation

8.1.1. Introduction: a quick recap

In this thesis, I have extensively studied the schemes for Public Procurement for Innovation (PPI) within the Netherlands, Sweden and the UK, with the goal of answering the following central research question:

What are the main barriers of using Public Procurement for Innovation (PPI) as an approach to induce sustainable innovation in a national context?

In order to answer this question, I have firstly, for each country, established context in terms of the history and practice of innovation policy, the status of demand-side innovation policy and public procurement for innovation in particular. Secondly, I have used the national innovation system as a framework to map the main actors influencing the PPI policy. Thirdly, for each country, I have identified the formal PPI programmes. Fourthly, I have reconstructed these PPI programmes in terms of their causal, final and normative relations. Fifthly, I have presented some empirical evidence of the practice of the PPI schemes, through reviewing formal evaluations and some flagship cases. Lastly, I have combined the results from the policy reconstruction and the empirical evidence to determine the strengths and weaknesses of the PPI schemes, using the capacity framework devised earlier in this thesis. This allowed me to draw, for each country, some conclusions on their governmental capacities to implement PPI and their potential to solve system failures within their specific national contexts. Subsequently, I have conducted a comparative analysis and have attempted to determine the differences and similarities between the Netherlands, Sweden and the UK in terms of their contexts (national innovation systems, their innovation policies and the status of demand-side innovation policy, their PPI approaches (in terms of the PPI form and the rationales behind them) and their strengths and weaknesses in terms of their governmental capacities.

There are many indications of PPI's potential to (partly) solve the system failures, as indicated in the beginning of this thesis. The pre-commercial procurement schemes SBIR and SBRI support the growth of small companies through providing a solution to the finance-gap for R&D of innovations (i.e. solving *costs vs. risk deadlock*). Furthermore, it increases *user-producer interaction* as it requires a much more active role by public bodies than conventional innovation policies (which also solves *lack of awareness*). Lastly, it increases the quality and cost-effectiveness of the public sector, which also increases *demand articulation* of the needs of the public sector. The SBIR/SBRI schemes are very flexible and applicable to any R&D demand, making them very suitable to induce radical innovation, which are especially needed in the environmental sector. The green or sustainable procurement schemes that are now increasingly adopted throughout Europe are still focusing mostly on energy-saving or energy-efficient products and services. Especially in product groups with a high use of phase-energy consumption, e.g. computers and office equipment, there is a large potential for energy savings, but the downside is that only incremental innovations are considered.

The central PPI programmes are mostly adding value in terms of coordinative and network efforts, but they can also play a role in spreading the PPI scheme throughout the government, *increasing awareness* of what the market has to offer, stimulating *demand articulation* through foresight strategies and stimulating *user-producer interaction* through their networking activities. The Swedish Energy Agency, the UK's FCP policy and the Dutch Sustainable Innovation Procurement are all examples of attempts to simultaneously stimulate innovation and sustainability through demand, solving the system failures associated with an inability to translate societal needs into market demands. This is a very promising route, as many of the organisational challenges associated with sustainable procurement are the same as those of innovation procurement (e.g. training of procurement, establishing foresight strategies, enabling the procurement chain, etc.). Furthermore, talks and discourses on green or sustainable procurement[43] have already been around quite a long time, which can facilitate the integration of innovation procurement. However, linking sustainability and innovation also presents troubles, especially since they originally operated quite separately and can

[43] For more information on the Commission's efforts to promote Green Public Procurement, and on Green Public Procurement as a concept in general, check the handbook: European Commission (2004) "Buying Green: a handbook on environmental public procurement", available on http://ec.europa.eu/environment/gpp/pdf/buying_green_handbook_en.pdf

sometimes have conflicting objectives. Furthermore, successfully implementing PPI schemes also presents many challenges.

In this concluding chapter, I will firstly answer the final research question: what can be learnt from this comparison in terms of the barriers for PPI to induce sustainable innovation? Then I will proceed with providing some directions for policy improvement of the three countries' PPI schemes. Finally, I will discuss this research and give directions for further research.

8.1.2. Barriers for using PPI

8.1.2.1. Coordination capacity

The main barriers within this dimension are related to integrating the PPI approach and the associated innovation rationale within other departments. This is mostly related to the *overhead political backing* in all (sectoral) policy rationales. Firstly, the *true (long-term) political will and vision on a high level* is a prerequisite for this to work. Lots of governments talk about the merits for demand-oriented policy, but it seems many are merely talking about it but they do not really see the need for it. However, as I have stressed earlier in this thesis, the globalising market combined with increasing occurrence of the innovation paradox illustrates the need for a new sort of innovation policy. As NESTA (2010) illustrates, Europe is procuring 20 times less R&D than the US public sector, which clearly signifies that Europe has so far failed to fully exploit the opportunity of using public procurement to drive innovation.

A next step is to make the *link between innovation and department's sectoral goals*; innovation can be considered a means towards the sectoral goal. Sustainability and innovation have been getting increasingly *interlinked* within different governmental departments and areas: from energy-efficient lighting in a hospital ward, to new technologies for efficient dike-inspection in the light of climate change – almost every department is attempting to work towards the sustainability goals in its own way, and innovation is a way to get there. However, the first barrier would be to *successfully devise a strategy* with which the commitment of other (sectoral) departments is guaranteed. As Van Putten (2011) suggests, it is important to *incorporate both carrots and sticks* in this strategy. Holland (2011) suggested a financial incentive, e.g. through linking the department's budget to their level of ambition in their department's procurement plans. However, it is also clear that most governments attempt to simultaneously stimulate innovation and sustainability, but are having trouble to *properly link the two*, especially since they originally operated quite separately. As such, integrating the different rationales will be a challenge.

A third step is associated with creating and maintaining a concrete *strategic implementation plan*. The barrier here is to balance the implementation in such a way that it is a *mix between top-down and bottom-up implementation*. On the one hand, it is important to give general directions and a roadmap with clear targets; on the other hand, it is also important to provide enough flexibility for the individual departments and agencies to implement the PPI scheme in their own context, and allow them to profit from their own ideas and (sector) specific knowledge. In any case it is important to arrange for regular coordination meetings or working groups to monitor progress and exchange experiences. In this context, it is also important to note that in all three countries, the *PPI schemes are not properly linked*. As I indicated in the comparative analysis, this is mostly a result of the different rationales behind the different PPI schemes, and as such it will be a barrier to link the PPI schemes.

8.1.2.2. Link with private demand

There are many barriers associated with this capacity. However, in order for the PPI policy to truly change consumer behaviour, it is imperative to include private demand. Obviously, the whole procurement process becomes more complicated when more buyers are involved. Furthermore, when a private buyer is included, it is difficult to determine the role each partner will play, who will get the intellectual property rights, and who will pay for which part of the innovation (e.g. when R&D is involved, in the case of pre-commercial procurement, it is unclear who should pay for the development costs). Of course, these are all operational barriers that are not impossible to sort out through contracts or agreements. The main barrier behind all these issues is *lack of trust*. As the Swedish Energy Agency's case illustrates, when an agency has knowledgeable procurers, a network with the private sector and a good reputation, and takes the lead in organising these cooperative tenders, the operational barriers are manageable. When successfully linking to private demand, the impact of the policy scheme is much larger as well, and it greatly increases the scheme's potential to solve the system failures.

8.1.2.3. Coping with complexity and procurement discourse

The capacities associated with this dimension are in general developed in all three countries, and there are no specific barriers associated with it, apart from a need to be able to cooperate with all actors involved. The barrier associated with this capacity is mostly in the *level of ambition* of the user-producer discourses, definition of long-term public needs and foresight strategies. It is very difficult to determine the extent to which this is done properly at the moment. However, without long-term strategies, the whole scheme is too fragile, so they are very important. Truly devising long-term strategies for determining public needs is very complicated, as it requires *extensive collaboration* between people who know the market, and people who are experts in the procurement process, and even then it is uncertain to which extent the foresight strategies will prove to be accurate.

8.1.2.4. Activating and enabling the procurement chain

The first barrier that is crucial to solve is to change the *incentive structure for procurers* on the operative level. This will prove to be difficult, but it is crucial for truly *embedding innovation in the procurement practice*. At the moment, there is no incentive at all for procurers to issue a tender for a risky innovation, and as their job is perfectly doable focusing merely on products that already exist and have been satisfyingly used for a long time, there is no need to change this attitude. Furthermore, there is a *lack of awareness* among public officials and purchasing agents – procurers need to be involved in the state-of-the-art on the market in their particular area as well as in the future needs and potential improvement of public service. The problem is that the demand for innovative products and services, if at all present, lies with politicians (often with sectoral goals), while the products and services are actually bought by the procurers who are generally risk-averse (Golding, 2011; Dekkers, 2011). Linking these two conflicting wishes is a major challenge – the House of Lords STC (2011) even recommended establishing a Minister responsible for Innovation and Procurement, thus *bridging the gap* that currently exists between policy makers and procurers.

Furthermore, as many governmental actors have no experience with innovation and foresight strategies, many will not be sufficiently able to transform the tender processes to specify functionalities instead of designs. This relates to another barrier of t*raining the procurers at an operational level*, which is not done sufficiently at the moment. Lastly, a major challenge that is related to activating the procurement chain is *scaling up existing PPI schemes*. In all three countries, there are currently successful PPI schemes that have proved their merits, but it will be very difficult to scale them up to include the whole government while maintaining the high quality (Technopolis, 2010). In order for this to happen successfully, the training and incentive structures already need to work properly.

8.1.2.5. Creating and maintaining a supporting innovation procurement culture

The first barrier relates to *embedding PPI within the existing innovation policy*, which seems merely a matter of formality, but which indicates much more: vision, commitment to this line of thinking, and a chance for PPI to be complemented with other, accompanying measures which strengthen its potential. The other two barriers are immense, and probably impossible to solve completely: *ensuring support of existing norms and regulations* (very difficult because of competition laws) and *creating sufficient financial support*. These last two barriers are mentioned most by professionals in the field. However, it is important to note that these barriers are an obvious and easy answer to the question which issues are hindering successful PPI implementation. As I have already described in this section, there are many other, more complex barriers that are also very important. In fact, many PPI experts also believe that *within the boundaries of existing regulations and with limited financial resources, PPI is still possible* and can even alleviate costs (Fineman, 2011; Golding; 2011; Van Putten, 2011).

Relating to the regulations-barrier, many governments as well as the EU are currently conducting research into the (EU) legislation on the procurement practice, in order for it to become more *clear, simple, modern and transparent* and, indeed, *allow for innovation and sustainability* objectives (OMC-PTP, 2010). However, as many regulations are embedded in the EU framework, there is only so much a national government can do. Even mature PPI schemes like the Energy Agency's technology procurement are encountering most problems related to this capacity: complexity of procurement rules, a lack of financial autonomy and a lack of available financing for Energy Efficiency investments (Neij, 2010).

8.2. Directions for policy improvement

8.2.1. The Netherlands

Demand-side innovation has received an increased emphasis only recently, through different policy measures, e.g. legislation, SBIR and public procurement for innovation efforts, standards, labelling. However, according to the European peer-review research PRO INNO

Europe, these efforts "could be further elaborated to complement the traditional supply-side policy which mainly uses public investments through grants to stimulate innovation" (INNO-Policy, 2009a, p. 21). The focus of the Dutch PPI policies seems to lie more heavily on the professionalisation of the public service than solving system failures, although in the process, some of the failures might very well be tackled. In the Netherlands, a wide array of actors is involved in the practice of innovation policy, and all these actors play a role in the PPI strategy as well. Therefore, *continued coordination and cooperation* are very important in order for the PPI policies to work; the coordination provided by the central PPI programme is a first step, but should be continued.

In general the Netherlands would be recommended to work specifically on the *linkages between the PPI programmes*. The Dutch SBIR programme has been proven to be quite successful; the number of projects and the budget has steadily increased over the past few years. The SBIR scheme supports SMEs in particular in developing innovative products and services. However, it seems that at the end of the funding, *more needs to happen* before the product or service is viable for commercialisation (Dekker, 2011). Thus, the last phase (where a prototype is created) needs to be linked more strongly to further policy measures, e.g. link the SBIR to other demand-oriented schemes or put more effort in linking the SBIR-candidates to private demand. The innovation parts of the Sustainable Procurement programme – a pre-phase which is mainly funding research into ideas for sustainable innovation (following a specific demand by a governmental actor), and an implementation phase in which a sustainable innovative product is scaled up from a pilot phase to a commercially viable product through a large coordinated tender – are in fact *equivalents of the SBIR scheme and, to a lesser extent, the FCP scheme in the UK*. It would be recommendable to strengthen the linkages between the schemes, because it would enable the Sustainable Innovation Procurement programme to *become more mature* and truly embrace innovation, instead of working in the margins of the overarching Sustainable Procurement programme. Furthermore, this would also open up possibilities to link more strongly with private demand.

Furthermore, the aim should be to *integrate PPI throughout the wider government*. However, as a first step the incentive structures for procurers would have to be changed to incorporate the innovation rationale, and more training would have to given to procurers on an operative level. Lastly, in order for the Dutch PPI schemes to truly become more mature, they should be better mixed with other policy instruments.

8.2.2. Sweden

For Sweden, the challenge will be twofold: 1) to link the sectoral and the central approach, also in terms of norms and associated rationales; and 2) to spread the success of the Energy Agency to other agencies and governmental bodies (Widmark, 2011; Fineman, 2011). However, it should be checked if other areas in which PPI could have a major potential (e.g. the health sector), have agencies that are mature enough to take the initiative for PPI. Due to the Swedish flexible and non-hierarchical system with the rather independent and active governmental agencies and good cooperation between actors, it seems that the most promising route forward would be for agencies and regional or local governments to independently set up PPI schemes after the Energy Agency's example. There is enough information available for active governmental actors. Vinnova will have to wait for the official assignment and then build competences, which will take long as they have to devise a scheme that is applicable for all situations.

Furthermore, mature agencies like the Swedish Energy Agency are ready for more complex issues. Dalhammer et al. (2011), argue that systems (e.g. transport systems or IT services) are getting so complex that they are too complicated for the private market to manage. This provides the government with legitimisation to step in to coordinate the other actors in the effort to find system solutions. However, in many cases the government alone is not competent enough to provide these system solutions, so they will have to work together with private actors. The Energy Agency can work towards finding a strategy to procure these system solutions. Important issues in this direction are: how to find (private) partners who are willing and able to commit to these procurements (and what will need to be offered to them?), and how can these system solutions be linked to general procurement? A high amount of trust (might be obtainable through the established networks) will be needed to navigate through the whole process, as well as solutions to the issues related to property rights and money.

8.2.3. The United Kingdom

The United Kingdom has two external issues that hinder a quick development of the PPI policies. Firstly, the PPI schemes seem to be in a transition period. With the termination of the

IPPs, a whole new strategy will have to be devised to connect the FCP and SBIR schemes, and to work on integrating PPI throughout the government. The TSB's current idea of a customised approach in which they sit down with each department's Chief Scientific Advisor to individually determine the department's long-term needs and the potential for either SBRI or FCP seems a very good start. However, it will take a lot of time, and most likely a more formalised central approach will be devised as well.
Secondly, the UK has a complex innovation system, with its administrative and organisational power scattered across three devolved national administrations, a large territory, and not much power over local municipalities (Creese, 2011). This of course does not facilitate the integration of PPI throughout the government. However, as Rothwell (1984) argues, local innovation-oriented procurement procedures could be very powerful in increasing the local innovation infrastructure and innovation system and stimulate the growth of innovative small firms. Furthermore, on a national level, BIS and the TSB could work on changing the procurement incentive structure. In general, the UK's largest challenge will be to scale up the current successful SBRI and FCP schemes, while maintaining the high quality of the programmes.

8.3. Discussion and recommendation for further research

In this section I will reflect upon the research design of this thesis, and discuss shortcomings in this design and other points for improvement concerning the way this research was conducted. Finally, I will provide some recommendations for further research.

One of the assumptions I have made in the beginning of this thesis was that innovation and sustainability can strengthen each other and can be integrated. Although I have supported this hypothesis with scientific literature, it is still a claim that can be debated. As such, it would be interesting to research if there are negative effects of the PPI policy on sustainability, as I have completely neglected this angle.

Furthermore, the scope of this thesis, which was necessarily delineated in order to be able to draw coherent conclusions and for the reason of time restrictions, is the first point of discussion. Although I have attempted to provide context in this analysis, through reviewing the three countries' innovation policy and the major actors that influence the PPI policy, it is in fact quite unrealistic to isolate the PPI policy schemes from other policies. Apart from an unrealistic image, it is also important to note that never in this thesis I have assumed that the identified system failures were solved by the PPI schemes only. Ultimately, it is imperative to look for a mix of policy instruments, which include both supply- and demand-side measures. As such, it would be interesting to study PPI's effect on some of these supplementary policy measures. A policy measure that is often used in sustainable procurement is labelling, and (voluntary) standards. However, many people also argue that these label hamper innovation. Many sustainability criteria are based on established standards like eco-labels or energy labels. Neij (2010) argues that the standards should increase the environmental and energy performance requirements for public buildings above building code requirements (both publicly owned and leased facilities). This would supplement the Energy Agency's technology procurement schemes for market creation and transformation towards more energy efficient building practices. Furthermore, it would also be interesting to study PPI in the context of a broader scope of demand-oriented measures.

It was difficult to sufficiently make the comparative analysis robust, as 1) it is a subjective judgement of the countries' PPI schemes; 2) the countries context is not taken into account in such a simplified plus-minus comparison; and 3) the judgement is made on the basis of all PPI schemes put together. However, the judgement had a sounds basis in the sense that it was based on the earlier analysis of the countries' strengths and weaknesses.

Furthermore, the capacity framework that I have derived from (mostly) demand-oriented innovation policy literature was quite complete for this research, as most of the PPI policies are still in an early and rather simple state. However, as the PPI policies mature, the capacity framework will have to be updated accordingly and might have to include other strands of literature as well. Related to this, I would like to emphasise that further analyses should be done later, as the PPI policies have matured a bit more. This research was in that sense a bit pre-mature as many of the PPI schemes were still in a state of transformation. This was especially the case for the central PPI scheme of Vinnova, which should be analysed as soon as the official assignment has been given and a budget is allocated, as well as in a later stadium when the central approach is more developed and specific instruments have been tried out.

Regarding the research material I used, I attempted to triangulate my sources as much as possible through using a combination of policy documents, scientific literature, interviews, information available on the Internet, etc. However, I have no doubt that the research results could be even more robust if I had conducted more interviews. Still, I feel that the most important results are corroborated through different sources. However, related to this, it would be interesting to conduct research into the companies' perspective on the PPI policies, and get their point of view. It is very possible that they highlight new aspects of the policies, or have suggestions for further policy improvements.

Several times in this thesis I have talked about cooperative or catalytic procurement, in which public authorities cooperate with private demand. However, it would be interesting to study how private companies organise their procurement processes to induce innovation, and how these processes compare to public PPI strategies. Research is at this moment being carried out in this direction by dr. Helen Walker[44]. Another issue I mentioned in this thesis, but have not fully explored, is the effect of knowledge spillovers through a procurement process. There is evidence (e.g. of the Energy Agency's technology procurement processes) that through successful innovation procurement, not only the company who wins the tender benefits, but all the contestants, as well as the companies in the winner's surroundings. Related to this, in this research I consistently focused upon the relationship between the public authority as demander and first tier suppliers. However, obviously the whole policy structure would change if one were to consider a whole supply chain and the optimal way to ensure that the innovation impulse and innovation spillovers are streaming both up and down the supply chain. Research would be conducted into how to activate innovation through procurement to reach the whole supply chain.

Finally, the link with the law and (EU) competition regulations was mentioned several times in this thesis, but my expertise in these matters is limited. Still, it would be recommendable to conduct research into the limitations of EU regulations for successful PPI implementation, especially since so many professionals in the field refer to these regulations as one of the main barriers to successful PPI implementation. Related to this, another recommendation for further research would be to conduct research into specific barriers or capacities that were identified in this thesis and further refine them, e.g. the challenge to design functionality-based tenders.

[44] For more information, see: http://irspp.com/ongoingres.htm

9. Literature

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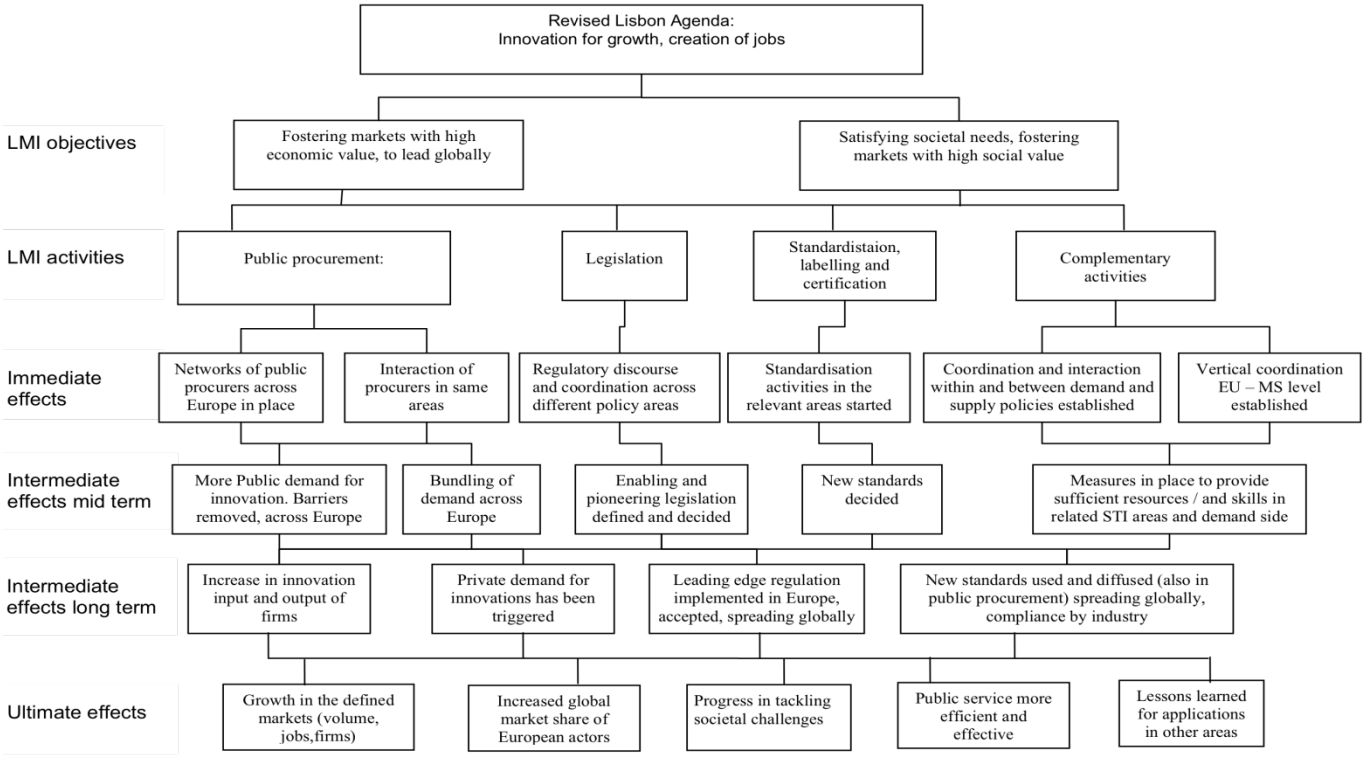
List of abbreviations

The most relevant abbreviations are listed in alphabetical order:

- BIS – UK Department for Business, Innovation and Skills
- CEMEP – UK Interdepartmental Commission on Environmental Markets and Economic Performance
- CO – UK Cabinet Office
- CSA – UK Chief Scientific Advisor
- DBIP – Demand-based Innovation Policy
- Defra – UK Department for Environment, Food and Rural Affairs
- DH – UK Department of Health
- DIUS – Former UK Ministry for Innovation Universities and Skills
- EL&I – Dutch Ministry of Economic Affairs, Agriculture and Innovation
- EU – European Union
- FCP – Forward Commitment Procurement
- House of Lords STC – UK House of Lords Science and Technology Committee
- I&M – Dutch Ministry of Infrastructure and Environment
- IPP – UK Innovation Procurement Plan (departmental)
- MIA – Dutch Societal Innovation Agendas
- MoD – UK Ministry of Defense
- NESTA – National Endowment for Science, Technology and the Arts (UK agency)
- NGO – Non-governmental Organisation
- NOI – Enterprising Innovative Netherlands
- NOW – Dutch research council
- OCW – Dutch Ministry of Education, Culture and Science
- PIANOo – Dutch procurement networking agency
- PPI – Public Procurement for Innovation
- R&D – Research and Development
- SBIR (Netherlands) – Small Business Innovation Research
- SBRI (UK) – Small Business Research Initiative
- SME – Small and Medium Enterprise
- TNO – Dutch research institute
- TSB – UK Technology Strategy Board
- UK – United Kingdom
- Vinnova – Swedish Agency for Innovation Systems, in short: Innovation agency
- WBSO – Dutch R&D Promotion Act

Appendices

Appendix 1: Logic Chart for the EU Lead Market Initiative



Source: Blind et al., 2009.

Appendix 2: Innovation Adoptation Curve by Rogers (2003)

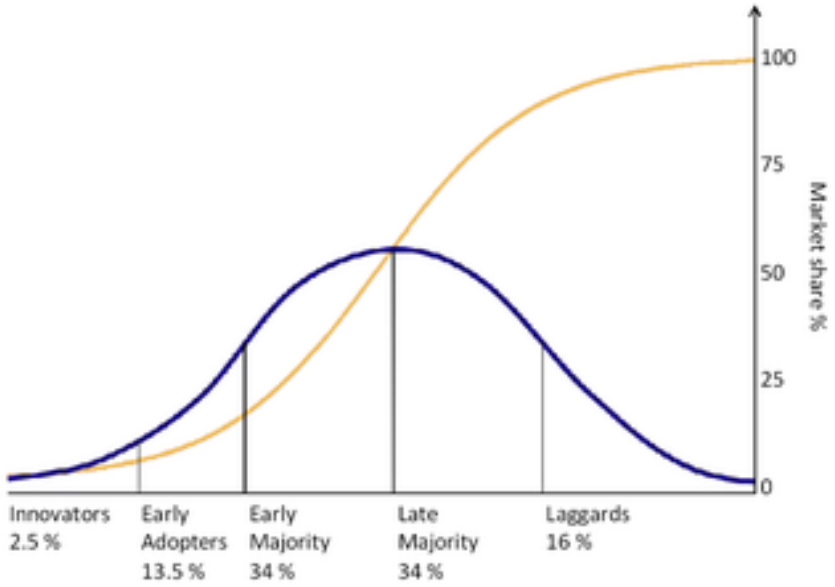
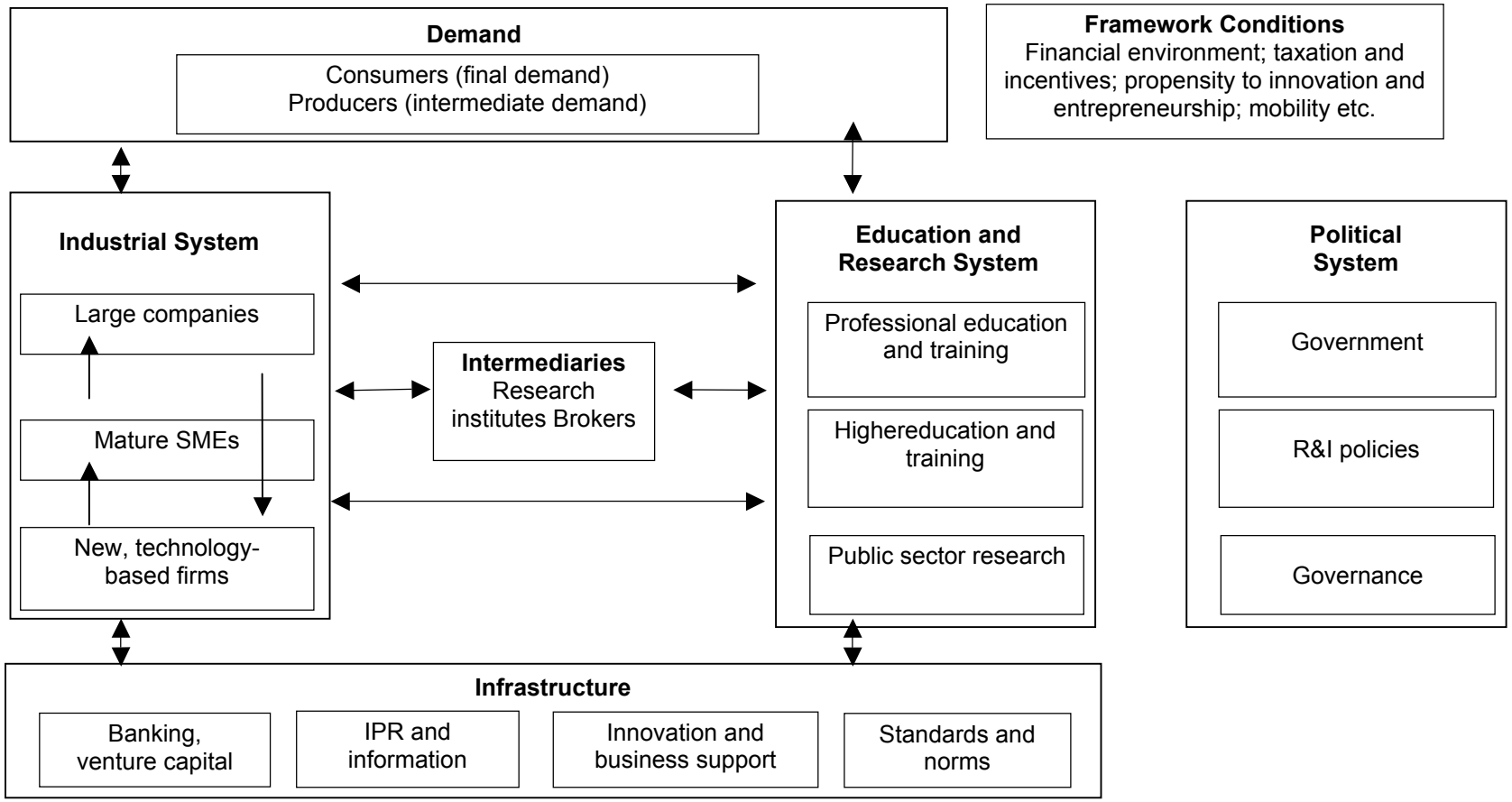


Figure 38: the Innovation Adoption Curve by Rogers (2003), depicting the successive groups of consumers adopting the new technology (dark line) and the technology's market share (light line).

This S-curve shows that a successful innovation will be slowly adopted at first, then more rapidly as the majorities adopt the innovation as well, and finally the market share will reach a maximum when the market is saturated. At this stage only a small percentage of laggards will not have adopted. As depicted in the figure, the S-curve distinguishes the users of an innovation in five categories: (1) innovators; (2) early adopters; (3) early majority; (4) late majority; and (5) laggards. The key point of Rogers' theory is his observation that each individual's innovation-decision is different, and this diversity is what makes the diffusion of innovations possible. Most people will postpone a decision until the uncertainty is reduced, but there is a small group that will not wait for that moment. These innovators provide data for a larger group of early adopters, who will be able to make a well-judged and well-informed decision about the innovation. According to Rogers (2003), this group is where the most opinion leaders in a social system reside. Most of the rest of the social system will trust and follow the decisions made by opinion leaders.

Rogers (2003) describes the diverse actions of change agents in this process, and how the most successful efforts are determined by the situation's characteristics and the goal of the encouragement of the diffusion process. The first step is to determine the market saturation of the product. This is generally done by dividing the S-curve in phases (pre-development, development, take-off, acceleration and saturation), and then determining the boundaries through specific indicators (e.g. 1st prototype marks the boundary between pre-development and development). The next step is to determine the most successful routes to encourage the diffusion of innovation. Change agents can take different actions to intervene in the diffusion cycle.

Appendix 3: Generic model of a National Innovation System



Source: Arnold and Kuhlmann, 2001.

Appendix 4: Key activities in innovation systems

I. Provision of knowledge inputs to the innovation process
1. Provision of R&D and, thus, creation of new knowledge, primarily in engineering, medicine and natural sciences.
2. Competence building, e.g. through individual learning (educating and training the labour force for innovation and R&D activities) and organisational learning.

II. Demand-side activities
3. Formation of new product markets.
4. Articulation of quality requirements emanating from the demand side with regard to new products.

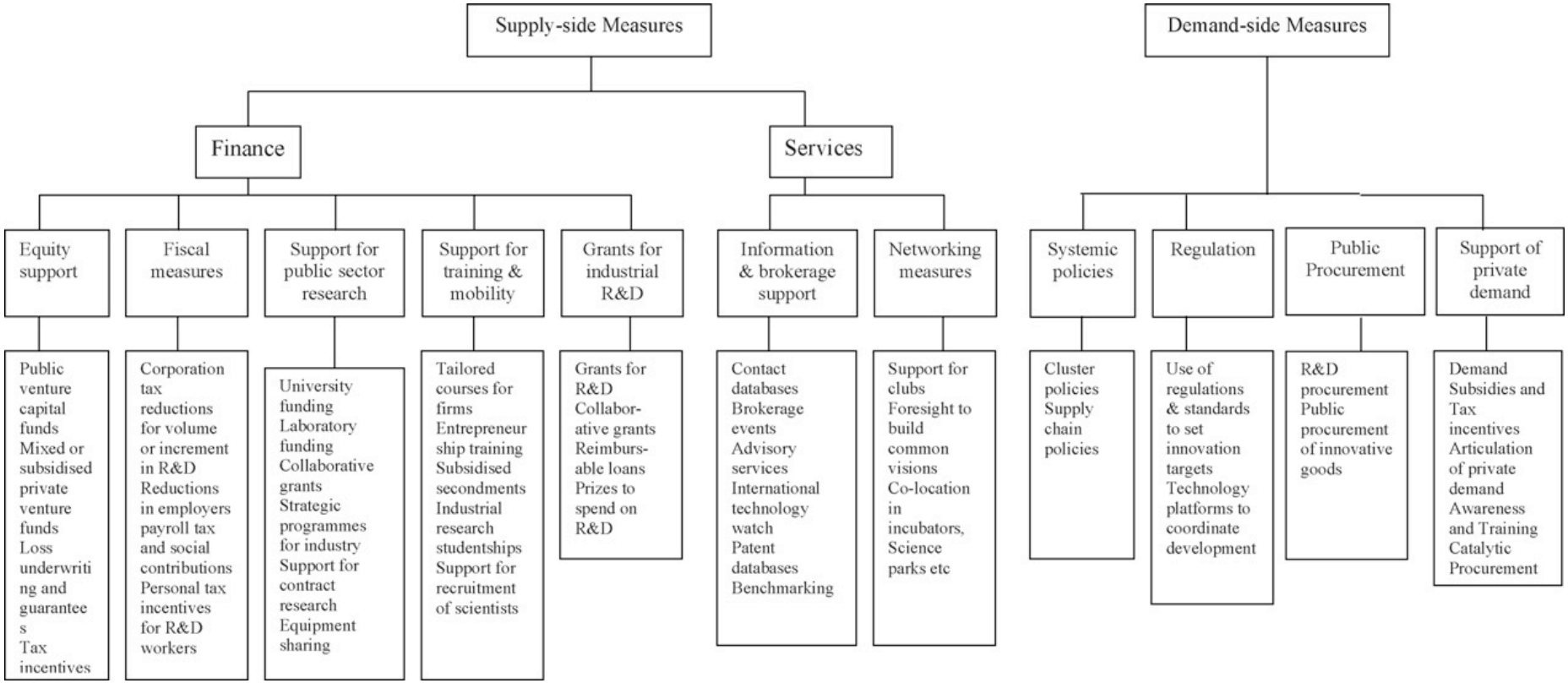
III. Provision of constituents for SIs
5. Creating and changing organisations needed for developing new fields of innovation.
Examples include enhancing entrepreneurship to create new firms and intrapreneurship to diversify existing firms; and creating new research organisations, policy agencies, etc.
6. Networking through markets and other mechanisms, including interactive learning among different organisations (potentially) involved in the innovation processes. Thisimplies integrating new knowledge elements developed in different spheres of the SI and coming from outside with elements already available in the innovating firms.
7. Creating and changing institutions – e.g., patent laws, tax laws, environment and safety regulations, R&D investment routines, cultural norms, etc. – that influence innovating organisations and innovation processes by providing incentives for and removing obstacles to innovation.

IV. Support services for innovating firms
8. Incubation activities such as providing access to facilities and administrative support for innovating efforts.
9. Financing of innovation processes and other activities that may facilitate commercialisation of knowledge and its adoption.
10. Provision of consultancy services relevant for innovation processes, e.g., technology transfer, commercial information, and legal advice.

Source: Edquist (2005).

Appendix 5: Taxonomy of innovation policy tools

Taxonomy of innovation tools, divided in supply-side and demand-side measures (source: Edler and Georghiou, 2007). Demand is further divided into systemic policies, regulation, public procurement and support of private demand.



Appendix 6: Typology of demand-oriented measures

Instrument	Role of State	Method of Functioning
1. Public demand		
General procurement	Buy and use	State actors consider innovation in general procurement as main criterion (e.g. definition of needs, not products, in tenders)
Strategic procurement (technology-specific)	Buy and use	State actors specifically demand an *already existing* innovation in order to accelerate the market introduction and particularly the diffusion. This can include the targeted co-ordination of different government bodies and moderation with manufacturers.
		State actors stimulate deliberately the *development* and market introduction of innovations by formulating new, demanding needs. This can include the targeted co-ordination of different government bodies and moderation with manufacturers.
Co-operative procurement	Buy / use moderation	State actors are *part of a group of demanders* and organises the co-ordination of the procurement and the specification of needs. Special form: *catalytic* procurement: the state does not utilise the innovation itself, but organises only the private procurement
2. Support for private demand		
Direct support for private demand		
Demand subsidies	Co-financing	The purchase of innovative technologies by private or industrial demanders is directly subsidised
Tax incentives	Co-financing	Amortisation possibilities for certain innovative technologies
Indirect support for private demand: information and enabling (soft steering)		
Awareness building measures	Informing	State actors start information campaigns, advertises new solutions, conducts demonstration projects (or supports them) and tries to create confidence in certain innovations (in the general public, opinion leaders, certain target groups)
Voluntary labels or information campaigns	Supporting Informing	The state supports a co-ordinated private marketing activity that signals performance and safety features.
Training and further education	Enabling	The private consumers or industrial actors are made aware of innovative possibilities and simultaneously placed in a position to use them.
Articulation	Organising discourse	Societal groups, potential consumers are given voice in the market place, signals as to future preferences (and fears) are articulated and signalled to the marketplace.
Regulation of demand or of the interface demander – producer (steering via standardisation)		
Regulation of product performance and manufacturing	Regulating, controlling ("command and control")	The state sets norms for the production and introduction of innovations (e.g. market approval, recycling requirements). Thus demanders know reliably what certain products perform and how they are manufactured. The norm affects firstly the producer (norm fulfilment), but spreads to the demander by means of the information about norm fulfilment
Regulation of product information		
Usage norms		The state creates legal security by setting up clear rules on the use of innovations (e.g. electronic signatures)
Support of innovation-friendly private regulation activities	Moderating	The state stimulates self-regulation (norms, standards) of firms and supports / moderates this process and plays a role as catalyst by using standards
Standards to create a market	Moderating, organising	State action creates markets for the consequences of the use of technologies (emission trading) or sets market conditions which intensify the demand for innovations
Systemic approaches		
Integrated demand measures	Combination of various roles	Strategically co-ordinated measures which combine various demand-side instruments
Integration of demand- and supply-side measures	Combination of various roles	Combination of supply-side instruments (R&D programmes) and demand-side impulses for selected technologies or services

Source: Edler, 2009.

Appendix 7: Enterprising Innovative Netherlands (NOI) and Innovation Platform

In the coalition agreement, it was stated that NOI was meant to function as a long-term strategy for innovation and entrepreneurship through cooperation between the government, the private sector, science and education. One of the key aims of the NOI was bringing together parties from all parts of society, but also from all parts of the government. Therefore, the coordination of the NOI programme was in the hands of an interdepartmental programme direction, called "Kennis en Innovatie" (K&I, Knowledge and Innovation). In this interdepartmental direction, the following ministries were working together: Internal Affairs, Defense, Economic Affairs, Justice, Agriculture & Fishery, Education, culture & Science, Health, Environment and Transport (EZ, 2007). The interdepartmental programme direction coordinated and aligned policies of all relevant ministries. K&I developed a long-term strategy "Towards an agenda for sustainable growth in productivity", which should guide future investments in knowledge and innovation. An important part of the NOI agenda was the development of "Maatschappelijke Innovatie Agenda's" (MIAs, societal innovation agendas), which form the basis for societal innovation programmes, an element in the Dutch policy mix that had not formally existed before (EZ, 2007). The MIAs were long-term strategies in subject areas that were considered relevant for society and a budget was allocated to stimulate efforts that furthered the MIA's (NOI, 2010). The MIAs are another part of the NOI that are being phased out as a result of the new government's innovation policy changes. Some projects are still running, but under formal supervision of the Ministry for Economic Affairs (Dekker, 2011).

In 2010, the NOI portfolio consisted of the following aspects (NOI, 2010):

- The MIAs, in the following six subject areas: Water; Safety; Education; Health; Sustainable agriculture- and fishery supply chains; and Energy.
- The "Taskforce TechnologieOnderwijs en Arbeidsmarkt" (TTOA, taskforce technology, education and labour market); which aimed at dealing with the shortage of engineers by stimulating regional cooperation between educational institutes and the private sector.
- Ashley; a project about the development of a 4th generation interface between humans and technology. Ashley was the name of a virtual nurse for elderly people.
- "Valorisatie" (literally translated: valorisation); which basically aims at using knowledge that is already available. The goal of this project is to stimulate knowledge valorisation in knowledge institutes, companies and the government, in order for a better application of research into products, processes and services.
- "MeerjarenInnovatie en KennisKompas"[45] (MIKK, Multi-Annual Innovation and Knowledge Compass). The MIKK was completed in 2010 and launched when the NOI was officially terminated. It functions as a compass for theme-oriented choices in knowledge- and innovation policy. It is user-friendly database in which mind maps and fact sheets about societal issues, knowledge themes innovation policy in the Netherlands are made available through the Internet. The fact sheets list, for each theme, the relevant (subsidy) policy programmes and demonstrates other data on this issue, while also indicating the extent to which the Netherlands distinguishes itself from an economic and/or scientific perspective.
- Small Business Innovation Research-programme (SBIR); a pre-commercial procurement scheme to solve societal problems by using the private sector's innovative power
- "Innovatiegerichtinkopen" (Public procurement for innovation (PPI)); stimulating procuring innovative products and services by governmental bodies (collaboration between NOI and the government's procurement agency PIANOo).

The performance of the Dutch innovation policy and implicitly of the NOI was evaluated in the Dutch National Reorganisation Programme 2008-2010, which was designed in accordance with the Lisbon strategy framework[46]. This document is drawn up every three year (in

[45] To use this interface, visit http://mikk.nl, also available in English.

[46] "Nationaal Hervormingsprogramma Nederland 2008-2010, in het kader van de Lissabonstrategie", available on:
www.rijksoverheid.nl/bestanden/documenten-en-publicaties/brochers/2009/05/27/nationaal-hervormingsprogramma-nederland-2008-2010/nhp-2008-definitieve-versie.pdf.

parallel with the 3-year Lisbon-strategy cycle) and details the execution of policy goals, macro-economic policies, micro-economic policies and employment policies.

Dutch innovation policy instruments

In order to stimulate innovation within the Dutch innovation strategy, several policy instruments are used, which can be divided in generic and specific instruments. Furthermore, a distinction can be made between the levels of governmental intervention. In Figure 39, the receivers of governmental intervention are divided into four categories. The categories refer to the degree of innovativeness of the companies: high end (very innovative, frontrunners), developers (companies that develop products and services from existing knowledge), adaptors (companies that adapt quickly to the new situation, new products, etc.) and the following SMEs (Holland, 2010a).

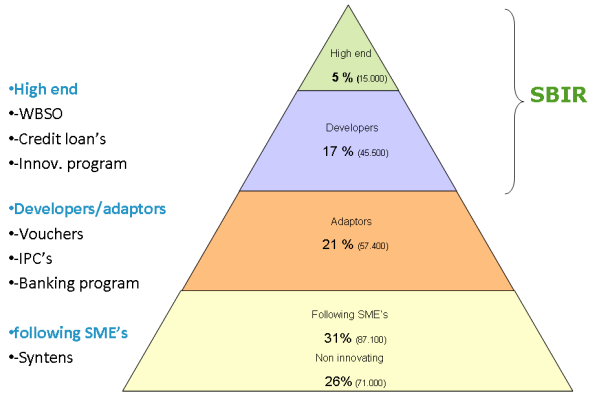


Figure 39: Context of Dutch innovation stimulation measures – Dutch innovation policy context (source: Holland, 2010a).

The generic instruments are assembled in a 'basic package', which includes a capital market package and a package with instruments focusing on knowledge and information or on the linkages between knowledge institutes and private companies, mostly on the developers/adaptors-level. The most noticeable examples are the innovation vouchers and the innovation performance contracts (IPCs). The innovation vouchers had three variants (knowledge, patent or private) and aimed at stimulating contact between SMEs and (public) research institutes[47]. However, the innovation voucher-subsidies were closed down when the Balkenende IV-government fell in 2010.

Furthermore, the innovation policy mix includes a fiscal scheme that is also still running, mostly aiming at the 'high-end' innovators. Within this scheme, the largest regulation scheme is the generic 'WBSO-regeling'[48], an R&D Promotion Act, which is basically an R&D-stimulating instrument. It offers a discount on the wage taxes for R&D employees within private companies (Agentschap NL, 2011a). Its budget, which has been growing steadily since 1996, was 566.5 million Euros in 2008 (SenterNovem, 2008)[49]. As such, the WBSO instrument encompasses more than two third of the budget for innovation-stimulating instruments. The other instruments are all much smaller. As such, one can say that the largest part of the budget for innovation-stimulating instruments is still used in the more traditional technology-push way. Concerning environmental innovation stimulating measures, most instruments focus on R&D of sustainable energy sources and on energy saving (Faber and Kemp, 2005). Furthermore, the credit loans (in Dutch: 'Innovatiekrediet') focus specifically on (starting) SMEs. These innovation credits cover the financial burdens of development projects with a lot of commercial potential but a lot of technological risks as well. The projects must be specifically aimed at developing new products, processes or services. The innovation credit decreases the financial risk for the entrepreneur because if the project fails, the innovation credit does not need to be reimbursed (Kensmil, 2010). In 2011, the budget for innovation credits amounts to €47.5 million (approximately €32 million for technological development projects and approximately €15.5 million for clinical (medical) development projects).

Innovation Platform

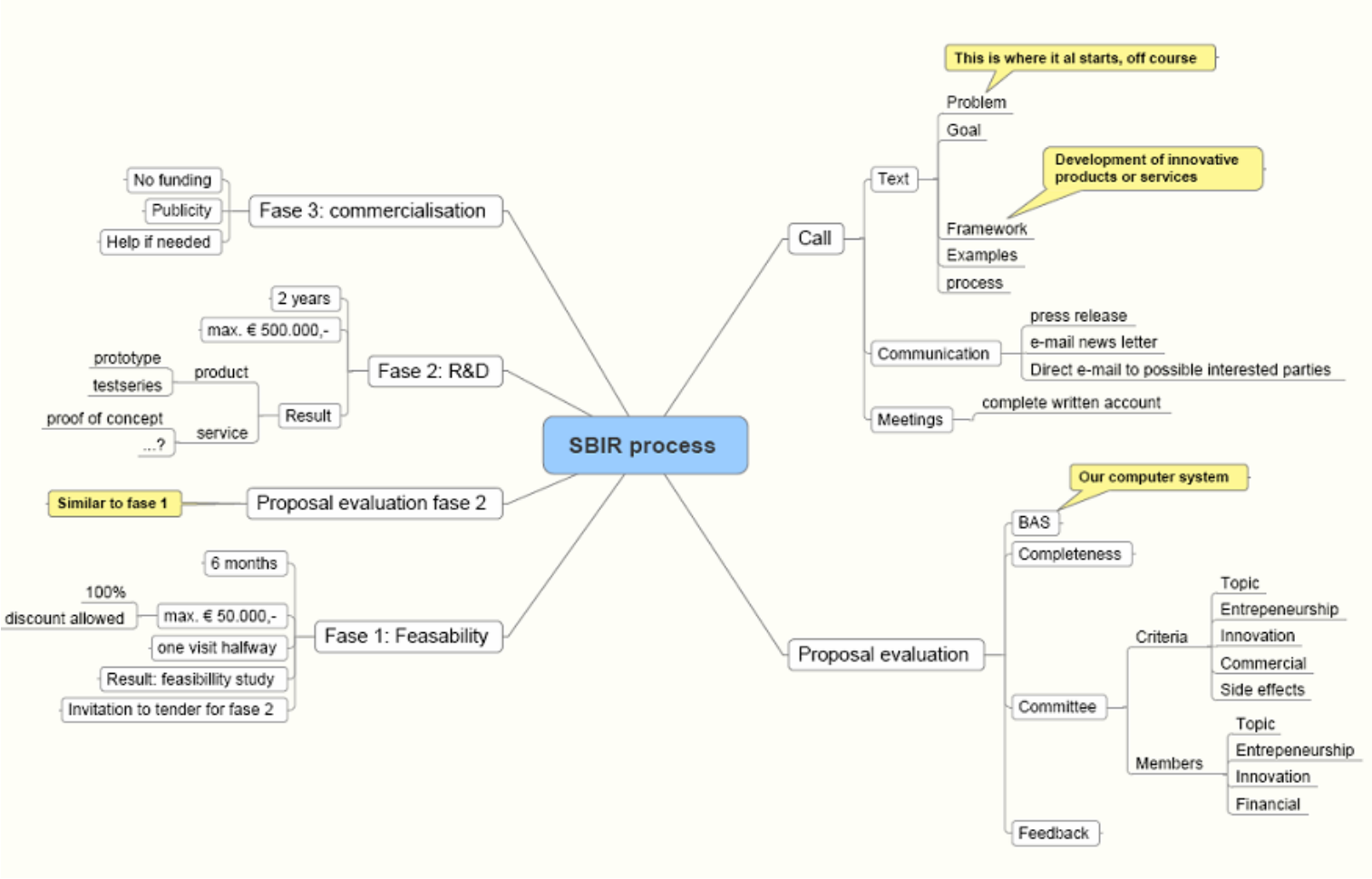
[47] An SME could use the innovation voucher to submit a research question to a university or research institute, but the research question needed to be application-oriented in the sense that the SME was supposed to be able to use the generated knowledge for renewing its product or its business processes (thus the innovation vouchers could not be used for ongoing projects, either in the SME or in the research institute).

[48] Stands for 'Wet Bevordering Speur- en Ontwikkelingswerk', literal translation: law for the stimulation of research and development. This regulation scheme is fixed in law, which makes it more stable than most other regulation schemes.

[49] There are no exact numbers available on more recent years.

The Innovation Platform is a relic from the Balkenende II-government. It was founded in 2003 with the then Prime Minister Balkenende as its president. The goal of the Innovation Platform is to stimulate innovation and to elevate entrepreneurship in the Netherlands, especially in the areas of higher education, research and innovation. As such, it was supposed to act as an independent advisory council and consisted of people who were considered to be leaders in politics, entrepreneurship, science and the private sector. The success of the Innovation Platform was debated – many argue that the Innovation Platform has had many good plans, but that most of its advice was never concrete enough to put into action, and that the Innovation Platform barely influenced the Dutch innovation policy at all. Furthermore, as the Innovation Platform consisted of 'leaders' of the most distinguished Dutch industries, in practice it entailed that CEOs of large multinationals had a lot of influence in the Platform. Critics stressed that the Innovation Platform's proposed policies and the funds it was supposed to allocate to innovation-stimulating activities, directly benefitted the large multinationals, and thus hampered innovation in SMEs. Therefore, the Innovation Platform ceased to exist in the original form in 2010, when the Balkenende IV-government fell. However, it continues its activities today, focusing on (1) simplifying 'becoming an entrepreneur, (2) helping starting entrepreneurs, (3) ensuring enough funds to allow the market to work as streamlined as possible, (4) taking away barriers in order for start-ups to find their way, and (5) bringing together *knowhow* and technology.

Appendix 8: Internal process and protocol of the Dutch SBIR-programme



Schematic overview of the Dutch SBIR-process, with on the input side an SBIR-call and proposal evaluation, and on the output side the three phases: (1) Determination of feasibility; (2) R&D; (3) Commercialisation.

Netherlands SBIR Programme: Internal protocol from start to contracts phase 1 projects in 10 steps
Protocol: SBIR procurement in 10 steps

STEP 1 Contact and commission from Department to NL Agency
1.1 Contact with Department
1.2 Request for Quotation by Department to NL Agency
1.3 Make an offer for implementation of an SBIR tender to the Department
1.4 Commission from the Department
1.5 First announcement SBIR tender on website
1.6 Send notice to companies by e-mail

STEP 2 Administrative and financial preparations
2.1 Time-keeping
2.2 Preparing project database
2.3 Access to database en disks
2.4 Planning and dead-lines
2.5 Announcement of Information meeting for companies on website

STEP 3 Judging Committee members and colleagues for project analysis
3.1 Recruitment and appointment of judging committee members
3.2 Excel file for members of the committee
3.3 Engage colleagues for preparation of the committee

STEP 4 Publish and information

4.1 Communication strategy
4.2 Announcement of the tender
4.3 Information on website
4.4 Press Release
4.5 Inform branches and companies
4.6 Formation of a helpdesk team for companies
4.7 Information meeting(s) for companies and notes of this meeting(s)

STEP 5 more administrative, financial and logistical preparations 20
5.1 Reservations of meeting room for the committee
5.2 Cupboard space
5.3 Instructions to the mailroom about incoming proposals

STEP 6 Preparing the work of the judging committee
6.1 The letter to the committee with instructions
6.2 Document on assessment method
6.3 Prepare excel file for the committee
6.4 Instructions for colleagues on assessment method and their task

STEP 7 Receiving the proposals
7.1 Day of the deadline: answering questions from companies
7.2 Day of the deadline: mailroom and reception receive proposals
7.3 Update Website: tender is closed
7.4 Check for completeness while submitting proposals to database
7.5 Digital copies of the proposals on disk for colleagues
7.6 Analysing proposals by fellow workers
7.9 Acknowledgment of receipt of proposal to companies
7.10 Invite companies for meeting judging committee (if number of proposals does not exceed 25)

STEP 8 The meeting of the judging committee
8.1 Preparatory meeting with the chairman of the committee
8.2 Discuss last details on the meeting with the chairman after receiving individual ranking results 8.3 Meeting of the judging committee: ranking the proposals
8.4 Notes of the meeting
8.5 Letter with advice on the ranking of the committee to the Department

STEP 9 Decision of the Minister and contracts with the companies
9.1 Letter with decision of the Minister
9.2 Informal feedback to the companies by telephone
9.3 Formal feedback to companies: decline or contract
9.4 Cash advance (80%)
9.5 Data collection for monitoring purposes

STEP 10 Informing the public
10.1 Press Release on winners of the contracts
10.2 Project Summary on the website
10.3 Organisation of an event to congratulate and motivate the winners

Source: Holland (2010).

Appendix 9: Formule E-team – procuring electric cars in the Netherlands

Transport accounts for a lot of environmental impacts and collateral damage (e.g. air pollution, toxic materials, etc.). However, an increasing amount of people own a car and use a car in their daily lives. Consequently, many governments aim at reducing the environmental impacts of transport and to integrate the concept of sustainability in the transport sector (Gerike et al., 2008). One of the roads to that goal is through electric transport. CO_2-emissions can be drastically reduced if we convert to a large-scale electrical car system. This is especially true when renewable energy is used to generate electricity. Furthermore, electric cars have an electric motor, which is highly efficient. In addition, it reduces the noise and toxic gases in cities. However, in order to truly integrate electric cars into our society, there are many barriers to overcome. Obstacles are the high price of the battery, the limited range of the car, the long charging time for the battery and the lack of charging stations.

The market share of electric cars in the Netherlands is still very low. In 2010, 83 electric cars were registered of which 52 cars are leased (Formule E-team, 2011). The market for hybrid cars (cars that combine an internal combustion engine and an electric engine), which many see as to pave the way for electric cars, has been growing slightly over the past few years. According to Nagelhout and Ros (2009), the market share of electric cars (including hybrids) in the Netherlands is 0.6%. When we apply this to Roger's (2003) innovation adaptation curve, it basically entails that the electric car is still in its infancy and only a few innovators have taken the risk to buy the electric car. The diffusion of the electric car is hampered by the fact that a successful market introduction needs a system solution. However, the technology behind electric cars has already been available since the mid-1980s, which demonstrates that the market is taking an unusually long time to grow.

For that reason, and because of the electric cars' potential to reduce the transport sector's environmental impacts, the Dutch government has attempted to stimulate the diffusion of electric cars. This was initially done through a scale-up project (track 3) from the Sustainable Innovation Procurement programme. This large public procurement tender included 3000 electric cars and several buying governmental parties (Bruring, 2010). The success of the procurement tender induced the formation of a consortium called the Formule E-team. The Formule E-team aims to stimulate the market for electric cars in the Netherlands. The Formule E-team realises breakthroughs in electric transport in infrastructure, batteries and availability. The team includes leading actors from the private sector, knowledge institutions and the government under the chairmanship of Prince Maurits of Orange-Nassau. The focal points of the Formule E-team are Security, Infrastructure, Batteries, Automotive (a larger availability of electric car models) and International cooperation (Formule E-team, 2011). The purpose of the Formule E-team is to introduce electric cars to the market in 2011. The overarching goal is to increase the supply and market share of electric cars. Public procurement for innovation is considered one of the main instruments to realise this goal.

Appendix 10: Recent development of the Dutch Sustainable Procurement Programme

In November 2009, a revised strategy for the Sustainable Procurement Programme was issued, following recommendations of the former Minister for Environment. However, the revised strategy is not implemented yet, and the Rutte-government consists of political parties who are critical of the Sustainable Procurement Programme. As a result, the Dutch Secretary of State of the Ministry for Infrastructure & Environment has commissioned an inquiry into the performance of the Sustainable Procurement. This research was carried out by the Advisory Council for Bureaucratic Burdens ACTAL[50], which in turn outsourced this assignment to private consultancy firm KPMG. The KPMG-report concluded that there is broad societal support for the government's aim to stimulate sustainability. However, the choice of using criteria documents as in instrument seems to increase the bureaucracy for companies, while uncertainties about the added value of the instrument to the overarching goal of sustainability remain uncertain (KPMG, 2010). Therefore, the report advises to revise the sustainable procurement policy drastically.

Firstly, as they conclude that many of the sustainability criteria overlap with existing rules and laws, they recommend to get rid of this overlap. As it turns out, the criteria-instrument stimulates the use of certification schemes, as this is easily controllable. However, in order to comply with a certification scheme, companies have to add all kinds of expensive reports to their application, which increases the administrative burdens (KPMG, 2010). Secondly, the report concludes that as the development of sustainable products and services goes so fast, the criteria documents have to be adapted constantly. In fact, for multiple sectors they have been adapted twice already in 2010. Furthermore, this entails that procurers are mostly not aware of the developments. Therefore, the documents are almost never up to date to the state-of-the-art and are consequently not always stimulating sustainability. As such, the static criteria-documents seem unable to keep up with the complex reality and dynamics of sustainability and thus are in practice merely used as ticking-lists (KPMG, 2010). Consequently, the KPMG-report states that the procurement policy should not be continued based on the set-up sustainability criteria, if it is not proven to contribute to more sustainability in that sector (KPMG, 2011).

As a result of both earlier criticism and of the ACTAL-advice, the government has set up an advisory group, and asked them to revise the Sustainable Procurement policy and the instruments it uses. The advisory group consists of the following organisations: VNO-NCW, MKB-NL, MVO-NL, NEVI and "De Groene Zaak" (represents private companies that aim at speeding up the sustainability-integration process in the Dutch economy)[51] (Bruring, 2010; Factsheet PPI, 2011; Van Putten, 2011). This advisory group has issued an advice in May 2011. However, this advice is not yet refined; it mainly provides recommendations in general terms. The advice basically recommended further developing and refining of the Sustainable Procurement system in cooperation with the private sectors and public procurers. In this refinement it is important to search for a combination of both product- and process related criteria. The process related criteria are derived from the CO_2-ladder that was created by private company Prorail, who is responsible for the train-infrastructure in the Netherlands. The CO_2-ladder is an instrument to judge suppliers' corporate governance on their supply-chain management. If suppliers score best in terms of sustainability, Prorail gives them a 10% discount on their procurement proposal, thus providing suppliers with a clear incentive to become more sustainable (Van Putten, 2011; Factsheet PPI, 2011). Concluding, it is very likely that the shape of the Sustainable Procurement programme will change, and it is unclear what this will entail for the innovation parts of the programme.

[50] In Dutch: het Adviescollege Toetsing Administratieve Lasten (ACTAL), see www.actal.nl for more information about this advisory council.
[51] See Section 4.3 for an overview of these actors in the Dutch national innovation system.

Appendix 11: Proposal for an Act on Pre-commercial Procurement in Sweden

Act on Pre-commercial Procurement in Sweden (Proposal)

The study proposes to introduce a new law on pre-commercial procurement. The Act is intended to serve as a voluntary tool for contracting authorities and entities wishing to procure research and development services. The proposed law declares that the authorities or entities who wish to purchase R & D services must follow the fundamental principles under European law. These are equality, transparency, proportionality and mutual recognition.

The contracting authority or entity wishing to conduct a pre-commercial procurement under the law has an obligation to advertise. The Inquiry proposes the establishment of a national database of pre-commercial procurement. In this database, which is to be managed by Vinnova, the advertisement and procurement specifications should be published.

The advertisement should describe the research and development service required and the deadline for the submission of concept ideas. Interested suppliers should be allowed adequate time to submit applications for participation in the pre-commercial procurement. The contract documents shall specify how the contracting authority or entity intends to proceed with the various phases, the principles for selection, the principles of the compensation and other conditions.

The contracting authority or entity may negotiate with the applicants in all phases of pre-commercial procurement.

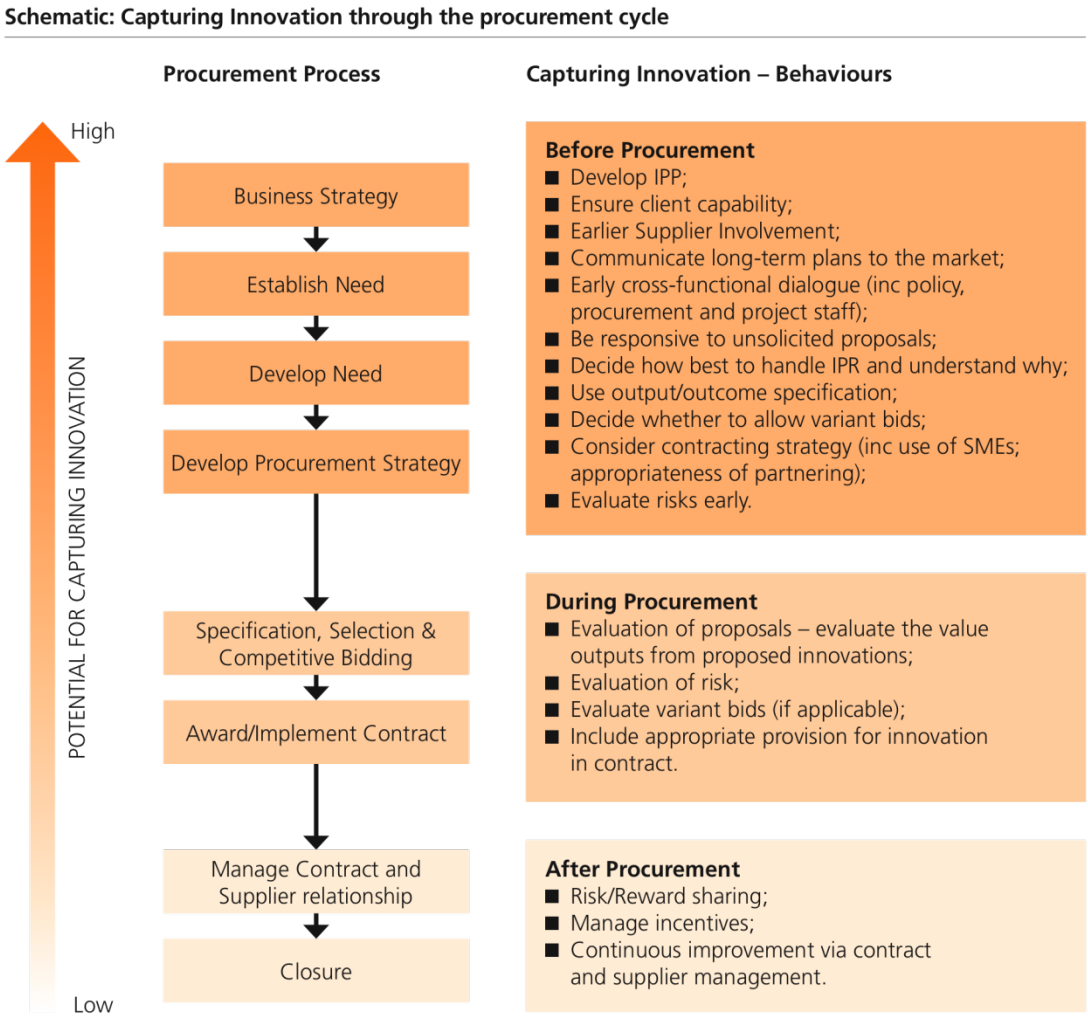
A supplier has the right to submit an application to participate in a pre-commercial procurement and may not be excluded solely because of requirements that the supplier should be a natural or legal person. Groups of suppliers may submit a joint application.

The proposed law establishes rules governing the circumstances under which the contracting authority or entity may exclude applicants from participation in a pre-commercial procurement. These rules are essentially similar to the rules specified in EU directives on public procurement and hence included in Swedish procurement legislation.

The contracting authority or entity shall without delay notify in writing the applicant of the decision to award the contract and the reasons for the decision. Such notice shall also be provided if the authority or entity decides to cancel the pre-commercial procurement.

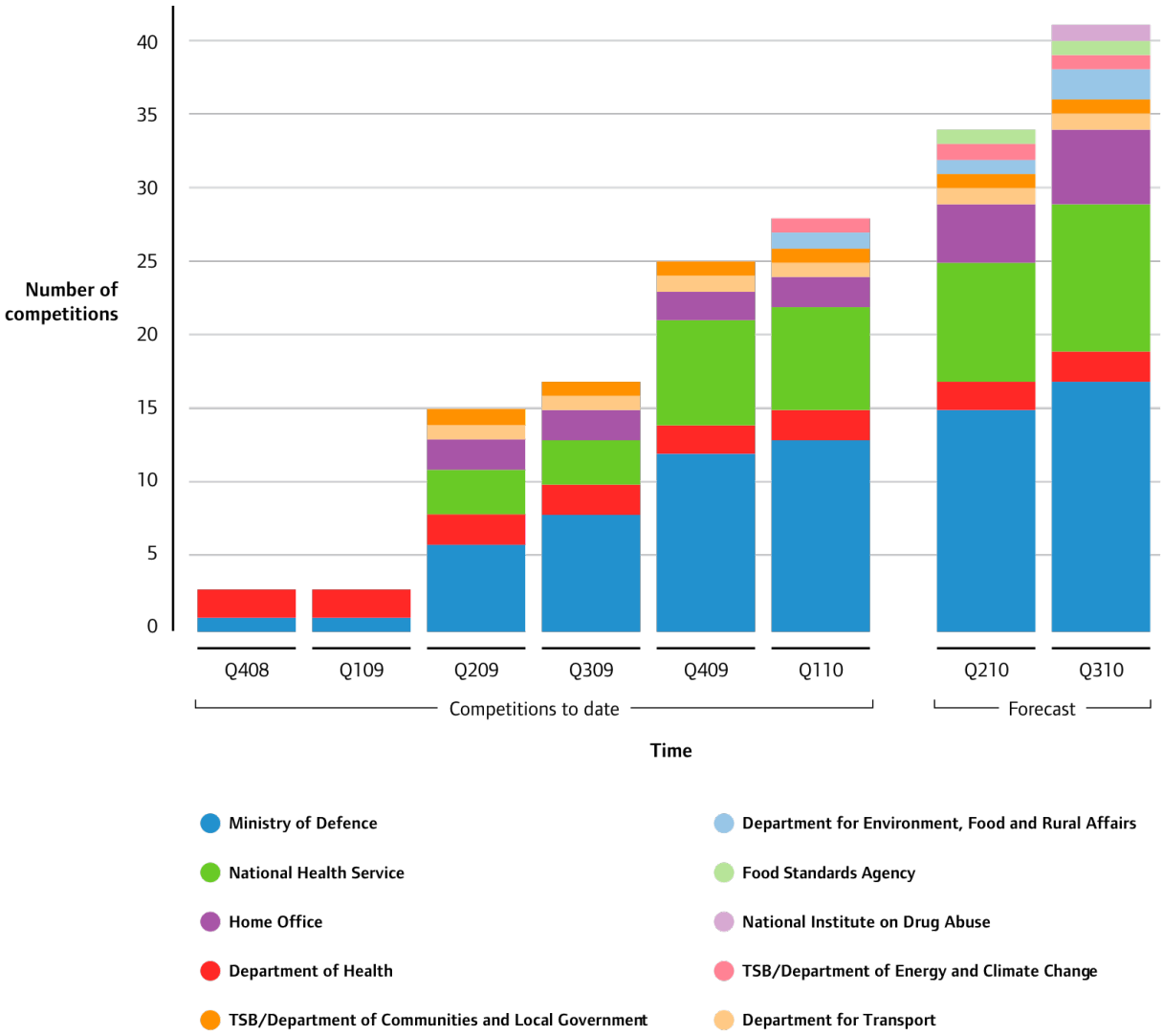
Source: SOU (2010:56).

Appendix 12: Capturing Innovation through the procurement cycle in the UK



Source: BIS and OGC, 2009.

Appendix 13: UK SBRI competitions launched per department



Competitions launched April 2009-January 2010 and forecasted.

Source: NESTA, 2010.