



HAL
open science

Stimulating innovation and creating new markets – The potential of circular public procurement

Joel Ntsonde, Franck Aggeri

► To cite this version:

Joel Ntsonde, Franck Aggeri. Stimulating innovation and creating new markets – The potential of circular public procurement. *Journal of Cleaner Production*, 2021, 308, pp.127303. 10.1016/j.jclepro.2021.127303 . hal-03447721

HAL Id: hal-03447721

<https://minesparis-psl.hal.science/hal-03447721>

Submitted on 25 Apr 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

STIMULATING INNOVATION AND CREATING NEW MARKETS – THE
POTENTIAL OF CIRCULAR PUBLIC PROCUREMENT

JOURNAL OF CLEANER PRODUCTION 308 (2021) 127303

DOI:[10.1016/j.jclepro.2021.127303](https://doi.org/10.1016/j.jclepro.2021.127303)

Joël Ntsondé

EPF-école d'ingénieurs, 92330, Sceaux, France

Franck Aggeri

MINES ParisTech, Université PSL, Centre de Gestion Scientifique (CGS), i3 UMR CNRS,
75006 Paris, France France

STIMULATING INNOVATION AND CREATING NEW MARKETS – THE POTENTIAL OF CIRCULAR PUBLIC PROCUREMENT

Abstract

Countless researchers have studied the challenges faced by public and private actors wishing to implement more sustainable practices. So far, few of them have investigated the potential role of public procurement in fostering a transition toward sustainability goals, despite the fact that management literature has already stressed that public procurement can be an effective policy instrument to foster the transition towards sustainability, emphasizing its potential influence on sustainable innovation and the creation of a circular market. At this point, however, there is still a paucity of empirical evidence on the mechanisms by which public procurement can effectively stimulate sustainable innovation and foster the development of greener markets. Consequently, using a design theory approach and building on valuation studies, this paper clarifies how public procurement can stimulate innovative practices in organizations and foster the creation of new markets developing greener products. To shed light on this issue, we use a qualitative method relying on an empirical case relating to a public tender in Denmark.

Keywords: Circular economy; public procurement; innovation; market creation; sustainability

1. Introduction

Even though the literature on public procurement still needs to be expanded (Preuss, 2009), a significant part of it has already analyzed the potential impact of public procurement on sustainability. Indeed, several researchers have highlighted the role of public procurement in fostering sustainability (Aldenius & Khan, 2017; Grandia, et al. 2015). This literature usually approaches the issue through the concept of sustainable public procurement (Brammer & Walker, 2011), green public procurement (Testa et al., 2012) or, more recently, circular public procurement (Sönnichsen & Clement, 2019).

However, this literature does not provide much empirical evidence or details regarding the mechanisms through which public procurement can help foster the transition towards sustainability (Cheng et al., 2018). This research often mentions the opportunities offered by public procurement to stimulate the development of innovative and sustainable solutions (Alvarez & Rubio, 2015; Brammer & Walker, 2011) or underline the ability of public procurement to bring about the conditions needed to create or enlarge greener markets (Testa et al., 2016; Li & Geiser, 2005). So far, however, discrepancies remain with regard to the potential role of public procurement in green innovation and markets. As far as we are concerned, the term ‘sustainable innovation’ refers to new products, services or processes designed to reduce the impact of human activities on the environment and society while taking into account their whole lifecycle. The term ‘green market,’ also referred to as a ‘circular market’, represents markets in which entrance conditions for sustainable innovations or products/services from the circular economy are easier than in regular competitive markets.

Therefore, the question we raise in this paper is how public procurement can affect innovation and markets in order to foster the development of greener products and foster the

transition towards sustainability. As the circular economy is now gaining momentum in academic literature and is increasingly considered an effective approach for contributing to sustainability (Geissdoerfer et al., 2017), we have chosen to more specifically focus on the case of circular public procurement.

In order to get empirical data to tackle this question, we have chosen to carry out a single case study focusing on a public tender in Denmark that tried to reach a high level of circularity (won the 2017 Best Public Market Award of Denmark). In this paper we first present our literature review highlighting the main approaches employed to study the impact of public procurement on sustainability, markets and innovation, then we present the methodology we implemented, and finally we present our results to clarify the potential impact of public procurement on sustainable innovation and green market creation.

2. Literature review

The academic literature about public procurement and sustainability is being developed around several concepts such as green public procurement, sustainable public procurement and, more recently, circular public procurement. As a result, the first part of our literature review will clarify the differences between these concepts. Next, we will discuss what this literature tells us about the potential effects of circular public procurement on innovation and green market creation.

2.1 From sustainable and green to circular public procurement

Public procurement (PP) can be defined as “the acquisition of goods and services by government or public sector organizations” (Uyarra & Flanagan, 2010). PP includes education, leisure, and social services (Walker & Preuss, 2008). In management literature, the terms “sustainable public procurement” (SPP) and “green public procurement” (GPP) have been used to point out how PP can be used as a policy instrument for reaching environmental quality objectives (Aldenius & Khan, 2017). Some scholars have defined SPP as the act of integrating a concern for broader social and environmental impacts within PP (Brammer & Walker, 2011; Preuss, 2009), and reckon that SPP has a broader scope than GPP as it takes into account the economic, social, and environmental pillars of sustainability (Aldenius & Khan, 2017), whereas GPP focuses mainly on environmental benefits (Testa et al., 2012).

Over the past years, an increasing number of researchers have been studying the barriers and drivers of SPP and GPP emphasizing factors such as a lack of financial or human resources (Grandia et al., 2015), inadequate expertise (Brammer & Walker, 2011), or policy issues such as insufficient support or clarity (Melissen & Reinders, 2012). Other researchers pinpoint the importance of active top management (politicians and high-level staff) in integrating SPP and GPP in planning strategies (Brammer and Walker, 2011).

As for the literature about PP and the circular economy, it is still recent and emerging. For instance, Witjes & Lozano (2016) have studied the links between the circular economy, PP and supply practices. They propose a framework which can lead to better collaboration and conflict resolution between public actors and suppliers. They explain that this framework can be used to design PP processes which contribute to the circular economy, closing loops and reducing both waste production and the amount of raw materials needed.

More recently, Sönnichsen and Clement (2019) carried out an extensive literature review on circular public procurement (CPP) and highlighted the main barriers encountered by local public authorities at organizational, individual and operational levels. Their paper first scrutinizes the literature on GPP and SPP and introduces the term ‘circular public procurement’ (CPP). According to these authors, the concept of CPP is advantageous when wishing to take into account the new methods, tools and practices ushered in by the circular economy. As the concepts of GPP, SPP and CPP have many similarities, for semantic simplification, they propose using the term CPP when referring simultaneously to GPP, SPP, and CPP.

However, other scholars underline the differences between CPP, SPP, and GPP, and set forth a specific definition for CPP. Indeed, in their recent paper, Alhola et al. (2019) acknowledge that even though the SPP and GPP literature is closely linked to the circular economy, it does not fully address the concept of a circular lifecycle approach. They furthermore claim that SPP and GPP are more product- and technology-oriented, while CPP aims to include complex networks and ecosystems. In the following, we have chosen to use the definition of CPP proposed by these authors, i.e. “*a procurement of competitively priced products, services, or systems that lead to extended life spans, value retention, and/or remarkably improved and non-risky cycling of biological or technical materials, making use of and supporting the circular business models and related networks*” (Alhola et al., 2019, p. 105).

2.2 Circular public procurement, Innovation, and Markets

Some authors reckon that CPP can be a major stimulus for ecological and environmental innovation (Brammer and Walker, 2011; Testa et al., 2012), claiming for instance that including

the carbon footprint as an evaluation criterion in CPP can generate a market signal and stimulate eco-innovation (Alvarez & Rubio, 2015). Some scholars furthermore claim that CPP can be used as an effective policy tool or instrument to overcome the current lack of support for innovation by public and private actors (Sönnichsen & Clement, 2019).

Some researchers address both innovation and market stimulation, arguing about the potential positive effects of CPP on fostering innovation and green markets, and underlining the major stakes involved in conducting research on this potential (Testa et al., 2016). According to Li and Geiser (2005), CPP can be an effective instrument for creating or enlarging markets for green products as long as public authorities have substantial purchasing strength, while Cheng et al. (2018) emphasize that when they are powerful enough, these public actors could also trigger innovation investment and competition.

However, there are still discrepancies in the literature regarding the strength of CPP's impact on sustainable innovation and green market creation. Some research indicates how difficult it can be for local authorities to support innovation practices in the private sector through CPP. In fact, Aldenius and Khan (2017) highlight the difficulties faced by local authorities willing to increase innovation in specific technologies when they do not have specific, detailed functional requirements available. Other scholars even claim that CPP is not really effective in creating more sustainable markets (Lundberg et al., 2015). According to them, even if CPP can lead public actors to increase their consumption of green products and services, eventually, it will have counterproductive environmental effects on private companies who will not make the effort to change their practices and will just develop niche products for public markets.

Consequently, the conclusion of the literature review carried out on CPP by Cheng et al. (2018) is that there is little evidence on the potential impact of CPP on innovation and markets because so far, there has been little empirical research on this topic. Nevertheless, a recent empirical study analyzed 18 cases and showed that CPP can provide favorable conditions for the development of innovative solutions and create new markets for these products (Alhola et al., 2019). This study hints at the relevant tools able to achieve CPP implementation (criteria supporting circularity, new business models), and highlights the potential role of cities and municipalities in offering a platform for innovative pilot projects and experiments.

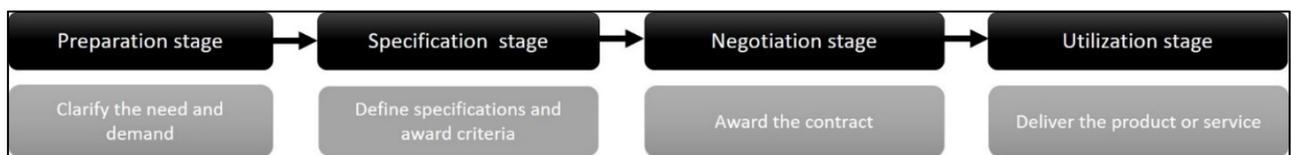


Figure 1: Public procurement process – source: adapted from Witjes and Lozano (2016)

3. Research methodology

In order to expand the emerging literature on CPP and clarify its impact on innovation and markets, the inductive approach (Eisenhardt et al., 2016) has emerged as the most suitable one for getting empirical data and shedding light on the mechanisms by which CPP can foster innovation and sustainable markets. The objective of this study was to gather and analyze empirical data in order to contribute to the nascent literature about CPP (Cheng et al., 2018; Sönnichsen & Clement, 2019) and bring empirical evidence with regard to the way CPP could create the conditions for sustainable innovation and greener markets.

Therefore, we have chosen to use a single case study approach appropriate for addressing ‘how’ and ‘why’ questions (Eisenhardt, 1989) focusing on a case that is particularly advanced in terms of sustainability. The initiative we studied was implemented in the municipality of Aalborg in North Jutland, the northernmost region of Denmark. With a population of more than 200,000 inhabitants, Aalborg is the third largest urban area in Denmark. The call for tender initiated by the city of Aalborg and won by the Højer Møbler furniture company has been identified as an exemplary initiative by the European Commission, which has included it in the list of the best green tenders in the furniture category (European Commission, 2018). In Denmark, too, this initiative is considered pioneering and effective, since in 2017 it won the Best Public Market Award, an annual prize awarded by the Danish Association for Public Procurement (IKA).

Data were collected via semi directive interviews conducted with the main stakeholders in this call for tender. In order to understand the process that unfolded to the achievement of this circular public tender, we have chosen to focus our interviewees on the three main actors who were involved in this tender: Aalborg municipality (2 interviews) who initiated the public tender, Højer Møbler who won the contract (4 interviews) and Aalborg university (3 interviews) who provided expertise regarding the circular economy. The first two, with managers of Højer Møbler, took place in October 2018 and March 2019 in Paris, while the other were held in Aalborg in April 2019. We have used an interview guide for these interviews following the funnel model (Voss et al., 2002): starting with broad, open-ended questions such as the original context and motivations that led to the implementation of this call for tender, and continuing with more specific ones like the processes, methods and tools applied to manage and materialize the public procurement of furniture using a circular economy approach (Appendix B).

In addition, we performed three other interviews with the Sustainable Business Network (2 interviews) and the Green Agent Network (1 interview). Those interviews were conducted with an exploratory approach to verify whether these networks played a role and contributed to create favorable conditions for the launch of the public tender. The Sustainable Business Network has been created by Aalborg municipality and Aalborg municipality roughly ten years ago to develop cooperation between public and private organizations of the North Jutland region. As for the Green Agent Network, it is an NGO which has been working closely with Aalborg municipality over the past five years to strengthen its local sustainability policy. The main questions asked to these two organizations were quite general and mostly about the evolution and emergence of sustainability and the circular economy as key matters in the local area.

Overall, we carried out 12 semi-directive interviews in all (Table 1) and also gathered complementary sources of evidence, such as reports and documents, from the EU and Aalborg municipality. The data gathered in the case study were first organized, sorted and decontextualized to prepare the analysis phase in order to highlight similarities and differences between the data from the interviews. Next, we applied thematic coding (Fereday & Muir-Cochrane, 2006) to the data. Seven themes emerged out of this process: transition, waste and resources, innovation, business model, tools and methods, sustainable value, and public policy (Appendix A).

Id	Organization	Nbre of Interviewees	Position	Date	Duration
R1	Højer Møbler	2	Founder Business Manager	11/10/2018	1h05 mn
R2	Højer Møbler	1	Business Manager	13/03/2019	35 mn
R3	Aalborg University	1	Professor	22/04/2019	2h05
R4	Sustainable Business Network	2	Project Manager 1 Project Manager 2	25/04/2019	1h45
R5	Sustainable Business Network	1	Project Manager 3	25/04/2019	1h40
R6	Højer Møbler	1	CEO	26/04/2019	1h20
R7	Højer Møbler	1	International business manager	26/04/2019	1h35
R8	Green Agents Network	1	Green Agent	29/04/2019	45 mn
R9	Aalborg University	1	PhD Student	29/04/2019	55 mn
R10	Aalborg University	1	PhD Student	29/04/2019	45 mn
R11	Aalborg Municipality	1	Head of Sustainability Department	30/04/2019	35 mn
R12	Aalborg Municipality	1	Project Manager	30/04/2019	2h10

Table 1: List of interviews conducted – source: authors

4. Main results

Data analysis provided our main insights into the organizational process that allowed the Aalborg municipality to implement its call for tender for ‘circular’ furniture. Our analysis also enabled us to clarify the mechanisms by which public procurement can stimulate sustainable innovation and create greener markets.

4.1 Case of the Aalborg municipality

Several insights came out of the Aalborg case study and were particularly helpful for conceptualizing the influence that CPP can exert on innovation and markets. In this section, we present the most significant reasons why this public call for tender allowed the Aalborg municipality to foster a transition toward sustainability.

4.1.1 Principal outcome of an award-winning public call for tender

The objective of the call for tender was to select a supplier from whom the 54 schools attached to the city of Aalborg would obtain new furniture for the next three years. The innovative nature of this procurement initiative lies in two main opportunities: first, the possibility for schools to acquire new furniture from the circular economy; and second, the possibility of using this new furniture to instigate a new type of pedagogy known as active learning, which values teacher-student interaction, movement, and active student participation.

The principles of a circular economy were considered throughout the furniture’s lifecycle, from the production of raw materials (wood, plastic) to the end of the furniture's life. Concerning the supply of raw materials, the furniture proposed by the contract winner, Højer Møbler, is made out of wood from sustainably managed forests (FSC label), but also from

recycled wood and plastic. Moreover, Højer Møbler undertook to reuse more than 20% of the furniture already present in schools (Table 2).

The call to tender included specific clauses to ensure the longest possible period of use, in particular by requiring the provision of easy-to-use maintenance guides and spare parts, and the possibility of dismantling the furniture and replacing one or more parts. With regard to repairs, social clauses were also integrated in the call for tender since local socially-oriented organizations were to handle repairs. Finally, the procurement conditions also stipulated that all furniture reaching the end of its life, i.e. which could not be reused or refurbished, must be fully recycled.

In the evaluation grid for applicants, the weight of the score attributed to the circular economy was 40%, which is not in line with the usual practices of public procurers, and was a determining factor. This is explained by the CEO of Højer Møbler: *“It is not often that I see a criterion of sustainable development [actually, it was a circular economy criterion] in a public market. And in general, when there is one, its weight represents half of what there was in this market where it was 40%”* [R6, Table 1]. The city of Aalborg was satisfied by this first initiative and then decided to launch similar projects for its ICT and school playground equipment. From an economic point of view, despite the specific efforts made for this project, the municipal teams have estimated that it will not be more expensive than a conventional call for tender. However, given that this is still a very recent project (initiated in October 2018), they do not have all the economic indicators to prove it.

This call for tender is already a political success for the city of Aalborg because it is part of the strategy that has been followed for the past ten years to become an attractive territory from an economic and environmental point of view. Although furniture is not necessarily a key sector for the Aalborg municipality, the issuing of such a call sends a strong signal showing that

this type of procurement is feasible, and not only on a small scale. Thus, from January 2019, the city launched a project designed to make its region the first ‘circular’ region in Denmark (Aalborg University, 2019).

Award Criterion	Description	Weight
Lifetime	Product life guaranteed > 5 years User manual for easy maintenance	30%
Service & maintenance	Spare parts guaranteed > 5 years Products that can be disassembled	25%
Reuse	Reuse of existing furniture (above 20%) Handling of furniture for reuse	20%
Refurbishment	Refurbishment of existing furniture Refurbishment by organizations with a social focus	15%
Material recycling	New furniture made of recycled materials Recycling of excess furniture	10%

Table 2: Main criteria of the Aalborg public call for tender for ‘circular’ furniture – source: authors

4.1.2 Achieving a circular public call for tender

Successfully implementing such an innovative market required of Aalborg procurement officials a long and very unusual preparation. It took the municipality’s teams a total of a year and half to finalize their call for tender, a period which can be divided into three main stages: market preparation, pre-qualification and final negotiations. For the preparation phase, the main difficulty encountered by the project manager was to define what comprised ‘circular’ furniture. To move forward on this subject, the municipality therefore sought the help of several partners who played a major role in the procedure.

Given that the municipality's teams had no skills in the circular economy, they contacted researchers and students at the University of Aalborg who provided them with their expertise to define a concrete offer for ‘circular’ furniture. A consulting firm was also asked to support

the preparation phase, which was carried out before the public procedure was launched. Several meetings were thus organized between the municipality's teams and potential suppliers. The aim of these meetings was to get to know their offers better and above all to assess their ability to respond to a call for tender with high ambitions linked to the circular economy. These meetings confirmed both the skills and the interest of companies in terms of 'circular' furniture.

The city of Aalborg therefore issued its call for tender in April 2017, with a first pre-qualification phase to which eight companies responded. The pre-qualification phase aimed to better characterize the offer of companies on several aspects such as the ability to integrate circular economy principles in product design, offer innovative interior layouts, ensure furniture maintenance, install new furniture or involve social workers in repair activities. The municipal teams then selected five companies from the eight applicants and asked them to formulate a bid for 'circular' furniture corresponding to four different school cases, including a description of the classes, the constraints to be considered and the existing furniture. In the end, three of these five companies chose to formulate a response for June 2017.

The last stage of the procedure therefore consisted in a negotiation phase between the city of Aalborg and the final three applicants to determine the best offer. These negotiations lasted until September 2017. It was ultimately Højer Møbler that won this contract and consequently signed a 3-year contract in October 2017, with an optional additional year.

4.2 Advancing the transition towards sustainability with circular public procurement

Being one of the first local authorities in Europe to issue a circular public call for tender so far, the city of Aalborg has laid the foundation of what can, and perhaps will be in the future an effective circular public procurement that will help foster local sustainable transitions. As

mentioned previously, this call for tender is not only a prize-winner in Denmark, but has also been hailed in Europe by the European commission as one of the most exemplary circular public calls for tender (European Commission, 2018). The case of Aalborg reveals the potential of circular public procurement for supporting innovation and creating new markets.

4.2.1 Stimulating cooperation, innovation and exploration

Public procurement is acknowledged by scholars as a linear and highly standardized process whose effects on innovation are still disputed (Cheng et al., 2018). However, the case of the Aalborg municipality exposed here reveals that public procurement can be leveraged to create appropriate conditions for collective and radical innovation. Previous research has already emphasized that developing cooperation between purchasers and suppliers is necessary in order to foster innovation and set up more sustainable public procurement (Witjes & Lozano, 2016). Sönnichsen and Clement (2019), for instance, claim that pre-market procedures and negotiations have significant benefits because they allow procurers and suppliers to share risk and consequently, foster the introduction of radical innovation in public procurement. However, these previous studies do not provide details on how public and private actors can achieve cooperative practices. Some researchers have focused on specific tools such as competitive dialog (Uttam & Le Lann Roos, 2015) without clarifying the required organizational mechanisms.

The case of Aalborg shows that a paradigm shift is required to reach ambitious targets in terms of sustainable or circular public procurement. Themes such as innovation, business model, and transition, which all came out of our coding process (Appendix A) led us to believe that public procurement can be considered as a design activity (Le Masson et al., 2010). Such

an approach is relevant for shedding light on the transformation processes that allowed the Aalborg municipality to implement circular public procurement. Indeed, public procurement can be considered as a design task whose objective is to design the characteristics of a contract, the conditions of the selection process and the execution conditions of the contract between a public and a private organization. As a repeated and routinized design activity, public procurement is traditionally structured around *rule-based design*, i.e. a dominant design consisting in a set of design rules (Le Masson et al., 2010).

By dominant design, we mean that the identity of the object to be designed is stable, its specifications and value criteria are known, as are the rules and business expertise required to complete the tendering process. Considering public procurement, the dominant design is mainly structured by the EU's legal framework and its transposition at national scale. It relies on European directives that have been defining the rules for public procurement in Europe since 1971 (Helfrich & Romestant, 2015). For instance, directive 2014/24/EU contains 94 articles establishing rules regarding a public call for tender, such as the thresholds corresponding to the different kinds of procedures, the use of framework agreements or award allocation principles. This directive has been transposed into the legal framework of EU members, and defines mandatory rules that public procurers have to follow in order to design the procurement process from the formulation of a need to the utilization stage (Figure 1).

On the other hand, *innovative design* (Le Masson et al., 2010) consists in designing a product, service or process in a situation where its identity is still unknown and not yet stabilized. In this case, the usage, performance and technical requirements of this product or process remain open questions. Innovative design often manifests itself in collective exploration activities, where the unknown and a lack of stabilized knowledge imply constructing the value

of the product or process to be designed (Hatchuel & Weil, 2009) during the process itself. With regard to Aalborg, the municipality was able to create space for innovative design and exploration within a specific call for tender, which has fostered the emergence of radical innovation in terms of a circular approach to furniture procurement.

Through a competitive dialog procedure, the Aalborg municipality was able to organize cooperation between heterogeneous actors such as Aalborg University, the Travel team for green procurement (partnership between the Danish Environmental Protection and the Danish Standardization Body), an external consulting firm and the suppliers, to engage in an innovative design process which questioned the object or subject matter of the contract, enriched the functional definition of the object and allowed the municipality to apply a major ‘circular’ component to the furniture’s lifecycle.

The subject matter of a dominant design type of call for tender would usually be related to the purchase of school furniture, but this time, the co-design process initiated during the seven meetings that took place with the suppliers allowed the municipality to redefine a new subject matter relating to the purchase of a “sustainable learning environment”, which enriched the functional definition of the product or service, opening new paths for innovation. This subject matter, for instance, has led the actors to include in the call for tender both specifications and criteria related to learning efficiency in terms of the spatial layout of classrooms with the new furniture.

Additionally, one of the main reasons why this call for tender was able to integrate such a major ‘circular’ component is the time and resources that were specifically allocated to it by the municipality. As explained here by the project manager, most calls for tender using the dominant design approach are carried out on a short schedule and mainly reuse previous calls,

while an innovative design approach needs more time and resources: *“When you are going to issue a call for tender, you have something in your drawer, you can just take it out and update it, it does not take very long. But when you issue a call for circular tender, you have to rethink everything, and it takes longer”* [R12, Table 1]. The Municipality’s top management agreed to let its teams spend more time and effort on this circular call for tender and even organized internal cooperation via the close teamwork fostered between procurement and sustainability departments.

We can observe then that the specific conditions set up by the Aalborg municipality allowed both internal and external participants to create a particular space for innovative design that contributed to developing an outstanding public call for tender in terms of its circular approach. However, in spite of the positive outcome of the school furniture bid, it has been difficult for the sustainability department to convince the procurement department to replicate the experimentation for other markets. Even if the Aalborg municipality eventually decided to launch new projects for ICT and school playground equipment, the project manager was surprised by the persistent resistance within the public organization: *“It was not easy to convince the head of the procurement department that we needed to do another call for tender — another pilot project — because it takes longer [...] and the extra cost involved is borne by the procurement department”* [R12, Table 1]

The new public calls to tender, especially the one related to ICT equipment, have required much time to set up. With the support of a PhD student, the project manager took a long time analyzing how the municipality’s seven departments managed their pool of computers, printers and phones, before bringing them together to encourage ideas about ways to harmonize their practices and reduce their waste. This specific work of collective innovation appears to be

powerful in terms of transformation potential, but it is also time consuming and costly for the municipality. Therefore, although innovative design is an effective approach for fostering the development of new circular economy practices, products and services for both public and private actors, it implies many constraints and cannot be easily systematized on a regular basis. As a result, the key point might be to generate new knowledge from this kind of experiment in order to change the dominant design approach and integrate new design rules derived from a circular economy approach.

4.2.2 Framing new markets to achieve sustainability

Developing innovation, cooperation and knowledge through innovative design and experimentation is an effective approach for enhancing the circular component in public calls for tender but is not sufficient to bring sustainability to a local area, city or region. The case of Aalborg shows that, thanks to innovation, circular public procurement has an important role in sustainable transition because it can create new markets through valuation processes.

Previous research has shown that markets do not correspond only to supply meeting demand, but result from the construction, transformation and reconstruction of arrangements representing the assembly of various elements such as intellectual property rights, regulatory instruments, the definition and framing of contracts, and calculating activities (Callon & Muniesa, 2005). Further research has shown that market value is the result of an ongoing valuation process (Çalışkan & Callon, 2009). In other words, market value results from “*any social practice where the value or values of something are established, assessed, negotiated, provoked, maintained, constructed and/or contested*” (Doganova et al., 2014, p 87).

With regard to the case of Aalborg, this refers to all the work completed during the tender procedure, which consisted in building and then qualifying the economic, environmental and social value of a ‘circular’ furniture solution. This explains why the themes “public policy”, “tools and methods” and “sustainable value” emerged from our coding work (Appendix A). In the call for tender, economic value was defined by the price; social value was defined by the quality of interior design that is supposed to improve the effectiveness of the learning environment, and the employment of socially-assisted workers for refurbishment activities; and environmental value corresponded to the furniture’s extended lifetime through reuse, refurbishment and recycling activities.

Additionally, while usually restricted to economic profitability, this time the Aalborg municipality chose to define indicators for monitoring environmental and social performance. They determined five criteria which are monitored on an annual basis: the quantity of furniture actually reused, the quantity of furniture repaired or refurbished, the quantity of new furniture used, the volume of social employment used, and the methods used to manage the waste produced. This monitoring activity will allow the municipality to gain experience and enhance the ‘circular’ performance of its future calls for tender, whether for furniture or other products or services.

The Aalborg municipality’s valuation work is not limited to environmental and social dimensions but also questions the economic dimension, enriching the potential value of ‘circular’ products and services. For example, with the support of the Travel Team for Green Procurement, the municipality’s teams have worked on the Total Cost of Ownership (sum of purchase cost, usage cost, maintenance cost and end-of-life cost) in order to understand how it could be used in public calls for tender to assess the cost of circular economy products over

their whole lifecycle. As they do not have enough experience on new learning environments, municipality teams have been unable to find out how to calculate the Total Cost of Ownership (TCO) of 'circular' furniture. However, they reckon that they will be able to calculate economic savings for the municipality as they expect the new learning environments to improve teachers' health and so decrease expenses for temporary staff. They will also try to compute the economic gains induced by better learning, higher grades and the improved health of pupils.

The Aalborg municipality has engaged in a valuation process which is constructing a market value for the circular economy structured by economic, social and environmental dimensions. Overall, we can see that the ongoing valuation process carried out by the Aalborg municipality is helping to build a new market value and arrangements for 'circular' furniture which are fostering the creation of new markets for the circular economy. The suppliers having responded to the call for tender have invested time and money in the process, and thanks to the innovative and collective design approach conducted by the Aalborg municipality, they have been able to create or improve their 'circular' furniture offer.

Most of these suppliers are now expecting new public procurement calls for tender of this type to be issued in the future in order to be able to propose and develop their new offer and make it profitable. For instance, one of these companies (Holmrís B8) has recruited a former intern of the contract winner, Højer Møbler, and is now working with her to improve their 'circular' portfolio. We can conclude that the case of Aalborg shows the high potential of circular procurement, which is not only about encouraging the purchase of 'circular' products and services, but also about constructing new markets for these products and services in order to stimulate the sustainable transition.

5. Discussion and conclusion

The case of the Aalborg municipality constitutes an empirical study which provides several contributions to the nascent literature on CPP. Using a design theory approach, our research describes and conceptualizes the mechanisms according to which CPP can foster the development of radical sustainable and circular innovations by creating opportunities for innovative procurement practices. Therefore, we show how the framework of innovative design (Le Masson et al., 2010) could be a relevant approach for studying CPP in innovative contexts. Consistent with results developed in the literature on SPP (Brammer and Walker, 2011), GPP (Alvarez & Rubio, 2015) or CPP (Sönnichsen and Clement, 2019), we provide a comprehensive, detailed analysis of the mechanisms at work and how they are combined in a dynamic and coherent setting.

This paper's contribution opens new paths for the literature about public procurement explaining the role potential role of innovation processes in implementing CPP. Indeed, our analysis of innovative design elucidates the mechanisms through which organizations perform exploration and creative tasks while implementing circular public procurement, advancing the literature on CPP and innovation (Sönnichsen & Clement, 2019). Furthermore, from our paper, it can be inferred that the literature on ambidexterity and the paradoxes of innovation related to tensions between exploitation and exploration activities (Andriopoulos & Lewis, 2009) can also be relevant to study CPP. This literature has shown that organizations which are able to pursue simultaneously exploitation and explorative innovation can attain greater performance (Chang & Hughes, 2012). As innovative design seems to be effective to materialize explorative and radical innovation in CPP, further research should be conducted in order to clarify how

organizations can manage the possible tensions that could raise between innovative practices and more conventional ones in public procurement processes.

The second major contribution of our research is to illustrate how CPP can also be an effective tool for creating new markets or expanding existing ones to include greener products using valuation study concepts (Callon & Muniesa, 2005). Previous works have already emphasized that CPP can be an effective instrument for creating or enlarging markets for green products sending a market signal that stimulates sustainable innovation (Li & Geiser, 2005; Alvarez & Rubio, 2015). In their recent empirical research, Alhola et al. (2019) set forth the role of public local authorities to create markets for circular solutions such as smart waste management systems or products manufactured from recycled materials.

The case of Aalborg contributes to strengthen these research works bringing empirical proof on how CPP can be used as an instrument by local public authorities to construct the criteria and arrangements that structure a market and characterize the qualities of the goods that are designed and exchanged within this market. Therefore, our research clarifies the process through which public procurement can be leveraged to create market value for the circular economy and accelerate its development, enhancing the existing literature on CPP and markets (Cheng et al., 2018).

Nevertheless, these contributions rely on a single case study and would need to be further explored and enriched by more empirical studies to clarify the effects that CPP can exert on innovation and markets for sustainability. What conditions are required in order to develop new radical innovations and create green markets? How can public and private organizations materialize these conditions? What are the most suitable methods and instruments for

leveraging the transformation power of CPP in terms of sustainability? These open questions could be addressed in future research.

Indeed, more research is needed to explore further the mechanisms that have been highlighted in this paper. Is innovative design relevant to all kinds of procurement tenders and products? Is it compatible with any kind of public local authority or public organization? How public actors can manage the tensions between innovative exploration and regular exploitation activities? Other empirical studies are needed to explore these questions and enrich the literature on CPP. Similarly, further research could focus on enlarging the validity of the market creation process conceptualized in this paper, applying it to other types of markets and products.

Acknowledgements

We would like to thank Pr. Arne Remmen from Aalborg University for providing us with valuable support to organize and conduct our field research in Denmark.

References

- Aalborg University (2019). Megaproject: The Circular Region. <https://www.megaprojects.aau.dk/megaproject-the-circular-region/>
- Andriopoulos, C., & Lewis, M. W. (2009). Exploitation-exploration tensions and organizational ambidexterity: Managing paradoxes of innovation. *Organization science*, 20(4), 696-717. <https://doi.org/10.1287/orsc.1080.0406>
- Aldenius, M., & Khan, J. (2017). Strategic use of green public procurement in the bus sector: Challenges and opportunities. *Journal of Cleaner Production*, 164, 250–257. <https://doi.org/10.1016/j.jclepro.2017.06.196>
- Alhola, K., Ryding, S. O., Salmenperä, H., & Busch, N. J. (2019). Exploiting the potential of public procurement: Opportunities for circular economy. *Journal of Industrial Ecology*, 23(1), 96-109. <https://doi.org/10.1111/jiec.12770>
- Alvarez, S., & Rubio, A. (2015). Carbon footprint in Green Public Procurement: a case study in the services sector. *Journal of Cleaner Production*, 93, 159-166. <https://doi.org/10.1016/j.jclepro.2015.01.048>
- Brammer, S., & Walker, H. (2011). Sustainable procurement in the public sector: An international comparative study. *International Journal of Operations and Production Management*, 31(4), 452–476. <https://doi.org/10.1108/01443571111119551>
- Çalışkan, K., & Callon, M. (2009). Economization, part 1: shifting attention from the economy towards processes of economization. *Economy and society*, 38(3), 369-398. <https://doi.org/10.1080/03085140903020580>

Callon, M., & Muniesa, F. (2005). Peripheral vision: Economic markets as calculative collective devices. *Organization studies*, 26(8), 1229-1250.

<https://doi.org/10.1177/0170840605056393>

Chang, Y. Y., & Hughes, M. (2012). Drivers of innovation ambidexterity in small-to medium-sized firms. *European Management Journal*, 30(1), 1-17.

<https://doi.org/10.1016/j.emj.2011.08.003>

Cheng, W., Appolloni, A., D'Amato, A., & Zhu, Q. (2018). Green Public Procurement, missing concepts and future trends—A critical review. *Journal of Cleaner Production*, 176, 770-784.

<https://doi.org/10.1016/j.jclepro.2017.12.027>

Doganova, L., Giraudeau, M., Helgesson, C.-F., Kjellberg, H., Lee, F., Mallard, A., Mennicken, A., Muniesa, F., Sjögren, E., & Zuiderent-Jerak, T. (2014). Valuation Studies and the Critique of Valuation. *Valuation Studies*, 2 (2) 2014: 87–96. <https://doi.org/10.3384/vs.2001-5992.142287>

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532-550. <https://doi.org/10.2307/258557>

Eisenhardt, K. M., Graebner, M. E., & Sonenshein, S. (2016). Grand challenges and inductive methods: Rigor without rigor mortis. *Academy of Management Journal*, Vol. 59, No. 4, 1113–1123. <http://dx.doi.org/10.5465/amj.2016.4004>

European Commission (2018). Circular procurement for a sustainable learning environment, Municipality of Aalborg (Denmark). GPP in practice. Issue No. 79. https://ec.europa.eu/environment/gpp/pdf/news_alert/Issue79_Case_Study_155_Aalborg.pdf

Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International journal of qualitative methods*, 5(1), 80-92. <https://doi.org/10.1177/160940690600500107>

Geissdoerfer, M., Savaget, P., Bocken, N.M.P., & Hultink, E. J. (2017). The Circular Economy – A new sustainability paradigm? *Journal of Cleaner Production*, 143, 757–768. <https://doi.org/10.1016/j.jclepro.2016.12.048>

Grandia, J., Steijn, B., & Kuipers, B. (2015). It is not easy being green: increasing sustainable public procurement behaviour. *Innovation*, 28(3), 243–260. <https://doi.org/10.1080/13511610.2015.1024639>

Hatchuel, A., & Weil, B. (2009). CK design theory: an advanced formulation. *Research in engineering design*, 19(4), 181-192. <https://doi.org/10.1007/s00163-008-0043-4>

Helfrich, V., & Romestant, F. (2015). Public procurement and sustainable development compatibilities and frictions between paradigms and practices: The case of the rail industry. *International Management*, 20(1), 78-93. <https://doi.org/10.7202/1045357ar>

Le Masson, P., Weil, B., & Hatchuel, A. (2010). *Strategic management of innovation and design*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511779916.001>

Li, L., & Geiser, K. (2005). Environmentally responsible public procurement (ERPP) and its implications for integrated product policy (IPP). *Journal of Cleaner Production*, 13(7), 705-715. <https://doi.org/10.1016/j.jclepro.2004.01.007>

Lundberg, S., Marklund, P. O., & Strömbäck, E. (2015). Is environmental policy by public procurement effective? *Public Finance Review*, 44(4), 478-499. <https://doi.org/10.1177/1091142115588977>

Melissen, F., & Reinders, H. (2012). A reflection on the Dutch sustainable public procurement programme. *Journal of Integrative Environmental Sciences*, 9(1), 27-36.
<https://doi.org/10.1080/1943815X.2012.658815>

Preuss, L. (2009). Addressing sustainable development through public procurement: The case of local government. *Supply Chain Management*, 14(3), 213–223.
<https://doi.org/10.1108/13598540910954557>

Sönnichsen, S. D., & Clement, J. (2019). Review of green and sustainable public procurement: Towards circular public procurement. *Journal of Cleaner Production*, 245, 118901.
<https://doi.org/10.1016/j.jclepro.2019.118901>

Testa, F., Annunziata, E., Iraldo, F., & Frey, M. (2016). Drawbacks and opportunities of green public procurement: An effective tool for sustainable production. *Journal of Cleaner Production*, 112, 1893–1900. <https://doi.org/10.1016/j.jclepro.2014.09.092>

Testa, F., Iraldo, F., Frey, M., & Daddi, T. (2012). What factors influence the uptake of GPP (green public procurement) practices? New evidence from an Italian survey. *Ecological Economics*, 82, 88–96. <https://doi.org/10.1016/j.ecolecon.2012.07.011>

Uttam, K., & Roos, C. L. L. (2015). Competitive dialogue procedure for sustainable public procurement. *Journal of Cleaner Production*, 86, 403-416.
<https://doi.org/10.1016/j.jclepro.2014.08.031>

Uyarra, E. and Flanagan, K. (2010), Understanding the innovation impacts of public procurement, *European Planning Studies*, Vol. 18 No. 1, pp. 123-43.
<https://doi.org/10.1080/09654310903343567>

Voss, C., Tsiriktsis, N., & Frohlich, M. (2002). Case research in operations management. *International journal of operations & production management*, Vol. 22 No. 2, pp. 195-219. <https://doi.org/10.1108/01443570210414329>

Walker, H., & Preuss, L. (2008). Fostering sustainability through sourcing from small businesses: public sector perspectives. *Journal of Cleaner Production*, 16, 1600–1609. <https://doi.org/10.1016/j.jclepro.2008.04.014>

Witjes, S., & Lozano, R. (2016). Towards a more Circular Economy: Proposing a framework linking sustainable public procurement and sustainable business models. *Resources, Conservation and Recycling*, 112, 37–44. <https://doi.org/10.1016/j.resconrec.2016.04.015>

Appendices

Appendix A – Coding samples

Codes	Verbatim	Interviewee
Transition	"The most important thing to succeed in changing things is to identify people who are really motivated to make this change happen, because it's very easy to put up or invent barriers; there are a lot of people who are very good at putting up barriers."	R11
Waste and resources	"Our purpose is to generate resource loops so that anyone in the network can reuse or transform it into other material. Currently, Denmark is good at burning waste; the incineration sector earns a lot of money from burning waste."	R5
Innovation	"It's like the whole public sector in Denmark: public funds are shrinking and it's really difficult to be innovative and to do things in a different way."	R12
Business model	"Circularity must be integrated into the very core of the company's business model to bring real changes."	R6
Tools and methods	"The problem is that when it comes from the academic world, it's very precise, with a lot of detail. But most of the time, this academic model works in theory, but not in practice."	R6
Sustainable value	"Most people prefer to change because they see something attractive rather than being forced to change because of the law. The objective in creating this network was to create a carrot making it more attractive for companies to be sustainable than not to be."	R11
Public policy	"There is a strong link between jobs, growth and public procurement. It is very important to show politicians the advantages of supporting local businesses through a purchasing policy that allows them to gain a competitive advantage and become leaders in their field."	R11

Appendix B – Interview guide

Presentation of your organization

Could present me in a few words the main goals and activities of your organization?

What is your role in this organization?

Original context of the tender

What is the vision of the circular economy in your organization?

Why is your organization interested by the circular economy?

Could you explain me why your organization have decided to launch or participate to the circular public tender about school furniture?

The circular economy and public procurement

From a general point of view how important is public procurement for your organization?

Why?

Was it the first time that your organization participated in a circular public tender?

What differences have you identified between a conventional and a circular public tender?

Description of the circular procurement process

Could you describe all the steps of the tender you have been involved into?

Please describe me the specific role of your organization at the beginning and during the whole procurement process?

How have you managed to include circularity in each different steps of this process?

What methods and tools have you used to implement circularity in the tender process?

Main difficulties encountered during the procurement process

What were the most difficult barriers faced by your organization during the tender?

How have you been able to overcome these barriers?

Outcome of the procurement process

What were the main results of the public tender?

Do you consider that this tender has been successful? Why?

Could you tell me what were the effects of this tender on your organization and the local area?

Other remarks

According to you, what are the key facts to remind from this experience?

Is there anything you would like to add?