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## **Functional procurement for innovation, welfare and the environment: a mission-oriented approach**

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# Functional procurement for innovation, welfare and the environment: a mission-oriented approach

Charles Edquist, Jon Mikel Zabala-Iturriagagoitia

**Abstract:** Public procurement represents a very large share of most economies worldwide. Besides its direct purchasing power, public procurement has an enormous potential to become one of the most important mission-oriented policy instruments in the context of the Sustainable Development Goals. The paper argues that the key to achieve more innovations when pursuing public procurement is to describe problems to be solved or functions to be fulfilled (functional procurement) instead of describing the products to be bought (product procurement). We contend that if products can be described in the procurement documents, it is because they exist, and hence, they cannot be regarded as innovations. Innovations cannot be described *ex ante*, simply because they do not exist. It is thus not accurate to talk about 'innovation procurement'. Accordingly, the only way to achieve an innovation by means of procurement is by describing the functions it shall fulfill or the problems it shall solve. For public procurement to become an effective policy instrument supporting innovation, product procurement should thus be transformed into functional procurement. Hence, contracting authorities need to identify the problems to be addressed by policy. The new products (innovations) solving the problems are to be designed by the potential innovators/suppliers, not by public procurers. Hence, the societal needs and problems must be translated and transformed into functional requirements. Functional procurement is allowed in EU regulations, and hence, there are no legal obstacles to use it for innovation policy purposes. Above and beyond, the European directives recommend using functional requirements "as widely as possible". Besides, it leads to increased competition, not only among potential suppliers of similar products, but also among different products that solve the same problem. Functional procurement thus not only supports innovation but also serves as a powerful instrument of competition policy.

**Keywords:** innovation policy; public procurement; product procurement, functional procurement; functional requirements; competition policy

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## **Abstract**

Public procurement represents a very large share of most economies worldwide. Besides its direct purchasing power, public procurement has an enormous potential to become one of the most important mission-oriented policy instruments in the context of the Sustainable Development Goals.

The paper argues that the key to achieve more innovations when pursuing public procurement is to describe problems to be solved or functions to be fulfilled (functional procurement) instead of describing the products to be bought (product procurement). We contend that if products can be described in the procurement documents, it is because they exist, and hence, they cannot be regarded as innovations. Innovations cannot be described ex ante, simply because they do not exist. It is thus not accurate to talk about 'innovation procurement'. Accordingly, the only way to achieve an innovation by means of procurement is by describing the functions it shall fulfill or the problems it shall solve. For public procurement to become an effective policy instrument supporting innovation, product procurement should thus be transformed into functional procurement.

Hence, contracting authorities need to identify the problems to be addressed by policy. The new products (innovations) solving the problems are to be designed by the potential innovators/suppliers, not by public procurers. Hence, the societal needs and problems must be translated and transformed into functional requirements.

Functional procurement is allowed in EU regulations, and hence, there are no legal obstacles to use it for innovation policy purposes. Above and beyond, the European directives recommend using functional requirements "as widely as possible". Besides, it leads to increased competition, not only among potential suppliers of similar products, but also among different products that solve the same problem. Functional procurement thus not only supports innovation but also serves as a powerful instrument of competition policy.

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## **Highlights**

- To support innovation through public procurement, functional requirements should be used.
- Functional public procurement is a transformative policy instrument (i.e. a game changer).
- It is not accurate to talk about 'innovation procurement'.
- There are no legal obstacles to use functional procurement in the EU regulations.
- Functional procurement not only supports innovation but also enhances competition.

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## **1. Introduction**

Grand challenge mitigation is framing many innovation policies and strategies worldwide (Mazzucato, 2018). Edquist and Zabala-Iturriagoitia (2012) introduced public procurement as a relevant and potentially very powerful “mission-oriented policy” instrument aiding in grand societal challenge mitigation. According to the results of the ERAC consultation (European Union, 2015), the estimations of public procurement expenditures on works, goods and services were close to €2.3 trillion per year in the EU, equaling 19.4% of European GDP (see also Kahlenborn et al., 2010).<sup>1</sup> Public procurement thus represents a very large part of the EU economy and the economies of many countries around the world.<sup>2</sup>

However, the share of the whole procurement spending used to stimulate innovation remains insignificant, even if no comprehensive statistics exist as to date about this (Edquist, 2017). Innovation-related procurement is now acknowledged as a relevant policy instrument, particularly as a mission-oriented innovation policy instrument related to grand challenge mitigation. In spite of this general context, in terms of its implementation and the mechanisms for its effective rolling out, it is still at its infancy (Uyarra et al., 2020). This is related to the discussions that are increasingly taking place in the academic realm as to the need to address the “implementation” of innovation policies (see Howlett, 2018).<sup>3</sup>

The purpose of this paper is to analyze how public procurement can enable and be a driving force for innovations, which in turn can increase welfare as well as improve the environment. Hence, the paper is about public procurement that requires or facilitates innovations. We will accordingly not deal with *product procurement*<sup>4</sup>, namely the kind of public procurement where one describes and buys existing and well-known products (which are obviously not innovations). Still, product procurement constitutes the largest volume of all procurement spending.

In this paper we will only address public procurement for which the EU procurement directives are applicable, i.e. works, goods or services (Directive 2014/24/EU of 26 February 2014).<sup>5</sup> There are other kinds of public procurement (e.g. Pre-Commercial Procurement - PCP), which are related to the public procurement of research results (see Edquist and Zabala-Iturriagoitia, 2015). We will not deal with this form of public procurement in this paper, since it is based on an exemption from EU procurement directives. Neither will we discuss the procurement of what is unclearly called “innovative solutions”. Hence, we will stick to analyzing how public procurement can enhance “innovations” as defined in Section 2.

From our point of view, an important task is to distinguish between procurement that leads to, or can lead to, innovations from such procurement that does not lead to innovations, or even prevents them. We will argue that the most important way of achieving more innovations when pursuing public procurement is to conduct *functional procurement* (i.e. formulate functional requirements in the procurement documentation).

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<sup>1</sup> According to the data provided by the Tenders Electronics Daily €420 bn is procured per year in the EU: <https://ted.europa.eu/TED/main/HomePage.do>.

<sup>2</sup> For example, in Sweden public procurement accounts for 17.5 % of GDP (Swedish Competition Authority and Swedish Public Procurement Agency, 2018), which is as large as the value of all industrial production.

<sup>3</sup> A ten-page sketch of a plan of action for implementation of functional procurement is included in section 5.6 in (Edquist, 2019b), in Swedish. This sketch is being developed into a detailed plan of action in a separate project during 2020 and 2021.

<sup>4</sup> Product procurement encompasses the purchasing of both goods and services, and is sometimes called traditional or regular procurement.

<sup>5</sup> Directive 2014/25/EU of 26 February 2014 deals with “procurement by entities operating in the water, energy, transport and postal services sectors”.

[https://translate.googleusercontent.com/translate\\_f - ftn2](https://translate.googleusercontent.com/translate_f-ftn2) Therefore, emphasis will here be put on functional procurement. An important and related issue to be discussed is also how *product procurement* can be converted into *functional procurement* in order to enhance innovations.

Innovations can lead to the creation of social and environmental problems, but they also have the potential to solve problems and mitigate global challenges in the same categories. They can both destroy and create jobs, lead to dirty as well as green GDP growth. Innovations can increase productivity through a more efficient use of resources, and contribute to increased competition, not only between different suppliers of similar products, but also between radically different products designed to solve the same problem.

Whether the effects of innovations become negative or positive depends on the *goals*<sup>6</sup> set up for public procurement, for innovation development and for innovation policy, and whether or not they are being met. This relates to the discussion about the role that innovation plays in economic and societal transformation and transformative innovation policy (Schot and Steinmueller, 2018; Fagerberg, 2018). This discussion, however, is beyond the purposes of this paper, and scholars such as Strumsky et al. (2010), Fragkandreas (2013) or Crafts (2018) have dealt at length with it.

## **2. Basic concepts - and some remarks on their emergence**

In order to move forward, we should make clear what we mean by, for example, “innovations”, “public procurement” and “procurement documents”. *Innovations* are defined here as new creations of economic or societal significance, which are usually implemented by companies.<sup>7</sup> Innovations can be new or improved products or processes. New products (i.e. *product innovations*, which provide new qualities) may be tangible goods or non-material (i.e. intangible) services; it is a matter of *what* is produced.<sup>8</sup> New processes (i.e. *process innovations*) can be technological or organizational, it is a matter of *how the* products are created, provided or manufactured.<sup>9</sup> In all cases, it is of great importance that these new creations do not become innovations until they have been substantially commercialized or otherwise disseminated to a significant extent in society. Developing a prototype or a test series is not enough for something new (a new creation) to qualify as an innovation.

*Public procurement* has to do with demand and happens when a contracting public organization (i.e. authority, entity), which can be national, regional, local or international, buys a product (i.e. a good or a service, or a combination of such as a system). It must also be included in the contract that a certain number of units of the product is delivered and will be paid by the contracting authority.

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<sup>6</sup> The goals of innovation policy are politically determined. For a discussion, see Edquist (2014, 2017, 2019a) and Borrás and Edquist (2019).

<sup>7</sup> This definition of innovation is based on the Oslo Manual (OECD/Eurostat, 2018: 20), according to which “a new or improved product or process (or combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)”.

<sup>8</sup> It is a common misconception that products are the same as material goods. But it is important to emphasize that the term also includes intangible services.

<sup>9</sup> Process innovations have been product innovations in a previous “incarnation”. For example, an industrial robot is first sold as a product innovation and then used as a process innovation by the buyer. This is an explanation of why we are talking here mainly about new products rather than about new processes as a possible result of functional procurement.



As the European Directive 2014/24/EU of 26 February 2014 on public procurement states, a *procurement document* “means any document produced or referred to by the contracting authority to describe or determine elements of the procurement or the procedure” (European Union, 2014: L 94/97). Besides, the procurement documents should include “the contract notice, the prior information notice where it is used as a means of calling for competition, the technical specifications, the descriptive document, proposed conditions of contract, formats for the presentation of documents by candidates and tenderers, information on generally applicable obligations and any additional documents” (ibid). The information provided in the procurement documents must be sufficient for a supplier to be able to assess the nature and scope of the procurement, and thus be able to decide whether to apply for participation in the procedure (ibid: L 94/111).

In most procurement documents there are different types of detailed requirements that can, for example, be related to information security, delivery aspects, etc. The most important part of the majority of all procurements is based on documents that also contain a description of an existing product that the corresponding public organization wants to buy. Often this description is quite – or even very – detailed (see Edquist et al., 2000 for some examples). When such a product description is included, the term “*product procurement*” is used in this paper.

There may also be requirements in terms of functions. Hence, functional requirements is an alternative to product descriptions. However, this is relatively uncommon. If so, it is often a mixture of product descriptions and functional descriptions. However, there are no systematic statistics on how this looks in detail to date. One must study individual procurement documents to obtain such data. It is important that such investigations are done. If product descriptions and functional descriptions are included in the same procurement, the evaluation of the tenders may become complicated – if the relation between the two is not made explicit.<sup>10</sup>

If an existing product is described in a detailed way in the procurement documentation (i.e. product procurement), then potential suppliers will try to provide exactly such a product. You simply get the products you describe, even if these may be obsolete, meaning that a better alternative that the public procurer is not aware of may already exist in the marketplace. Of course, such product specification will not result in new products (i.e. innovations). And in evaluating such procurements, price will be the dominant criterion when deciding from whom to buy.

For many decades, researchers, policymakers and procurers have used, and still use, such terms as innovation procurement, innovative procurement, public procurement of innovation (PPI), and the like. The reason has probably been that they have been interested in creating innovations as a result of public procurement in order to mitigate the social challenges faced by municipalities, regional and national state authorities. For example, in Sweden the term innovation procurement is used by the National Procurement Agency and VINNOVA (i.e. the Swedish national innovation agency). Many other public agencies worldwide also use similar labels to refer to this type of innovation-related procurement.

Just like other scholars, we have, in previous work, also ourselves argued that innovations can be achieved through public procurement by describing products that do not exist (Edquist et al. 2000, 2015; Edquist and Zabala-Iturriagoitia, 2012, 2015), and which would therefore become innovations if they were developed. Our further reflections have however led us to conclude that this is indeed an impossibility, and that the term *innovation procurement*, as well

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<sup>10</sup> See Section 5.

as the previous similar concepts, is therefore inappropriate.<sup>11</sup> However, one can try to achieve innovations through the deployment of procurement in other ways than by describing innovations (i.e. products that do not exist). Discussing how this can happen is, as already mentioned, the main purpose of this paper.

If products can be described in the procurement documents, it is because they exist, and hence, they cannot be regarded as innovations. Innovations cannot be described *ex ante*. We would like here to make a reference to the philosopher Karl Popper's pointing out that we cannot predict future knowledge (1957). Anyone who claims to be able to correctly describe and predict certain future knowledge, actually claims to already have this knowledge – although it does not exist. This is a contradiction.<sup>12</sup> What applies to knowledge in a general sense also applies to innovations. Thus, product procurement, generally, cannot lead to innovations.

Of course, the procuring entity wants to buy products in order to *use* them for some particular objective or purpose. In other words, with the help of the product, public organizations usually want to achieve a goal or a mission, solve a problem, or have a function fulfilled. And this is done in the interest of citizens. An alternative to product procurement is that the procuring organization describes these problems, missions and functions in the procurement documents. When such a description exists, we use the term “*functional procurement*” in this paper. *Functional procurement is when a public agency buys products that perform functions that provide solutions to problems.*

As mentioned earlier, the expected result of public procurement is to solve societal problems, satisfy human needs, or be able to respond to and hence meet (global) challenges. These goals can often be achieved through product procurement (i.e. using product specifications), but such specifications exclude the development of new products as a result of the procurement. Because these products do not exist, they cannot be described.

However, functional procurement (i.e. functional specifications) opens for innovations, so these can emerge as a result of the procurement process. A new product that did not exist at the outset of the procurement could be the result. Naturally, existing products could also outcompete the newly developed innovations, and be finally selected by the public procurer – if they provide a higher degree of satisfaction of the purpose of the procurement. Thus, the product is not, as such, the goal of the procurement, but rather a means to achieve the goals intended with it, let them be solving societal problems, satisfying human needs, or meeting (global) challenges (Diercks et al., 2019; van den Hove et al., 2012). Obviously, this does not imply that all problems/needs can be solved/satisfied through public procurement. Of course, many social problems instead require social and political solutions (e.g. gender equality, social justice).

In the case of functional procurement, the procuring organization specifies *what is* to be achieved rather than *how* (i.e. with the aid of which product, method, technology, language processing, programming code, etc. it should be done). Functional procurement *can lead to innovation*. It can lead to new products (innovations) developed in the procurement process,

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<sup>11</sup> An interesting point in this context, is that the term “innovation procurement” is *not at all* found in the Swedish Procurement Act, which follows the EU procurement regulations and is therefore similar to procurement laws in all EU Member States. Directive 2014/24/EU on public procurement only uses the term “innovation procurement” to indicate that “the important differences between individual sectors and markets, it would however not be appropriate to set general mandatory requirements for environmental, social and innovation procurement” (Recital 95) and that “In order to fully exploit the potential of public procurement to achieve the objectives of the Europe 2020 strategy for smart, sustainable and inclusive growth, environmental, social and innovation procurement will also have to play its part” (Recital 123).

<sup>12</sup> Popper's real interest was to prove that “for strictly logical reasons it is impossible for us to predict the course of history” (1957: ix).

and hence, it *opens* for innovation. However, functional procurement does not necessarily require the development of innovations. What distinguishes functional procurement is that the expected result is described as a function that must be fulfilled through the procurement.

The arguments above have led us to the view that, from an innovation perspective, there are reasons to talk about – that is, to construct or create – two main types of public procurement:<sup>13</sup>

1. Procurement based on *product specifications (product procurement)* is when a public organization describes the products that they want to buy.
2. Procurement based on *functional specifications (functional procurement)* is when a public organization describes problems/functions/needs that must be solved/fulfilled/met through the procurement and use of products.

The difference between these two types of public procurement is thus the *way* in which the procurement is advertised (i.e. how the procurement documents are formulated) and how the procurement process is carried out. Although we used other categories and conceptualizations in previous work, after two decades of analysis of the area of public procurement and innovation, we have now come to the conclusion that product procurement and functional procurement are the only two main categories needed to understand the dynamics between procurement and innovation. These two main categories are both simple and effective for such purposes. They are also sufficient if one wants to pursue a procurement policy that leads to innovations. This is done by transforming product procurement into functional procurement.<sup>14</sup>

We and others have developed, over the years, different procurement taxonomies (e.g. Edquist et al., 2000, 2015; Edler and Georghiou, 2007; Hommen and Rolfstam, 2009; Uyarra and Flanagan, 2010; Rolfstam, 2013; Timmermans and Zabala-Iturriagoitia, 2013; Georghiou et al., 2014; Knuttsson and Thomasson, 2014; Lember et al., 2014; Obwegeser and Müller, 2018; Edquist and Zabala-Iturriagoitia, 2012, 2015; Edquist, 2019b; Uyarra et al., 2020). The development of this new – and very simple, but purposeful – typology means that we have fundamentally changed our view of the categories and concepts needed to understand and explain the relationships between public procurement and innovation. It has also changed our view of how one should conduct policy and practical procurement activities in the area.

The remainder of the paper is structured as follows. In Section 3 we will discuss the differences between product procurement, ‘innovation procurement’ and functional procurement and how these phenomena relate to each other. We will also address the question of which kinds of procurement enhance innovation. Section 4 shows that functional procurement is allowed, and even encouraged by EU regulations if the purpose is to enhance innovations. It also discusses how product procurement can be transformed into functional procurement, so that public procurement can become a demand-side policy instrument that effectively promotes innovation. Section 5 discusses conclusions and policy implications and provides a summary of the paper.

### **3. Which kinds of public procurement promote innovation?**

In this section we will discuss more in detail what we mean by product procurement, ‘innovation procurement’ and functional procurement and how these phenomena relate to each other and to innovation processes.

#### **3.1. Product Procurement**

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<sup>13</sup> Czarnitzki et al. (2018) also differentiate between innovative and regular procurement contracts.

<sup>14</sup> See Section 3.

In product procurement, the contracting authority buys existing products (i.e. “off the shelf”, as we have ourselves claimed in other contributions), and hence, it does not require any innovations from tenderers and potential suppliers. Simply describing previously procured products makes it difficult, or impossible, for new products (innovations) to be accepted.

As we argued in Section 1, the contracting authority simply gets what is described in the procurement documents.<sup>15</sup> And if they can be described by the procuring organization, they are not innovations, but existing products. You get what you order, even if it is an obsolete product. As a result, qualitatively superior products will be excluded in the procurement process, as argued in Section 2. Innovations will thus not result out of product procurement, except in exceptional cases.

### 3.2. “Innovation Procurement”

During the last decades of the 20th century, some of us began to argue that public procurement should increasingly lead to technological development and ultimately, to innovation (Edquist et al., 2000).<sup>16</sup> This was due to the fact that innovations are an extremely important factor for the development of the economy and the society, and because innovation and public procurement account for such a large part of the economy (see Section 1). It was thus natural to talk about ‘innovation procurement’. That term usually meant public procurement that necessarily led to innovations and that this was achieved by describing innovations (new products) - although the latter was often only implicit. We also began to empirically study examples of public procurement that led to innovations (e.g. Edquist et al., 2000).

The basic rationale behind this idea was that a new product (i.e. an innovation) was the goal and hence, it should be the result of the so-called “innovation procurement”. Innovation procurement, or PPI, as we have referred to in previous contributions (Edquist and Zabala-Iturriagagoitia, 2012; Edquist et al., 2015) is a concept often used to capture when demand from public organizations is used to enhance innovation. Some of the main rationales for using public procurement to promote innovation include the following (Chicot and Matt, 2018):

- Creating markets to fulfil (agency) missions and/or needs;
- Speed up public sector modernization: improving the effectiveness and efficiency of public services;
- Promoting and diffusing innovations to existing private agents;
- Signaling the demand for certain technologies/products;
- Demonstrating the value of innovations to other users, producers;
- Strengthening key suppliers, providing new knowledge and capabilities that will be useful to them in the future, potentially breaking path dependencies and avoiding lock-in situations;
- Adopting/using cost-saving innovations;
- Incentivizing industry to invest in innovation, with potential substantial spillover effects (e.g. internationalization of local firms to inter-regional markets).

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<sup>15</sup> Of course, contracting authorities do not always aim to promote innovation in their public procurements. Product procurement can thus be used when purchasing, for example, staple goods such as toilet paper.

<sup>16</sup> Terms used at that time were “technological development” and “technical change”. Later we started to talk about “innovations” in a more general sense, which we defined in Section 1.

- Create growth and jobs in Europe (i.e. help innovators bring European R&D to the market)

However, few of us realized that, in a procurement document, it is simply not possible to describe *ex ante* something that does not exist, as Popper argued (see Section 2). The insight is that it is on problems or functions, which can be described, that procurement documents need to focus. This is what is referred to here as *functional specifications*.

Therefore, innovation procurement should mean *when a public organization places an order for the fulfillment of certain functions within a reasonable period of time, by delivering a new product (product, service or system) that does not exist at the time of the order*. Innovation procurement should hence focus on functions that satisfy human needs or solve social problems (Edquist and Zabala-Iturriagagoitia, 2012), and not on stimulating the development of new products *per se* (Edquist, 2014: 15). As earlier discussed, the product is just the means to achieve the function/need/mission. Innovation procurement thus *requires* a functional description. If these functional descriptions exclude existing products, the procurement leads to an innovation, or it may also lead to a failure in case no innovations result out of the procurement process. In turn, if the functional descriptions allow for the inclusion of already existing products, either the existing *or* the new products can be procured.

In (Edquist, 2017: 3) we also discussed why *all* procurement that leads to innovations must be based on a functional specification, and that product procurement does not lead to innovations. Achieving innovations through procurement is therefore primarily a matter of transforming product procurement into functional procurement (i.e. increasing the proportion of functional procurement in the total procurement).

In one part of the European Commission (DG CONNECT), PPI and PCP are emphasized as relevant instruments supporting “innovation procurement” within the H2020 programme. “Innovation procurement” is also highlighted by the OECD (OECD, 2016). PPI and PCP are used to fund “innovation procurements” in fields such as health, security, energy, transport, satellite and research infrastructures, For example, in 2016, PCP and PPI actions managed by DG CONNECT amounted to about €40M, in 2017 to €34M. In turn, the budget for innovation procurements (PCP+PPI) in the 2018-2020 Horizon 2020 programme was expected to surpass the €12M (i.e. €3,7M in 2018, €9,5M in 2019, and €9,5M in 2020). In this paper we have argued that it is not accurate to talk about “innovation procurement”.

According to DG CONNECT, PCP “addresses the development and testing of innovative solutions”, while PPI “focuses on the deployment of innovative solutions”.<sup>17</sup>In Section 1, we saw that public procurement are expenditures on “works, goods and services”. In section 2, we defined innovation following the Oslo Manual. “Innovative solutions” is a much more vague concept than “innovation” and it does not exist at all in the Oslo Manual.

As we shall see in Section 5, functional procurement is strongly stressed in another part of the European Commission, i.e. in DG GROW, where the regulations (the legislative framework) for public procurement are formulated. It is surprising to observe this lack of conceptual clarity and this conceptual inconsistency between different parts of the same organization, particularly when it is an organization with so much policy influence as the European Commission. The Commission talks with two different tongues (i.e. one supporting “innovation procurement” and the other supporting functional procurement).

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<sup>17</sup> See: <https://ec.europa.eu/digital-single-market/en/news/1185m-euros-new-eu-funding-innovation-procurements>

### 3.3. Functional procurement

As already introduced, *functional procurement is when a public agency buys products that perform functions that provide solutions to problems.*<sup>18</sup> Hence, this form of public procurement should not describe the product that is to perform the function (product specifications), but rather describe the problem or need (functional specifications) to be solved/satisfied. Product procurement can only exceptionally lead to the development of innovations. In principle, functional procurement opens all procurements for the development of new and better products.

In functional procurement, a public agency specifies what is to be achieved rather than how it is to be achieved. It is a matter of the way a procurement call is set up and the procurement documentation is formulated. Problems are accurately identified, translated into functions and presented as requirements in terms that suppliers can respond to. A functional tender thus requires a process by which the problem or need is identified, accurately specified and through which potential suppliers are informed and engaged prior to the formal (functional) tender.

Functional procurement is innovation-enhancing in the sense that it opens for innovation but does not require it. However, it does not necessarily have to lead to innovations, if the functional description includes existing products (more on this below). What characterizes functional procurement is that the expected result is described as a function that must be fulfilled through the procurement.

Defining functional specifications rather than traditional descriptions of product/process characteristics is key to support innovation through public procurement. Innovations may, of course, sometimes occur in regular product procurement, even if it was not a requirement of the procurement – if the product description is generic enough to include innovations (better products) that emerge anyway. One of the roles of innovation policy is, however, to create conditions and incentives for the systematic emergence and development of innovations that help address and respond to socioeconomic and environmental needs (Metcalf, 1995; Palmberg, 2006), both in present times and in the future. Innovations may be very much facilitated by functional specifications, as compared to product specifications. To achieve innovation through public procurement it is, somewhat paradoxically, more important to emphasize functional specification than to try to pursue “innovation procurement”. Functional specifications open for innovations in all types of public procurements (e.g. green procurement).

Following the previous discussion, we argue that the category functional procurement can in turn be further divided into two subgroups:

- A. Functional procurement where the functional specification includes existing products.
- B. Functional procurement where the functional specification does not include existing products.

The difference between A and B lies in how broad or comprehensive the functional specifications are. The functional specifications used in Type A can, of course, result in the continued procurement of existing products, if no better or cheaper products (innovations) are developed and offered. However, it does not exclude the development of innovations, since functional specifications are based on a problem that shall be solved or a need to be satisfied. If the new products perform the functions required to solve the problems described better than the old product, then they should be chosen by the public procurer. This implies that type A

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<sup>18</sup> The perspective on functional procurement has been developed in Edquist (2014, 2015, 2017, 2019b) and Edquist et al. (2018).

functional procurement requires comparing the different solutions to the same problem when evaluating tenders. (Edler et al., 2005; Tysseland, 2008).

An important argument for including existing products in the functional specifications is that the risk of failure of the procurement is almost non-existent. If no new products are developed, or if the new products do not outperform the existing ones, then the old product can always be purchased. Since an innovation is not required in this first type of functional procurement, the risk of failure is smaller in the sense that the lack of achieving an innovation is not required. The risk is also smaller in the sense that the pre-existing product can always be procured.

Type B specifications are based on functional specifications that require a new and better product to be developed to fulfill the function or solve the problem before delivery can take place. An alternative, however, is that the procurement completely fails because no new product that meets the specification is developed. The exclusion of existing products in the functional description may be because there are no such products at all, as the procurement has been oriented to fulfill a need or solve a problem not addressed before. Another reason for excluding existing products may be that more advanced products than those currently available in the marketplace are absolutely required, due to the negative impact of old products, for example, on the environment. For example, you can exclude old refrigerators by requiring in the functional description that energy consumption should be half compared to existing products and that no freon should be used due to its negative environmental impact. So did the Swedish Energy Authority in the 1990s (see Edquist et al., 2000). Such requirements are not product descriptions, but functional requirements.

Functional descriptions can be narrow or broad also in other respects than to exclude/include old products. Here the regulations impose certain requirements: “The design of the procurement shall not be made with the intention of excluding it from the scope of this Directive or of artificially narrowing competition. Competition shall be considered to be artificially narrowed where the design of the procurement is made with the intention of unduly favouring or disadvantaging certain economic operators” (European Union, 2014: L 94/106). The type of specifications used in the call “shall not refer to a specific make or source, or a particular process which characterises the products or services provided by a specific economic operator, or to trade marks, patents, types or a specific origin or production with the effect of favouring or eliminating certain undertakings or certain products. Such reference shall be permitted on an exceptional basis, where a sufficiently precise and intelligible description of the subject-matter of the contract... is not possible. Such reference shall be accompanied by the words ‘or equivalent’” (ibid: L 94/121).

An important digression is justified here: Product specifications must not be formulated in such a way that competition is hampered. The best way to possibly avoid this is to use functional specifications, as a function can often be fulfilled by several different alternatives. We return to this question in Section 5.

If a very narrow functional description is used, “unexpected” innovations that come from unpredicted directions or new areas of research would be excluded. The procuring organization cannot predict where innovations may emerge from. Neither can they define what the innovations may look like or what characteristics they may have. Therefore, working with broad and generic functional descriptions should be encouraged. However, they cannot be too abstract either. Further analyses are required here to arrive at some kind of optimal “breadth” of functional descriptions. Furthermore, there must be an “interface” between product descriptions and functional descriptions. It is a central task to investigate this in further research.

We would like to reiterate that this requires an analytical distinction between product descriptions and functional descriptions.

#### **4. Is functional procurement allowed? Yes, it is strongly encouraged!**

The EU procurement directives on public procurement are very important for all procurement in the European Union. In this regard, the Directive 2014/24/EU of 26 February 2014 states that:

*“The technical specifications drawn up by public purchasers need to allow public procurement to be **open to competition** as well as to achieve objectives of sustainability. To that end, it should be possible to submit tenders that reflect the **diversity of technical solutions** standards and technical specifications in the market place, including those drawn up **on the basis of performance** criteria linked to the life cycle and the sustainability of the production process of the works, supplies and services. Consequently, technical specifications should be drafted in such a way as to avoid artificially narrowing down competition through requirements that favour a specific economic operator by mirroring key characteristics of the supplies, services or works habitually offered by the economic operator. **Drawing up the technical specifications in terms of functional and performance requirements** generally allows that objective to be achieved in the best way possible. **Functional and performance-related requirements are also appropriate means to favour innovation in public procurement and should be used as widely as possible**” (European Union 2014: Recital 74 – extra bold type added by the authors).<sup>19</sup>*

It is interesting that the EU Directives stress functional requirements, and remarkable that they emphasize that they “should be used as widely as possible” to favor innovation in public procurement. In the Swedish National Procurement Strategy, adopted by the Swedish Government in 2016, functional procurement is also given an important role in the section on public procurement that enhances innovations.<sup>20</sup>

However, the emphasis of functional specifications in the EU public procurement rules is not only intended to promote innovation. It also serves as a powerful competition policy tool. The mechanism is that functional descriptions leads to increased competition between different products to satisfy the same needs or solve the same problem. Not only does it increase competition between different companies offering similar products. It also increases competition between different (companies offering different) products.

Since functional requirements are included in the legislation, there are no legal obstacles in this regard, and functional demands can always be used in the tender specifications, without changing any laws or rules. Therefore, functional procurement can and should be used – even to the “largest extent possible”. Besides, if considered, technical specifications should be designed to avoid restricting competition through requirements that favor a particular economic operator. The technical requirements should thus not be *reflecting* important characteristics of

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<sup>19</sup> A performance requirement is the same as a functional requirement. This means that the procurement documents can specify a certain energy reduction compared to the best available technology, without specifying how this reduction will be achieved.

<sup>20</sup> The development, adoption and implementation of the Swedish National Procurement Strategy is described and analysed in detail in Edquist (2019a, 2019b) and in Borrás and Edquist (2019).



the goods and services that a supplier usually offers or be *describing requirements in a too precise way*. This goal is met in the best possible way if the technical specifications are designed as functional and performance requirements. For *competition reasons*, it is best, according to our interpretation, that goods and services are not described. Rather, the functions that they are intended to perform should be described. The procuring organization should therefore rather use functional descriptions than product descriptions in the procurement documents.

In spite of the previous legal authorization, functional procurement is not included as one of the procurement procedures of the EU regulatory framework for public procurement, which has to be followed by all EU Member States.<sup>21</sup> Functional procurement just represents a way to carry out any of the specified procurement procedures. Under current regulations, one of the procurement procedures must always be used when functional requirements – or other requirements – are specified. This is a legal fact and cannot be changed in the short term. Summing up, functional procurement is allowed, and it is even strongly encouraged by the EU regulations – both for innovation and competition reasons.

## **5. Discussion, conclusions and policy implications**

Public procurement represents a large share of most economies worldwide. In the EU, for instance, public procurement expenditures are more than 2.3 trillion Euros per year, equaling almost 20 % of GDP. Besides constituting direct purchasing power, public procurement is also increasingly used as a tool to achieve additional policy objectives, such as environmental, economic, and societal goals (McCrudden, 2004; OECD, 2017). Public procurement is a transformative instrument (i.e. a game changer) because it can help to create the conditions for creativity, and for the development, diffusion and uptake of innovations, which is ultimately the purpose of innovation policy (Borrás and Edquist, 2013, 2019; Mastroeni et al., 2013).

However, most of public procurement is not innovation related. The literature has for long discussed how the procurement of existing goods and services can partly be transformed to explicitly demanding non-existing products, in what it has termed as ‘innovation procurement’. One of the main rationales for supporting ‘innovation procurement’ lies in that innovation could lead to better results for the procurer in the long run in terms of need satisfaction and solving societal problems. Naturally, the procuring organization wants to buy products to use them for something. In fact, the products procured usually constitute a means to get a problem solved or a function fulfilled. And this is (mostly) done in the interest of citizens.

If innovations are required to solve many of the current grand challenges we are facing, then public organizations need to use proper means to design policies by which innovations can be developed, used and diffused (Kuhlmann and Rip, 2018). In this paper we have argued that it is not accurate to talk about ‘innovation procurement’ in the sense that non-existing products are described and demanded. It is simply not possible to describe *ex ante* something that does not exist. In the current context of grand challenges and mission-oriented policies (Mazzucato, 2018) public organizations are searching for unknown solutions to often unknown/undefined problems.

Many regular public procurements are perfunctorily conducted; the procuring agency or unit describes the same product as in previous procurements in a routine manner (Edquist, 2014).

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<sup>21</sup> These procedures are: open procedure, restricted procedure, competitive procedure with negotiation, negotiated procedure with prior advertising, negotiated procedure without prior advertising, competitive dialogue, or innovation partnerships (see European Union, 2014 – Title II – Chapter 1).

These products must obviously be existing ones, since they can be described by the procuring organization. Often this description is quite – or even very – detailed, and it may even describe an obsolete product. If that is the case, qualitatively superior, products (i.e. innovations) may be excluded from the procurement process. A routine of simply describing the previously procured products in tender documents makes it difficult or impossible for new products (innovations) to be accepted. It is a serious obstacle preventing innovation. You simply get the products you describe. And if they can be described, they are not innovations.

In this paper we have labelled this kind of procurement “product procurement”. An alternative to product procurement is that the procuring organization describes, in the procurement documents, the problems, needs and functions that they are interested in. When such a problem description exists, we use the term “functional procurement”. Our definition is: *Functional procurement is when a public agency buys products that perform functions that provide solutions to problems.* The biggest difference between these two concepts, when it comes to innovations, is that while product procurement can only rarely lead to innovations being developed, functional procurement opens virtually all procurements to the development of new and better products.

The category functional procurement can be further divided into two subgroups (see Section 3):

- A. Functional procurement where the functional specification includes existing products.
- B. Functional procurement where the functional specification does not include existing products.

The difference between A and B lies in how broad or comprehensive the functional specifications are. The functional specifications used in Type A can, of course, result in the continued procurement of existing products, if no better, or cheaper, products (innovations) are developed and offered. However, it does not exclude the development of innovations, since functional specifications are based on a problem that shall be solved or a need to be satisfied. If the new product performs the functions required to solve the problems described in a better way than the old product, then the new product should be chosen by the procurer.

An important argument for including existing products in the functional specifications is that the risk of failure of the procurement is almost non-existent. If no new products are developed in the procurement process, or if the new products do not outperform the existing ones, then the old product can always be purchased. Since an innovation is not required in this first type of functional procurement, the risk of failure is smaller in the sense that the lack of an achievement of an innovation is not needed. The risk is smaller in the sense that the pre-existing product can always be procured.

Type B specifications are based on functional specifications that require a new and better product to be developed to fulfill the function or solve the problem before delivery can take place. An alternative, however, is that the procurement completely fails because no new product that meets the specification is developed.

Product specification and functional specification are two ideal types. Sometimes only one of them is present in the tender specifications and contracts. They can also occur together in one and the same contract, i.e. they can coexist. It is still however important to distinguish between them for analytical and innovation policy reasons. One of these reasons is that one type prevents innovations and the other opens for innovations. The innovation policy conclusion is that the proportion of functional procurements should increase, and the share of product procurement should fall, if innovations shall be promoted through public procurement. If only one of these

two ideal types is present in a procurement document, the innovation effect is evident. If both occur in the same procurement document, it is reasonable to assume that the product specification becomes dominant and decisive - and that innovations are thereby hindered. The conclusion is that it is not useful from an innovation policy point of view to add a functional specification without removing the product specification. However, this must be further analyzed.

In a choice between functional descriptions of type A and type B (see Section 3), we believe, at least for the time being, that type A may be more effective. A pre-existing product can then still be procured, if it fulfils the – functional – specifications. Therefore, functional procurement does not (necessarily) mean that an innovation results from the procurement. Including old products in the specification reduces the risk, but still opens for innovations. In addition, there are strong arguments for broadening the specifications so as not to exclude unexpected innovations. A reason for this is that the procuring organization cannot predict where innovations may emerge from. Neither can they define what the innovations may look like or what characteristics they may have. Therefore, working with broad and generic functional descriptions should be encouraged. But of course, there are limits to this width. Where these boundaries go must be further analyzed.

The ultimate rationale for functional procurement is to facilitate the conditions for the emergence, development and diffusion of innovations. If public organizations want to demand innovations in public procurement, then they need to change the way that demand is being articulated – by using functional specifications. Functional procurement is about making the procurement process as simple as possible, because it is possible!<sup>22</sup>

Functional procurement also provides directionality to innovation policy making (Edler and Boon, 2018). As Mazzucato (2018: 805) argues, innovation policy should not choose what to promote, but rather, how to promote: “picking directions is... about deciding that a transformation must occur in society—and making it happen”. We believe that while the global sustainable development goals can set the ambition for future problems and needs, functional procurement can contribute substantially to implementing solutions to these problems.

Both the speed of innovation processes and their direction are affected if functional descriptions instead of product descriptions are used in public procurement. This is done by influencing the direction of the innovation processes through specifying functions, for example that solutions to environmental problems are demanded. This means that functional procurement can help mitigate global challenges, for example in the climate field. It is a matter of the objectives of innovation policy. Once the direction of innovation processes has been established, the speed at which they move can also be affected by the fact that product descriptions do not hinder the speed of innovations.

Finally, functional procurement also helps release enormous creativity and innovativeness among suppliers, and ultimately for the public sector and society as a whole. In turn, it also leads to increased competition, not only among potential suppliers of similar products, but also among different products that solve the same problem. Functional procurement favors competition as well as it favors innovation. And maybe, the best way to increase competition is innovation policy!

The concept of functional procurement outlined in this paper is aligned with the arguments posed by Mazzucato (2018: 810-811) on the role that mission-oriented innovation policies can play in stimulating innovation. As she claims, “*missions should be broad enough to engage the*

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<sup>22</sup> This sentence just comes to rephrase the old Dutch saying “make processes as simple as possible, if possible”.

*public and attract cross-sectoral investment and remain focused enough to involve industry and achieve measurable success. By setting the direction for a solution, missions do not specify how to achieve success. Rather, they stimulate the development of a range of different solutions to achieve the objective... A culture of experimentation and risk-taking is a crucial element in the philosophy of missions. There must be incentives to “think outside the box” to come up with new solutions to address the mission objective”.*

In this paper we have argued that functional procurement is, from an innovation and needs satisfaction point of view, advantageous for all public procurement. This is simply because product specification is an obstacle to, and usually makes it impossible for, innovations to be the result of procurement processes. Naturally, functional procurement can be combined with other innovation policy instruments. Functional specifications can also be combined with Pre-commercial Procurement (PCP). PCP is a matter of buying research results that solve certain problems, not procurement of new products. These research results – just like innovations – are not known *ex ante* and cannot be described at the outset of the procurement process. This implies that PCP normally is a matter of functional specifications (of research results).

As mentioned before, functional procurement is allowed in EU regulations. Hence, there are no legal obstacles to the use of functional procurement in the EU. Above and beyond, the European directives on public procurement recommend procuring agencies to use functional requirements to “the largest extent possible” (see Section 4).

The most important task in preparing for functional procurements is to identify the problems and needs to be solved. It is a question of specifying the goals (problems and needs) in a simple and overarching way. Identified societal needs and problems must be translated and transformed into functional requirements. Solutions to problems are to be designed by the potential innovators/suppliers, not by public procurers. Contracting authorities should only specify problems and functions. If not, the creativity and innovativeness of potential suppliers will be hampered. It may also lead to development being locked into wasteful and ineffective paths. By the same token, too detailed functional specifications may also be an encumbrance for innovation.

Knowing what procuring organizations or contracting authorities want/need is not a trivial task. It requires time and cooperation between departments, which can be a barrier. Sometimes the supplier may not understand the need properly, which in turn leads to a contract not fulfilling the expressed need. In this regard, overly detailed specifications can increase rather than decrease risk. Thinking in terms of what is needed rather than how the need is met requires a change in mind-set in the specification, selection and contract monitoring stages. Developing the required capabilities to identify needs and problems, as well as to evaluate the feasibility and quality of proposed solutions are thus central for the further development of public organizations and contracting authorities for public procurement to work effectively (Kattel and Mazzucato, 2018).

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