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## **Public Procurement Policy for Innovation and Technology**

*Draft Research Paper*

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### **Introduction**

Public procurement for innovation (PPfI), most simply speaking, refers to situations where a public agency places an order for a product that does not yet exist, but which could probably be developed within a reasonable period of time, based on additional or new innovative work (Edquist and Hommen 2000). Recently, scholars as well as policy-makers – especially relying on insights from evolutionary economics and systems of innovation theory – have claimed more widely that public procurement as a tool for promoting innovation, technology and economic development is a viable idea and that in principle societies would be better off if governments used procurement for innovation rather than not.<sup>1</sup> This line of arguments is very often illustrated with the developments of the Internet, GPS technology, the semi-conductor industry, and passenger jets, which are perhaps the most prominent examples that resulted from government innovation-oriented procurement bringing along major economic and social impacts (see also Ruttan 2006, Cabral et al. 2006). The last decade has witnessed a proliferation of public

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<sup>1</sup> This is not a universally held view, though. Much of the literature dealing with the economic effects of public procurement considers any secondary policies (such as social, innovation or industrial) as discriminatory and thus disadvantageous for any country or region to pursue. See Kattel and Lember (2010) for a more in-depth discussion on that respect.

procurement for innovation policy initiatives around the world and one can even claim that there may be a sort of a new policy convergence emerging. Especially the European Union and its member states, but also China and other countries have started to develop explicit policies that would put public procurement into the services of innovation policy (see e.g. OMC-PTP 2009, Edler et al 2007, OECD 2009a, 2009b, European Commission 2010b, 2011).<sup>2</sup> Countries and regions have started to emulate from public procurement for innovation policies of other, more experienced countries: for instance, the European Union's Lead Market Initiative as well as China's Indigenous Innovation Policy are both said to be attempts to learn from the experiences of the US, South Korea and other global players that have explicitly used the tool in the past (Edler et al 2007, ECWG 2005). Also the international donor organizations have recently suggested that developed as well as developing countries to introduce their own PPFI policies as part of the demand-side innovation policy mix (e.g. OECD, 2009b). Moreover, OECD is of the opinion that PPFI related programs, even in developed countries, must be accelerated and expanded "wherever possible" (OECD, 2009a, p. 9).

However, in spite of the emerging new policy initiatives worldwide, it is somewhat surprising that the academic literature still lacks coherent overviews and analyses on public procurement for innovation policies. There are many excellent (comparative) studies published on successful cases (see only Edquist et al 2000), but just some of them are analyzed within a wider policy context. The existing academic treatments often refer to the successful application of policies binding together public government purchasing decisions and innovation in various countries, but only seldom do they provide a sufficient account of the actual state of affairs on the policy level nor are the policy processes addressed in a comparative manner. This is even more surprising if to take into account the fact that during the past three decades governments around the world have introduced complex contracting-out policies, which have increased the role of industry in delivering public services (Hodge 2000, Greve 2007). The public procurement for innovation policy debate is still mostly limited to normative suggestions and best practices, which are almost identical to the prescriptions suggested already in 1970s (see e.g. Rothwell and Zegveld 1981).

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<sup>2</sup> China has been working with its Indigenous Innovation Policy initiative since 2007, according to which the Chinese public sector should devote up to 40% of its procurement funds for innovative products in order to boost economic development (Edler et al 2007).

As the current knowledge of policy-related issues in public procurement for innovation is scarce, several questions remain unanswered. For example, what exactly constitutes as public procurement for innovation policy and what lessons can countries actually learn from each other? Is it a coherent concept or can we actually see different types of policy initiatives that are brought under the label of public procurement for innovation? In addition, do we have evidence on coordinated and explicit public procurement for innovation policies or is it primarily something that only happens accidentally on an organizational level? Or is it something that is limited to public technology programs or just buying R&D? Taking into account the recent developments on the EU level, it is key to understand when can we expect innovation to play a crucial role in every-day procurement decisions? One could also ask whether the documented successful single cases give the governments enough of a basis to start developing large-scale policies binding together procurement, innovation and economic development in general. Are there any reasons to expect that public procurement for innovation will not become yet another reform “hype” that drowns in the implementation mess as has happened to many previous contracting-out and public-private partnership (PPP) campaigns? At last, but not least, what exactly are the institutional factors and conditions contributing to or hampering the success of public procurement for innovation policies? This list of questions can be expanded, but against the recent international developments it becomes clear already from this list that there is a need to have a better understanding on the policy issues.

The recent EU initiatives and processes (Lead Market, pre-commercial procurement, regulative reform proposals etc) indicate that the innovation aspect is becoming a crucial aspect of the union’s public procurement policy making. As the EU has favored for the past decades somewhat different ideas – not using public procurement for other goals than open competition and creation of single market – the whole region faces a dilemma whether and how to change its procurement policy trajectory. The aim of the current paper is to explore the possibilities for public procurement for innovation policy change. First, by reviewing the existing academic as well as policy literature, we propose a public procurement for innovation policy taxonomy that could be used for further analytical exercises. In doing so, we stem from four possible policy dimensions capable of describing the policy developments: a) public procurement for innovation (PPfI) as a ‘no policy’ policy, b) PPfI as a “policy for all seasons”, c) PPfI as a mission-critical technology development policy, and finally d) PPfI as a research and development (R&D)

policy. Second, based on the abovementioned taxonomy, we analyze the strengths and weaknesses of each policy dimensions and draw policy implications for the future. We apply the results from a recent study on Estonia to illustrate and strengthen our analysis.

The paper is structured as follows. In the first part, an overview is given about the role of public procurement in innovation. The second part deals with the public procurement for innovation related policy issues by identifying the main goals, means and challenges of the policy. The third part outlines preliminary findings from the Estonian case-study. The final part draws some conclusions on the possible future strategies.

### **Public procurement and innovation**

Public procurement – usually equivalent to 10-20% of countries' GDP<sup>3</sup> – is mostly referred to as a way public sector acquires goods, services and works in order to deliver public services. On a micro level, this is a specific and highly regulated method for public sector to carry out market transactions (e.g. buying cars or contracting out vehicles' maintenance service). On a broader level, public procurement can be understood as a specific and unique way how to organize and manage public intervention into economy. Due to its significant volumes public procurement can be employed to affect market behavior in many areas, but most notably in environmental protection and economic development. This broader understanding involves not only traditional procurement auctions, but also different public-private partnership arrangements where governments invest their resources for the delivery of specific goods or services.

It has been demonstrated by many authors that as innovation in the private sector can be seen as a main engine for economic development and competitiveness, public procurement should be geared towards supporting this process. In a nutshell<sup>4</sup>, public procurement can be used to

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<sup>3</sup> This is a figure often used in the literature and which is supported by recent calculations made by the European Commission (2010a). The Commission estimates – based on the national accounts statistics – that as of 2009 the government procurement equals to 19,4% of the member states GDP, ranging from 11,1% in Greece to 30,9 in the Netherlands (European Commission 2010). In the least developed countries, where large portion of public budgets comes from international donor organizations, the respective figure can be as high as 80% (Evanett). However, measuring the exact volume of government procurement in different countries has proven to be a difficult task and that is why many contradictory figures are used in the literature. For example, at least three different sources can be exploited to describe public procurement market of the EU member states: national public procurement registers, the EU Tenders Electronic Daily (a supplement to the Official Journal of the European Union) and national accounts.

<sup>4</sup> There are many in-depth articles and books available discussing the logic of innovation-friendly public procurement. For recent overviews see e.g. Edquist et al 2000, Edler and Georghiou 2007, Hommen and Rolfstam 2009, Kattel and Lember 2010, Lember et al 2011, but see also Rothwell and Zegveld 1981, Rothwell 1984, Geroski 1990).

socialize innovation-related risks, to influence the technology life cycle and to promote clusters and innovation systems, it can create demand for new products or technologies, enhance providers' innovativeness, create and protect infant industry, and thus increase the diversification of economic activities. As competitiveness can be considered a function of diverse economic activities, higher average wages, increasing returns, positive externalities and a high degree of cooperation, it can be presumed that public procurement for innovation positively affects these factors. The concept of public procurement for innovation underlines the importance of policy-learning and use of technology and it can be seen as a special case of user-producer interaction. The role of the central government as well as local governments can be seen also as a facilitator of innovation processes in fluid phases as both social and economic benefits for the region and/or nation state might follow. The public sector can act as a technologically demanding first buyer by socializing risks for socially/ecologically demanded products where significant financial development risks prevail as well as by promoting learning as procurement introduces strong elements of learning and upgrading into public intervention processes.

### **Goals and means of public procurement for innovation policy**

Although the term 'public procurement for innovation' represents a general idea how public sector can intervene into economy and affect industrial innovation, it is far from being a straightforward concept neither on the project or policy level. On the contrary, public procurement for innovation has become an umbrella term for many different forms of contracting, which all assume different preconditions and thus policy solutions. Although the literature often identifies the creation of internet and semi-conductor industry (see e.g. Ruttan 2006) as being the result of the same kind of innovation-oriented procurement as, for example, building energy efficient houses, it is relatively straightforward to see the difference in the scope and complexity these activities assume. History teaches us that the abovementioned rationales of public procurement for innovation have been actually targeted with a rather wide set of policy measures, which makes it complicated if not possible to analyze the conceptual limits of public procurement for innovation policy under one single approach. Therefore, the next sections give a closer look at the goals and means of public procurement for innovation policies.

#### *Policy goals*

On a policy level public procurement for innovation has at least four different rationales (see also OMC-PTP 2007). Firstly, public procurement can be used as a tool to fund industrial R&D, which is deemed important to redress systemic and market failures in knowledge creation and technology development (Edler and Georghiou 2007). As argued by Nelson (1987, 551) “...*the heart of such policies are efforts aimed at developing and bringing into production particular products. In contrast with more broadly oriented basic research support programs that rely heavily on the relevant scientific or technical community for guidance, procurement-oriented policies tend to be tightly controlled by government agencies pursuing their own ends.*” Thus in this case public procurement serves directly the goals of science, technology and innovation policy, but is at the same time directly connected with production and not only knowledge creation.

Secondly, public procurement can be deliberately employed as an industrial development tool through influencing local demand. This does not necessarily mean developing a home-biased government procurement policy, but rather targeting a set of measures towards creating sophisticated and challenging demand on local sectors and markets that are considered important for national economy (Edler and Georghiou 2007). Even in the case contracts go to foreign companies, “...*the economic benefit [from public procurement] is broader, as application of innovative products and solutions may lead to a technological upgrade of a location and a market. Such innovative products need to be installed and maintained, competing suppliers are put under pressure to catch up, complementary services and products need to be in place, users upgrade their skills and the location may gain a more innovative image. All of this benefits the local economy.*” (ibid., 956).

Thirdly, public procurement of innovative goods and services has the potential to improve public services. Although the New Public Management reform ideas – an agenda that has been influencing heavily how governments around the world contract out public services to private sector during the past three decades – have emphasized on the need to improve short-term efficiency of public service delivery (see e.g. Pollitt and Bouckaert 2004 for a general or Greve 2007 for a more specific overview), the innovation dimension could be used to enhance the medium-term efficiency in contracting for public services by demanding and introducing e.g. new technological solutions (OMC-PTP 2007). Also, public procurement of innovative solutions

can significantly enhance the quality of public services (see e.g. Lember et al 2011), which can be seen as a major trigger for the whole process.

Finally, public procurement can be used as a policy tool to meet (grand) social challenges, which are primarily to be found in energy consumption, environmental protection, ageing societies and other issues. Here government may accelerate the process of developing proper answers to these problems by investing in innovative solutions through, for example, the form of catalytic public procurement.<sup>5</sup> This means that the governments do not necessarily need to use public procurement for creating new public infrastructure or upgrading existing public services, but also for creating socially desired new goods or services offered by private or non-governmental sectors. It should be noted, however, that this differs from giving out research grants and other similar measures as public procurement for innovation aims not only towards R&D, but also production of final solutions.

#### *Policy means*

In addition to diverse goals, public procurement for innovation policy can be targeted with very different policy tools. Historically one can distinguish between four major different public procurement for innovation policy types (see also Table 1). First of all, governments can target innovation by adopting ‘no policy’ policy. This means that in order to organize or support public services governments employ regular public procurement practices (e.g. simple price auctions targeting on-the-shelf solutions) without no direct secondary (i.e. innovation) policy intentions in mind, but where markets (occasionally) react to the call for tenders with innovative solutions. This option can be chosen for various reasons. It can be done deliberately based on the assumption that governments should not use public procurement to intervene into economy as public sector is due to its inherent lack of capacities and insufficient incentive mechanisms prone to policy failures. In these cases governments do not have or even desire any policy-level strategic goals other than creating level playing-field for market players as it is believed that innovations result from open procedures and maximum competition rather than built-in innovation incentives that often act as entry barriers to market (see also Cabral et al 2006). This policy strategy can also be chosen unconsciously simply because public officials and politicians

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<sup>5</sup> Catalytic procurement refers to a situation where a public sector actor is involved in the procurement, or even initiates it, but the purchased innovations are in the last instance used exclusively by private end users. See also Edler et al (2005).

are not aware of the alternative policy options. In case of ‘no policy’ policy there can be random experiments for sourcing innovative solutions within public sector – initiated and implemented by single organizations – but no explicit policy or links to other innovation policy areas exist. One should also be aware that innovation effect can always emerge without any explicit plans or strategies.

Secondly, public procurement for innovation policy can take the form of mission-critical technology development programs. Before World War II (WWII) public procurement of innovative goods and services was mostly related to military equipment and arsenal (Nelson 1987, Ruttan 2006). It continued to be so and even in increased volumes also after the WWII, but due to many successful military projects that diffused to the non-military markets (e.g. semi-conductors, internet), the technology procurement ideas were soon adopted also in other policy domains such as space, telecommunications and electrical utilities (ibid.). Military procurement can be regarded as the main stemming point for the later developments in public procurement for innovation policies, as it has proven to be an effective way to diffuse mission-related radical as well as incremental innovations into the market. In this case the technology development results from a set of coordinated public procurement projects that can take decades to evolve before reaching to marketable solutions. It can start off with procurement of pure R&D and end up with a set of procurement contracts for ready-to-use products. In contrast to regular public procurement, the emphasis is given on continuous dialogue – over and above specific transactions – between public sector and the markets (incl. developing technology roadmaps, technology foresights etc.) (Edler and Georghiou 2007). These procurements are driven by governmental or social needs and are usually led by a public agency, which is responsible for articulation of that need and bundling together sufficient demand. Innovation is deliberately sourced for, although it may not always be acknowledged as part of innovation or economic development policy, but rather a technology or sectoral policy. When the success of the R&D procurement programs after the WWII (especially in the US) became more widely acknowledged, many governments began to emulate the policy as a direct developmental or industrial policy tool (see Rothwell and Zegveld 1981 for an overview). Therefore, public procurement for innovation as mission-critical technology development policy can be either technology driven (i.e. based on sectoral needs, e.g. low-carbon solutions in environmental

protection or defense systems) or industry driven (i.e. where national industry has potential advantage to grow).<sup>6</sup>

Thirdly, public procurement for innovation can be employed as a R&D policy. Here governments create horizontal programs that aim at procuring radical innovations assuming high level R&D work from providers in order to meet specified government or social demand. In addition to challenging so-called “grand challenges” of society, these programs serve to increase the overall level R&D spending in society. This policy usually relies on public competence centers capable of articulating public needs, contracting with private sector and evaluating results. Small Business Innovation Research program in the US, but also in the UK and elsewhere, are the classic examples here.<sup>7</sup> In the EU context this policy option has been labeled as pre-commercial public procurement, which “*refers to the procurement of Technological Innovation up to and including a first pre-commercial volume batch of products and/or services validated via field tests* (ECWG, 2006, p.17). It is about procuring ‘yet-to-be-designed’ technology research and which supposedly helps the providers to reduce investment risks and gain capital for R&D (ibid.).

Finally, governments can develop so-called policy ‘for all seasons’, where innovation dimension is incorporated into all public procurement decisions. Emphasis is given to technological innovations (but not only) and the use of specific procurement criteria such as performance (outcome) specifications, competitive dialogue etc. This means that innovation is explicitly targeted for and it becomes a legitimate criterion for almost all government spending decisions. China’s plans, but also recent developments in the EU and in many other countries, are closest to that position.

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<sup>6</sup> There are also examples where governments try to deliberately combine these two drivers. This is, for instance, well reflected in the development stages of NASA (see Mahler 2011).

<sup>7</sup> The US version of SBIR was created in 1982 and has since then been used on projects varying from biomedicine to energy and security. It is regarded as one of the most successful economic development policy tool in the US. See e.g. Block, 2010 or Connell, 2006 for an overview. For more critical accounts, see Lerner (2008).

**Table 1:** Tentative taxonomy of public procurement for innovation (PPfI) policies

Type of PPfI policy	Main goal	Implementation mechanism	Examples
PPfI as ‘no policy’ policy	Level playing-field (innovation as a result of “perfect” competition)	a) Innovation as a by-product of regular public procurement. b) Public procurement for innovative solutions randomly initiated and implemented on organizational level, but no explicit policy or links to other innovation policy areas exists.	Electronic ID-card in Estonia, X-road project in Estonia
PPfI as “policy for all seasons”	Innovation spillovers from better (or new) public services	Innovation policy incorporated into all public procurement decisions. Emphasis on new technology and the use of specific procurement criteria such as performance (outcome) specifications, competitive dialogue etc.	China’s S&T Strategic Plan (2006-20) aiming at 40% of public procurement dedicated to innovation
PPfI as technology (platform) development policy	Tackling social challenges (e.g. environmental, defense) and/or industrial development	Mission critical technology (platform) development, driven by government or social needs. Often led by public agency, which is responsible for articulation and bundling of demand. Emphasis on continuous dialogue – over and above specific transactions – with market (incl. roadmaps, technology foresights etc.). Can take the form of catalytic procurement. Can be: a) technology driven (i.e. sectoral needs, e.g. low-carbon solutions in environmental protection or defense systems) b) industry driven (i.e. where national industry has potential advantage to grow)	Nordic Mobile Telephone (NMT), SAAB fourth-generation fighter-jet, Internet, semiconductor technology, Lead-Market initiative in the EU?; NUTEK (STEM) in Sweden; various PPP projects funded by the EU (e.g. <a href="http://www.enprotex.eu">http://www.enprotex.eu</a> ), Forward Commitment Procurement (UK), NHS (NIC+PASA) (UK) DARPA (US), BARDA (US)
PPfI as R&D policy	Knowledge creation in science, technology and innovation	Horizontal programs aiming at procuring R&D to meet social demand and increase R&D spending. Emphasis on pre-commercial procurement. Built around public competence	Small Business Innovation Research (SBIR) program in the US; Small Business Research Initiative (SBRI) in

		centers capable of articulating public needs. Largely based on the idea of unsolicited proposals.	the UK; SBIR in the Netherlands; Forska&Väx (Research&Grow) in Sweden
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**Challenges of the PPfI policies**

Although the history teaches us that public procurement can be a powerful tool for innovation and economic development, it is only now when we see a new global trend emerging in terms of explicit policy initiatives. Two aspects seem to stand out here that could explain the situation.

The first aspect has to do with the limits of both government and market capacities to exploit the opportunities arising from public procurement. Although the historical record of PPfI includes the Internet as well as semi-conductor industry creation, PPfI is not without its downsides and has actually many inherent limits (see also Geroski 1990, Walsten and Stiglitz 1999, Edquist et al 2000b, Rolfstam 2009, Uyarra and Flanagan 2010, Kalvet and Lember 2010). It has proven to be difficult to coordinate not only large, but also small scale public procurement for innovation projects, where there is a need to bind together innovation policy goals with sectoral policy aims and to combine often conflicting values of public procurement organizations with innovation organizations. Most of the students of the field share the perception that public sector often lacks sufficient innovation and technology-related knowledge in order to carry out market intelligence, technology foresight exercises, transform identified needs into contract specifications and make smart decisions whom to award contracts. In addition, the questions regarding intellectual property rights (IPR), risk management, involvement of small and medium size enterprises (SMEs) and lack of awareness among civil servants as well as politicians tend to contribute to the policy challenges. Public sector interventions need to be in sync with innovation cycles and technology trajectories in the private sector (see Edler 2008), but it has been questioned whether governments have the capacity to choose the right tools at the right moment. Thus, the current research has questioned the ability of public sector to effectively use public procurement to intervene into economy without creating technology lock-ins leading to inferior technological solutions.

In one of the best-known attempts to comprehensively analyze public procurement for innovation process, Edquist and colleagues found that the capacity in terms of timing, technical

and organizational competence is regarded as important feature to overcome problems related to immature environments, where *“the informal contacts are considered as inhibiting the impartiality of the public sector agency acting as procurer”* (Edquist et al 2000, p 304). They continued – after reviewing nine international case-studies – that in most successful public technology procurement cases informal contacts precede formal procurement process leading to technological developments. It is more difficult to plan and implement successful public technology procurement where the level of trust is low in society and where strict competitive procedures are only used. The latter implies to the shortcomings of the EU (as well as international) regulation on public procurement, which assumes the presence of adversarial relationships and is therefore not conducive to innovation goals (see also Kattel and Lember 2010).

The development of PPfI policy is limited not only with administrative and policy capacities, but also with the existing economic diversity and market structures. As mentioned above, the main argument for using public procurement for innovation is that strategic government purchasing can create new products and technologies, enhance providers’ innovativeness, create and protect infant industry, and increase the diversification of economic activities. This argument is often put into force (e.g. the EU green paper, OECD) without considering whether the local markets are actually capable of responding to the sophisticated demand by governments. Public procurement for innovation represents a unique way of government intervention and as in other innovation (industrial) policy areas the success of a policy measure does not depend only on the policy idea as such, but also – as Cimoli and others put it – on “distance of any country from the technological frontier” (2009, p. 355). If to look at the practice of PPfI in different countries then it can be expected that public procurement for innovation cannot become a viable policy option unless a certain level of development has been already achieved in a country and/or sector (see also Kattel and Lember 2010). This is especially so if to take into account the changed policy space where the governments find it more problematic to sync public procurement with other industrial policy measures (see also below). Overall, it can be hypothesized that the scope of public procurement for innovation (both tools and policy in general) is dependent on the existing economic structure rather than the other way around.

Small and/or underdeveloped home markets limit the possibilities for economies of scale and geographical agglomerations. Similarly, limited government purchasing power of less developed

or small states makes bundling of demand more challenging and may also diminish the demand-pull effect as well as limit the potential of creating lead-markets. So, even if PPfI schemes are applied by governments, there might be no clients for the products and services developed in the local markets. The proximity of the users to the suppliers of an innovation plays an important role in the design and de-bugging of new products, especially high-technology products (Walsh, 1988).

The second aspect relates to the changed international policy space where countries must operate. Although the latest PPfI policy initiatives have often been regarded as new developments (e.g. see OMC-PTP 2009), they to a large extent reflect the very ideas already tested in 1960s and 1970s (see for an overview Rothwell and Zegveld 1981, but also Williams and Smellie 1985). Still, the current policy discussion fails to take into account that the policy context has changed and that the governments' policy space for experimenting with PPfI has significantly diminished by 2011 compared to 1960s and 1970s.

In the 1990s small as well as big countries witnessed a radical move from industrial to innovation policy. This shift does not change the final goals of policy (*to influence the economic specialization of private sector into activities that foster structural techno-economic change (and catching up)*), but rather changes the perceptions of what kind of policy instruments and institutional system are suitable for fulfilling the policy goal. The move from industrial to innovation policy embodies a significant change in the policy means and in the ideas of how the main policy aim (structural change) can be achieved at all. Industrial policy assumed that the main focus of policy interventions is to change firm-level capabilities (technological, production, managerial etc capabilities) in only given set of industries that were deemed to have high growth and above all high productivity potential (increasing returns). Innovation policies, in turn, assume that much wider set of capabilities should be in the policy focus, such as R&D skills, educational levels, life long learning activities, etc, that companies can tap into in their attempt to upgrade their activities. Industrial policy interventions were accordingly aimed at exclusivity in capabilities creation (handful of industries with limited number of firms and suppliers) while innovation policy sets out to capture as wide as possible set of capabilities in a given society. It is important to add that key underlying ideas about macroeconomic policies changed similarly. While during industrial policy period macroeconomic tools (above all exchange and interest rates) were used in conjunction with industrial policies aiming to change firm-level capabilities,

from 1990s the driving idea behind macroeconomic stability is investment stability for foreign companies (above all low inflation and taxes) and the impact of their presence in the economy on wide set of skills through various spill-overs.

Public procurement as an economic instrument in the 1960s and 70s should be viewed in accordance to the main economic development ideas of that time, which were very much linked to industrial policy as opposed to currently prevailing innovation policy (Soete 2007). This does not mean that the thinking alone has changed (from supporting specific industries to development of wider set of capabilities across society such as R&D knowledge), but also the international trade regulation (including World Trade Organization's Government Procurement Agreement) is today very much different than after the WWII or during 60s and 70s (see Reinert 2007, but also Kattel and Lember 2010). Compared to the 1960s and 1970s, where governments had much wider policy space available for experimenting with various industrial policy measures suited with local conditions (incl. public procurement), the current international trade regime expects governments to act in a uniformed manner as if the context of all countries was the same. This makes it very difficult to adjust public procurement according to the local context and makes it more problematic to find the best ways to create and develop the much needed capacities for public procurement of innovation.

### **The case of Estonia**

In order to understand better the limits and challenges public procurement for innovation policy may have, the paper exploits the situation of Estonia as a case-study. Estonia clearly represents the case of “no policy” policy, where the governments of the past two decades have, in accordance with overall domestic economic policy-making, preferred not to intervene into economy and thus not to employ public procurement for other reasons than creating level playing field for the market players. However, recently some Estonian policy stakeholders have insisted that the government should change the prevalent policy course and put some effort into directing public procurement funds for innovation (ICT Strategy). In addition, it is very likely that the current EU public procurement for innovation plans (Green Paper 2011, Lead Market Initiative etc) may at some point accelerate these processes. After all, when it comes to innovation policy making in general then Estonia has since the 2000s been very much influenced by the EU innovation policy initiatives. The Estonian case, thus, gives a good opportunity to explore the

specific challenges when a country with very limited experience with public procurement for innovation policies faces a dilemma whether and how to change the policy trajectory. Studying the Estonian case is also useful regarding the wider European context as in both cases the governments have tried to avoid using public procurement as a direct economic development policy measure.

### *Methodology*

Studying the innovation-related aspects of public procurement has proven to be methodologically a complicated task. Previous empirical studies have used statistical (e.g. Aschhoff and Sofka 2009, Dalpe et al 1992) as well as qualitative strategies (Edquist et al 2000, Edler et al 2005), but each of the strategy has its own limitations. For surveys the problem is how respondents actually define and interpret the concept of innovation. As the concept itself is rather ambiguous, there is the danger that respondents understand innovation differently than it is perceived by the research community. At the same time, more qualitative case-studies suffer from the generalizability problem, which is especially problematic in case wider policy impacts are analyzed. In order to lessen these methodological problems, we developed a two-stage data gathering strategy.

First of all we tried to find out what is current situation of public procurement for innovation in Estonia. More specifically we wanted to understand how much are the R&D organizations involved in public procurement, what is the share of innovation-friendly public procurement in total public procurement among R&D organizations and where the current demand is concentrated.<sup>8</sup> Considering the fact that all the EU member countries are obliged to run electronic public procurement registers and there is also a register for the EU wide procurements (TED), one could have taken the whole population of national or the EU public procurement register as a starting point for this kind of research endeavor.<sup>9</sup> However, relying only on the public procurement registers is not sufficient. As it appears from the public procurement reports, the standard formulary does not include variables capable of explaining procurement of innovative products. In addition, the vague procurement descriptions are of little help when the

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<sup>8</sup> This is not just pure research organizations, but also companies that spend at least some of its finances for R&D activities.

<sup>9</sup> The national register includes reports of all procurement contracts above certain threshold in standard formulary, which consist very different information ranging from description of procured products to price information and procurement methods.

total population consists of tens of thousands of reports. In order to alleviate this problem, we decided to use participation of R&D organizations in public procurement as a proxy measure as it can be assumed that this group of organizations has the highest potential to offer innovative solutions to public sector purchasers.

We developed a complete dataset of R&D organizations in Estonia (n: 500) and then controlled the participation of all the listed R&D organizations in public procurement bids during 2007-2010. The list of the R&D organizations was formed based on publicly accessible data.<sup>10</sup> As a result we got a dataset that comprises, *inter alia*, the following information:

- a) a list of R&D organizations successfully participating in public procurement bids;
- b) the total number of public procurement cases involving R&D organizations in 2007-2010;
- c) the total monetary value of public procurement bids involving R&D organizations in 2007-2010;
- d) based on descriptions of public procurements, we then “cleaned” the registry; we then had the same data on public procurement for innovation cases where R&D organizations participate.

This information allowed us to analyze the role and significance of PPFI among R&D organizations as well as to make some more general conclusions.

As a second step we conducted semi-structured interviews with R&D organizations as well as public procurers that were involved in successful public procurement for innovation cases. The goal was to find out the specific factors facilitating or hindering the innovation effect of public procurement. A sample of cases was drawn from the database developed in Stage I.

There are still some obvious limits to generalizability when using this kind of data gathering method. Cases of pure R&D procurements (or pre-commercial procurements) and defence

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<sup>10</sup> This includes a) organizations that have received R&D grants from Enterprise of Estonia (*Ettevõtluse Arendamise Sihtasutus*, hereafter EAS). EAS is the primary semi-autonomous public agency responsible for allocating the national and the EU R&D funds to Estonian R&D organizations; b) organizations that have received other public R&D funds (targeted financing schemes by the Estonian Ministry of Education and Science, and Estonian Science Foundation grants); c) organizations that have participated in the EU FP6 and FP7 programs; and d) organizations that have reported R&D spending in various other sources. The list was verified with various experts and the Statistics Estonia.

procurements are excluded from this approach as these fall outside the direct scope of public procurement legislation and therefore register. It also excludes product, process, marketing or organisational innovations done outside the world of R&D organizations. These limits should be taken into account when discussing the policy implications.

### *Preliminary findings*

The main characteristics of the Estonian public procurement market vis-à-vis the EU and innovation-related factors are provided in Annex 1. We could not find any traces of systemic use of public procurement for supporting innovation in Estonia. The existing situation reveals that the current practice falls short in stimulating innovation in public procurement and that the recent years have witnessed decrease in procurement of sophisticated solutions. Even in the IT sector, which is the central area of the national science, technology and innovation policy in Estonia, the innovation-oriented public sector purchasing has been decreasing in recent years. This is in spite of the fact that large part of the IT solutions sourced for are in fact tailor-made and that there have been some truly innovative success-cases in the past (e.g. electronic ID-card and related platforms, X-road platform etc).

At this point we are in the middle of the last stage of the data-gathering exercise (i.e. interviewing) and therefore the results and conclusions reached so far are somewhat preliminary and subject to change. Based on the Estonian “no policy” policy example, one can outline the following policy-relevant conclusions:

- 1) Most of the policy shortcomings discussed in the literature so-far can be found also in the Estonian context. That includes, inter alia, limited (technology) capacity of public procurers, short-term orientation of procurement projects, misinterpretation of available procurement procedures conducive to innovation, lack of dialogue between sectors regarding future trajectories and problems with IPR allocations. This poses a serious challenge for countries trying to launch overwhelming PPfI policies (e.g. policy “for all seasons”). It is hard to expect countries to successfully jump directly from “no policy” policy to what we earlier named as policy “for all seasons”. Creating a more innovation-friendly environment while having all the problems in place at the same time assumes not just developing technical skills but an overall change in the procurement culture. But changing a public procurement culture has proven to be a very difficult task in the past: it

takes time and a lot of coordinated effort, and thus may require more of a step-by-step approach rather than one-off change in policy course. In addition, there is an inherent tension between the main public procurement goals in Europe and elsewhere (i.e. non-discrimination and free trade) and secondary goals (e.g. innovation).

- 2) Specific budgets allocated for public procurement of innovative solutions may not necessarily bring along expected effects if the institutional context is not designed to support the process. For example, in Estonia the idea of using the EU structural funds was to bring along major structural changes in the local IT industry, but as these programs were implemented via using the conventional public procurement institutions, the initial ideas were lost in and did not materialize. Thus, policy-wise, it is not only technical capacity and overall procurement culture that needs to be altered, but also there is a need for specific institutional solutions that would take into account the importance of innovation.
- 3) Understanding the existing structure of government demand for innovative solutions can give the policy-makers a key for further policy developments. It is not perhaps the best solution to start right-away with large public procurement for innovation programs, but instead to build further plans on the existing demand structure. As it came out from the Estonian case, the IT industry would be happy to respond to much more sophisticated demand than it is the case at the moment, but again, this should be done within altered institutional settings as otherwise the initial goals tend to get lost in the procurement process.

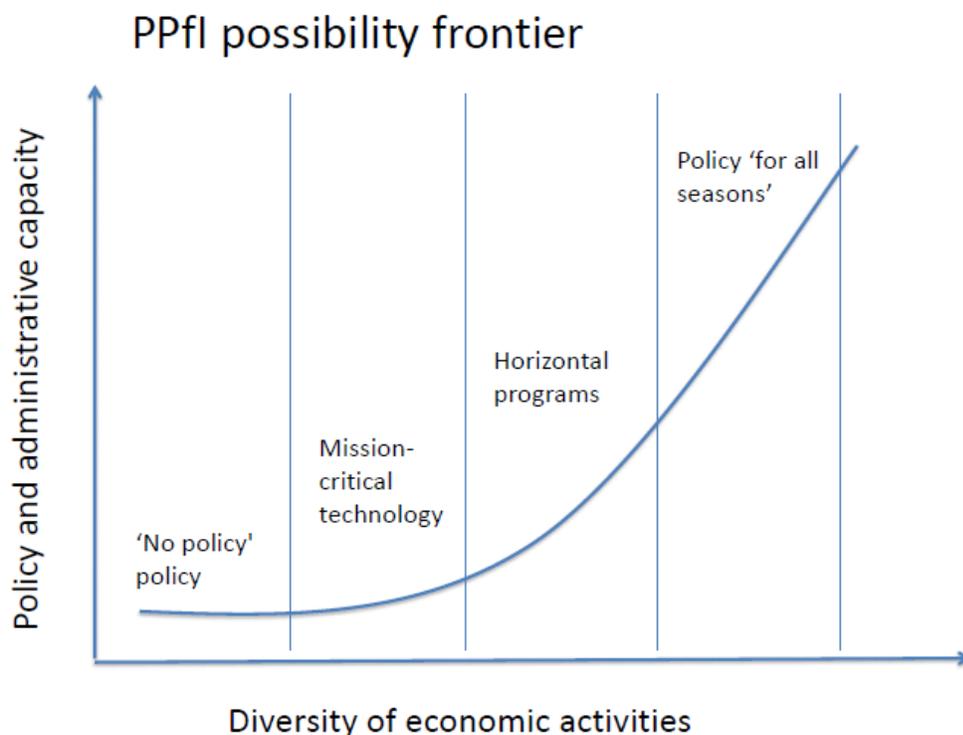
### **The future strategy**

Having described the possible policy scenarios for public procurement for innovation and taken a closer look at the Estonian case, we now sum up the possible future scenarios for “no policy” policy countries. As indicated above, Estonia as well as many other European countries share a common starting point for future policy making: whether and how to move beyond simple “no policy” policy-making and involve innovation aspect as much as possible to public procurement decisions. The challenges identified in the previous parts as well as in the Estonian case suggest that the shift can be much more difficult than often anticipated in current policy discussion. However, this is not to advise that governments should avoid developing their own approach in employing government procurement for the sake of innovation, technology and economic

development. What are needed are the policy solutions that would fit into the local context and in order to do that, one has to first understand the essence of the different PPfI policy options. We have argued in this paper that the available policy options could be found in a) ‘no policy’ policy, b) technology development programs c) horizontal programs targeting R&D intensive production d) policy ‘for all seasons’.

One could conclude – taking into account the nature of the available policy options and possible challenges – that states should first start off by experimenting with single projects in order to develop internal capacity and to get themselves acquainted with the existing international policy space (incl. legal opportunities and restrictions), which is very much internationally regulated (especially by the WTO, but also bi- and multi-lateral agreements). This would also give the governments the chance to understand which domestic economic sectors are best suited to respond to the government innovation-friendly procurement. This does not necessarily mean that contracts should be directed towards local companies, but at minimum there should be functioning markets capable of cooperating with international companies. It is only then advisable to move on to technology development programs, as after the first set of policies the government could have at least a rough idea whether the spillovers would take roots in the local market or not. The third set of measures – horizontal PPfI programs targeted at R&D – should be initiated at a point where the public sector has sufficient experiences and knowledge on the subject matter and where it is clear that the existing companies are able to implement R&D intensive projects and/or are ready to establish new markets. Although it is still questionable whether PPfI can be employed as ‘policy for all seasons’, it can become a viable policy strategy in sectors where public sector has become highly sophisticated demand creator, where markets have well know reputation of innovative activities and where there is a high level of trust between the stakeholders. This argument is summarized in the Figure 1.

Figure 1: Public procurement for innovation (PPfI) possibility frontier



Further comparative studies are needed in order to verify whether the proposed frontier would hold also empirically.

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### **References:**

- Aschoff, B. and Sofka, W. 2009. Innovation on demand – Can public procurement drive market success of innovations? *Research Policy*. 38,1235-1247.
- Arrowsmith, S. (2003). *Government Procurement in the WTO*. The Hague: Kluwer Law International.
- Block, F. (ed). 2011. State of innovation: the U.S. government's role in technology development. Boulder, CO: Paradigm Publishers
- Cabral, L., Cozzi, G., Denicoló, V., Spagnolo, G. & Zanza, M. (2006). "Procuring Innovations." In N. Dimitri, G. Piga & G. Spagnolo (Eds). *Handbook of Procurement* (pp. 483-528). Cambridge: Cambridge University Press.

- Cimoli, M et al. 2009. Institutions and policies in developing economies. In: Bengt-Åke Lundvall, K. J. Joseph, Cristina Chaminade, Jan Vang (eds.) *Handbook on Innovation Systems and Developing Countries: Building Domestic Capabilities in a Global Setting*. Edward Elgar.
- Connell, D. (2006) ‘Secrets of the World’s Largest Seed Capital Fund Centre for Business Research.’ Centre for Business Research, University of Cambridge. Cambridge: University of Cambridge.
- Dalpe, R., DeBresson, C. and Hu Xiaoping. 1992. The Public Sector as First User of Innovations, *Research Policy*, vol. 21, issue 3, pages 251-263.
- ECWG (European Commission Expert Group). (2005). *Public Procurement for Research and Innovation: Developing Procurement Practices Favourable to R&D and Innovation*. [On-line]. Available at [ec.europa.eu/invest-in-research/pdf/download\\_en/edited\\_report\\_18112005\\_on\\_public\\_procurement\\_for\\_research\\_and\\_innovation.pdf](http://ec.europa.eu/invest-in-research/pdf/download_en/edited_report_18112005_on_public_procurement_for_research_and_innovation.pdf). [Retrieved March 22, 2010].
- Edler, J. et al. 2005. Innovation and Public Procurement: Review of Issues at Stake. Study for the European Commission (No ENTR/03/24). Fraunhofer Institute Systems and Innovation Research.
- Edler, J. and L. Georghiou. 2007. “Public Procurement and Innovation: Resurrecting the Demand Side.” *Research Policy* 36, 949-963.
- Edler, J., Corvers, S., Xielin, L., 2007. Public Procurement and Innovation in China. Status Quo, Lessons from Abroad and Ways Forward. Report to the OECD. Manchester, Paris
- Edquist, C. and L. Hommen. 2000. “Public Technology Procurement and Innovation Theory.” In C. Edquist, L. Hommen and L. Tsipouri (eds). *Public Technology Procurement and Innovation*. Norwell: Kluwer Academic, 5-70.
- Edquist, C. & Hommen, L. 2008. Small country innovation systems : globalization, change and policy in Asia and Europe. Cheltenham: Edward Elgar.
- Euractive. 2010. <http://www.euractiv.com/en/enterprise-jobs/innovation-hampered-risk-averse-public-authorities-news-373313>
- European Commission. 2010a. Public Procurement Indicators 2009. Available at: [http://ec.europa.eu/internal\\_market/publicprocurement/docs/indicators2009\\_en.pdf](http://ec.europa.eu/internal_market/publicprocurement/docs/indicators2009_en.pdf).
- European Commission. 2010b. *Europe 2020. A European Strategy for Smart, Sustainable and Inclusive Growth*. [On-line]. Available at <http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-20EN%20version.pdf> [Retrieved May 28, 2010].
- European Commission. 2011. Green Paper on the modernisation of EU public procurement policy Towards a more efficient European Procurement Market. Available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:DKEY=556316:EN:NOT>
- Evenett, S. J. (2002). “Multilateral Disciplines and Government Procurement” In B. M. Hoekman, A. Mattoo & P. English (Eds.). *Development, Trade and the WTO: A Handbook* (pp. 417-427). Washington, DC: The World Bank.

- Evenett, S. J. & Hoekman, B. M. (2005). "Government Procurement: Market Access, Transparency, and Multilateral Trade Rules." *European Journal of Political Economy*, 21 (1): 163-183.
- Freeman, C. & Lundvall, B.-Å. 1988. *Small countries facing the technological revolution*. London ; New York: Pinter.
- Geroski, P. A. 1990. Procurement Policy as a Tool of Industrial Policy, *International Review of Applied Economics*, 4 (2), pp. 182–198.
- Greve, C. 2007. *Contracting for Public Services*. London: Routledge.
- Hodge, G.A. 2000. *Privatization: An International Review of Performance*. Boulder CO: Westview Press.
- Kalvet, T. (Forthcoming 2012). Innovation: a factor explaining e-government success in Estonia. *Electronic Government, an International Journal*, 9(1).
- Kattel, R., Kalvet, T. & T. Randma-Liiv. 2010. Small States and Innovation. In Steinmetz, R. & A. Wivel, editors, *Small States in Europe : Challenges and Opportunities*. Aldershot, England: Ashgate.
- Kattel, R. and Lember, V. 2010. "Public Procurement as an Industrial Policy Tool – an Option for Developing Countries?" *Journal of Public Procurement*, 10(3), 368 - 404.
- Lember, V., Kalvet, T. & Kattel, R. (2011). "Urban Competitiveness and Public Procurement for Innovation." *Urban Studies*, 48(7) 1373–1395
- Lerner, J. 2008. The Government as Venture Capitalist: The Long-Run Impact of the SBIR Program', *Journal of Business*, 72 (3), 285-318.
- Lowenthal, D., 1987. "Social Features". In C. Clarke and T. Payne (eds.), *Politics, Security and Development in Small States*. London: Allen & Unwin, pp. 26–49.
- Mahler, J. 2011. Agency Autonomy and Contracting: NASA and the Aerospace Industry. Paper prepared for the 2011 Meetings of the Public Management Research Association June 2-4, Maxwell School of Public Service, Syracuse University, Syracuse, NY.
- Nelson, R. R. 1987. Roles of Government in a mixed economy. *Journal of Policy Analysis and Management* 6(4), 541-566.
- OECD (Organisation for Economic Co-operation and Development). (2008). *OECD reviews of innovation policy: China*. Paris, France: OECD Publishing.
- OECD (Organisation for Economic Co-operation and Development). (2009a). *OECD Reviews of Innovation Policy: Korea*. Paris, France: OECD Publishing.
- OECD (Organisation for Economic Co-operation and Development). (2009b). *OECD Reviews of Innovation Policy: Mexico*. Paris, France: OECD Publishing.
- OMC-PTP. 2009. Exploring Public Procurement as a Strategic Innovation Policy Mix Instrument. Available at: [http://www.technopolis-group.com/resources/downloads/reports/public\\_procurement.pdf](http://www.technopolis-group.com/resources/downloads/reports/public_procurement.pdf) (01.09.2011)
- Palmberg, C. and O. Martikainen. 2005). The GSM standard and Nokia as an incubating entrant, *Innovation: Management, Policy & Practice*, 7(1), 61–78.

- Perez, C., 2002. *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages*. Cheltenham: Elgar.
- Perez, C., 2006. “Respecialisation and the Deployment of the ICT Paradigm: An Essay on the Present Challenges of Globalization”. In R. Compañó, C. Pascu, A. Bianchi, J-C. Burgelman, S. Barrios, M. Ulbrich, I. Maghiros (eds.), *The Future of the Information Society in Europe: Contributions to the Debate*. Seville, Spain: European Commission, Directorate General Joint Research Centre.
- Pollitt, C. and G. Bouckaert, 2004. *Public Management Reform: A Comparative Analysis*, 2nd edition. Oxford: Oxford University Press.
- Randma, T., 2001. “A Small Civil Service in Transition: The Case of Estonia.” *Public Administration and Development* 21: 41–51.
- Randma-Liiv, T., 2002. “Small States and Bureaucracy: Challenges for Public Administration”, *Trames* 6(4): 374–389.
- Reinert, E. S. (2007). *How Rich Countries Got Rich and Why Poor Countries Stay Poor*. London: Constable & Robinson.
- Richards, J., 1982. “Politics in Small Independent Communities: Conflict or Consensus?” *Journal of Commonwealth and Comparative Politics* 20(2): 155–171.
- Robinson, E. A. G. (ed.), 1963. *Economic Consequences of the Size of Nations*. : London: Macmillan.
- Rolfstam, M. (2009). “Public Procurement as an Innovation Policy Tool: The Role of Institutions.” *Science and Public Policy*, 36 (5): 349-360.
- Rothwell, R. and Zegveld, W. 1982. *Industrial Innovation and Public Policy. Preparing for the 1980s and the 1990s*. London: Frances Pinter.
- Rothwell, R. (1984). “Creating a Regional Innovation-Oriented Infrastructure: The Role of Public Procurement.” *Annals of Public & Cooperative Economics*, 55 (2): 159-172.
- Ruttan, V. W. (2006). *Is War Necessary for Economic Growth? Military Procurement and Technology Development*. New York: Oxford University Press.
- Soete, L. 2007. “From Industrial to Innovation Policy”. *Journal of Industry, Competition and Trade* 7, 273–284.
- Stiglitz, J. E. & Wallsten, S. J. (1999). “Public-Private Technology Partnerships: Promises and Pitfalls.” *American Behavioral Scientist*, 43 (1): 35-51.
- Trionfetti, F. (2000). “Discriminatory Public Procurement and International Trade.” *The World Economy*, 23 (1): 57-76.
- Uyarra, E. & Flanagan, K. (2009). “Understanding the Innovation Impacts of Public Procurement.” *European Planning Studies*, 18 (1): 123-145.
- Walsh, V., 1988. “Technology and Competitiveness of Small Countries: A Review”. In Freeman, C., and B-Å Lundvall (eds.), *Small Countries Facing Technological Revolution*. London: Pinter, pp. 37–66.

Williams, R. and Smellie, R. 1985. "Public Purchasing: An Administrative Cinderella." *Public Administration* 63 (2), 23-39.

## Annex 1: Main characteristics of public procurement and innovation in Estonia

Table 2: Total value of public procurement market in EU and EE in 2009 (BEUR)

	National PP register	TED	ESA 95
EU	-	420,44	2 288,44
Estonia	3,2 (1,37*)	1,15	2,6

\* - without contracts awarded by the Estonian Health Insurance Fund. These are long-term contracts, where actual payments are done over years

Sources: ESA, Estonian Public Procurement Register and authors' own calculations. National Account is based on data from ESA (European System of Accounts) 95, published in "Public Procurement Indicators 2009" by EC (2010), available at [http://ec.europa.eu/internal\\_market/publicprocurement/docs/indicators2009\\_en.pdf](http://ec.europa.eu/internal_market/publicprocurement/docs/indicators2009_en.pdf). National public procurement data is based on the Estonian Public Procurement Register (<https://riigihanked.riik.ee/lr1/web/guest/index>), published in "Statistiline ülevaade 2009" ["Statistical Overview 2009"], available at <https://riigihanked.riik.ee/lr1/web/guest/statistilised-ulevaated>.

Table 3: Share of public procurement to GDP in EU and EE 2009

	National PP register	TED	ESA 95
EU	-	3,6%	19,4%
Estonia	23% (9,9%*)	8,4%	19,0%

\* - GDP 2009 MEUR 13 860.8 (stat.ee)

Sources: ibid.

Table 3: Share of contracts won by R&D organizations in total public procurement in Estonia 2007-2010

	2007	2008	2009	2010
R&D organizations (incl. health care contracts)	2,53%	2,72%	0,55%	0,61%
R&D organizations (excl. health care contracts)	2,53%	2,91%	1,31%	0,78%

Source: Estonian Public Procurement Register, authors' own calculations