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Research article

Optimising Public Procurement Through Circular Practice: The Power of Intermediation

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Abstract

The public sector is a key economic player in society with a significant purchasing power and therefore has the potential to promote societal change while maintaining a degree of control over use of public funds, transparency and fairness. However, current public procurement processes largely result in purchasing products and services through a generally more pre-planned and rigid type of process.

In this paper we argue that the current public procurement process is not "fit for purpose" for a transition to large-scale circular public procurement which aims to optimise value retention. In order to overcome this, we propose a conceptual framework that could support public organisations in aligning the procurement processes and structures with the value propositions of their own operations. We suggest that intermediation is the key enabler for a transition to a more circular economy by stimulating innovation in public procurement and with an ecosystem perspective.

Keywords: Circular Economy, Public Procurement, Innovation, Intermediation, Business Ecosystem

1. CE INTRODUCTION

In order to drive out our established production-consumption system based on a "take-make-waste" linear industrial approach towards a novel socio-technical regime based on more resource-efficient and sustainable modes of production and consumption, it is imperative to innovate and bring about changes in technology, policies, consumer practices, markets, cultural meanings, infrastructures, and business models (Markard et al., 2012; Pontoni & Bruschi, 2018; Geels, 2019; Termeer & Metze, 2019). In such a context, circular economy (CE) has been proposed as an alternative production and consumption model for achieving sustainable development (European Commission, 2014b). CE offers an alternative, regenerative model that aims to decouple economic growth from resource utilisation by redirecting the linear flow of material and energy into closed loop systems which emphasise prudent resource use for value retention over time thereby eliminating waste (Ghisellini et al., 2018).

Despite the still evolving and diverse concept and associated practices of a CE (Velenturf & Purnell, 2021) one can fundamentally describe a taxonomy of five business models for circularity: 1) circular supply; 2) resource recovery; 3) product life extension; 4) sharing platforms and 5) product-service systems (Accenture, 2014).

Several scholars argue that offering product-service solutions rather than selling products - that is adopting a stock-based rather than flow-based logic - is an effective way towards the achievement of environmental objectives (Mont, 2002; Tukker, 2015; Witjes & Lozano, 2016). Moreover, Tukker (2004 and 2015) argues that result-oriented product-service systems (PSS) are the most innovative way of providing services to satisfy the customer needs, while reducing environmental impacts. While PSS has

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been generally associated with the private sector, it has also considerable potential in the public sector in delivering long-term environmental and economic benefits (Lingegård, 2020).

Public sector institutions have a social and fiduciary authority to preserve natural resources and promote social welfare and equity (Directive 2014/24/EU; European Commission, 2017). The public sector has therefore a crucial responsibility for advancing the notion of sustainable development, arguably even greater when compared to corporations (Ball et al., 2014; Halonen, 2021). This could be pursued by proactively engaging and investing in innovation, which has traditionally been the "Achilles heel" of the public sector, and especially in the area of procurement (Lingegård and Lindahl, 2015). Larsson (2018) argues that a successful procurement strategy should be value-based and that is when it facilitates procurement to develop attractive value propositions for both suppliers and internal stakeholders. However, public institutions have been repeatedly shown to be both path-dependent (difficult to change or implement new solutions) (Schreyögg & Sydow, 2009) and risk-avoiding (Bovaird & Quirk, 2016).

This paper argues that the current public procurement process, which focuses predominantly on cost-effectiveness (Gustavo & Thai, 2007) is not fit for purpose for a transition to large-scale Circular Public Procurement (CPP).

Public procurement has been advocated as one of the most promising policy interventions to enhance resource efficiency in the economy by leveraging innovative and resource efficient solutions (Uyarra et al., 2014; Öhgren et al., 2019). This is particularly relevant today in a social and global context of increased complexity (Neagu, 2021) with climate change being one of the most daunting challenges mankind has to face (Balint et al., 2017). Complex issues require concerted efforts from the whole range of societal actors. As seen in literature, the role of collaboration is taking more centre stage but is broadly defined (van Winden & Carvalho, 2019). Therefore, the goals of the paper are:

1) to examine the role of public procurement as a catalyst for innovation;
2) to explicate the role of intermediation as a means to unlock innovative CPP.

We therefore present a conceptual framework for CPP that could help public organisations to align the procurement processes and structures with the value propositions of their own operations. The framework is built on the ProBiz4CE model by Witjes & Lozano (2016) and hinges upon the three constructs of 1) public procurement innovation; 2) the role of intermediation in public procurement; and 3) ways of working in business ecosystems to stimulate CE transition.

The ProBiz4CE model (see fig. 1) posits that in a more focused environmentally sustainable procurement process environmental and social criteria may be introduced alongside the traditional economic ones (i.e., value for money). This results in the object of negotiation between the procurer and the supplier shifting from product to PSS and therefore, from a price per product unit to price per delivered service (Witjes & Lozano, 2016). The authors argue that by incorporating such elements, companies are more likely to adopt sustainable business models to meet the procurers' criteria. This entails a closer interaction between the parties so that new technical and non-technical specification, together with socio-cultural specification are achieved. Witjes and Lozano label this type of interaction as "collaboration". We argue that such collaboration is loosely described and that therefore the model could benefit by deepening such a concept in terms of "intermediation".

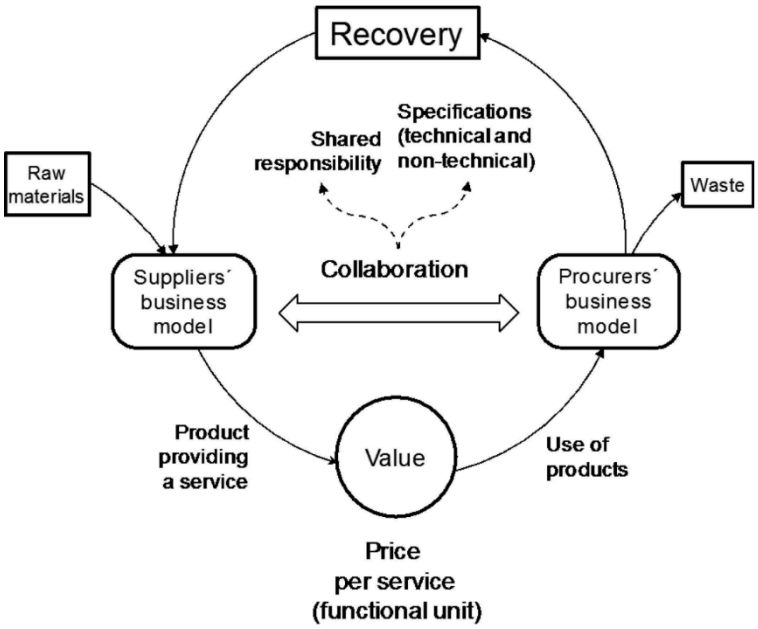

Figure 1. The ProBiz4CE Model (source: Witjes & Lozano, 2016)

In this paper we intend intermediation as the catalyst function of a change agent who is equipped with a blend of hard and soft skills and has a broad knowledge and experience in public and private sector public procurement, alongside sustainability.

The paper is organised as follows: section two introduces the concept of public procurement, sustainable public procurement and circular public procurement and raises the question on why the current public procurement model is unfit for purpose to meet sustainability goals. Section three puts forward three constructs, namely public procurement innovation, intermediation and ways to operate in business ecosystems to drive the transition to CE. These constructs make up the basis for our proposed model. Section four offers a case study by describing first the study methods and then the results of a case study of a PSS applied in a public procurement process illustrating how the proposed model can be applied in practice. Section five introduces and discusses a model that could facilitate the uptake of CPP. The sixth and last section offers concluding remarks while suggesting further related research avenues.

2. PUBLIC PROCUREMENT

A well-established definition of procurement is offered by Porter (1985) who describes it as "the purchasing activity of the inputs to transform these into finished products or services. Procurement adds value by the acquisition of appropriate goods or services at the best price, at the right time, and in the desired place with the desired quality and quantity". Procurement is also a "supporting activity"[3] in Porter's value chain which, together with "primary activities"[4], should contribute adding value to all the stages of a product/service life cycle while working in harmony and synergistically to make the final output successful (Porter, 1985).

A way to conceptualise the factors that influence public procurement and analyse how public procurement works is offered by the input-throughput-output (ITO) model (De Bruijn, 2007). The use of the ITO framework can be advantageous for several reasons: 1) it facilitates the understanding of public procurement as a process, divided into well-delimited stages; 2) it helps pinpoint improvement

[3] The four supporting activities are: Infrastructure, Human Resources Management, Technology Management and Procurement.

[4] The five primary activities are: Inbounds logistics, Operations, Services, Outbound logistics, Marketing and Sales.

areas in the procurement process; and 3) it may guarantee efficiency, transparency, accountability and fairness of the procurement process (Brown et al., 2007; Straub et al., 2010).

The inputs in public procurement typically refer to the requirements set by the procuring body such as request for quotation, the procurement plan or the procurement regulations. The throughput includes the different processes and activities occurring during the procurement process, for example the pre-qualification of suppliers, the bids evaluation, the contract awards and the contract management. The outputs are the end-result of the procurement process in the form of procured goods, services, work and accumulated benefits (e.g., cost savings, better quality).

The procurement function has therefore gained prominence as a fundamental and autonomous component of organisational strategy (Lawson et al., 2009; Knoppen & Sáenz, 2015) with the potential to contribute to organisational performance, profitability, competitive advantage, supplier responsiveness and communication (Larsson, 2018).

Moreover, public procurement occurs at all levels in society, i.e., at a municipal, regional, national or even supranational level (Rolfstam, 2012) with local and regional governments accounting with over a third of all public procurements in OECD countries in 2015, with peaks of 47% in Sweden, 62% in Denmark and 68% in Canada (van Winden & Carvalho, 2019). Essentially, all public functions are sourced via public procurement - as goods (and services) utilised by a public agency are acquired through public procurement.

Globally public procurement is one of the most deeply legislated and regulated areas of government (Lloyd & McCue, 2004) and particularly in the European Union (EU) where a specific legal framework applies to all the members' states as a key element of the single market (Grandia & Meehan, 2017). The current EU public procurement legal framework is comprised by the Directives 2014/23/EU on the award of concession contracts[5]; 2014/24/EU on public procurement[6]; and 2014/25/EU on procurement by entities operating in the water, energy, transport and postal services sectors[7].

The concept of Sustainable Procurement (SP) has developed as an affirmative approach of organisations to maintain competitive advantage by leveraging the factors to generate value for money in the long run which in turn positively affects the business and society while curbing environmental damage (Tiwari et al., 2019; Kannan, 2021).

Several studies (Kainuma & Tawara, 2006; Mollenkopf et al., 2010; Tiwari et al., 2019) suggest that SP has been traditionally associated mainly with "green supply chain management" in the private sector by considering practices, activities or frameworks aimed to minimise ecological effect amid their life cycle in the supply chain (Zhu et al., 2005; Srivastava, 2007; Winkler & Noble, 2010; Tiwari et al., 2019).

Substantial work has also been carried out by scholars and practitioners to define and develop what SP is (Brammer & Walker, 2011; Tiwari et al., 2019) and how it can be operationalised. In 2017 the ISO 20400 standard for sustainable procurement was published, where sustainable procurement is defined as:

> (...)the process of making purchasing decisions that meet an organisation's needs for goods and services in a way that benefits not only the organisation but society as a whole, while minimising its impact on the environment. This is achieved by ensuring that the working conditions of its suppliers' employees are decent, the products or services purchased are sustainable, where possible, and that socio-economic issues, such as inequality and poverty, are addressed (ISO 20400, 2017).

[5] Directive 2014/23/EU of the European Parliament and of the Council of 26 February 2014 on the award of concession contracts, OJ L 94/1.

[6] Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC, OJ L 94/65.

[7] Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC, OJ L 94/243.

Alhola et al. (2018) argue that Sustainable Public Procurement (SPP) can be considered a key market-based instrument providing significant and untapped potential for meeting environmental and social objectives of a resource efficient society while developing markets for sustainable solutions.

At the EU policy level, the Directive 2014/14/EU has integrated such environmental considerations at various stages of the public procurement procedure, namely, in the definition of technical specifications, the selection and awarding criteria, the use of criteria underlying environmental labels, the life cycle analysis, and the special performance conditions (Pouikli, 2020, p. 5). A specific tool to achieve SPP is Green Public Procurement (GPP) that is a way for agencies to achieve environmental quality objectives by focusing their purchasing processes on environmental considerations, i.e., goods, services and works with a reduced environmental impact throughout their life cycle when compared to traditional ones and within a given legal framework (European Commission, 2007; Rosell, 2021).

CPP has been indicated as an effective means to carry out GPP (Stahel 2016; European Commission, 2022a). The EU Action Plan for the Circular Economy (2015) has recognised public procurement as a main driver to a transition to a CE since it can support public sector buyers in adopting a more holistic approach to sustainability while also gaining potential savings (EC & ICLEI, 2018). Moreover the recently updated EU Circular Economy Action Plan (COM(2020) 98 final 2020) flags up the lack of a "comprehensive set of requirements to ensure that all products placed on the EU market become increasingly sustainable and stand the test of circularity". In that regard the European Commission proposes "minimum mandatory green public procurement criteria and targets in sectoral legislation and phase in compulsory reporting to monitor the uptake of Green Public Procurement without creating unjustified administrative burden for public buyers".

According to Hudon et al. (2021) in literature, the field of PP appears to be fragmented due to the focus on some research subjects and the absence of equally important ones, for instance related to the practice. Moreover, there is a scarcity of research conducted by using those analytical methods such as comparative analysis, programme / policy / project evaluation, and institutional analysis which are typical in public administration studies. Recently, subtopics such as SPP (including green and social procurement), have gained noticeable interest also in connection with innovation (Uyarra et al., 2014), circular economy (Alhola et al., 2018; Sönnichsen & Clement, 2020), intermediation (van Winden & Carvalho, 2019) and the combination of the last two topics (Rainville, 2021). However, we find that hitherto no systematic framework has been described to connect these mutually reinforcing elements.

3. SPUBLIC PROCUREMENT INNOVATION, INTERMEDIATION & ECOSYSTEM APPROACH

Developing and integrating new concepts and practices in public procurement is a major challenge which requires changes at the system, ecosystem and organisational level (Alhola et al., 2018). As McCue & Prier (2007) point out, effective procurement reforms should consider the whole procurement process in terms of inputs (e.g., selection of procurement agents), throughputs (e.g., the development of procurement strategies) and outputs (e.g., goods and services delivery). We postulate that such changes can be ascribed to the need for innovation, intermediation, and a holistic/ecosystem approach for a CE transition. These three constructs, which are presented below, make up the basis for our proposed model which is a development of the ProBiz4CE model by Witjes & Lozano (2016).

Construct n. 1 - Public Procurement Innovation (PPI).

The public sector is a major consumer especially in the EU with on average about 14% GDP spent on purchasing goods and services (European Commission, 2022b). The public sector therefore has the potential to spur and sustain new demand for resource efficiency and thus accelerate the transition to a more CE (Rainville, 2021; Halonen, 2021; Klein et al., 2020). As aforementioned, PP is a primary function for public authorities which allows them to perform their functions and provide essential services adequately (Uyarra et al., 2014).

PP is also a complex policy instrument that can be decoded in a flexible way and its operationalisation necessitates considerable capabilities and institutional change (Rolfstam, 2013, p.21). Moreover, public authorities can influence innovation of businesses by purchasing or manifesting their intention to purchase a product or a service not available "off the shelf" (European Commission, 2014a; Uyarra et

al., 2014). In that sense, according to the authors, Public Procurement of Innovation (PPI) is "a demand side measure for innovation-driven economic, ecological and societal development" and plausibly one of the most powerful forms of innovation-oriented public policies that should steer suppliers and society in general towards the creation and use of better environmentally and economically products and services. This in turn will result in increased competitive advantages for businesses and countries (van Winden & Carvalho, 2019; Lăzăroiu et al., 2020).

Innovative PP can consist of several configurations, from the procurement of a significantly upgraded item to a product-service system or even a combination of them (Lăzăroiu et al., 2020). Furthermore, Uyarra et al. (2014) argue that it is important to understand how and under what conditions the impact of a procurement process occurs or could occur. Indeed, procurement has the potential to expedite technology development and uptake as well as to affect the structure of the general industrial landscape. "It can influence the evolution of existing and yet-to-be-created markets, changing the structure of competition to make it more attractive and/or accessible for new entrants" (Uyarra et al., 2020, p.3).

However, Uyarra & Flanagan (2010) warn that innovation should not be pursued *per se*, instead promoted whenever appropriate, as a "by-product" of the procurement process. Such an "innovation-friendly" procurement logic entails that innovation should be considered case-by-case. According to Radicic (2019) PPI (i.e., a demand-side policy measure) is more effective in stimulating (product) innovation than supply policy measures. Specifically, the author claims that supply-side measures have no effect on stimulating service innovation.

It can be argued that this requires and could be facilitated by change agents or intermediaries as elaborated in the following section.

Construct n. 2 - Public Procurement and the role of intermediation as a key enabler for innovation.

Public procurement is a fundamental practice affecting dynamics between business and public bodies which overtime has evolved from serving an essentially administrative or bureaucratic function to creating a strategic activity for supporting and implementing government objectives which often respond to supranational demands and needs (e.g., meeting the Paris Agreement goal of limiting temperature rise to 1.5 degrees Celsius compared to pre-industrial levels by the end of this century) (Martinez Romera & Caranta, 2017). This entails articulating concepts, objectives, activities, processes and considering the related resources, especially human resources (van Winden & Carvalho, 2019). If a public authority lacks the necessary personnel to operate effective procurement (as a key input of the process), this can result in inefficiency in the procurement process (output) (Thai, 2001). A number of scholars argue that the role of intermediation is a key enabler for innovation (van Winden & Carvalho, 2019; Rainville, 2021; Edler & Yeow, 2016). Such a role consists of the following:

1. Coordinating government and industry through aligning project goals;
2. Facilitating cooperation of industry players to stimulate new business relationships;
3. Collaborating with the buyer to properly articulate the demand.

According to van Winden & Carvalho (2019) the role of intermediaries (or change agents) exceeds the simple function of a "middleman". Indeed, government related intermediaries in PPI should fulfil three different roles: facilitating, configuring and brokering. Change agents therefore possess a certain degree of power which enables them to translate intentions into action, regardless of their internal or external position in regard to the involved organisations (van den Berg et al., 2019).

However, it is problematic to ascertain how the need or the upsurge of an intermediary figure arises. Typically, the drivers for a public authority to decide whether to outsource or internalise a function or a solution to a need can be ascribed to three types of considerations, i.e., economic, political or "opportunistic". One can argue that it is difficult to pinpoint whether the drivers are initiated intentionally or if they are "reactive" to circumstances. Also, their evaluation seems to depend on the internal level of awareness and skills related to a particular matter.

This seems particularly relevant for sustainability matters. SPP and its innovation present perhaps a higher degree of complexity, fuzziness and ambiguity compared to "traditional" innovation processes and public procurement due to the multidimensional, system thinking approach that is required (Porter & Derry, 2012; Goodman et al., 2017).

In the matter of sustainability, a change agent with a "helicopter view" is desirable, in other words, somebody who is able to consider and reconcile often contradictory demands from a wide range of stakeholders (Goodman et al., 2017), political goals, legal framework, technology and environmental

trends. Such an intermediary figure would ensure that SPP is enabled by an effective and essential activity coordination system (Troy et al., 2008) which is powered by functional information flows (Cuijpers et al., 2011).

Thus, a very important question for public authorities appears to be: "Who could act as a catalyst and guarantee that Public Procurement stimulates Innovative Services and is sustainable?". One way to overcome barriers and stimulate PPI would be approaching the challenges of working in business ecosystems to stimulate circular transition (Diener et al. 2021) which will be introduced in the next section.

Construct n. 3 - Ways of operating in business ecosystems to drive CE transition.
According to Mont (2002), Tukker (2015) and Diener et al. (2021), the shift from a stock-based to a flow-based logic would require that a concerted change of ways of thinking and processes are adopted both internally and externally within the supply chain. In such a context resource optimisation requires redistribution of new activities within established value chains and formation of new partnerships.

The construct of the business ecosystem seems well suited for a systemic change such a CE transition as it suggests that a constellation of actors come together to co-create value that individually could not achieve. Also, when a change occurs for opportunistic/economic reasons (e.g., saving budget on raw materials) or is initiated because of the necessity to meet new legal requirements (e.g., meeting environmental targets such as reduced annual CO_2 emissions), the alignment of actors could be disrupted and therefore needs to be restored.

Actors both in a private, public or public-private context can operate in several ways in their business ecosystem to bring about (circular) change:

1. Focal actor (from demand or supply-side) utilises conventional bi-lateral supply-chain relationships;
2. Focal actor initiates new relationships and roles;
3. Activities from a group aligned around a shared goal that can become a shared value proposition (VP);
4. Activities generated around a developing or emerging platform or VP.

4. CASE STUDY

The case study section includes first a description of the adopted methodology and then an illustration of the results.

4.1 Methodology

This section outlines the study methodology by encompassing the criteria for selecting a case study, proceeding and the process of data collection and analysis.

4.1.1 Selection

The selection process for the case study started at the country level. Sweden was selected since it is a country at the upfront for both GPP and CPP as demonstrated by the launch of a national strategy for a circular economy by the Swedish government in July 2020[8], and the development of city government strategies for the creation of circular cities like in Umeå[9] and Gothenburg[10]. National guidelines

[8] https://www.regeringen.se/globalassets/regeringen/bilder/klimat--och-naringslivsdepartementet/klimat-och-miljo/cirkular-ekonomi---strategi-for-omstallningen-i-sverige/ (in Swedish).
[9]https://www.umea.se/platswebbar/hallbarhetiumea/socialhallbarhet/cirkularekonomi.4.333c64e217718860a23c32.html (in Swedish).
[10] https://goteborg.se/wps/portal/start/kommun-och-politik/sa-arbetar-goteborgs-stad-med/hallbarhet-och-agenda-2030/cirkulara-goteborg (in Swedish).

corroborated by various green/circular public procurement criteria have been developed by the National Agency for Public Procurement (Upphandlingsmyndigheten).

Nevertheless, GPP and CPP are still not mainstream in EU and in Sweden (Fuertes Giné et al., 2022). Therefore, the authors' aim was to identify a company that was working or was considering becoming a supplier in a circular public procurement process. The researchers made a screening of the companies stored in the Customer Relationship Management (CRM) database which had been entered in the period 2017-2018. The resulting list comprised 10 companies which were all contacted by email with the aim to ask 1) whether they were involved in public procurement, and 2) whether they would be interested in initiating and developing work on the topics of circular public procurement, innovation and intermediation between public and private sector. One company – company H. – positively replied and was selected. Thereafter, following the key informant approach, originating in ethnographic studies (Marshall, 1996), the selection of key stakeholders in company H. followed and four main roles were identified and contacted by email and telephone, namely the Chief Executive Officer, the Chief Financial Officer, the Procurement/Logistics Manager and the Managing Director of the forklift truck department. Moreover, three key stakeholders at the local public authority (here anonymised as H. K.) were identified and contacted, namely two with roles in sustainable urban planning and a city coordinator with functions in public procurement.

Company H. supplies professional machines and services in the field of Cleaning and Municipal Technology and is the Swedish branch of an international leading manufacturing group. Company H. is a medium size enterprise and has been supplying machinery to the local authority H. K. for several years.

H. K. is a local authority with circa 150,000 inhabitants and ranks in the top 20 of the largest municipalities by population in Sweden. H. K. has a dynamic and growing business community with a wide range of industries and knowledge clusters. The majority of employees are in the logistics, retail trade and construction industries with the largest employers being from the public sector. The local authority's goal is to have attractive housing, sustainable society, circular society, good water management, school, care and varied recreation for the local community. Such a goal is translated in a strategic plan articulated in four key development areas which overall aim to achieve sustainable development for the community in the long term.

4.1.2 Data collection

The main method for data collection in this study has included meetings with identified key stakeholders. A plan was devised including two phases, namely an explorative phase and a subsequent research and development project phase.

The explorative phase lasted about five months and comprised of fortnightly meetings with the research team and the interested parties which were held in person, or via a video conferencing platform (namely Microsoft Teams). The meetings focused on Circular Business Models (CBMs), to explore whether they could be fully developed at H. and methodologies such as Lean Start-up were utilised. The exploration was extended also to the forklift truck business so that - in combination with the cleaning machines already having an established CBM - the whole company business model could be fully circular.

A second phase followed during which company H. joined a one and half-year research and development project which focused on fostering circularity in the Swedish region where company H. is located, by developing and fostering opportunities for CBMs.

Over the project duration, about 20 meetings lasting between 90 and 180 minutes, with four representatives from company H. were held, which were followed up with emails to share meeting notes, clarify discussion points and define objectives and action points for the next meetings. Moreover, all the material was stored in a private group folder in Microsoft Office 365 and access was given to the working team only. The main topics of the meetings included analysis and consolidation of value propositions and CBMs, sustainable and circular public procurement processes with focus on the aspects of mediation private/public sector, innovation, operational eco-system and legislative framework.

Additional four workshops of two hours each were organised and facilitated by the research team including the regional agency representatives. They occurred after four or five of the aforementioned 20

meetings. The workshops focused on circular value proposition, innovation and intermediation and consisted of an initial phase of sharing material, mainly PowerPoint presentations, prepared by the Business Coach of the research team, progressively summarising the work carried out with company H.; and a brainstorming phase using whiteboards where all the attendees could contribute to. Photographs, meeting notes, and observations were elaborated by the research team and shared after the sessions.

Additionally, the research team analysed several examples of tender documents provided by stakeholders, including all available documents for the case study (published tender, revised tender, selection criteria and the list of winning suppliers).

4.1.3 Data analysis

Throughout the study the researchers gathered and stored all the developed material in a private group folder in Microsoft Office 365. The documentation was organised in separate folders according to macro themes, namely value propositions and CBMs; sustainable and circular public procurement processes with focus on the aspects of mediation private/public sector, innovation, operational ecosystem and legislative framework; the local authority H. K.; and complementary correspondence.

The researchers performed data analysis in several stages of phase two and specifically at the end of the 5-interview cycle and in preparation to the workshop with the public authority with the aim to find a convergence on the key aforementioned themes. The resulting analysis consisted in the development of a model for circular public procurement that could see both parties meeting their circular goals and where some "enabling areas" (i.e., intermediation and innovation) emerged as critical.

4.1.4 Results

This section presents the results of the work carried out with company H. which involves interaction with its local authority H. K. The results illustrate how the three aforementioned constructs converge and how they exemplify the framework that is described in the discussion section.

In the last few years both parties have increasingly considered environmental sustainability issues and the need to shift to a more resource efficient and value preserving economy. The drivers for company H. seem to be linked more to economic reasons (e.g., costs saving of raw materials) whereas drivers for H. K. are arguably because of the necessity to contribute the EU legal environmental targets for 2030[11] (e.g., reduced annual CO_2 emissions).

At the time of the selection of the company by the researchers, company H. had been trialling the offer of cleaning machines as a service however without being aware and identifying such a business model as circular.

The major difficulties of company H. consisted in better developing the value proposition, finding the customers, including public authorities and making them understand the concept. It was questioned whether a "focal actor" who could reach out local public authorities could help overcome the issues. This situation made company H. to join the work proposed by the research team which *de facto* took on the role of "focal actor" in the system.

Specifically, in the explorative phase the business coach of the research team supported the company in mapping out the current business, educating in circular principles and business models, scrutinising public procurement legislation and processes. The work was implemented with a variety of business management tools such as lean start-up methodology and circularity indicators and was consolidated in the development of a value proposition for based on a service model for a public bid.

In phase two of the study, in order to trial the sketched service-based value proposition, the business coach of the research team encouraged company H. to use their contacts and book meetings with H. K. with no sales representatives involved, where the business coach intermediated and moderated the meetings and workshops. The intermediation role of business coach, supported by the researchers, was arguably pivotal in opening up and establishing a more direct and deep dialogue between procurer and

[11] https://climate.ec.europa.eu/eu-action/effort-sharing-member-states-emission-targets_en.

supplier in the preparatory and planning phases of the procurement process. The research team acted as a focal actor that opened up dialogue to help codify individual interests and values.

Table 1 below summarises the intermediary roles, the key available tools and the intended outcomes identified in this study.

Table 1. Intermediation: roles, key tools and intended outcomes.

Intermediaries	**Key Available Tools**	**Intended Outcomes**

• Business Coach
• Researchers
	• Meetings
	  o In person
	  o Online (Microsoft Teams)
	• Coaching sessions
	• Workshops
	• Methodology & Managerial tools:
	  o Lean Start-up
	  o Business Model Canvas
	  o Value proposition Canvas
	  o Circularity Indicators
	• Shared living meeting notes
	• Various supporting documentation:
	  o Tenders
	  o Legislation
		• Shared understanding of CE, CBMs, CPP
		• Implemented circular innovation processes in public procurement
		• Deeper and more open relationship between supplier and procurer
		• Meeting organisational sustainability goals
		• Successful “circular case” to potentially influence policy & regulations based on environmental and economic gains

From the joint work, challenges and opportunities for a servitised procurement were first identified. Furthermore, it was realised that there was no regulation or policy requiring the public authority to necessarily buy and therefore own any machinery and that circular principles were in line with the local authority’s strategic targets.

The intermediation activity contributed to paving the way for helping the local authority in clarifying the technical and non-technical requirements for the next procurement tender and for company H. to properly position itself to respond to those (Witjes & Lozano, 2016). This resulted in company H. winning the public tender and being awarded the contract, and in the local authority H. K. formally adopting a service-based model to serve a procurement need. The studied ecosystem benefitted from the introduction of circular innovation which according to the parties contributed mainly to the following: meeting the procurer’s need of public street cleaning; money savings from both parties; reduction in public waste (i.e., disposal of machinery); optimisation of raw materials (related to the material components of the machinery); increased and more open dialogue between parties.

Since then, company H. has been actively applying a PSS business model with the public sector. This is based on the consideration that technology shifts require a long period to consolidate and bring about competitive advantage and profitability; also, linked to this, new products tend to become more complex. Therefore, providing services appears to be an easier and quicker way to ensure company survival and competitiveness, especially in relation to supply chains. Such a trend is spreading and can be observed across several technology manufacturers (ex. Husqvarna, Volvo Car Corporation, etc.).

After a two-year contract H. successfully managed to renegotiate and extend a contract for work machines for another year, with the main reason being economic benefits for both parties.

Moreover, in the long run, company H.’s refurbishment business may, if they sell refurbished machines for function, include picking functional modules from machines that are for scrapping due to their poor conditions. Such innovation could generate competitive advantage for H. while achieving system resource saving and positive environmental impacts. For example, if the combustion engine is scrapped, hydraulic motors, mower units, etc. may still be worth salvaging for use in refurbishing other machines. Hence, a “ready for scrap” product may contain many modules that do not need to be ready for scrap (similarly to “organ donation”).

This business case seems to show the formation of a circular ecosystem enabled by the catalysing role of intermediation of a business coach supported by the researchers which allowed the parties to articulate individual value sets and thus co-create and align joint ones. In other words, inputs-throughput and output have been optimised so that both parties could meet their respective goals and the system could be effective from a sustainable viewpoint.

However, the presented case does not seem to be the norm. A key bottleneck appears to be a broken link between the different governmental administrative levels in relation to sustainability, environmental and circular targets. The problem is that such targets are not quite explicit and clear *per se* and how they relate to each other at both the strategic and implementation level between the central government, regions and municipalities. It could be argued that this point is caused by a lack of understanding of sustainability and the CE of the political leaders or in other words, a system perspective.

Such considerations together with the need to involve the environmental and climate change leaders of the stakeholders also emerged in a focused online workshop on CPP and role of intermediation organised within a project on circular public procurement. The event was attended by 14 representatives from Swedish public authorities, was moderated by four researchers and gathered contributions on the question: *"WHO (in which role) must have competence WHEN (in which moment) in the process?"*.

Thoughts were organised in a matrix hosted in a Mural websheet with rows referring to six phases of "the when" and columns referring to six roles of "the who".

The attendees pointed out the necessity for an arena for dialogue in different forms but structured in a systematic way so that various parties of the (circular) procurement ecosystems could reach a common understanding of the objectives to be achieved. Moreover, most answers concentrated in the initial row/phase (needs formulation) suggesting the urgency of closer dialogue in the public-private value chain that would and co-creation.

Such a situation would require, as previously argued, strong change agents for a large innovative change, who could also provide access to technical developments and trends. Perhaps an entity such as a National Agency for Public Procurement (in Sweden, Upphandligsmyndigheten), by focusing on highlighting needs usage patterns, could catalyse both companies and public authorities' innovation on both fronts (business model innovation and PPI).

5. DISCUSSION

This paper elaborated the concept of CPP in relation to innovation and intermediation with the view of adopting servitisation to accelerate a transformation to a CE. PSS models necessitate tight collaboration between producers and consumers (Lozano et al., 2013).

However, in general, in order for sustainable/circular public procurement to happen the concept of collaboration is crucial as it is the sine qua non condition which "harvests its benefits from differences in perspectives, knowledge and approaches, solving problems" while simultaneously presenting benefits to all parties involved in the process (Lozano et al., 2019). A holistic approach focusing on innovation is therefore a key enabler and can be orchestrated via a quintuple helix model encompassing academia, industry, government, civil society and natural environments of society (i.e., local communities, employees, shareholders, business partners, suppliers, customers, public authorities and NGOs) (Lozano et al., 2019).

However, such collaboration is often hindered by a number of institutional, cultural and organisational factors. Hence there is a need for intermediation between the public and its ecosystem. In this section we present a framework that combines the concepts, and we discuss the potential as a key enabler for a CE.

The proposed framework has been elaborated by incorporating the aforementioned constructs, of 1. Public Procurement Innovation, 2. The role of intermediation, 3. The way of working in ecosystems to stimulate circular transition (especially servitisation) in the ProBiz4CE model by Witjes & Lozano (2016).

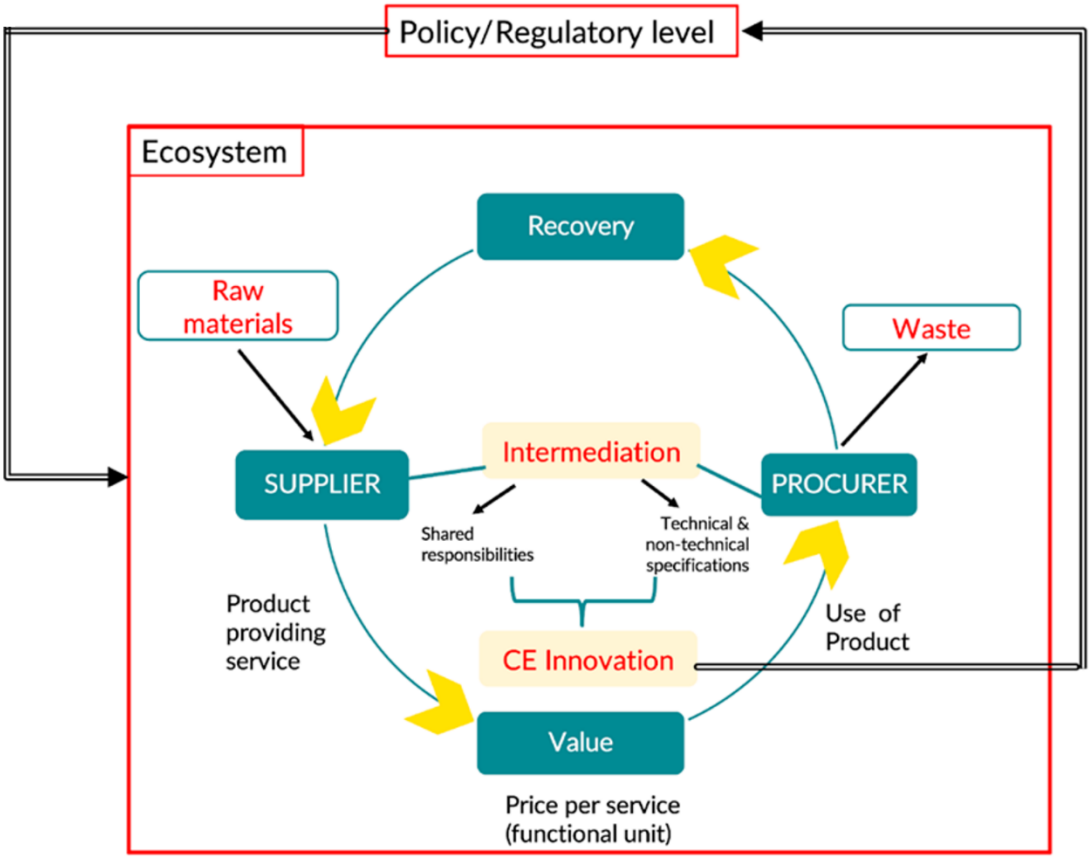

Figure 2. Proposed framework: Public procurement empowered by intermediation.

The framework (see fig.2) suggests that the relationship between suppliers and procurers can be facilitated and empowered by intermediaries who would work with both sides of the procurement process, i.e., the procurers and the suppliers. Such work would encompass complying with the legal level, shaping the organisational strategy, providing advice on technical matters to steer towards an agreement between parties that the "best" economic, ecological and societal values for the organisations and society are met. Such outcome is based on shared responsibility and agreed technical and non-technical specifications of the product-services. It is assumed that such an intensive intermediation spurs innovation for both sides' business models, making public procurement, in line with Ralfstam (2013) "a special case of user-producer interaction" where learning occurs. Such a learning should become also "lessons learnt" by the policy makers.

Policy makers could adopt measures such as integrating the performance and access model concepts in public purchasing activities and guidelines, to increase the probability to achieve the preferred identified scenario and steer away from the less desirable ones.In this context the preferred scenario is instrumental for achieving sustainable development via circular practice and especially by adopting PSS.

Our empirical research focused on a Swedish case. One might argue that intermediation can find breeding ground in Sweden since, according to Hofstede et al. (2010) in their pioneering studies on cross-cultural studies in organisations and countries (Huczynski & Buchanan, 2013), the Nordic country is characterised by a highly individualistic culture (scoring 71/100 on the individualism-collectivism index). However, Sweden simultaneously shows tendencies towards conformity and prioritisation of social cohesion over self-expression and therefore tends to emphasise collaboration and cooperation (scoring only 5/100 on the Masculinity index).

Sweden and similarly other Scandinavian countries, undoubtedly differ from other countries' such as China characterised by opposite cultural characteristics thus possibly limiting cross-case comparability. Nevertheless, it can be claimed that even countries scoring high in collectivism and therefore promoting harmony would be prone to promote collaboration and intermediation. An

interesting avenue of research focusing on national cultural aspects could provide insights on in what measure intermediaries could play a pivotal role in circular public procurement.

6. CONCLUSIONS

The successful uptake of CE relies on broad support, contribution and synergy from all types of organisations in society such as civil society, corporate or public sector (Barreiro-Gen & Lozano, 2020). In this paper we focused on the public sector as a key economic player in society with a significant purchasing power as a means for promoting societal change while still guaranteeing effective use of public funds, transparency and receiving value for money as contracting authorities and users of public services (Halonen, 2021).

In order to elaborate on our study goals, we argued that the current PP process is not "fit for purpose" for a transition to large-scale CPP. For the current public procurement process to become "fit for purpose" and therefore be able to achieve sustainable development via circularity we have proposed a conceptual framework for CPP that could support public organisations in aligning the procurement processes and structures with the value propositions of their own operations. We suggested that, based on the ProBiz4CE framework, intermediation is the key enabler for a transition to a more CE by stimulating innovation in public procurement and with an ecosystem perspective.

The main limitation of this study lies in the lack of systematic testing of the model. Therefore, future research could focus on validating the proposed model to further shed light on the power of public procurement as a leverage for transitioning to a CE.

DECLARATIONS

Competing interests The authors declare that they have no known competing interests or personal relationships that could have appeared to influence the work reported in this paper.

AUTHOR CONTRIBUTIONS

Emanuela Vanacore: Conceptualisation, Methodology, Formal Analysis, Writing – Review & Editing.
Agnieszka Hunka: Project administration, Funding acquisition, Methodology, Writing – Review.
Leticia Fuertes Giné: Writing

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