PROCEED
(Public PROcurement with a Circular Economy EDge)
Project

Final report

A Vinnova funded project - Ref. 2018-04696

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Introduction

This report documents and analyses the work carried out in the PROCEED (Public PROCurement with a Circular Economy EDge) project between December 2018 until February 2020. PROCEED was funded by Vinnova, the Swedish Agency for Innovation under the prioritised programme “Cirkulär och biobaserad ekonomi. Från teori till praktik” (Circular and biobased economy. From theory to practice). The document also highlights the main findings which constitute the basis for recommendations and future research areas in circular public procurement.

Project description

The PROCEED project focused on Sustainable / Circular Public Procurement based on the rationale that the Public Sector can play a pivotal role in transitioning to a circular economy (CE).

More specifically, the project investigated Circular Public Procurement (CPP) current dynamics and tried to identify activities for opening up the market for radically higher resource efficiency through truly circular offers via Public procurement.

Public procurement is a key economic activity in governments (Brammer and Walker, 2011). For instance, in 2017 in Sweden the total value of purchase covered by public procurement regulations has been estimated to SEK 706bn. This equates to 17.4% of GDP at fixed price (Konkurrensverket, 2019).

The EU Action Plan for the Circular Economy (2015) 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 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 Commission proposes “minimum mandatory green public procurement (GPP) criteria and targets in sectoral legislation and phase in compulsory reporting to monitor the uptake of Green
Public Procurement (GPP) without creating unjustified administrative burden for public buyers”

Since EU and Swedish public authorities are major consumers, they could clearly use their purchasing power to choose environmentally friendly goods, services and works and give an important contribution to sustainable consumption and production, i.e. GPP (EC & ICLEI, 2018).

**Project goals**

The overall project goal was to enable public authorities to use CPP to proactively drive the shift to a CE. This was meant to be achieved by establishing an effective and innovative procedure that would include circularity metrics and management standards that are well-spread (ISO 14001 on Environmental Management Systems) and prominent / promising (ISO 20400 on Sustainable Procurement). A detailed “effect logic” diagram that was included in the project application can be found in Annex 1.

The effective procedure was set to be co-created by the project leader - the research institute RISE Research Institutes of Sweden, Sustainable Business team (with business-oriented expertise on CE) together with the procurement departments and environmental strategists at four public authorities and the publicly owned company RISE AB, Procurement department.

It was hypothesised that the innovative methodology would ensure continuous improvement in circularity between CPP rounds for each and the same offering. Also, elements of ISO 20400 framework (particularly §6 “Organising the procurement function towards sustainability” and §7 Integrating sustainability into the procurement process”) would be considered to better frame CPP. A crucial step would consist of both diagnosing barriers to implement and use CPP and how to eliminate or mitigate them.

Then a series of analyses would be carried out to identify challenges between regions, municipalities and companies operating under the Swedish legal framework (LOU) regulating CPP, to study problematics and solutions in the interaction between seller and buyer within the context of LOU. This aimed to understand whether there would be any risk for companies in
“revealing” business model dynamics to competitors which are more important in Product-Service System (PSS)-based than in transaction-based business models).

Moreover, focus would be given on the sellers’ reactions and reasonings around CPP and how to meet them by considering the following questions:

1. Will CPP enable innovation?
2. Will CPP create a market and trigger broader demand, i.e. from more customer segments?
3. Will CPP improve overall circularity?

A final project summary would be developed including recommendations for practitioners for wide dissemination across the Swedish public sector to inspire and guide any public authorities seeking to effectively implement CPP.

It is important to note that since sustainable / circular procurement appears to have a significant untapped potential to catalyse green development, the project aimed at significantly contributing to achieving the National Agenda 2030 for Sustainable Development as per the UN Sustainable Development Goals⁴. Specifically, two goals will be addressed, SDG12² (Responsible consumption and production) and SDG17³ (Partnership for the goals).

**Project activities**

The project activities were organised around four phases: 1. Start (or state-of-the-art); 2. Initial work (until May 2019); 3. Progress (September 2019); and End of the work (until February 2020). A detailed description of the phases follows.

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² [https://sustainabledevelopment.un.org/sdg12](https://sustainabledevelopment.un.org/sdg12)
³ [https://sustainabledevelopment.un.org/sdg17](https://sustainabledevelopment.un.org/sdg17)
1. The start (state-of-the-art)

Public authorities are major consumers across the world and therefore they play a pivotal role in production and consumption dynamics, including sustainable ones. However, research shows that there are a number of key issues that prevent a wider uptake of sustainable / Green Public Procurement (GPP) practices and they include a lack of awareness, knowledge, information and experience among public procurement authorities on sustainable principles, tools and their translation into innovative sustainable practices. Also, another key issue refers to the lack of certain products / services in the market that are designed to optimise close material loops and improve material efficiency (Alhola et al., 2017; Testa et al., 2016; Witjes and Lozano, 2016).

There is a range of toolboxes and guidelines available at a national level (Sustainable Criteria Library) and at the European level (e.g. REBus Guide, Circular Procurement Best Practice Report, Training modules on procuring Product Service Systems, Zero Waste Scotland’s Category and Commodity Guidance, MVO Nederland Circular Procurement Guide). However, it could be argued that none of them is designed to ensure a higher degree of circularity at each procurement round over time and at a sufficient speed mainly because of the lack of a clear and specific circular indicators that would track and ensure the progress of circular uptake in organisations.

The state-of-the-art of circular / sustainable public procurement was first discussed at the project kick-off meeting that was held at RISE office in Gothenburg on 24th January 2019. Generally speaking, all the public authorities acknowledged that their organisational vision embraces sustainability as per Agenda 2030 however, depending on the local politicians, with different degrees of clarity. Sustainable procurement is recognised as one important step in the “sustainability journey” which has not yet been described in terms of actions to undertake.

Focusing on the public procurement, public authorities are all subject to LOU requirements, which gives a procurement framework of a maximum of four years (note that there are other types of procurement though, such as financial services and similar, that can run longer, for example 10 years, 14 years, etc.). However, how processes are conceived, organised, implemented and evaluated can greatly vary.

The buyer acts as a project manager and typically gets support from sustainability experts (of which however, sometimes there is a shortage of) to choose any product category (e.g. cars,
furniture, lighting, computers, etc.) and to find out what to buy and how. Purchasing criteria are set and ideally proposed to a reference group when available (and which is responsible for ensuring good performance). The time to get the criteria in place and approved can range from days to months, depending on the product and a purchase can take three months to be completed, but more often even up to twelve months.

In this phase some initial challenges were highlighted. First, it emerged that it is difficult to involve those who should specify in detail what they need. Also, it is also challenging to opt to buy functionality instead of a physical product. In that regard, comparing product and function purchases in terms of cost-effectiveness appears to be highly problematic.

2. Initial work (until the May 2019 workshop)

As part of the project plan the researchers developed a “managerial Toolbox for CPP” whose primary source of inspiration was the ISO standard for sustainable procurement ISO 20400: 2017. The CPP Toolbox contains a description of why CPP is important, what to expect during a CPP process, and a detailed step-by-step guidance for each phase of the procurement process.

It is important to mention that the research team set out to develop the Toolbox with a co-creative approach by actively involving each member of the project consortium in the process. First, a draft of the Toolbox was then sent out to the participating organisations for review and improvements. Based on the feedback and contributions, the Toolbox was revised by the research team and a complementary “Action Plan” was developed. This document – that was eventually added to the CPP Toolbox as an annex - contains templates for tables and checklists that, in combination with the Toolbox, provides a very hands-on support for public procurers to run a CPP process. The CPP toolbox is available in both English and Swedish at the following weblinks:


https://www.ri.se/sv/vad-vi-gor/projekt/public-procurement-circular-economy-edge

After providing the hands-on Toolbox and Action Plan, two sets of online meetings were held. The first set of online sessions introduced the participants to both the concept of measuring
circularity and the product-value based circularity metric “C” developed by RISE - Sustainable Business Researchers (See Linder et al., 2017) and previously and successfully tested in a Re:Source funded project (Re: Source: 42909-2) with 18 companies from different industries. The sessions were held by the lead author of the C metric.

Subsequently, another set of sessions included a couple of online meetings were conducted with each consortium member. At first, the project participants were asked individually to fill in a SWOT (i.e. Strengths, Weaknesses, Opportunities, Threats) matrix to help both them and the researchers to better understand their starting point in CPP. Two SWOT matrices are shown below for illustration purposes.

The online meetings also aimed to identify and choose one promising procurement activity among the upcoming ones for each consortium member. During the sessions, it emerged that more market information was needed before any reasonably informed choice could be made. In addition, all the participants who were introduced to the “C” metric expressed concerns about the complexity of its use. It was also discovered that considerable calendar time would have to be consumed to gather more information from suppliers and to share the “C” metric with them.

Moreover, the complexity of environmental impacts from different options among products (like cotton-based clothes or recyclable but oil-based polyester or bamboo) required rather deep Life-Cycle Analysis studies which were impossible to carry out within the project’s budget and timeframe. When the need for such investigations emerged, it became apparent that the CPP of such products had to be postponed and that a more suitable product category had to be chosen. Participants were encouraged to try to conduct such a new investigation with frequent market information exchange (i.e. Request For Information, RFI). Due to time limitations and the very limited information at hand, there was no choice but to choose the procurement that was deemed to have the best chances to succeed according to circular principles.
### Table 1. SWOT Analysis for CPP-example 1

<table>
<thead>
<tr>
<th><strong>Internal origin</strong> (attributes of the system)</th>
<th><strong>Strengths</strong></th>
<th><strong>Weaknesses</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- IT departments are positive to use products</td>
<td>- Purchasing behaviour and attitudes outside the operations</td>
</tr>
<tr>
<td></td>
<td>- IT departments are easy to work with</td>
<td>- Some work methods must be adapted and we may not be able to do so</td>
</tr>
<tr>
<td></td>
<td>- The contractor is experienced</td>
<td>- It requires preliminary work and knowledge acquisition</td>
</tr>
<tr>
<td></td>
<td>- We have environmental leaders who have time to make a thorough market research and set requirements</td>
<td>- We have not purchased this before, which creates insecurity and uncertainty</td>
</tr>
<tr>
<td></td>
<td>- Environmental managers work at the Procurement Department</td>
<td>- We must succeed really well to gain recognition and confidence to continue to procure used products</td>
</tr>
<tr>
<td></td>
<td>- We have the support of politicians in the procurement committee</td>
<td>- How do we get the products and suppliers that meet our needs and wishes, and at the same time can guarantee good used products. We do not want to end up without used products and need to buy new ones</td>
</tr>
<tr>
<td></td>
<td>- We have the support of the manager</td>
<td>- The first agreements are important for building trust.</td>
</tr>
<tr>
<td></td>
<td>- We have goals that tell us to be at the forefront when it comes to sustainable procurement.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>External origin</strong> (attributes of the environment)</th>
<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- We expect a saving</td>
<td>- Uncertainty about the supplier not being able to deliver satisfactorily if we experience problems with the product, service and warranty during the contract period</td>
</tr>
<tr>
<td></td>
<td>- There is a market</td>
<td>- There are suppliers who primarily provide new products but who can also give us used products. That way they are not happy if we get them on the same agreement (they want to make money and maybe rather sell new products).</td>
</tr>
<tr>
<td></td>
<td>- The market cooperates.</td>
<td></td>
</tr>
<tr>
<td><strong>Internal origin</strong> (attributes of the system)</td>
<td><strong>Strengths</strong></td>
<td><strong>Weaknesses</strong></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------------</td>
<td>---------------</td>
</tr>
<tr>
<td></td>
<td>- Commitment throughout the purchasing stage</td>
<td>- Competence in the use of the measure of circularity</td>
</tr>
<tr>
<td></td>
<td>- Governance (political decisions and plans adopted)</td>
<td>- Competence in alternative business models</td>
</tr>
<tr>
<td></td>
<td>- General competence regarding alternative solutions for circularity (e.g. function instead of product, hire)</td>
<td>- General knowledge of the market maturity, if there are potential bidders when setting tough circularity requirements</td>
</tr>
<tr>
<td></td>
<td>- Interest from the purchasing unit</td>
<td>- Lack of time, too little before the next procurement</td>
</tr>
<tr>
<td></td>
<td>- The &lt;municipality name&gt; model - structured and systematic way of working for sustainable procurement and procurement (i.e. the efforts are part of a whole)</td>
<td>- Immature organisation, not sure that the companies happily embrace new solutions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Important to follow-up so that whoever bluffs does not win.</td>
</tr>
</tbody>
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<tr>
<th><strong>External origin</strong> (attributes of the environment)</th>
<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Possibility of leasing</td>
<td>- We set requirements that lead to few or no tenders</td>
</tr>
<tr>
<td></td>
<td>- Available to buy second hand</td>
<td>- Knowledge on how to measure of circularity</td>
</tr>
<tr>
<td></td>
<td>- There is growing interest from the companies to new business models</td>
<td>- Difficult to secure shares of recycled material on long supply chains, alternatively to access required documentation</td>
</tr>
<tr>
<td></td>
<td>- Opportunity to participate in a development project</td>
<td>- They do not get any more business after investing</td>
</tr>
<tr>
<td></td>
<td>- Can lead to good examples and new business opportunities with other clients, new opportunities for revenue</td>
<td>- Can be more expensive</td>
</tr>
<tr>
<td></td>
<td>- Increased CSR image</td>
<td>- Different requirements in different municipalities, difficult to relate to an increased set of requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Important to follow-up so that whoever bluffs does not win.</td>
</tr>
</tbody>
</table>
A key learning was hence that the **RFI is a fundamental tool in the shift to a more CE**; additionally, it appears to be **vital and never too early to start engaging** and discussing **with potential suppliers** in different business sectors. Market investigations, early and relatively general RFIs, in some cases even LCAs and other investigations are often needed to gather information **to inform the selection** of the most promising CPP rounds to run.

Other individual coaching sessions with the project participants followed, during which the research team discussed specific organisational issues when attempting to run the selected circular procurement process. Here is an overview of the main issues:

**The use of the proposed value-based circularity metric “C” by Linder et al. (2017).** This was a common issue that emerged across the whole consortium. The reason being that the “C” metric is a measure of material circularity whereas it became apparent that in many purchases the shift to a higher degree of circularity would more easily be carried out by improving other aspects such as product longevity (or rather market entropy) or use intensity rather than by increasing material circularity. Measures for product entropy and for use intensity were hence needed but did not exist at that point in time. With that in mind, the research team decided to organise a second intermediate workshop in November 2019 to provide the participants with both an overview of the key aspects to consider when measuring circularity and a selection of the most relevant circularity metrics currently available.

**The supply chain bargaining power relationship and its design.** A supplier’s possibility to initiate and drive a shift towards a higher degree of circularity in a value chain is dependent on many factors and can be quite different between driving higher material circularity, higher circularity through product entropy, or higher circularity through higher use intensity. It is the OEM who has power over product design, longevity, material circularity, “re-manufacturability” and so forth. The OEM’s willingness to change may be dependent on several factors such as the required effort, market size for circular offerings, etc. Therefore, it is of paramount importance to consider how the supply chain looks from the viewpoint of the public purchasing organisation’s immediate suppliers and upstream.

**Cascade-chain challenges (biomaterials).** Certain materials may be difficult to circulate because of both degradation of specific material attributes during use and recycling (for example, fibre length for cotton), but also because of contamination during the use phase (oils,
paint, silicone, etc.). In such cases, a cascade chain should be designed from first application up to finally energy recovery. A material circularity metric for biomaterials would be needed. That necessitated knowledge and tools beyond the scope of the PROCEED project. Cascade chains also necessitate a system-level analysis to ensure overall circularity improvements.

The challenge of pursuing CPP without nationally standardised metrics. During the individual sessions it was debated whether some kind of simplified metric could be used in specific purchasing projects instead of the proposed C metric. From those discussions and from other circular purchasing efforts, it was realised that without standardisation of metrics and without access to easy-to-use tools to measure, simpler but more subjective metrics might be used despite their low adherence to CE principles.

The organisation’s preparedness for circular procurement. First, it was noted that the procurement departments and circular procurement processes did not seem to be the main challenge per se. A possible reason could be that the environmental or sustainability specialists were part of the purchasing departments which were relatively knowledgeable on CE and on how to specify procurement requirements incorporating environmental and sustainability demands. That means that demands and specifications for the suppliers were covered for but demands to put on its own organisation to change were not at hand. The final users and / or the departments managing the various assets (e.g. IT-department, real estate department, car fleet management) were mostly not on par with the purchasing department on CE. It was therefore difficult to pinpoint a specific department or role that had the authority and task to be the change agent for a CE. Also, it clearly emerged that such a responsibility was not included in the purchasing department’s responsibilities.

To some extent, the organisations were able to identify, measure and follow up on “what” issues (e.g. minimising the use of plastics, reducing travels, etc.) but less so on “how” in terms of behavioural, policy and procedural changes and other similar typical topics that would affect the whole organisation across departments. For instance, when the procurement department secures a contract for circular procurement a number of questions would rise as follows:

- Who is responsible for creating internal awareness of the contract?
- Who makes sure that the use of that contract will be the default and any deviance require approval / attestation from the management?
Who keeps in touch with the supplier chain and follows up on their business model shift to a CE to make sure that the transition runs smoothly or perhaps requires support?

It emerged that the public organisation’s environmental leader(s) often work in the purchasing departments. However, the purchasing department does not hold the responsibility to work on behavioural and policy changes organisation-wide towards a CE logic. In several cases, the general trend was rather that the purchasing department worked “just on order” from the users. When there was a need for external resources, the purchasing department was given the task to get a contract in place that fulfilled the need. The environmental leader was quite often not positioned within the organisation to have authority, support from, and access to top management / politicians to efficiently and effectively drive organisational change towards a CE.

The research team hypothesises that adopting the typical ISO framework for certified management systems PDCA (Plan-Do-Check-Act) cycle, could support an organisation’s change-process to CE operations. No such a case was observed during the project.

**PROCEED Examples** (from different organisations):

The IT department did not want to deal with old computer hardware. Their product life would become more complicated since OS updates slowed the hardware and security issues were important and dealt with through OS updates and antivirus-software updates.

Smartphones had to be preconfigured, which was done by the manufacturers of new smartphones. Finding a solution for used smartphones appeared to be an impossible issue to solve within the timeframe of the project (if possible, at all!). The pre-configuration as such may be questioned as a type of customisation that may reduce the later market value of the smartphone (in later use cycles). Are there alternatives to customisations to “keep product value as high as possible at all times”?

In another organisation, despite having a purchasing agreement in place for used furniture, user habits made them continue to order new furniture from a parallel contract. When digging deeper into the case, the research team learned that habitual changes are not within the responsibility and mandate of the purchasing department. In many organisations, there is no
clear responsibility for driving behavioural shifts when new circular purchasing agreements (initially) have to be complemented with traditional agreements because of a need for both new and used equipment.

3. Progress (Until November 2019)

During the coaching sessions the questions that were raised and the comments received from one supplier led the research team to decide that interviewing suppliers and offering them support on the need to embrace CE principles, on one hand would facilitate them in gaining a deeper understanding of the key topics discussed with the public authorities. On the other hand, it would clarify the supplier’s perspective to the research team.

With the help of the public sector partners, the researchers had the opportunity to approach and interview the supplier who was most negative in regard to the suggested circularity metric “C”. That interview revealed that the reluctance to the C metric was not due to the objection of CE principles; instead it referred to both material complexity issues as well as the supplier’s network issues that supported the initial hypotheses. It also helped the research team reveal alternative pathways to start shifting to a CE and that depends on product attributes, product use and the supplier’s role in the supplier network required to deliver the offering.

Alternative pathways demand additional circularity metrics, such as a metric for market entropy and a metric for use intensity. The research team hence gathered available research on circularity metrics in these three dimensions, put together a comprehensive presentation material and in November 2019 delivered a focused workshop. The public sector participants had the opportunity to further develop their insights on circularity metrics at hand and understand their benefits and drawbacks.

An alternative pathway that was discussed was purchasing performance, function or any other suitable service in such a way that ownership of the products is retained by the supplier (preferably the manufacturer). Two obstacles were however identified:
• The users in public organisations (and probably elsewhere) are more used to specify product attributes rather than functional or performance attributes, which tends to make such purchasing processes longer and more tedious for everyone involved.

• For the participants of the PROCEED project, the interpretation of LOU was that a new purchase has to be done every four years. Even though it is not mandatory, in practice there seems to be no alternative to extend a contract for longer. One of the consequences of buying a function or a performance (that is when the supplier retains ownership over the products that deliver the functions / performances) is that every four years there is a risk that all those products have to be replaced if the same supplier fails to win the new contract. Depending on how the products are replaced, such procurements could result in “violating” the key circular concepts of prolonged product life, increased use intensity and reduced product throughput.

The researchers also had the possibility to interview the sustainability department of one of the participating public organisations. Specifically, the organisation declared to have an ongoing collaboration on corporate sustainability issues between the sustainability department and the purchasing department. That collaboration was relatively uncommon and that resulted in attracting the interest of many other organisations that invited that organisation to explain the reasons of their successful internal collaboration and how to drive sustainability issues into the core of business (where purchasing obviously is one core element). It must be said however, that not even in this organisation the issue of how to work on and implement organisational change towards a higher degree of circularity when more circular contracts were at hand, was solved.

The only safe conclusion that can be made (and this will be further discussed later on when comparing this organisation with two other participating municipalities), is that with such organisational set-up (compared to cases with an “environmental leader” sitting in the purchasing department), there was at least a joint understanding between the two departments that the responsibility to ensure that circular contracts become the “default” over “linear” contracts lies with the environmental department and not the purchasing department. Finally, it cannot be concluded or assumed that the organisational set-up as such means that “a full PDCA-cycle” (to refer to the typical Plan-Do-Check-Act ISO management standard framework) is in place for an organisational transition to CE.
4. End of the work (Until February 2020)

The final phase of the project focused on verifying general research conclusions with the participating public sector partners, developing presentations, a white paper, an opinion paper, a project report, a dissemination plan, and disseminate project results in different fora. Also, an open final project event was organised and delivered in Gothenburg on 25th February where various the whole project consortium, together with national and international interested parties from the research, public and private sector, congregated to share learnings and discuss case studies and ways forward in CPP.

Findings

Public procurement typically accounts for a substantial percentage of GDP (10-30%), so this sheer size can directly influence economies. Thus, countries with CE ambitions can leverage public procurement as a tremendously powerful tool in their transition. By coordinating public sector actors’ requests towards more circular offerings, countries can create early market demands and promote suppliers with true circular ambitions.

Even though shifting to CPP may appear like a relatively easy task to implement, in practice it hides numerous challenges. It can be tempting to think that the task at hand simply consists of ensuring that procurements are conducted in such a way that circular offerings are provided by the chosen suppliers and that is ensuring that tenders are designed so that circular offerings are increasingly chosen and that each new loop of products will further improve the organisational level of circularity. Based on the PROCEED project activities and collected evidence, the research team is inclined to claim that such a specific task is probably one of the easiest. However, it will not be successful without significant preparatory work, both strategic and tactical as well as at micro-, meso-, and macro level, internally both on behaviours and policies, and externally on products and on supply chains - or rather *with* supply chains. To refer to the ISO management standard terminology (like for instance ISO 9001 and ISO 14001), **there is**
a need to ensure that a full PDCA (Plan-Do-Check-Act)-cycle is implemented in the public organisation for the shift to CE.

A list of some topics strictly related to the notion of “circular procurement” is here presented together with a short argument.

**The notion Circular.** To start with, the notion “circular” is a difficult one that needs three different measures to be covered:

- **Material circularity.** The more recirculated parts a product consists of, the more circular it is. But how circular is such a product if it lasts a short period of time and/or has a low use intensity?

- **Market entropy.** The longer a product lasts, or more precisely, the longer it is attractive and therefore provides utility, the better it is in CE terms. In other words, the ultimate circular product is never circulated. It may hence take forever to know its true degree of circularity.

- **Use intensity.** The continuous “consumption” of a product’s utility is key, or a long-lasting product may otherwise become “long-lasting waste”. For example, the amount of utility consumed per unit of time is as important as market entropy and material circularity.

**Lack of established measures.** Since circularity metrics have not been established, we cannot expect to get easy-to-use tools for measuring product circularity (as highlighted in the opinion paper authored by the research team and published on the Svenska Dagbladet newspaper on 7th February 2020⁴). Meanwhile, CPP will struggle, even fail in many cases (in terms of increased circularity) and stumble in terms of arbitrary claims and measures of circularity of offerings.

Even if measures are used (and there are several available, see for example Saidani et al., 2019), they are currently either manageable but subjective or complicated but objective, mainly because of the lack of established circularity metrics discourage industry to provide simple and useful measurement tools. Such tools could, for instance, take the form of software packages that could be added to ERP systems and design software that in turn can be included to CAD

⁴ [https://www.svd.se/ta-fram-matt-for-varors-cirkularitet](https://www.svd.se/ta-fram-matt-for-varors-cirkularitet)
systems so that product design for future-adaptivity and automated circularity measures are calculated with no or little effort.

Public organisations’ need for internal changes. Quite often, a circular contract cannot replace a “normal” contract. It is therefore rather common that both circular and “normal” contracts coexist. Moreover, some municipalities are not equipped with internal purchasing systems that direct the buyer to the supplier with whom the municipality has a valid contract. Instead, buyers call the supplier when there is a need to buy. The buyer is supposed to be informed on new contracts however, often the buyer is somebody who is not regularly tasked to purchase. This may be for example, a chef in a school kitchen, an IT-support person, or a building manager who buys only on an occasional basis. In many cases, the buyers end up purchasing products from the already well-known supplier who has already met their needs.

A shift in purchasing behaviours among the public organisation’s users is hence needed or there could be a considerable risk that a shift in purchasing will not take place. During the PROCEED project, a partner organisation had two coexisting contracts, the more circular one at an annual ordering amount of about 200K SEK, while the “normal” was about 5M SEK per annum. That was their starting point to try to swap the situation around.

The need for a strategic approach to drive CE change. Since the “normal” purchasing case in public organisations does not require any particular internal attention and need for change, there is quite often (and quite understandably) no clearly defined responsibility within the public organisation to drive the shift to higher circularity more long-term than a single purchasing contract. The options are therefore driving behavioural change within the organisation either “by force” (i.e. through implementation of policies that oblige to choose more circular before less circular contracts when ordering), or by “free will” through training (by educating and showing that “used can be better than new”). This cannot be expected to be handled by the purchasing department. It is a strategic and more long-term task that also may need direct support from the top management / politicians.

Also, the change of attitudes is not limited at an individual level. Today, many public authorities for instance, want customised products, e.g. specific colours on busses, specific logo and patterns on bus seat textiles, customised logos on work clothes, pre-configured smartphones, and so on. In principle, any type of customisation means that a product will fit a
smaller market, and this negatively affects the product value over time which, according to CE principles, should be kept at the highest possible level at all times. Public bodies hence need to work on other means to profile themselves and should try to find other ways to add special configurations to IT-equipment, etc. This may require significant “out-of-the-box” thinking and creativity and the involvement of staff with different expertise. It is highly unlikely that such innovations and new solutions will materialise without anyone driving CE initiatives strategically across all departments of a municipality, to create the required demands for change. It may also need external contacts and discussions. Today, some clothes may be seen as “benefits” from a tax perspective unless they are distinguishable as work clothes, for instance by different colours and / or logos. For example, there may be tax rules and LOU rules that currently work against the CE principles and hence need to be changed or at least be discussed and clarified.

**Strategic management of the supply chain.** A “true” CE builds on another manufacturer logic about how to make money - from a product-flow based one (i.e. selling more by making the product look expensive while being cheap to produce, lasting as short time as the market can accept, and impossible / uninteresting to repair) to a stock-based where ownership is retained and profit comes from the delivery of products’ utilities from long-lasting, attractive-over-time, upgradeable, modular, and easy-to-fix products. The decision of which business model to use is in the hands of the original equipment manufacturing company, and neither its suppliers nor its distributors. In many cases, public procurement agreements are not signed directly with the manufacturer but rather with one local distributor, often in a global distributor network. In such cases it can be problematic to request a change of the manufacturer’s business model, or of material circularity through new, unproven, and often even not yet existing material supply networks.

There are several possible avenues to test how to trigger a shift to higher degrees of circularity of offerings in different supply chains and for different product typologies.
1) Allow suppliers to choose what dimension of circularity to focus on initially.

By that, the immediate supplier can, although with limitations, improve circularity without having to be the OEM. This will at least start a shift and may encourage further changes and OEM involvement later on.

2) Collaborate with other municipalities using the same product typology and circularity metric. This will increase the total market demand for circular offerings and hence soar interest in the supply chain.

3) Run early RFI rounds as tools to be able to choose the most promising combination of product typology, supply chain interest, user acceptance, and economic benefit. Such an approach should increase the probability for success, which can be crucial in the early steps of shifting to a more circular operation.

The need for a strategic and fairly high position for a shift to CE. Based on the aforementioned points, the research team believes there is a need for municipalities to approach CPP from a strategic level, for a time period encompassing many purchasing processes per product category. Such a strategic role could then deal with organisational issues, like behavioural change and attitudes towards new and used equipment, change of routines and policies, training in how to specify service or function rather than products, collaboration with other public sectors on circularity metrics to use, tax issues, LOU issues. This would support the analysis of system level effects from procurements aiming at product circularity improvements, and how to help and control the supply chain on the implementation and use of circularity metrics.

Answers to the initial research questions.

To summarise here are the answers to the set research questions:

1. Will CPP enable innovation?
   - The effort to pursue CPP (however without success) has enabled innovation, primarily at the procurer, in terms of innovating other purchasing alternatives than the initial ones.
2. Will CPP create a market and trigger broader demand, i.e. from more customer segments?
   - During the project CPP has not triggered broader circular demand. However, CPP as such should create markets. That is the whole point, and the research team has detected indications that suppliers at least consider broader offerings that may improve circularity (like for example, mending and washing clothes).

3. Will CPP improve overall circularity?
   - A correctly designed PCC will improve overall circularity. However, many CPP processes are currently still not correctly designed.

Conclusions

Conclusions are drawn on two levels, namely a meso-level (on the supply chain challenges; on the need of market dialogue (RFI); and on the need for internal shift to a CE) and a macro-level (on LOU and the need for standardised circularity metrics).

Meso-level

On the supply chain challenges

In order to reach big improvement potentials (regarding utility per resource consumed) in a CE, all three dimensions of circularity must be addressed, i.e. improved material circularity, (reduced market entropy) and higher use intensity. This cannot be achieved unless OEMs adopt both circular business models and circular product design principles and practice. Such a change will inevitably and considerably affect both suppliers and dealers / retailers.

It should however be possible - and in many cases necessary - to push for a shift towards higher degrees of circularity in other parts of the supply chain than the OEMs. This is because the end customers have no contact with the OEMs but only with dealerships, retailers, etc. Thus, shifts in market demand trickle down to the OEMs through these channels. There could be a situation
where, even when an OEM has embraced CE principles, big Tier 1 suppliers - which for decades have provided parts and subsystems in a linear manner - have a considerable bargain power over that OEM and may be sceptical about CE. Also, even when most actors are interested in increased material circularity, there might not be an established supply chain for recycled materials in the required quantities, qualities, and price levels. There could be then a way for dealers and retailers to initiate and “design” a more circular supply chain rather than being subjects to OEMs’ initiatives.

Dealers and retailers cannot directly influence a product’s longevity (or rather market entropy) since this requires design changes and changes in part specifications - that are decided by the OEM. Dealers and retailers may also face difficulties in influencing the material circularity of a product since changes in material circularity requires the set-up of new material flows. These include return flows of components for remanufacturing, material flows from recycled materials into parts production and so forth and are typically driven by the OEMs. What dealers and retailers could do however, is to take ownership and control of products and work with increasing use intensity (like car-sharing companies do) and reduce market entropy (like some companies do on garments by adding washing and mending services to their offerings to end customers). It is worth noticing that these initiatives do not exclude them from keeping acting as dealers / retailers.

Product typology may also affect the starting point in the three circularity domains. For example, in the case of garments, cotton may be preferred over polyester to avoid oil-based textiles. But cotton is more difficult to recycle due to the shortening of fibre length at each recycling loop. In addition, contamination in the use-phase (oil, paint, silicone and acrylic sealants, soil, etc.) may severely impede recycling and even cascade loop use of both cotton and polyester. Such choices considering all these aspects should inform the design and development of a system-level perspective and LCAs for the cascading loops of different alternatives. Circularity metrics for the three dimensions of product circularity only measure the circularity at product level and cannot be used to choose between products of significantly different material content.

In conclusion, an important project learning point was that in order to increase the probability for success with CPPs, **public actors need to be flexible in how the procurement becomes more circular**. They should take into consideration factors such as the supply chain’s internal
structure, bargain power relations and the product typology at hand so that to provide the supply chain with the best possible conditions to meet more circular demands. Perfection must not become the enemy of goodness. In other words, wishful objectives should not hinder the more pragmatic-driven increases that can be achieved in product circularity.

**On the need for market dialogue (RFI)**

There is a significant difference between being in a “steady-state” (like the CE or the linear economy) versus starting a shift, i.e. moving from one steady-state to another one. Here, the discourse is on a shift in behaviours, product design, types of offerings, logic behind profit-making (from flow-based to stock-based) and so forth. As Einstein is supposed to have said:

*It takes a whole new way of thinking to solve the problems we have created with the old way of thinking.*

The “old way” is the way things are done in the steady state we want to shift away from.

Leading a shift like the one at hand - shifting to a CE via CPP - is a demanding task. It is essential that public authorities are determined in *what* they want to achieve (higher degree of product circularity) while simultaneously remaining flexible in *how* to achieve the desired higher level circularity without deviating from the guiding CE principles. This is particularly critical when taking the initial (and inevitably) stumbling steps - even if they are small and perhaps do not involve all parties, not even the most crucial ones (like the OEMs) - and when it is important to show progress and benefits to all interested parties.

Since there are so many possible hindrances that may arise in a procurement process, it is necessary to choose a product that is suitable in one or several of the three circularity dimensions and there is a sufficient number of positive and open minded actors in the supply chain interested in circular business opportunities.

One way to find those possible pathways for CPP could be to **run various forms of very early RFI**s with suppliers in different product categories. An early dialogue with multiple possible suppliers for several product categories should increase the probability to find promising pathways to circular procurements that would therefore open up to CPP when the time is mature for it.
On the need for internal shift to CE

The current analysis was developed on only the five public organisations of the project consortium, therefore no statistically grounded claims can be inferred. The aim of the research team here is purely to try to describe what was observed and compare with what needs to be achieved for any organisation that intends to shift from one state of economic logic to another one, be it from linear to circular, or the reverse or in any other way.

CE is an economy that is based on value preservation and, when this is not achievable, material preservation, so that the use of virgin resources is minimised, i.e. both virgin energy and virgin material use (excluding non-bio-stored flow-based energy from the sun). Such an economy is in stark contrast to the current linear economy which is based on a profit logic capitalising on flows of virgin material and energy. In essence, the more is sold, the better is for the economy. The linear economy must however not be misinterpreted. As for any economy model, also the linear economy aims to maximise the economic outcome from scarce resources. Hitherto, labour has increased in price (and taxation) much more than virgin resources which means that labour productivity has increased much more than resource productivity. Nevertheless, continuous resource productivity improvements also happen in the linear economy but not at such a pace that it outperforms economic growth. In other words, even though the linear economy leads to improvements in “decoupling” economic growth from virgin resources use, the absolute use of virgin resources continues to increase.

Organisations should therefore shape a “new circular soul” that is made of a completely different logic for making money, creating value, valuing ownership, utility and what should be valued and what the inviolable principles the organisation is grounded on are. It is argued that a change from a “linear soul”, which all organisations “were born with”, to a “circular one”, cannot be achieved by only focusing on “technical” issues like “reduce the use of plastics” or “avoid oil-based textiles” or “reduce CO2-emissions with X% annually”. Even though all such initiatives are preferable than none and the related delivery agents are commendable for their engagement, those initiatives will not trigger the change of mindset and routines that are required to become truly circular. They will mainly affect the decoupling factor in the linear economy logic - still keeping the organisation in the same status quo.
In conclusion, it is inferred that if the public sector organisations would have an ISO 14001 certified EMS with CPP as a key performance metric to achieve, there are reasons to believe that the EMS structure (i.e. the PDCA-cycle: Plan, Do, Check, Act) coupled with clear consequence of losing the certification if actions are not taken by the entire organisation, would have radically improved the organisation’s ability to shift itself to a CE public organisation.

Moreover, an alternative could be to appoint a role sufficiently high within the organisation and sufficiently powerful to drive the required changes in terms of educating, policy changes, change of routines, change of attitudes and so forth. Such a role would therefore have not only the responsibility to drive a “PDCA-cycle” but also the authority to ensure that the “Do” and the “Act” phases are executed by the designated organisation’s departments (on top of the typical required tasks) and within reasonable timeframes.

Macro-level

On LOU and the need for standardised circularity metrics

The legal framework for public procurement and the need for standardised circularity metrics are two key issues in CPP which can be considered at a country’s macro-level. They would need particular consideration that falls outside of the scope and possibilities of the PROCEED project. Both arguments on LOU and the need for standardised circularity metrics require further investigation possibly in a future project that specifically aims at collaborating with macro-level authorities or bodies, such as the Delegationen för cirkulär ekonomi and Upphandlingsmyndigheten.

Recommendations

- For society / stakeholders (The government, Upphandlingsmyndigheten, Sveriges Kommuner och Regioner -SKR, etc.)
  - Check / develop regulations for public procurement so that procurement of performances, functions or other services can be done in ways that do not force the replacement of the required equipment while ensuring fair market competition.
- Check/develop tax regulations so that these do not become the reasons / necessity to drive products “customisation” in ways that negatively affect their market value.
- Standardise objective circularity metrics for material circularity, market entropy and use intensity.

- For public authorities
  - Create a strategic position for driving the shift of the whole municipality to run under the CE principles.
    - Alternatively, if an EMS structured according to a PDCA cycle is in place, set objectives and targets for CE so that the EMS’s PDCA cycle will help drive organisational change towards CE

- For researchers
  - Develop circularity metrics that could effectively support the implementation of CPP.
  - Study the evolution of the legal framework on public procurement LOU and its impact on CPP.

**Next steps**

Thanks to the PROCEED project, public procurement has been identified as an “area of expertise” within RISE. The research team is therefore currently engaged in further develop such an area of research. Moreover, it is currently in dialogue with the Swedish Delegation for CE that positively reacted to the opinion paper on the need to measure circularity and set standards which was published on Svenska Dagbladet.
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Annex

Annex 1. PROCEED Effect logic diagram (as per project application)