

1. Introduction

A BOOK ON THE TOPIC THAT IS ON EVERYONE'S MIND

This book concerns the role of public procurement as a means to stimulate innovation. It manifests an attempt to summarize some thoughts regarding the utilization of 'intelligent' public demand that ultimately prompts private sector innovation. Over the last decade the topic has evolved from initially being a matter attracting only scattered attention (mainly in academic circles) to the current state where few would question the idea of using public procurement as a demand-side innovation policy instrument. The Organisation for Economic Co-operation and Development (OECD), for instance, has established that '[p]ublic procurement is at centre of recent demand-side innovation policy initiatives. Because of their large purchasing power governments can pull demand for innovation and can also create a signalling effect as lead user and influencing the diffusion of innovation broadly' (OECD, 2011, p. 11).

Although the role of public procurement of innovations has attracted attention in many parts of the world, such as Canada (Currie, 2005), China (US–China Business Council, 2010; Li, 2011), New Zealand (Ministry of Economic Development, 2005), India (Mani, 2003) and Japan (Myoken, 2010), the main concern of this book is the developments in the European Union (EU) in the last ten years or so. For the EU, public procurement was identified as an important tool for reaching the innovation targets drawn up in the wake of the Lisbon Agenda goals, set to increase competitive advantage in a global economy (European Council, 2000; European Commission, 2003b, 2005; Edler *et al.*, 2005). An array of reports has since then been published in order to promote a discussion and utilization of public procurement as a means to stimulate innovation. In the last few years, public agencies both at the EU level and at other levels in the member states have initiated concrete projects where public procurement is used to stimulate innovation. The fact that 'public procurement' occurs 14 times in the EC communication from 2010, *Europe 2020 Flagship Initiative: Innovation Union*, indicates that public

procurement of innovation as a policy instrument will continue to move towards the centre of innovation policy making for many years to come (European Commission, 2010).

It is this developing interest in public procurement as an innovation policy instrument that is the basic justification for this book. Although public procurement of innovation has gained increasing attention, a more profound and updated analysis that could help to inform policy and methods development and implementation is lacking. The purpose of this book is therefore to try to ameliorate this situation by drawing on relevant recent research. The underlying concern here is the impact of public procurement on innovation, that is, the extent to which public procurement generates innovations (other than process innovations within the procurement processes themselves). In other words, the concern here is primarily public procurement of innovations, rather than innovations in public procurement. In some places, however, innovation in public procurement might be required in order to accomplish public procurement of innovation. This book relies on the assumption that public procurement is a useful innovation policy instrument. Such a position does not automatically assume an ideal world free from any problems that might occur in activities aiming at applying these ideas. On the contrary, any agent engaging in public procurement of innovation will face problems and challenges, as would anyone engaging in any activities aiming at delivering innovation. Any sound analysis should acknowledge these potential problems, but perhaps foremost try to gather some insights useful for making public procurement of innovation successful. The ambition here is to contribute to such a sound analysis.

Some theoretical considerations reflect the character of this book. As would be typical of any work carried out with scientific aspirations, this book consists of statements and analysis of facts, what Chalmers calls 'observation statements' (Chalmers, 1999). The formulation of observation statements does not happen solely by facts entering the brain through the senses. Instead, 'the formulation of observation statements presupposes significant knowledge' and also 'that the search for relevant observable facts ... is guided by that knowledge' (Chalmers, 1999, p. 13). This means that scientific knowledge cannot be derived from *any* fact but is the result of a knowledge-dependent (*ibid.*, p. 14) selection mechanism: in the words of Kuhn, a paradigm (Kuhn, 1996). Although, it might be somewhat of an exaggeration to talk about a paradigm in this context, this book has nevertheless followed some paradigmatic rules that have affected what facts have been collected and observed and how they have been analysed. The particular topic itself would also probably never have been 'conceived and none would have [carried out further research on it]

without a paradigm theory to define the problem and to guarantee the existence of a stable solution' (Kuhn, 1996, p. 28).

One paradigmatic nominator for this book, especially in the initial stages of the work, was the volume edited by Edquist, Hommen and Tsipouri (2000). Their volume provides a thorough introduction to the field, at least in the way that what was then called public technology procurement was perceived at the time. Although things have evolved since then, the book suggests a 'sensitizing' direction on what knowledge to look for and collect that is highly relevant for a book like the current one. For example, what follows naturally from Edquist, Hommen and Tsipouri (2000) is the interest in the procurement legislation and how it might affect possibilities for the public procurement of innovation. Although the current book will also demonstrate some of its weaknesses, the perhaps most important contribution is the theoretical link established between innovation theory and public procurement. Very briefly, this link can be summarized as follows: viewed as an act of innovation, public procurement becomes a special case of user–producer interaction (von Hippel, 1988) where interactive learning takes place (Lundvall, 1988, 1992). Rather than being the result of anonymous market processes based on price information, public procurement of innovation (as distinct from procurement of regular goods or services) becomes a process where the social and collaborative aspects need to be stressed. What comes naturally from such perception is the interest for what governs these social and collaborative aspects, namely institutions.

There prevails what appears to be an expanding research stream concerned with public procurement of innovation. The topic has been brought up in contexts such as the International Purchasing and Supply Education and Research Association (IPSERA) Conference, the International Public Procurement Conference (IPPC) and the Procurement Law Academic Network (PLAN). The Danish Research Unit for Industrial Dynamics (DRUID) has also over the years facilitated a discussion on the topic. There are also publishing venues stemming from these contexts or elsewhere facilitating the development of new knowledge on different aspects of public procurement. One example is the Participatory Innovation Conference organized by University of Southern Denmark in 2011, which had a special track dedicated to 'public procurement of participatory innovation'. In 2012, Manchester Institute of Innovation Research organized a conference where public procurement was a central theme. An important part of the debate is also evolving in the policy realm, manifested in reports issued by public agencies and/or consultants working on behalf of them. Although about to emerge, there is not yet an

institutionalized research context, with reoccurring conferences and journals, for public procurement of innovation per se. The approaches and perspectives applied are also scattered. The current book attempts to add to existing perspectives a particular emphasis on innovation, useful for academic as well as non-academic development of new knowledge and practice on this topic. The assertion is that public procurement viewed as a special case of innovation, that is, essentially as a social process governed by institutions, calls for understanding of the 'rules of the game' of public procurement and how these rules may affect the possibilities for public agencies to procure innovation. This book sets out to make such an analysis. The generic research question derived from such a perspective can be formulated as follows: how do various kinds of institutions affect the possibilities for public procurement of innovations?

This book builds on research carried out between 2004 and the present time (for example, Edler *et al.*, 2005; Rolfstam, 2005, 2007a, 2007b, 2009a, 2010, 2012a, 2012b, 2012c; Gavras *et al.*, 2006; Hommen and Rolfstam, 2009; Rolfstam *et al.*, 2011). The empirical material drawn on consists of a set of case studies (Eisenhardt, 1989; Yin, 1994). The book also relies on innumerable discussions with people from academia, the public sector and private industry, and reflections made after attending an array of meetings, workshops and conferences dedicated to developing more knowledge on the public procurement of innovation.

The subsequent sections of this chapter provide an introduction to the topic, by initially discussing some definitions of public procurement of innovation and what types of innovation can be delivered. Then follows a brief discussion on innovation policy in general and in particular the rationale behind utilizing public procurement as an innovation policy instrument. The chapter concludes with a brief account of the recent historical developments in this field, which is a story about a topic that has moved from an almost unknown existence to become something on everyone's mind, a development that in itself is a justification for a book like this one.

WHAT IS PUBLIC PROCUREMENT OF INNOVATION?

Some ambiguity prevails among available definitions of public procurement of innovation. There is also a variation in what terms are actually defined. 'Public procurement of innovation', 'innovation procurement', 'public technology procurement', 'innovative procurement' and 'pre-commercial procurement' are some of the terms used in the literature and

in discussions. Although it is possible to pinpoint discernible differences among these concepts, they all share some characteristics that make them relevant here. There is typically a public agency engaged, together with one or several private firms or other organizations, in activities that may lead to or promote innovation of some kind. Sometimes the difference in wording and meaning is merely a matter of taste. In some cases, however, there are assumptions hidden in the terms that may create confusion if precautions are not taken, especially in cross-national settings.

Some countries have developed concepts describing relationships between a public agency and a private firm that primarily are used and understood the same way among actors in that particular local context. One such example is 'public private innovation' (Weihe *et al.*, 2011). This is a well-established term in Denmark used to describe learning activities taking place in collaboration between a public agency and research organizations and/or private firms that may lead to innovation, at least in the sense that these arrangements tend to function as test-beds for innovative products and services that have not yet been introduced to the market. The term however does not necessarily include procurement of a tangible item. 'Public technology procurement' is another concept well known in Sweden, and is even legally defined in Spain, but is perhaps less known and applied in other countries. One concept developed and used extensively in Australia and the UK, typically used for large infrastructure projects, is the private finance initiative (PFI). Another notion closely related to PFIs is public-private partnerships (PPPs) (Tvarnø *et al.*, 2010). Although the use of PFIs has diffused elsewhere, it has been adopted only sparsely in some other EU member states (see Petersen, 2011 for a comparison between Ireland, a country with extensive experience of PPP, and Denmark, a country with rather modest adoption of PPP). Yet another term, 'developing pair', is used to describe long-term collaboration between a public agency and a private firm as seen in some Scandinavian countries in the twentieth century, for instance in telecom (Fridlund, 1999).

From an institutional perspective, where nations can be understood to manifest national contexts developed according to system-specific and path-dependent trajectories, it would not be a far-fetched expectation to encounter context-specific concepts and procurement traditions (for example, Hollingsworth, 2000, p. 621). Allowing internalizing and localization to fit local contexts is, according to the same logic, central both for the promotion of public procurement of innovation policies and for successful practice. To fully give an account of the different developments of local concepts in the EU or elsewhere is however outside the scope of the current book. Public procurement of innovation, as for any

kind of innovation, is also very versatile in terms of how outcomes should be understood and defined. This complexity, which holds for any kind of innovation, is yet another factor that adds to the challenges for anyone seeking to clarify the meaning of the concepts used by people engaged in discussions on public procurement of innovation. In the light of that reality, what follows is an elementary discussion on definitions.

Understandings of Public Procurement of Innovation

Procurement 'refers to the function of purchasing goods or services from an outside body' (Arrowsmith, 2005, p. 1). Public procurement occurs when this function is performed by a public agency. From a legal perspective, procurement carried out by private firms acting on behalf of a public agency also in principle comes under the definition, as such procurement needs to comply with public procurement laws as well. Although procurement is synonymous with, for example, purchasing, buying, sourcing and so on, and although technically speaking it could be referring to any actor, the assumed agent, if the term is used without a qualifier (for example, 'private', 'public'), is usually a public agency. Public procurement can take place at any level in society – in a department in a local council of a municipality, or on the regional, national or even supranational level. In fact, essentially all public functions are supported by public procurement (Thai and Grimm, 2000, p. 231). Following these definitions, for public agencies goods (and services) of any kind are acquired through public procurement.

What is needed for the purposes here, however, is a definition that reflects not only the activity of procuring but also the delivered outcome, innovation. One way to meet this requirement is to draw on the classical writings in innovation studies, for example those of Joseph Schumpeter. One way of defining innovation is to distinguish between production and innovation, as Schumpeter did. According to him, production concerns the utilization of 'materials and forces within our reach' (Schumpeter, 1934 [1969], p. 65). Innovations (although Schumpeter used the word 'development') are new combinations manifested as the introduction of a new good, a new method of production, the opening up of a new market, or the use of a new source of supply of raw materials or new ways of organizing industries (*ibid.*, p. 65). Essentially echoing the words of Schumpeter, Edquist (1997, p. 1) states that '[i]nnovations are new creations of economic significance', distinguishing, at least implicitly, between innovation and invention. An invention, unlike an innovation, has not yet proven its success on a market, as discussed by Fagerberg (2005, pp. 4–5). With reference to Schumpeter (1934 [1969]), public

procurement of innovation could then be understood as a purchasing activity that delivers any of the development aspects mentioned above.

One concept that emphasizes Schumpeterian understanding of innovation as the creation of something new is technology procurement. This is a concept that ontologically belongs to technology policy, not innovation policy. Several authors also make this connection explicit, for instance Lundvall and Borrás (2005). Technology procurement is understood to occur 'when a public agency acts to purchase, or place an order for, a product – service, good, or system – that does not yet exist, but which could (probably) be developed within a reasonable period of time, based on additional or new innovative work by the organisation(s) undertaking to produce, supply, and sell the product being purchased' (Edquist and Hommen, 2000, p. 5). Westling (1991, p. 43), writing about the Swedish construction sector, maintains that "[t]echnology procurement" is a form of purchasing aimed at directly stimulating innovation'. The Swedish Energy Agency uses a definition essentially similar to the one suggested by Edquist and Hommen (2000) cited above. It does, however, provide a more elaborate interpretation of what that means in practice: 'Technology procurement is a complete tender process with the purpose of promoting and speeding up the development of new technology. The purpose of technology procurement is to develop new products, systems or processes that meet the procurer's demand' (A. Persson, 2004, p. 5, author's translation). Persson's broader understanding comes close to another concept available in the literature, market transformation. The purpose of market transformation is 'to introduce new products and services and to increase adoption of new products and services as well as existing but underutilised products and services' (Neij, 2001, p. 68). This concept concurs to some extent with a general understanding of public procurement of innovation. One ontological difference is the aims, which are typically energy efficiency and sustainability, that is, qualitative change. The perspective places a focus primarily on the effects of procurement activities on the market, not necessarily on strategic concerns for increased competitive advantage. It can be seen as complementary to public procurement understood as an innovation policy tool. The concept is also broader in the sense that it sometimes also includes private procurement.

The definition of technology procurement implies that there is also a type of procurement which does not deliver innovation. This is consistent with the life cycle dynamics most products go through. An innovative product does not remain an innovation forever but becomes eventually a mature product that at some point vanishes completely from the market (cf. Utterback, 1994). The distinction thus offers a demarcation line

between procurement activities that are plain sourcing activities of well-known products and procurement activities that lead to innovation. This in turn offers a way of operationalization. It is relatively easy to determine whether or not innovation has been delivered in a particular case by asking questions about what aspects of the procured item were novel, if the supplier performed any research and development (R&D) in order to deliver the product, if there were any changes in the organizations after the procurement was completed, and so on (see Edler *et al.*, 2005 or Rolfstam, 2008 for examples of case study questions applying that understanding). Procurement of items such as fuel, stationery or any off-the-shelf product would then belong to the non-innovative category of 'materials and forces within our reach' (Schumpeter, 1934 [1969], p. 65), that is, what is sometimes referred to as 'regular procurement' (Edquist and Hommen, 2000). As will be discussed below, the public procurement of innovation versus public procurement of regular goods dichotomy is not always adequate, and might blur the analysis if applied too persistently.

To discuss further the differences between public procurement of innovation and public procurement of regular goods it might be useful to reflect on what innovation is and to what extent something 'does not exist'. Such an exercise relates to the discussions in the first few years of the 2000s that sometimes evolved in the early workshops organized to diffuse information on public procurement of innovation. When introduced to this at the time new topic, people sometimes assumed innovation to mean exclusively the creation of something radically new, and the discussions developed around that idea and to what extent it would be possible for public agencies to stimulate radical innovation. Although innovations can be radical and ground-breaking, they can also consist of incremental improvements (Utterback, 1994), perhaps based on new combinations of already existing knowledge. So, when a public agency procures something which 'does not exist', what did not exist before the procurement might in reality vary in magnitude of radicality. One definition that partly takes these other forms of innovation into account stipulates that public procurement of innovation is 'the purchase of goods and services that do not exist, or need to be improved and hence require research and innovation to meet specified user needs' (European Commission, 2005, p. 5).

Apart from stressing the understanding of innovation as combinations, Schumpeter also makes distinct the difference between product and process innovation, where the former is the 'introduction of a new good' and the latter 'the introduction of a new method of production' (Schumpeter, 1934 [1969], p. 66). Therefore, it might be argued that the

definitions on technology procurement discussed above 'do not account for innovation through the recombination of existing goods or services, innovation in the delivery of existing services, and exclude most process innovations' (Uyarra and Flanagan, 2010, p. 124), which is of course a severe limitation. At least for products, it is well established that the 'innovative focus' initially set on product innovation is later in the life cycle of the product replaced by process innovation (Utterback, 1994). It could then be argued that even public procurement of mature products could include innovation. For a public procurer it would be a matter of shifting focus from product innovation to process innovation. Examples of public procurement of process innovation are for instance when a public procurer decides to buy computer time, rather than physical machines, or when certain environmental criteria are specified for the delivery of procured services. Such specification strategies may stimulate supplier process innovation without necessarily affecting the tangible features of the product.

Two other concepts related to innovation are diffusion and adoption. Diffusion, adoption and innovation are to some extent overlapping concepts. Sometimes, however, it is necessary to keep them distinct. An innovation may be seen as an invention that becomes commercially successful on a market, that is, it is adopted by users, or diffused (Rogers, 1995). An innovation may also be incrementally altered over its diffusion time, that is, exposed to post-innovation improvements (Coombs *et al.*, 1987, p. 130), which might affect the diffusion curve. In that sense, diffusion and innovation are interlinked. As will be discussed below, public procurement can indeed be used to diffuse innovation. One relatively neglected type of public procurement of innovation related to diffusion is unsolicited bids, that is, when a supplier approaches a public agency with an offer of an innovative product without being prompted by a specific tender call. Such a situation can clearly lead to public procurement of innovation if the public agency exposed to the offer is able to act. It is also a situation that falls out of the definition of technology procurement, owing to the lack of an initially given specification of something which does not exist.

Understanding public procurement of innovation as a way of acquiring knowledge needed to innovate has also been brought forward in policy discussions. The National IST Research Directors Forum Working Group (2006, p. 19) uses the notion of R&D procurement

because it refers to acquisition of knowledge – collected by the supplier by carrying out intellectual investigation services (R&D services) consisting of

critical solution analysis, prototyping, field testing and small scale pre-product/service development – with the objective to prove the feasibility or unfeasibility to transform a technologically innovative idea into a first working batch of pre-commercial volume and quality pre-products/services according to the requirements in the tender specifications.

This is also consistent with innovation research, where a generally accepted claim is that ‘the most fundamental resource in the modern economy is knowledge’ and that ‘the most important process is learning’ (Lundvall, 1992, p. 1). In a similar way Dosi thinks of innovation as ‘*the search for, and the discovery, experimentation, development, imitation, and adoption* of new products, new production processes and new organizational set-ups’ (Dosi, 1988, p. 222, italics added). Viewing public procurement of innovation in such terms brings focus onto the process of innovation, that is, the cognitive activities that lead to innovation, rather than the Schumpeterian perspective which mainly deals with innovation as an *ex post* outcome. It also highlights the role of public procurement of innovation as a device for knowledge accumulation beyond a single procurement project. Eliasson, for example, in his study of the procurement and development of the Swedish military aircraft JAS talks about procurement as a ‘technological university’ enabling knowledge spillover to other projects (Eliasson, 2010). Kaiserfeld (2000) has also shown that even projects failing to deliver the intended product innovation may still be useful as instruments accumulating knowledge facilitating innovation elsewhere. (For a discussion on public procurement of innovation as public procurement of knowledge see Cabral *et al.*, 2006.)

The knowledge aspect of public procurement of innovation is central to ‘pre-commercial procurement’, a term that has been increasingly promoted by policy makers on the EU level as an ‘approach to procuring R&D services’ (European Commission, 2007a, p. 2). The emphasis here is on generating new knowledge that can be commercialized at a later stage. In essence, pre-commercial procurement can be seen as a pedagogical ‘package’ drawing attention to the exception in the European procurement directives that allow direct procurement of R&D services, that is, procurement which does not deliver commercial applications. The model gives an opportunity to develop different ideas in parallel where one or a few of the initial ideas will eventually be selected for commercial public procurement in accordance with the procurement directives. At the same time, competition must be maintained in order to avoid transactions that constitute state aid. In that sense the pre-commercial procurement model is the outcome of a balancing act defined

by the two legal frameworks regulating public procurement and competition. Public agencies applying this package may assume that they will violate neither the EU treaty nor the procurement directives. Pre-commercial procurement is described in detail elsewhere (for example, National IST Research Directors Forum Working Group, 2006; European Commission, 2007a). One of the benefits of the model is that it offers a way of handling risk and uncertainty. The first phase in pre-commercial procurement may involve a pre-study or 'solution exploration' where several different solutions are explored. A second phase may include prototype development of the solutions that are judged most promising. This can be followed by the development of a small test-batch of some of the remaining solutions. Eventually, when the procurer has reached sufficient knowledge, one or more of the remaining solutions are selected for commercial roll-out.

Although pre-commercial procurement is an interesting attempt to highlight possibilities for public agencies to procure innovation within existing legal frameworks, it is still relatively untried in practice in the EU context. One potential problem with the pre-commercial procurement model is that it does not require the execution of commercial full-scale procurement. Although certainly leading to the Dosi kind of learning, applying the pre-commercial procurement model per se does not necessarily lead to a finalized product diffused on a market. Critics have also claimed that the model is unnecessarily expensive, especially for smaller or local procurers. These remarks do not however mean that the pre-commercial model is not an interesting tool, but only that its success will probably depend on complementary activities in the specific contexts in which it is applied. What is probably the most important factor is that pre-commercial procurement processes should be driven by a genuine interest to actually procure the outcome. Otherwise there prevails a risk that pre-commercial procurement will become a tool for producing 'yet another pilot' that never reaches the commercial stage.

Finally, it is interesting in this context to note that the central legislative package for public procurement within the EU, the EC directives on public procurement, do not include any definitions of *the act* of procuring that relates to the *real outcomes* of the procurement activity. The concern of the legal texts is the *contracts*, that is, the formal agreements of 'pecuniary interest' made in writing (European Parliament and Council 2004a, 2004b). Legally, a procurer may be the state, regional or local authorities, bodies governed by public law, or associations formed by such authorities. The directives also define a set of procedures to be invoked by public procurers. These are: the open procedure; the restricted procedure; the competitive dialogue; the negotiated procedure;

and design contests. There is also an array of definitions on different types of contracts that can be awarded. These are: public works contracts; public supply contracts; public service contracts; different concession contracts; and framework agreements. The legislative package does not however regulate in any sense the content of procurement activities, that is, what is procured. Neither does it discriminate between public procurement that delivers innovation and public procurement of off-the-shelf goods. This makes any assertion that the EC rules inhibit innovation somewhat off-target on formal grounds, as innovation per se is not an element regulated by the rules.

Here, public procurement of innovation is understood as *purchasing activities carried out by public agencies that lead to innovation*. This relatively broad understanding means for example that activities carried out both before (what is sometimes called the 'pre-procurement phase') and after the formal tender process should be taken into account or, to follow the terminology suggested by Murray (2009), activities that belong to the commissioning cycle and the procurement cycle respectively. Examples of activities in the pre-procurement phase would be the scanning of markets and emerging technologies, market consultations, facilitating the communication of public need, or match-making events where solutions can be connected to existing problems. Examples of activities after completion of the formal tender process would be the evaluation of project outcomes and collection of lessons learned to improve procurement projects in the future. The definition incorporates not only products or systems, but any kind of innovation that might be delivered. The relatively broad understanding would also include procurement activities carried out on behalf of a public agency, which also fall into public procurement from a legal perspective.

What at least implicitly follows from this definition is that one instance of public procurement of innovation might not be the same as one call for tender. A large project might consist of several tender calls, all with a different purpose (see for example Gavras *et al.*, 2006). There might be tender calls aiming at awarding contracts where suppliers will perform pre-studies, prototype development, consultancy services and so on. Although not all of the individual tender procedures themselves technically speaking deliver innovation, they should be considered as part of purchasing activities that lead to innovation, if conducted to acquire support or resources to be used in a context leading to innovation. In this light, the attempt to make a distinction between regular procurement, understood as the procurement of already existing goods, and public procurement of innovation, as Edquist and Hommen (2000) do, is somewhat misleading. Implied in the definition is also the position that

any sound tender call should be set up in an innovation-friendly way, where the initial requirements from the procurer are met, without excluding the possibility for suppliers to suggest innovative solutions not initially known by the procurer. This means that public procurement of supplier-driven innovation is also included in the definition.

PUBLIC PROCUREMENT AS INNOVATION POLICY

The understanding that innovation is beneficial from a long-term perspective is well established, as is also the underlying rationale for developing innovation policy. It is therefore not particularly controversial to claim that innovation is the most important determiner for sustaining competitive advantage and growth. By innovating, a firm can present a better product on the market, or produce it more efficiently than its competitors, and thus achieve competitive advantages. With the understanding of a firm as an actor in an economic environment with actual or potential innovating rivals, innovation is far from a one-off event. A firm that wishes to stay competitive in the long run must continuously evaluate its activities to seek out opportunities for innovation. In other words, firms must handle the underlying mechanisms on which capitalist economies develop, what Joseph Schumpeter poetically described as ‘the perennial gales of creative destruction’ (Schumpeter, 1976, p. 84). Indeed, innovation does not become any less important in an economy characterized by global competition.

Appreciating firms as central loci for innovation does not mean, however, that relying solely on innovation generated from within the market will be the most beneficial option for economies (for example, regions, nations or supranational entities such as the European Union). Public agencies on different levels can and may want to develop ‘knowledge policies’ to promote for example scientific progress or development within a specific sector in order ultimately to stimulate innovation (Lundvall and Borrás, 2005). By using this term, these authors want to stress that innovation and competence building involve ‘many different sources of knowledge and that innovation itself is a learning process’ (*ibid.*, p. 625).

There exists an array of different means to stimulate innovation, and public procurement has not been one of those much emphasized in the last few decades. In general, innovation policy instruments can be ordered under three different headings: environmental, supply-side and demand-side measures (Rothwell, 1981). Examples of environmental measures are tax allowances for firms which engage in R&D. Another

measure that falls into this category is intellectual property laws that give monopolistic rights to commercialize a product developed by a firm. This temporary exclusion of competition makes it possible for firms to secure a return on investment in development. Supply-side measures are typically research infrastructure provided by public agencies. Examples of this category are public provision of scientific training, public laboratories and R&D grants. One measure listed on the demand side is public procurement (E. Braun, 1981). In a similar way, Geroski (1990) put public procurement and regulations on the demand side and subsidies and infrastructure investments on the supply side. A recent taxonomy of innovation policy tools also includes public procurement as a demand-side measure alongside systemic policies (cluster policies), regulation and standardization in order to target technical development and support for, or articulation of, private demand (Edler and Georghiou, 2007). Although the potential of public procurement as an innovation policy instrument is fairly well established, policy making in the last few decades has emphasized supply-side measures such as providing technical infrastructure, R&D grants or subsidies in order to stimulate innovation. Demand-side innovation policy instruments such as public procurement have been relatively neglected (Rothwell, 1981; Edler and Georghiou, 2007). For the European Union it has been emphasized that ‘the main area of neglect in recent years in R&D and innovation policy spheres has been demand-side policies. Certainly many countries have attempted to stimulate aggregate demand via the use of a variety of macroeconomic instruments, but few have actively sought to link supply and demand directly via the use of instruments such as Public Technology Procurement’ (European Commission, 2003a, p. 64). Accordingly, it has been argued that EU policy makers should take into account both blades of the scissors of demand and supply (Georghiou, 2007, p. 4).

The common underlying idea is that public agencies could help to stimulate private sector innovation by putting out for tender public contracts on products, services or systems which, in order to be delivered, require some kind of innovative effort by the supplier, such as R&D. Such contracts may provide efficient incentives for the private sector to carry out R&D, especially in situations characterized by uncertain market conditions where firms would otherwise hesitate to carry out R&D. In short, public demand for innovation may stimulate R&D among suppliers. The knowledge and capabilities gained by firms responding to public demand for innovation will render competitive advantages that contribute to firm growth. Potentially, the process also has a reciprocal effect, in the sense that firm growth increases tax income for economies, both through increased intake of company taxes and

through increased intake of individual income taxes. In principle, then, a successful chain of events initiated by public demand for innovation would in the end increase public purchasing power to be exercised in further public demand for innovation. Another aspect of public procurement of innovation concerns the effects on the procuring agency. An innovation satisfying intrinsic needs may lead to the same service provided by a public agency being delivered at less cost. The other possibility is that a better public service can be delivered at the same cost. A sometimes neglected effect is the potential market transformations associated with public procurement of innovation. Even firms not directly involved as suppliers may have to respond to innovations delivered in public procurement of innovation projects, in order to stay competitive on a specific market.

One basic justification for making public agencies more prone to innovation generation lies in the fact that public procurement represents 16 per cent of EU GDP, a purchasing power which if directed wisely could significantly boost supplier-side innovation. The importance of public procurement of research and development and the fact that countries such as the US and Japan which have adopted more strategically focused procurement policies have run ahead of the EU in terms of creating demand for R&D further justify this policy focus (National IST Research Directors Forum Working Group, 2006). In a comparison between EU and US expenditure on 'R&D procurement', it was found that 'EU spending here is four times less (approximately \$3.4 bn) than the US – after the elimination of expenditures on military procurement, with the addition of which the US lead over the EU increases to a factor of 20' (*ibid.*, p. 10).

A BRIEF HISTORICAL OUTLOOK

It should be noted that the idea of using public procurement as a policy tool is not new. Over the years, public procurement has been used to accomplish a variety of policy objectives: to increase overall demand, stimulate economic activity and create employment; to protect domestic firms from foreign competition; to improve competitiveness among domestic firms by enticing 'national champions' to perform R&D activities; to remedy regional disparities; and to create jobs for marginal sections of the labour force (J. Martin, 1996). McCrudden (2004) discusses procurement initiatives addressing social goals that took place in the nineteenth century. For example, in 1840, US president Martin Van Buren issued an executive order that established the ten-hour workday for

those working under certain government contracts. Similar initiatives were also made in Europe, in particular France and the UK. The same author even states that '[i]t is not too much of an exaggeration to say that modern procurement systems evolved alongside the development of the welfare State, and it is hardly surprising that the former was used in part to underpin the goals of the latter' (ibid., p. 258).

In the 1980s, studies were carried out to explore the phenomenon of technology procurement and to assess its potential as an industrial policy instrument in the telecom sector in four countries (Denmark, Finland, Norway and Sweden). On a general level it was concluded that, 'although there are several indications that private and public technology procurement is an efficient means of generating economically viable innovations, it does not follow that government policies to stimulate public and/or private technology procurement are easily implemented' (Granstrand and Sigurdsson, 1985, p. 202). Ove Granstrand (1984) also produced a paper providing a general framework for describing and analysing patterns of buyer–seller interaction with special reference to technology procurement. Cases collected from the areas of telecommunications and power transmission were provided. One attempt to think of public agencies as technology users important for a national innovation system was made by Gregersen (1992). One of her points was that public agencies can stimulate innovation *either* through establishing stable long-term incentives for private sector innovation *or* by being forced to act innovatively in unstable situations. Her second point was that public procurement is one tool that could be used in concert with others, in order to simulate innovation in a global economy.

If one makes the jump from history to recent history, studies have shown that public procurement can be used to stimulate technical development in the building sector (Westling, 1991); for creating environmentally friendly technology (IEA, 2000; Erdmenger, 2003); and as a way to coordinate demand and bring new technology more quickly to the market (Phillips *et al.*, 2007) or induce market transformation (Neij, 2001). Older European examples are available in Edquist *et al.* (2000); examples of projects carried out by the Swedish National Board for Industrial and Technical Development (NUTEK) are given in Suvilehto and Öfverholm (1998, cited in Neij, 2001). It has also been shown how public procurement public agencies can stimulate innovation and help in maintaining or even increasing competitive advantage for a country. Scandinavian cases supporting this point include the formation of a development pair with the Royal Board of Waterfalls (Vattenfall, the Swedish Power Corporation) and ASEA (later ABB) in the twentieth century. The public agency provided the necessary willingness to take

risks associated with the development of innovative technology as well as pressure to do so in situations when the private supplier hesitated (Fridlund, 1999). The important role played by public telecom operators in the 1980s to stimulate innovation in telecom in a similar way, in both Sweden and Finland, has also been brought up in the literature (Palmberg, 2002; Berggren and Laestadius, 2003). Taking into account also work by Dalpé, DeBresson and Xiaoping (1992), Geroski (1990) and Rothwell (1984), we are left with the conclusion that rather profound insights existed on the topic even then.

In the last decades of the twentieth century, however, the prevailing perception of the relation between the market and the public sector was not conducive to promoting public procurement as a demand-side innovation policy tool. This was the time of the free market approach that stressed market mechanisms rather than public sector management as the way forward, as promoted by world leaders such as US President Ronald Reagan and UK Prime Minister Margaret Thatcher. In many countries this trend typically led to the contracting out of non-core activities in the public sector or to sales of government business enterprises (Callender and Mathews, 2002). In Sweden, for instance, the policy discourse in the 1990s was 'characterized by more generally oriented policies than before, at least within the area of industrial policy. Instruments of a more selective character, implying stronger intervention in the market economy [e.g. public technology procurement], were not in fashion' (B. Persson, 2008, p. 22). These neoliberal policies were also visible in the way public procurement legislation was designed: to prevent nationalistic, protected and (therefore) inefficient procurement and instead promote the creation of a common European market (Cox and Furlong, 1996). Other references elaborating on this development are the European Commission (1998) and S. Martin *et al.* (1997). Similarly, Gavras *et al.* (2006, pp. 70–71) argue that the EC directives were stressing regulation rather than strategy, the free market rather than interventionist orientation, European rather than national competitiveness, competition rather than protectionism, equal opportunity rather than collaboration and learning, and competitive markets rather than public sector monopolies.

PUBLIC PROCUREMENT OF INNOVATION IN THE EU

What can be seen as a demarcation line between the neoliberal policies of the past and what was about to come was the Lisbon European Council meeting in 2000. At the meeting a process was initiated in which

public procurement as a means to stimulate innovation would become increasingly emphasized. The meeting established that the European Union, although in a fairly good state in terms of inflation levels, interest rates, public sector deficits and education level of the workforce, still had to address the challenges imposed by global competition and the shift towards a knowledge-driven economy. As a response to the perceived situation, the goal was set for the European Union 'to become the most competitive and dynamic knowledge-based economy in the world' by 2010 (European Council, 2000). One of the ways forward to achieve this goal was to form 'better policies for the information society and R&D, as well as stepping up the process of structural reform for competitiveness and innovation' (ibid.).

Two years later, the European Commission (2002a, p. 23) concluded that 'a stronger European impulse is needed' to achieve the Lisbon goal. At the Barcelona European Council that year it was also agreed that R&D investments needed to increase from the level of 1.9 per cent of GDP in 2000 to 3 per cent of GDP in 2010. A second issue concerned the level of business funding of R&D. The goal was set that the current levels of 56 per cent should be increased to two-thirds of total R&D investment (European Commission, 2002b). In the general effort to develop research and innovation-friendly regulations, public procurement started to gain attention as a potentially useful funding source for public infrastructure. The tendency of governments to buy established rather than new technologies was acknowledged, however, and also that '[c]hanges in these areas could have a substantial impact on increasing private R&D' (ibid., p. 14). In 2003, research carried out for the European Commission based on the perception that the targets initiated at the Lisbon Council would not be met without support from governments and the European Commission, emphasized (among other things) the importance of the right mix of different policies adapted to a given context. Among the measures listed was public technology procurement. It was also concluded that:

Policy instruments which attempt to link supply with demand have been relatively neglected ... despite the fact that public technology procurement entailing a measure of R&D is the largest potential source of the financial resources needed to meet the Barcelona target. Public authorities should be encouraged to be less risk-averse and take steps to increase the amounts of R&D associated with procurement decisions. (European Commission, 2003a)

The same year, the European Commission concluded that public procurement 'is a leading or major component of demand in a number of

sectors ... where the public sector can act as a launching customer' (European Commission, 2003b, p. 20) and noted that '[a]n important objective is to raise public buyers' awareness of the possibilities offered to them by the legislative framework, and to support the development and diffusion of information enabling them to make full and correct use of these possibilities' (ibid., p. 20). In 2005, public authorities were described as 'big market players' which 'have powerful means to stimulate private investment in research and innovation' (European Commission, 2005, p. 8) for the purpose of assuring economic growth in the face of global competition. In the same year, the Council of the European Union recommended that member states should (among other things) focus on 'encouraging public procurement of innovative products and services' (European Council, 2005, p. 6). The Aho report from the European Commission published in 2006 outlined the role of public procurement as a way of creating lead markets. This idea draws on the notion of lead users developed by von Hippel (1988) and a belief that public procurement could be used to build on lead users creating lead markets, by driving demand for innovative goods, while at the same time improving the level of public services (European Commission, 2006, p. 6). The lead market initiative seems not to have managed to live up to the great expectations with which it was born, mainly, it has been claimed, because of budget constraints (CSES and OR, 2011). One could also argue that the idea was built on unrealistic expectations of the lead user notion. The fact that this phenomenon occurs and may create lead markets does not in itself allow for the conclusion that lead users can be generated by top-down intervention. Although 'knowing where innovation occurs would seem to be a minimum prerequisite for exerting effective control' (von Hippel, 1976, p. 238), it appears unlikely that such 'knowing' would become anything but probabilistic in character.

In 2007, the European Council published a guide for innovative solutions in public procurement. In addition to providing a list of ten 'elements for decision makers who want to develop and implement a public procurement policy that promotes innovation' (European Commission, 2007b, p. 5), the guide explicitly emphasized the role of public procurement as a tool for innovation: 'To have the greatest impact, then, public procurement for innovation needs to be a part of a general innovation policy. What is needed is a system providing for education, for research, for finance, for knowledge transfer and support for small business, for intellectual property management and for a high quality regularity environment' (ibid., p. 4). Another example of a project with a clear focus on promoting innovation was the Open Method of Coordination – Public Technology Procurement (OMC–PTP) project set up to

bring together policy makers, practitioners and suppliers (Bodewes *et al.*, 2009) to establish a platform for learning concerning various forms of procurement leading to innovation. Yet another project, the STEPPIN Project, dedicated attention to the role of standards in the procurement of innovation (Europe Innova, 2008). In 2008, the European Commission also set up an expert group on public procurement and risk management (Tsipouri *et al.*, 2010). The European Commission has also launched coordination actions, essentially aiming at diffusing or promoting, for instance, the use of pre-commercial procurement (Turkama *et al.*, 2012).

The increasing emphasis on public procurement of innovation on the EU level has also started to become apparent in rather concrete activities on the national and sub-national levels. This is evident not only in the UK and the Netherlands, the countries with the most developed policies and practices (see Edler *et al.*, 2005 for a survey of the initial state of public procurement of innovation policy development). Other member states have also initiated fairly concrete activities. For instance, innovation-promoting agencies such as the Finnish Funding Agency for Technology and Innovation (TEKES), the Danish Enterprise and Construction Authority, and the Swedish Governmental Agency for Innovation Systems (VINNOVA) have in the last few years intensified their efforts to develop and launch concrete programmes aiming at promoting different forms of public procurement of innovation. Initiatives are also visible on the sub-national level, where the region of Southern Denmark is a perfect case in point, having launched a €6.5 million project devoted to developing demonstration projects and new knowledge that may inform public procurement of innovation practice in the future (OPI-Lab, 2011).

In sum, it would not be an exaggeration to say that the pendulum has swung in the other direction, and the emphasis on 'free' market forces has lost ground in favour of the public sector as a pacer of innovation (Gregersen, 1992). 'Government is suddenly seen as a fundamental provider rather than an adjunct to the business of running the economy' (Callender and Mathews, 2002, p. 230). The beginning of this chapter also cited an array of documents signalling the particular emphasis on public procurement as a tool to remedy the innovation emergency. In other words, getting involved in research in this field, with an attempt to support, inform, analyse and maybe sometimes criticize the policy development, is easily justified.

AN INSTITUTIONAL APPROACH TO PUBLIC PROCUREMENT OF INNOVATION

Two observations from the development outlined above emerge. The first one follows from the policy development per se, meaning that public agencies in EU member states are exposed to innovation policies emphasizing and encouraging the implementation of public procurement as a means to stimulate innovation. For some public agencies this means very little deviation from what is currently business as usual. To many others, however, this discourse is a rather profound shift in perspective from prevailing practices derived from the neoliberal policies in vogue in the last decades of the previous millennium. The second observation, which is connected to the first one, is that there is at present support and persuasion on the EU level for the implementation of these policies among EU member states. This means that public agencies may increasingly try to adapt to these policies and start to develop new procurement practices where innovation is given more attention. This creates a situation rather different from what would have been the case if no such support existed. Any public agency striving towards increasing its role as a 'market player' and a demanding customer may find useful support in terms of concrete funding possibilities as well as opportunities on the national level. The focus here is not so much on the external incentives, however, as on the endogenous institutional change required in many places.

One of the virtues with an institutional analysis of society in general is that it opens up an understanding of human behaviour as taking place in relation to already established 'rules of the game'. From an institutional perspective it follows for instance that any single action can never be understood as a stand-alone and disconnected phenomenon. In order to make sense, it can only be studied in relation to its context, which in turn is evolutionarily determined. An emerging complementary policy development emphasizing innovation, in a context affected over many years by policies emphasizing 'efficiency', may bring about different types of institutional clashes. Although this book does not take a position regarding the pace of EU policy implementation, it is at least noteworthy that, a decade after the first concrete reflections about utilizing public procurement as an innovation policy instrument emerged, the opinion is still that 'Europe has an enormous and *overlooked* opportunity to spur innovation using procurement' (European Commission, 2010, p. 16, italics added). The aim for the institutional analysis attempted in the current book is to provide some understanding that could inform the policy development

further towards a situation where public procurement of innovation is not overlooked but utilized to a greater extent than it is today.

STRUCTURE OF THE BOOK

After this introductory chapter, there follows in Chapter 2 a discussion of what institutions are and how an institutional analysis can be applied in order to understand public procurement of innovation better. Chapters 3 to 6 each highlight different takes on endogenous institutional analysis, essentially by drawing on case studies. Chapter 3 deals with a case of public procurement of innovation that was a success story and can thus be seen as a falsification of the general claim that the EC directives on public procurement prevent innovation. By drawing on additional cases, Chapters 4, 5 and 6 scrutinize other reasons on endogenous levels why problems sometimes occur in public procurement of innovation. Based on a cross-case analysis of an array of cases, including the cases discussed in these chapters, Chapter 7 discusses some factors shown to be important determinants for success in public procurement of innovation projects. Chapter 8 provides some concluding remarks.