

# **Markets for Promoting Innovation in Health Care?**

*A Market Practice Study of Public Procurement of Innovation (PPI)*

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## ABSTRACT

This article critically analyzes public procurement of innovation (PPI) as an instance of using markets or market-like aspects as a means to resolve public concerns. It reports findings from a case of procuring radiation therapy equipment for a university hospital in Stockholm, Sweden. By extending a line of literature built on economic sociology as well as science and technology studies (STS), the study elaborates on public actors' efforts in framing markets to promote innovation. The case illustrates how the participating actors constructed the notion of *innovativeness* to be introduced into health care as means of addressing various public concerns. It also reveals the intended—and unintended—consequences of PPI as manifested in various actors' claims on the value of PPI realized in practice. The study suggests that it is extremely difficult to frame a market for the realization of innovation via procurement as a policy instrument because we cannot predict the ultimate impacts of devices and practices employed in such initiatives. By formulating a practice-based critique of PPI, our study invites important questions about the potentiality of such instruments for governing innovation without delimiting their consequences to the success-or-failure dichotomy as prescribed in predefined tools and strategies.

**Keywords:** Health Care; Innovation Governance; Market-based Instruments; Medical Technology; Public Procurement of Innovation (PPI).

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## INTRODUCTION

Public procurement, defined as the acquisition of goods and/or services by public bodies by means of market transactions (Arrowsmith, 2005), is increasingly proposed as a critical policy instrument to achieve broad industrial, social, and environmental objectives. For example, the Europe 2020 strategy included public procurement as a key market-based instrument for supporting goals such as environmental protection and good social conditions (European Commission, 2010). More recently, the European Commission (EC) issued a directive that aims to reform procurement processes in its member states to make them more efficient, while also ensuring that public actors make optimal strategic use of public procurement to spur innovation (Directive 2014/24/EU). Furthermore, the importance of public procurement as a critical policy instrument has attracted greater attention due to the recent transformative turn attributed to innovation policy (Boon & Edler, 2018; Diercks *et al.*, 2019), and growing calls for mission-oriented policies (Mazzucato, 2018). In this paper, our purpose is to critically examine the practical use of public procurement as a market-based instrument of innovation governance. In particular, we focus on the so-called *public procurement of innovation* (hereinafter PPI), an instrument whose use is broadly encouraged by policymakers aiming to improve the performance and functionality of public services through innovation (EC, 2021; OECD, 2017). By investigating how PPI is done and what it achieves, we aim to contribute to a broader discussion on the use of markets as a means of addressing public concerns.

The implementation of market instruments is not new to the *new public management* (NPM) agenda of modernizing the public sector and improving the effectiveness as well as the efficiency of public services. Much of the critical literature about procurement as a means of governing revolves around the inherently conflicting nature of aligning market instruments with public values in principle; for example, how public procurement takes a central role in public domain marketization (Öjehag-Pettersson & Granberg, 2019), and how it delimits societal problems and their solutions to market matters (Olsson & Öjehag-Pettersson, 2020). Similarly, critical voices on innovation question the dominant premises of innovation in its current state, which are often wedded to neoliberal ideas of economic growth and market extension (Godin, 2021). Hence, such market initiatives are often considered to comprise ideological foundations wherein innovation is strongly promoted as good *a priori* and a generator of economic and social value.

In this paper, we approach the question of using procurement as a means of governing from a different angle by directing our attention to the practical details of how PPI has been performed. In doing so, we propose a practice-based critique that can offer a more dynamic critique of PPI as a governing instrument due to its emphasis on the processual and relational aspects. Specifically, this approach allows us to critically assess the work performed by public buyers to make markets work to achieve the aims and expectations set out in public procurement policies and strategies. It does so by foregrounding a detailed empirical view of the tools and practices in the process, as well as the reflexivity of participating actors. To develop this practice-based critique, we draw conceptually on *constructive market studies*, a line of literature inspired by an emerging research tradition in economic sociology and in science and technology studies (STS). According to this approach, economic markets are not pre-existing entities, but are rather outcomes of the construction, transformation, and reconstruction of arrangements of various elements such as rules and regulations, technical and calculative devices, discourses and material infrastructures (Callon, 1998; Callon *et al.*, 2002; Callon & Muniesa, 2005; Kjellberg & Helgesson, 2006, 2007). Within this conceptual framework, we critically assess PPI within the notion of concerned markets, whereby we focus on the expanding trend of purposefully using markets or market components—such as choice, competition, and price—as potential solutions to pressing matters of collective interest (Frankel *et al.*, 2019; Geiger *et al.*, 2014). Markets such as health care are prototypical *concerned markets* in this sense, wherein PPI is a market-based instrument introduced in attempts to enhance the *value for money* of public services by promoting innovation.

We achieve this by critically analyzing a specific PPI case study in which radiation therapy equipment was procured for a university hospital in Stockholm, Sweden. The case demonstrates extensive efforts made by contracting authorities to deploy PPI. Our study highlights the differences between what had been envisioned, both before and during the procurement process, and the claims made in subsequent controversies about the value of *innovation* that was ultimately realized. Sweden has long been considered a leader in promoting innovation policy goals through procurement, as evidenced by its strategic industrial research programs and specially designated government procurement agencies (EC, 2016). In this regard, our study provides an opportunity to probe the workings of a *developed case* of an otherwise globalized discourse of innovation governance via public procurement.

The structure of the article is as follows. First, we briefly review the background of PPI by outlining the regulatory space of strategic public procurement in the European Union (EU), and its promises in prescriptive policy suggestions and in innovation policy literature. Following that, we introduce constructive market studies literature that provides the conceptual background for our study and informs our critical approach on PPI. Subsequently, we outline our materials and methods, followed by the description and analysis of our case. Finally, in the concluding section, we summarize and discuss our findings.

## BACKGROUND: THE PROMISES OF STRATEGIC PPI

In the EU, the traditional view on public procurement regulation is that it falls under the scope of economic policy, with the primary goal of ensuring competition and efficiency in public sector contracts (cf. Graells, 2015). Over time, however, further visions and strategies have been proposed that look beyond purely economic objectives. Particularly in relation to the EU 2020 goals, public procurement ambitions were directed toward addressing challenges pertaining to social and environmental concerns as well as innovation-related issues (EC, 2010). Such strategic components of public procurement were subsequently entered into the regulations in 2014 through the new EU Procurement Directive (EU Directive 2014/24).

Procurement of innovative solutions forms a central element in the 2014 reform. This was later defined as "any procurement that has one or both of the following aspects: (1) buying the process of innovation – research and development services – with (partial) outcomes, or (2) buying the outcomes of innovation" (EC 2021/C 267/01, p. 6). In the guidelines, innovation is presented as a means to achieve various public policy goals, among which were modernizing and delivering higher quality public services on an optimal budget (EC 2021/C 267/01, pp. 7-10). The new directive takes up the idea of *most economically advantageous tender* (MEAT) and integrates it with the new objectives. This implies that cost or price considerations remain part of the award criteria for public buyers; however, additional quality aspects – such as those based on the environment, society, or innovation – may also be used to identify the MEAT. At the same time, a number of new procedures and tools were introduced by the new directives, which opened up possibilities for fostering innovation in public services through the *innovation partnership* and the *competitive procedure with negotiation* (Handler, 2015). The latter is closely related to *competitive dialogue* in that both procedures offer possibilities for dialogue and negotiation with potential suppliers and have similar purposes and use conditions.<sup>1</sup> Innovation partnership,

on the other hand, is a procedure that begins with a tender for the development of products and solutions for a specific need or societal challenge that does not yet exist in the market (Directive 2014/24/EU 2014).

It is generally agreed that *value for money* is the main objective of EU public procurement. Indeed, EU regulation as a whole is traditionally viewed as emerging from the free market economic approach and principles consistent with neoclassical economic theory (cf. Graells, 2015; Trepte, 2004). The assumption underlying EU regulations is that the efficient operation of the market will ensure that the public sector is well served by the most efficient suppliers, leading to significant savings in public spending. This perspective reflects a mainstream textbook economics perception of markets (i.e., that they function according to neutral forces or natural-like laws that allocate resources to their expected highest valued uses once market barriers are removed). Such a system emphasizes the need for maximum competition in public contracts to achieve efficiency and requires public purchasers to seek value for money as a proxy for profit maximization (see Kunzlik, 2013, for a detailed analysis of EU public procurement law with respect to neoliberalism). Accordingly, the most common understanding of value in public procurement terms relates to economic worth, where value is ranked by price levels or cost-benefit analyses and different outcomes of non-economic objectives can be taken into account if translated into a common metric that can be added together and compared (Halloran, 2020).

It is worth noting that, more recently, public procurement with its strategic elements has assumed a prominent role in an ongoing international discourse at the intersection of innovation policy and public procurement – more specifically, on the use of public demand as an engine for the development and diffusion of transformative innovations (Chicot & Matt, 2018; Georghiou *et al.*, 2014; Uyarra *et al.*, 2020). The main argument driving this academic discussion is that today's societal challenges require innovative solutions. In their purchasing processes, public buyers should therefore focus on both current *and future* problems of public service delivery instead of privileging the solutions that are already available in the market. By exercising their purchasing power, they can demand transformative solutions (Boon & Edler, 2018) while also addressing calls for public actors to tackle societal challenges in a mission-oriented manner (Mazzucato, 2018).

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<sup>1</sup> The primary distinction is that the competitive procedure with negotiation begins with an initial tender as a foundation for later negotiation, whereas it is not a condition of competitive dialogue (Directive 2014/24/EU 2014).

The literature on PPI has largely focused on a macro perspective, often at national levels, with a frequent emphasis on technological goals (Uyarra *et al.*, 2020; Miller & Lehoux, 2020). The effectiveness of PPI is typically measured by the number of new products developed or, more broadly, the degree of R&D-intensive technology change in a sector (see Aschhoff & Sofka, 2009; Guerzoni & Raiteri, 2015). Research in this stream emphasizes the importance of public procurement in managing markets and highlights the need for procurement officials to possess the necessary skills and capacity to do so effectively (Caldwell *et al.*, 2015). Such studies show that the selective use of the public procurement policy instrument can allow public organizations to act as a *lead customer* for innovative products, incentivize developers of new technologies, legitimize product standards, and create new markets (Edler & Georghiou, 2007). However, significant barriers to implementing PPI exist, including a lack of technical skills, risk aversion among buyers, insufficient supplier incentives, and regulatory challenges (Uyarra *et al.*, 2014). Public procurement is a complex process that demands a broad range of capabilities – including defining needs, exploring solutions, and conducting procurement – which can overwhelm public buyers.

PPI is attributed a greater strategic potential than conventional public procurement. However, in the mainstream literature, both approaches are tied to a similar conceptualization of markets and their functioning. Specifically, markets are tools for (more) efficient fulfillment of societal demands since they harness competition in the service of public concerns. Where the two approaches differ is in the role of public buyers; PPI envisages a more dynamic role for public actors as active participants in the market and emphasizes their capacity to create or shape markets for the generation of creative solutions to pressing societal problems.

On a principal level, this paper shares an understanding with the mainstream literature that there may be different ways to organize markets to take societal challenges into account. At the same time, our perspective departs from this literature by deliberately side-stepping prescribed strategies and ambitions of PPI based on ready-made assumptions of what markets can and cannot do in practice. To this end, we turn to constructivist market studies for our conceptual starting points, including the notion of concerned markets. This literature specifically asks what happens when markets become intertwined with aspects of social life that are commonly not considered to be market-involved.

## STUDYING PPI FROM A CONSTRUCTIVIST MARKET STUDIES PERSPECTIVE: THE FRAMING OF MARKETS FOR PUBLIC CONCERNS

There are two central tenets in constructivist market studies (CMS) that informs our work. First, CMS conceptualizes markets as practical outcomes of multiple actors' organizing efforts rather than as static entities governed by invisible laws (Callon, 1998; Geiger & Gross, 2018; Kjellberg & Helgesson, 2006; Neyland *et al.*, 2019). Second, and related, CMS recognizes that markets come in many shapes, thus preferring to speak of *markets* (plural) rather than *The Market* (singular). To account for this heterogeneity, CMS emphasises how markets are continuously formed and reformed (Callon, 1998; Kjellberg & Helgesson, 2006, 2007). Here, the notion of *concerned markets* is used to denote markets that are being formatted by, or provoke ethical, moral, or social concerns (Geiger et al 2014; Frankel *et al.*, 2019). The term thus highlights the political character of many efforts to (re)organize markets. In such markets, market governing involves "evaluation, diagnosis, design and repair" of specific arrangements that make the market work the way it does (Frankel *et al.*, 2019, p. 154).

Such market arrangements are socio-technical in character; they combine ideas, humans, texts, artifacts, technologies. One example is how economic agencies rely on specific instructions and tools for their ability to calculate (Callon & Muniesa, 2005). Importantly, as Callon (1998) notes, this ability to calculate is intimately linked to *framing* – the specification and fitting out of a 'stage' on which economic agents can engage in exchange as if independent of the world 'off stage'. Established markets are thus the results of framings that define objects of exchange, actors, qualities, rules, and relations (*ibid.*). At the same time, market actors bring their own expectations, conceptions, projects, interests, and concerns regarding how markets should function. Therefore, market frames are always partial and temporary, subject to challenges that address various collective concerns. Framing and stabilizing the qualities and value(s) of goods is a particularly important activity in shaping markets toward public concerns (e.g., to become more socially and environmentally sustainable or more innovative). *Market devices* – such as protocols, valuation tools and models, material forms, charts, presentations, and digital formulas – play a key role in framing because they make certain qualities more visible, economically valuable, and marketable (Doganova & Eyquem-Renault 2009; Doganova & Karnoe, 2015; Muniesa *et al.*, 2007).

Previous studies have demonstrated that specific practices and devices are important parts of market-oriented policy instruments (Doganova & Karnoe, 2015; Geiger *et al.*, 2014; Johansson Krafve, 2015; Neyland *et al.*, 2019). For example, Neyland *et al.* (2019) show how efforts to develop *advanced market commitments* contributed to incentivize innovation and balance private and public interests in the development of malaria vaccines. Webb and Hawkey (2017) show how technical-economic models contributed to create a market for sustainable energy in British heat network infrastructures. Reijonen and Tryggestad (2012), finally, studied how market actors constructed different versions of *environmental friendliness* in the market for urinary drainage bags, defining, negotiating, and situating these versions in relation to one another and in relation to other product qualities. Their findings suggest that there is nothing inherently *green*; rather, *greening* is an ongoing process of shaping the socio-technical arrangements of the market to take various matters of collective concern into account (p. 229).

This suggests that the use of markets to address public concerns is not only a choice from 'the outside' but also an issue that needs to be handled from 'the inside', in market practice (Geiger *et al.* 2014). However, as Frankel *et al.* (2019) stress, it is far from given that concerned markets will magically transform into democratic fora where the voices of concerned groups are recognized and heard. Indeed, increased reliance on markets may propel new types of expertise that exclude solutions that are framed in other terms. For example, economists are increasingly engaged in designing markets to fix public concerns; one prominent example being the discourse on strategic procurement. Skeptical of this trend, Nik-Khah and Mirowski (2019) warn against blindly trusting market solutions to address problems. They suggest all markets are imbued with neoliberal politics and governmentality, pointing at the chronic problems in health care, education, and environmental pollution as cases in point. While this constitutes a valid critique of specific market initiatives, it also downplays one of the central tenets of CMS, namely that of the heterogeneity of really existing markets.

Building on this literature, we critically interrogate the PPI process as an attempt by public buyers to construct a particular market frame to promote innovation in health care. We examine the process of how a market-based instrument is composed, enacted, and given effect (Neyland *et al.*, 2019). Our approach aligns with the style of critique found in critical studies of innovation, situating an innovation within the institutionalized socio-technical configuration in which market framing takes place (Laurent, 2021). This style of critique is distinct from making epistemic statements about a true value or uncovering the ideology behind an innovation. Rather, it involves examining the connections between dis-



courses, practices, institutional structures, regulations, and policy instruments (Lascoumes & Le Gales, 2007), as well as market organizations and devices (Callon, 2007). To this end, we thus incorporate into our analysis the diverse understandings, definitions, and concepts of innovation and markets mobilized by the actors under study. Our critical interrogation follows three explorative themes: (1) the economic and political motivations behind the choice of PPI as a tendering method, (2) the specific practices and devices deployed in public buyers' efforts to frame the market to promote innovation in health care, and (3) the intended and unintended consequences of PPI—more specifically, different actors' claims about the value of PPI realized in practice.

## METHODS AND MATERIAL

Our case study concerns the process of buying radiation therapy delivery in Region Stockholm, Sweden, through innovation procurement – rather than buying readily available equipment and service solutions in the market. The procurement process in question occurred between 2013 and 2018. At the time of our investigation, the procurement had been completed; however, not all the items in the contract had yet been delivered. The case study was conducted between April 2019 and June 2020 as part of a larger research project that involves all of the co-authors. The project deals with how valuations of medical devices impact the conditions and prospects of new products coming to the market. Empirically, the study is based on qualitative research with interviews with market actors, and analysis of policy and bidding documents as well as news articles.

We interviewed authorities and governmental bodies in the medical device market to achieve an understanding of the workings of the Swedish market in general. We also interviewed the persons who are identified as relevant to the specific PPI case. The selection of persons rested on two considerations. First, we searched to include diversity in terms of key actors in the market we are interested in, which included sellers, buyers, and assessing authorities. Second, so as not to overlook important actors, we snowballed informants we were advised to interview from other informants. In total, we conducted 20 interviews (10 interviews about the Swedish medical device market in general and 10 interviews about the focal procurement process); all but one were recorded and transcribed. The duration of the interviews varied between 23 to 80 minutes (see the Appendix for the list of data sources).

The documents we used in this research are news articles, reports and presentations from market actors, procurement and assessment documents, as well as court decision protocols (total of 51 documents). Most documents were available online; others, such as the procurement and court documents specific to the case, were provided by our informants. To access national press articles relevant to the case (2013–2020), we used the Business Retriever database. The articles reviewed have enabled us to follow important actors' expressions of expectations and reflections on the process in real time.

Data analysis was conducted through the iterations between analyzing the data, writing narratives, and revisiting the literature (Alvesson & Sköldbberg, 2017). First readings of the collected material aimed at identifying the activities, actors, rules, metrics, tools and processes involved in assigning value to the radiation therapy equipment and were used to write a detailed case description. We then analyzed our case by addressing our three exploratory themes.

## CASE STUDY: PPI OF RADIATION THERAPY EQUIPMENT IN THE STOCKHOLM REGION

### Case Context

Health care in Sweden is largely tax-funded and universal for all citizens. The main paragraph in the Health Care Act (SFS, 2017, p. 30) states that the goal of Swedish health care is good health and equal care for the whole population. Respect for autonomy, human dignity, and cost effectiveness are also central values in the national and local documents regulating health care. Responsibility for health care in Sweden is highly decentralized, shared by the central government, 21 regions, and 290 municipalities. The steering system is both national and regional, in that self-governing regional councils are responsible for the financing and provision of health care in different regions. These councils are named after the regions they govern; for example, as in *Region Stockholm*.<sup>2</sup>

The incorporation of innovation into the Swedish national procurement law is very much embedded in the latest EU directives, but the origin of the innovation procurement notion in Sweden goes back to the state's Innovation Procurement Strategy from 2010

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<sup>2</sup> The "region" title was adopted by the regional councils when the county councils of Sweden (*landsting* in Swedish) were officially reclassified as regions (*regioner* in Swedish) in January 2020 (Proposition 2018/19:162). Region Stockholm, which is the name used in this paper, was previously named "Stockholm County Council" (known as SLL in Sweden).

(SOU, 2010, p. 50) that sets clear goals to improve the conditions for increased application of innovation procurement in the country. For example, since 2011, the Swedish Governmental Agency for Innovation Systems (in Sweden, known as Vinnova) financially supports national procurers to undertake innovation procurement via its Innovation Capacity in the Public Sector program (EC, 2016; Vinnova, 2020). Furthermore, the National Agency for Public Procurement (*Upphandlingsmyndigheten*) and the Swedish Competition Authority (*Konkurrensverket*) have been working strategically to provide contracting authorities with PPI methodology and guidelines (*Upphandlingsmyndigheten*, 2019a). Although the share of PPI in all public procurement performed in the country is considered fairly small,<sup>3</sup> it is highly encouraged. For example, the government has recently made further investments in increasing nationwide use of PPI, including the establishment of a collective platform aiming to expand public buyers' involvement in the topic (Axelsson, 2021).

Sweden does not have a national innovation procurement policy in the health care field; however, health care is one of the central areas outlined in these national strategic activities (SOU, 2010, p. 50; *Upphandlingsmyndigheten*, 2019a; Vinnova, 2009). The main motivation of PPI is to deliver innovative solutions that may enable better health care for the patients, help governments meet growing demand, and reduce costs by developing more advanced and efficient services (Vinnova, 2009). Promotion of PPI in health care further includes exchanging best practices and case studies as well as organized seminars by state agencies (*Upphandlingsmyndigheten*, 2019b) as well as industry associations (Nordic Medtech Growth, 2017).

Radiation therapy is one of the most common treatments in cancer care and is performed in specially equipped medical facilities in different regions. With few exceptions, radiation therapy equipment in Sweden is procured through competitive public tenders by regional councils. At the time of the procurement, radiation therapy treatments within the Stockholm region were available at two physical sites: Karolinska University Hospital and Södersjukhuset. The procurement was intended for the acquisition of equipment partially to replace the existing equipment at Södersjukhuset and partially to be installed at a newly built hospital which would replace Karolinska University Hospital's existing site. The new hospital building is called *New Karolinska Solna (NKS)*. During the procurement, NKS was still under construction; thus, the procurement was part of a program for supplying medical technologies to the new hospital construction project.

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<sup>3</sup> In 2021, procuring organizations announced 18,421 procurements in all public sectors in Sweden. Of these, 809 were designated as PPI (Upphandlingsmyndigheten: <https://www.upphandlingsmyndigheten.se/statistik/upphandlingsstatistik/statistik-om-annonserade-upphandlingar-i-sverige-2021/innovationsupphandling/>).

## Motivations Behind the Choice of PPI

### PPI for increasing international competitiveness of the region

The formal decision to build a new university hospital was made by Region Stockholm in 2008 (Karolinska, 2022), and equipment was to be installed at the launch of the hospital in 2017/2018. The project was characterized by high expectations for future innovativeness and competitiveness of the region. In the political vision, the hospital has repeatedly been described as a hub in the health care system with "world-class" care, research and education, and as a "prestige project," both in Sweden and internationally (Grafström, Qvist, & Sundström, 2021, p. 10). Region Stockholm's own view of the NKS project was best depicted in the following decision material (Decision Protocol, 2008, p. 2, in Johannesson & Qvist, 2019, p. 6):

New Karolinska Solna is one of [Region Stockholm's] most extensive projects ever and will have great significance in a wide range of areas. The hospital will be the hub of a regional and national health care system that is internationally competitive. NKS will be a special hospital for the region with a focus on highly specialized care and shall play a central role in the development of the Stockholm region into a biomedical powerhouse.

The new hospital building was constructed as a private–public partnership (PPP) between Region Stockholm and a private consortium called Swedish Hospital Partners, which consists of the Swedish project development and construction company Skanska, in partnership with the British investment fund Innisfree (Karolinska, 2022). The PPP agreement involved the design, construction, financing and operation of NKS. Although the extensive medical technology equipment needed at the hospital was not included in the project agreement with the consortium, medical equipment was nevertheless a large part of realizing the NKS project. As regards the equipment, "flexibility and generality" were specifically emphasized in the project vision. The hospital would be built to be able to replace equipment as quickly and easily as possible, and offer an infrastructure to accommodate the parts needed for all kind of heavy equipment (Grafström *et al.*, 2021).

Despite the high expectations, the NKS project has been the subject of much debate and controversy in Sweden, where the process received heavy criticism for poor planning, execution, and management as well as accusations of corruption (Lundberg, 2013; SVT, 2018). Thus, Region Stockholm's decision to buy new radiation therapy equipment, as well as its procurement, took place in a setting that included the ambitions and controver-

sies concerning this project. This fact was considered to further complicate the radiation therapy procurement. On one hand, the project attracted much public attention and naturally involved pressure for the contracting authorities. On the other hand, medical equipment was a crucial part of the NKS "world-leading hospital" vision, which oriented the procurement toward innovation from the outset. In our interview, the public buyer responsible for the procurement of radiation therapy equipment clearly stated that their aim included the hospital's leveraging of innovation (Public Procurement Officer, Region Stockholm, 2019): *We wanted to secure that it was the latest technology supplied and also which would be upgraded over time, over a long period of time.*

PPI for bridging the gap between society's need for radiation therapy and ability to pay

Region Stockholm commissioned the management consultant company Ernst & Young (EY) to develop an innovation procurement methodology specifically to buy medical equipment for the new hospital. With the financial support of the Swedish Governmental Agency for Innovation Systems (Vinnova), an innovation action pilot project was carried out during 2012–2013 with a specific emphasis on the needs of health care services in the region. The work from this project resulted in three innovation procurement methodology books (EY, 2014), and the experiences from the specific PPI were spread through various conferences and events in the region (*Dagensmedicin*, 2015). The claims in the books and materials presented at the seminars were grounded in innovation's assigned role in meeting future health care challenges. The specific emphasis was on the risks of a widening gap between society's needs and ability to pay. The objective of PPI was often formulated to meet this challenge, while fulfilling Karolinska University Hospital's mission and long-term goals and creating the world's best university hospital (Carlsson & Andersson, 2015). This was depicted in the descriptions of the radiation oncologist who was involved in the specific procurement process as a clinical user (Interview, NKS, 2019):

That [innovation partnership] was something that came from outside, so we weren't really participating in discussing the pros and cons of that. That was part of the scope.

I think it was decided that all the tender processes of NKS should be an innovation partnership because there was a theory that as the health care costs rise more and more, you should have an innovation aspect of it because that could sort of pay some of the expertise. So I don't know, but I think that was sort of the idea.

## PPI for better cancer care, accessibility, and equity in radiation therapy

Radiation therapy is an integral part of Swedish cancer care, and how it is organized is often viewed as having a major impact on the public health service (RCC, Stockholm-Gotland, 2016). The number of devices – and thus, the extent of accessibility to the treatment across the regions in Sweden – varies (SBU, 2003; RCC, Stockholm-Gotland, 2016), and Stockholm is not ranked among those with the highest accessibility per capita (RCC, 2016). In Stockholm, patient waiting times in cancer care, a well-accepted measure for care quality in Sweden, has long been a major concern and an area of underperformance despite a number of policy measures over the years (Wilkins *et al.*, 2016). Although investment in devices is not the only indicator of treatment capacity, the situation still raises concerns about the accessibility and equity of cancer care for those who live in the Stockholm region.

Surprisingly, the procurement in the case did not promise a real increase in the number of existing devices (12 pieces in total for the region). Given the growing need for treatment and the existing problems due to under capacity, this was noted as a concern in the analysis of the region's cancer care report (RCC, Stockholm-Gotland, 2016). Although not clearly stated, it seemed likely that the decision to keep the same number of existing devices came from the availability of the treatment rooms, which was decided already within the NKS construction project. The infrastructure that the operations require is a binding factor when it comes to the number of devices. The rooms that each device operates (called bunkers) must be built strictly according to the directives given by the National Radiation Safety Authority. Our interviews with both the clinical users and the management consultants suggest that the solution to this problem via the specific procurement was to maximize the capacity in the region with innovative solutions, and that there is a high degree of technical and managerial innovation in the resulting contract. When referring to the number of devices ordered to be placed at NKS, one of the management consultants explained the process (Interview, EY, 2020):

I think the problem was when they [Region Stockholm] said eight accelerators, they didn't have that idea, because if they did, then they probably would have made ten rooms. So, there was definitely at least an opinion from the hospital that the bases for those eight rooms were not calculated well enough. So, the effect was that then we have to use them quicker. I guess you can say that.

## Efforts to Make PPI Work: Framing the Market to Promote Innovation

The process of performing the specific procurement activities comprised buyers' efforts of outlining the object to be exchanged, the actors to be involved, and the devices and methods of assessing the value of innovation (described in detail below).

Innovation negotiated: Device or the software (capacity, speed, interoperability, and efficiency at stake)

At the very early stage of the process, Region Stockholm formed a procurement group specific to this purchase. The group included users of the device (such as physicians, physicists, engineers and nurses) as well as administrators, procurement officers, lawyers and consultants. The group attended several workshops between 2013–2014, led by the management consultants, to define the goals and the scope of the tender. One major concern regarding the scope was the focus of innovation – more specifically, whether the eligibility criteria to join the tender for the potential suppliers would be focused on the device or the software. In addition to the (highly technical) device, radiation therapy also involves the use of well-functioning specialized software with information and image management solutions, generally known as the oncology information system (OIS) and treatment/dose planning system (TPS) (SBU, 2003). Our interviews suggest that the clinical users in the group were well informed about the technical developments in the market, and that there was substantial attention directed specifically at developments in the software for planning and running treatments more effectively in the radiation therapy area.

The other major concern was whether the procurement would be designed for a sole supplier or a multi-supplier solution. Despite claims of potential advantages, working with several suppliers was considered a major hindrance in terms of interoperability. The overall radiation equipment market is highly consolidated, dominated by two major players: US-based Varian and Sweden-based Elekta (the rest is primarily shared in smaller parts between US Accuray and German Siemens). Both Elekta and Varian provide their own oncology information and treatment planning systems integrated to the hardware and their service. At the time, all devices operating in Stockholm were from a single vendor, Varian (except one Elekta device placed for research purposes). Thus, they all shared Varian's information systems – the Aria OIS and Eclipse TPS (Doc: LS 1310-130) – and it was critical for the procurement to set the conditions in such a way that different devices could "talk to each other." According to our informants, different scenarios about the procurement's scope, and the pros and cons of each possibility, were discussed in a number of workshops

– mostly by the clinical users – that amounted to hundreds of hours (Interview, Radiation oncologist, NKS; 2019):

It was a long process, so we from the profession also had several groups that worked closely to define the tender, define the scope. That was managed by a team of consultants, but the definition and the scope was made by the professions of physicians, physicists and engineers.

Following these workshops, the first procurement document sent to the potential suppliers was an invitation by Region Stockholm to join a competitive dialogue in 2014 (Doc: LS 1310-1308, 4/9/2014). On the document, the scope was defined as a single-supplier solution with a focus on the software. The orientation toward a single-supplier solution was presented in the condition of being an eligible supplier to the invitation. It was framed as ability to provide (or outsource) the equipment together with the software, whereas the first and foremost eligibility criterion was defined as the ability to demonstrate the technical capacity of providing and maintaining the oncology information system (the software, not the device) (Doc: LS 1310-1308, 4/9/2014, p. 20):

Bidders must have competence, resources and such an organization that it can be expected that Bidders have the ability to lead and carry out deliveries of radiation treatment equipment as well as certain related equipment, software and services. As can be seen from section 3.2, it is necessary that the Bidder also has the ability to deliver and maintain a verification system (OIS) in order to function as a Bidder in the Procurement. This is because [Region Stockholm] and Karolinska University Hospital see the verification system (OIS) as the core of the Procurement as it is expected to form the backbone of the future solution.

The invitation also required that the eligible supplier be able to become a long-term *innovation partner* with the hospital and engage in improving treatment operations in the region. Innovation partnership was perceived as a fairly new idea by the clinical users, at least at the time. The features of a desirable partner were highlighted as willingness and ability to cooperate. The dialogue phase was expected to take approximately five months (between August 2014 to January 2015). Three to five suppliers were expected to join the dialogue; they would then be asked to prove their qualification to join the tendering process. According to the procurement officer interviewed (Region Stockholm, 2019), three vendors were interested in the first phase of the process, and eventually there were only two left to be chosen to join a dialogue with the region: Elekta and Varian.



## Assessing and rewarding the most economically advantageous innovation

The assessment model in the tender was based on the logic of *the most economical alternative gets the contract*, which refers to a combination of price and the fulfilment of certain criteria. Accordingly, one major task for the buyers during the procurement was to define the qualifications and measures to appropriately assess and compare the suppliers' bids in the tender. Several more workshops were dedicated specifically to bringing together all the preferences into concrete measures in such a way that the formulation would facilitate comparison of the bids, including the potential partnership with the selected supplier. These included defining and formulating specifications in a list of criteria in a valuation model. It continued with distributing the weight in each criterion based on their significance for radiation therapy services in the region. All criteria were matched with monetary values in terms of benefits or cost savings. The goal was to achieve a single MEAT value in the form of a cost-benefit ratio representing the worth of the offers from the buyer's perspective. Finally, on March 3<sup>rd</sup>, 2015, Region Stockholm sent out the tender invitation to both potential suppliers, asking them to fill in the valuation model. The invitation was for equipment, software, updates and training, together with a proposal for an innovation partnership agreement. Eventually, on September 1<sup>st</sup>, 2015, the contract was awarded to Varian (Doc: LS 1310-1308).

## INTENDED AND UNINTENDED CONSEQUENCES

### The procurement process takes a legal turn

In September 2015, Elekta appealed to the Administrative Court in Stockholm for the review of the tender and requested the reiteration of the process, which found in favor of Elekta (*Förvaltningsrätten*, Mål nr. 19616-15). More specifically, Elekta claimed that there was something wrong in the procurement's Excel pricing tool that prevented the company from quoting their correct total price. The problem with the Excel file was verified and the new procurement, which began in April 2016, ultimately awarded the contract to Elekta (Doc: S2016-0113). The basis for Region Stockholm's decision was reported to be Elekta's more advantageous offer, which was lower than Varian's offer of €54.4 million. However, not long after, it was Varian's turn to appeal this decision (*Förvaltningsrätten*, Mål nr. 19667-16). Varian argued that Region Stockholm's procurement schedule had violated the Swedish Procurement Law. However, the Administrative Court in Stockholm declined Varian's tender review request (*Förvaltningsrätten*, Mål nr. 19667-16), so Varian brought the matter

before the Court of Appeal in Stockholm (*Kammarrätten*; Mål nr 4068-16), marking the fourth occasion that the case had been taken to court. Varian claimed that a tender period of 41 days was insufficient due to the extent and complexity of the contract. Furthermore, Varian argued, Elekta had a language advantage because all the tender documents were to be prepared in Swedish. On November 30<sup>th</sup>, 2016, the court ruled against Varian (Mål nr 6757-16). Finally, in December 2016, Region Stockholm signed a contract with Elekta for the entire order, worth €46.1 million.

In July 2017, problems began with the delivery of equipment and software to NKS by Elekta. The situation was controlled by an independent inspector, who did not approve Elekta's delivery of the technical requirements agreed upon in the contract. Elekta's spokesperson later stated that there were mistakes in connection with the inspection and that the entire system could be tested only when Elekta installed all the equipment (Froste, 2017). After a few months of correspondence between Region Stockholm and Elekta, the final decision became public on December 12<sup>th</sup>, 2017: there would now be a direct procurement (without a new competitive tender process) and two separate contracts would be signed with both suppliers. The first was with Elekta for the device and software at Södersjukhuset. Equipment would be installed and gradually prepared to operate in 2020. The other agreement was with Varian for the supply of the device and software to be clinically operational at the end of 2018 at NKS (*Region Stockholm News*, 2/26/2018).

Appeals and tender reviews were considered common practices during such large procurements in Sweden (*Nordic Medtech Growth*, 2017). According to the buyers, the challenge was inherent to the EU public procurement framework, where even the tiniest incongruencies in the contract offered openings for appeal. The assumption was that in such a complex procurement case, everyone would be capable of finding a hole in a contract hundreds of pages long, and company lawyers were expected to start identifying holes from day one in case their client were to lose. Thus, Region Stockholm could expect one tender review to delay the process, but when it compounded into a protracted series of reviews and appeals, time ran out and the procurement took a turn toward potential problems (Interview, Consultant EY, 2020).

## The aftermath of the procurement and controversies

The process resulted in disagreements between Region Stockholm and Elekta. In a letter from Region Stockholm to the press, Elekta was described as having acted carelessly. According to the region, deliveries had not been up to par and the delays risked affecting patients. On the other hand, Elekta refuted all criticism. According to the newspaper, Elekta's spokesperson reported in an email (*Dagens Industri*, 11/16/2017):

We have a completely different view. Elekta maintains the view that the system meets all the requirement specifications in the contract. Elekta has also proposed a far-reaching solution to meet [Region Stockholm's] expectations.

Besides such conflicting views of the supplier's performance, newspapers reported clinical users' claims that the reason for the delay was to be found in the procurement process itself. They believed that the region's procurement allowed the supplier to present a technology that they did not have, and which they could not develop in such a short time, either. The problem (according to the reporters' sources in *Svenska Dagbladet*, 5/22/2017) was that Region Stockholm had recognized the problems earlier and had mobilized lawyers who already started working with different options. However, they could not break the agreement before reaching the deadline for delivery in the contract; otherwise the supplier could claim that the region did not give them the opportunity. According to the users, this would have the most serious consequences for the health staff and the patients. Former chairperson of the Labor Union at Karolinska Hospital, who had insight into the procurement process over the years, commented: "*We have sounded the alarm so many times, but those involved in this do not listen to the health care staff*" (*Svenska Dagbladet*, 5/22/2017).

In time, the results of the procurement attracted further nationwide attention, and the process itself was being questioned in the press for poor public administration. The most central issue brought up was patients' limited access to treatment in the region. According to the reports in the press, to undergo treatment, many breast cancer patients were forced to travel to clinics not only in other regions of Sweden, but also in neighboring countries (*Dagens Nyheter*, 7/23/2019). Region Stockholm attributed the patients' travel to personnel shortages, rather than solely to low equipment capacity. Accordingly, the equipment would be fully used once the personnel issues were fixed. However, this did not spare the region from harsh criticism. The Chairman of the Stockholm Medical Association drew attention to the badly managed use of current resources, such as the very premature closure of the existing radiation therapy operating site (*Svenska Dagbladet*, 8/19/2019).

Of course, the devices will be used if you can get hold of enough staff, for the patients' sake, and for that it is much cheaper. But the whole planning is like that, mismanaged from start to finish, that you would rather send patients across the country and to Finland until further notice.

Moreover, the costs incurred by sending patients abroad, as well as the extra costs of rebuilding the new hospital's radiation therapy rooms to accommodate Varian's equipment (as it was built initially according to Elekta's devices), drew further criticism. The source of discussions extended beyond Stockholm, where Region Stockholm was accused of creating overload on other regions that were already suffering from capacity issues (e.g., Juntti, 2019).

At the time of our investigation (2019 to early 2020), there were eight new Varian devices with the corresponding software at NKS, and three devices with software from Elekta at Södersjukhuset. One new Elekta device was still to be installed later during 2020. According to our informants at the operational sites, the devices were in use 12 hours a day, and seven days a week. Patients were distributed between the two sites; Södersjukhuset specialized in treating breast, prostate and rectal cancers, while the equipment at NKS was used for all other cancer patients. Because the procurement had to be split between the two vendors, users felt that the goal of interoperability across the two sites was not achieved. Furthermore, innovation partnership was not actively in use at any of the sites, either (Interviews, NKS, 2019 and Södersjukhuset, 2020).

## DISCUSSIONS AND CONCLUSIONS

The purpose of this paper was to provide a critical analysis of PPI as a case of innovation governance via a market-based instrument. Through this analysis, we aim to contribute to the broader discussion on the use of markets or market-like features as a means of addressing public concerns (Geiger *et al.*, 2014; Frankel *et al.*, 2019). Our literature review embedded the promises of strategic PPI within its regulatory landscape, as well as previous research that both analyzes and promotes the development of PPI. In our analysis, we employed the interdisciplinary constructive market studies approach to formulate a practice-based critique on PPI. Our case narrative gives a detailed empirical account of the work performed by public buyers to make markets work to achieve the aims and expectations set out in public procurement policies and strategies.

In summary, PPI in our case was given a central role to govern innovation in delivering radiation therapy in the region. The process lasted almost five years (including pre-studies). The case manifested various concerns about the economic and political motivations behind the choice of PPI as a tendering method; these ranged from enhancing the region's competitiveness and prestige to cost effectiveness, accessibility and equity of cancer care. The buyers wanted to enact an innovation procurement that included investments in a variety of new and existing procurement tools specifically developed to perform a PPI. Extensive efforts were made to specify needs and identify possible solutions. Various actors and resources were mobilized, including region representatives, professional buyers, users, technicians, potential suppliers, management consultants, and lawyers. Further investments were made in developing the evidential basis for assessing the innovative solution and costs to be saved, and the numerous factors at play were classified and evaluated. Eventually, the procurement process concluded by rewarding a vendor for supplying an innovative equipment solution at the lowest cost. However, the process did not end there but dragged on through several court appeals and tender reviews that turned the procurement into a duel between the two participating vendors. This public conflict was dogged by debates about the long patient waiting times, capacity issues, extra economic costs, and dubious efficiency of public resource use that directed substantial public attention to the procurement.

What can be learned from our critical analysis of this process in terms of innovation governance? First, our observations align with earlier work in the constructive market studies literature (Callon & Muniesa, 2005; Neyland *et al.*, 2019; Reijonen & Tryggestad, 2012), which shows that socio-technical arrangements of the market play a crucial role in defining the solutions to public concerns. Our case traces how public buyers constructed a particular form of *innovativeness*, even though its precise meaning remains uncertain to this day. The *innovativeness* in the PPI was defined and negotiated by various actors – first and foremost in relation to its form, namely whether it was a medical device or software. Specific accessibility concerns and capacity problems were framed in the procurement, especially in the form of speed and technical expectations of the equipment needed to treat all cancer forms. A further concern was efficiency, as provided by a single-vendor solution and interoperability across devices and sites.

The *innovativeness* anticipated in the case was shaped primarily during the carefully designed and executed workshops and formulations with the expertise of management consultants (e.g., via developing scenarios, using risk analysis tools, and various other management techniques). Here *innovativeness* was articulated in such a way that its qualities

could be translated into contractual terms. Notably, the potentiality of innovation was framed primarily as the development of the software as well as the terms and conditions of the innovation partnership contract. These qualities were then associated to monetary value, which was later calculated and compared to determine the solution that offered the *best value for money*. During this process, we have also seen that the concrete work to realize the aims of the procurement led to mistakes in Excel files, calculation formulas, the language of forms, and rules about the number of days.

To us, more than anything, our findings indicate that it is extremely difficult to frame a market for the governance of innovation via procurement as a policy instrument. The emergent character of such procurement processes makes it impossible to know beforehand the outcome of tools and practices used in PPI. As such, our study highlights the important role played by the practices, expertise, and material tools in framing markets and in determining what becomes *innovative* in practice (Muniesa *et al.*, 2007). We see that PPI processes are not simply about effectively applying the specific procurement tools prescribed by regional or national policies to achieve greater innovation in public services, for example through competitor dialogue or innovation partnership. Rather, the meaning of *innovativeness* is constructed during the procurement process. Therefore, our analysis emphasizes the critical role of socio-technical organizing work of innovation governance in the specific practices of PPI. It establishes a connection between policy instruments and markets by shaping the meaning of *innovativeness* through various valuation tools and practices, as also demonstrated by Reijonen and Tryggestad (2012) in relation to the espoused goal of *greening* procurement.

What, then, can our critical analysis say about the use of markets as a means of addressing public concerns? Our case has illustrated how PPI produced both intended and unintended consequences. The intended consequences were demonstrated in the existence of a competitive tender that framed a market situation in a contractual form to enable decision-making based on the best value for money – including *innovativeness* as a value. The unintended consequences were the delays in the delivery of equipment, insufficient radiation therapy capacity within the region, and the conflicting stakeholder views on the value of the *innovation* that was delivered.

Our empirical study suggests that diverging market concepts mobilized during the process, such as *competition* and *value for money*, contributed to the unfolding of these unintended consequences. In particular, the notion of competition that is embedded in PPI aligns with a neoliberal ideal of free-market efficiency. Market competition is understood

here as a type of distributed collective intelligence mechanism that surpasses planning or democratic decision-making in finding innovative solutions to public problems (Frankel *et al.*, 2019). It thus follows that competing vendors will come up with the best solution to any problem at the lowest cost, thereby ensuring the highest value for money for the buyer. Our case highlights how buyers viewed competition as an essential market component to be actively pursued and conditioned to address public concerns about radiation therapy in the region. However, the participant suppliers' understanding of competition differed from the buyer's interpretation. Suppliers clearly positioned competition in relation to the public buyer's role in safeguarding 'the market' from state intervention, in line with EU and national regulatory frameworks. This clash led to appeals and tender reviews between the vendors and the region, significantly delaying the process as an unintended consequence.

Similarly, the value-for-money formulation in the procurement (i.e., the most innovative solution with the best price) was contested in the aftermath of procurement. For example, various parties argued that value associated with enhanced access or shorter waiting times for patients was inadequately accounted for in this formulation. Instead, the clinical users and the Labor Union at Karolinska Hospital claimed that PPI and the competitive pressures it mobilized allowed the supplier to present a technological innovation that they did not possess and, furthermore, that the supplier could not deliver within such a short time frame. In short, the value of an innovative solution and future *innovativeness* that was carefully designed during the procurement process did not fulfill expectations of value that privileged continuous care delivery over other outcomes (very much associated with political motivations of enhancing the region's competitiveness and prestige at the cost of accessibility). Our analysis is therefore in line with previous studies that have highlighted how practitioners involved in designing and implementing market-based instruments often bring their own definitions and conceptions of markets. The making of a particular market-in-practice in line with different definitions and components of markets-in-theory can lead to conflict, as pointed out by Frankel *et al.* (2019).

In highlighting the consequential interplay between different versions of markets and its practical functioning, our paper contributes to the current special issue on innovation governance by showcasing a theoretical lens that does not treat markets or innovativeness as inherently fixed concepts. This diverges from the dominant discourse in the innovation policy literature on PPI, which routinely focuses on the benefits of, and barriers to, implementing PPI to achieve desired societal goals (e.g., Uyerra *et al.*, 2014). By foregrounding the distributed and contested effort to render innovativeness in practice, our study opens up for broader questioning of the potentiality of market-based instruments

such as PPI to govern innovation, without delimiting an analysis of its consequences to a simplified dichotomy between success (*yes, there is innovation*) or failure (*there is no innovation*) (cf. Aschhoff & Sofka, 2009; Guerzoni & Raiteri, 2015). For example, our case underscores that PPI will take form in action, notwithstanding how policies outline guiding principles and best practices. It is how abstractions such as innovation, competition, and value for money are given concrete form through practices and devices that determine what PPI can and will become. Thus, making markets *innovative* requires a careful consideration of these practices and devices, including ostensibly technical details such as timelines and Excel sheets, as well as seemingly obvious things such as the object of exchange, the meaning of competition, and the (also challenging) issue of which qualities/characteristics actually constitute innovation.

We do not claim to have fully addressed solutions to these challenges in this paper, and we expect future research to explore PPI in diverse contexts beyond health care and dig deeper into the questions, such as who is involved in their design, what kinds of expertise are employed (including management consultancy and beyond), and what role is attributed to them in relation to innovation governance and societal problems.

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Appendix: List of data sources.

Data type	Data collection points	Number of points	
Documents	News articles in Swedish press retrieved from database Business Retriever	21	
	Decision protocols - Region Stockholm	6	
	Procurement/tendering documents	9	
	Court decision protocols	5	
	Vendor annual reports	10	
		Total: 51 documents	
Interviews	State agencies <ul style="list-style-type: none"> <li>• Dental and Pharmaceuticals Agency (TLV)</li> <li>• Regional Cancer Center, VästraGötaland</li> <li>• National Strategic Innovation Program within medical technology (Medtech4Health)</li> <li>• Swedish Agency for Health Technology Assessment &amp; Council for new medical devices (MTP-Council)</li> <li>• Council for new therapies (NT- Council)</li> </ul>	6	
	Public organizations <ul style="list-style-type: none"> <li>• Region Stockholm public procurement office</li> <li>• Swedish Association of Local Authorities and Regions (SKR)</li> </ul>	4	
	Health care providers (hospital radiation therapy units) <ul style="list-style-type: none"> <li>• NKS, Stockholm</li> <li>• Södersjukhuset, Stockholm</li> <li>• Hospital Ryhov, Jönköping</li> </ul>	3	
	Consultants (in the management consultant company specialized in health care external to the regional government)	1	
	Vendors (radiation therapy equipment and software)	2	
	Swedish Industry Association, Medical Devices	4	
			Total: 20 interviews