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Full length article

## Towards a more Circular Economy: Proposing a framework linking sustainable public procurement and sustainable business models

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## ABSTRACT

Sustainability aims at addressing environmental and socio-economic issues in the long term. In general, the literature on sustainability has focused mainly on the environmental issues, whereas, more recently, a Circular Economy has been proposed as one of the latest concepts for addressing both the environmental and socio-economic issues. A Circular Economy aims at transforming waste into resources and on bridging production and consumption activities; however, there is still limited research focusing on these aspects. This paper addresses the link between procurement and supply practices, and proposes changing from a traditional public procurement process, based on product-selling business models, to a more service-oriented system. The paper proposes a framework to include technical and non-technical specifications of product/service combinations that improve resource usage efficiency through recovery. The framework also considers socio-cultural specifications and physical and social proximity between the stakeholders in the procurement process. The framework is based on collaboration, which is a vital link between the public procurement process and the development of more sustainable business models, where the experience gained in the collaboration process serves as the bases for suppliers and procurers in improving their contribution to CE, whilst at the same time securing economic benefits for both parties. Although, in this process, the specification setting may take longer, the relationships between procurer and supplier tend to be longer lasting and stronger. This research shows that collaboration between procurers and suppliers throughout the procurement process can lead to reductions in raw material utilisation and waste generation, whilst promoting the development of new, more sustainable, business models.

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### 1. Introduction

Sustainability is aimed at addressing environmental, and socio-economic issues of this and future generations (Hopwood et al., 2005; Lozano, 2008; WCED, 1987). In general, the sustainability literature has focused on environmental issues (e.g. Atkinson, 2000; Costanza, 1991; Rees, 2002; Reinhardt, 2000); although, a number of authors have highlighted the importance of balancing the sustainability issues (i.e. economic, environmental, and social; Elkington (1998)), and the time dimension, as well as their inter-connections (Lozano, 2008) through a holistic perspective (see Escobar, 1999; Hjorth and Bagheri, 2006). The concept of the Circular Economy (CE) has become one of the most recent proposals to address environmental sustainability (Murray et al., 2015). This is done through addressing economic growth, while at the same time

considering the shortage of raw materials and energy (Yuan et al., 2006), as well as a new growing business construct (Murray et al., 2015). CE<sup>1</sup> is based on ‘closing loops’ through different types and levels of recovery (Yong, 2007; Yuan et al., 2006) by transforming material into useful goods and services through resource efficiency (Klettner et al., 2013; Webster, 2013). Resource efficiency within CE is achieved by keeping the added value through the prudent use of raw materials and energy consumption throughout all stages of the value chain (Yuan et al., 2006), and by using products for as long as possible, thereby eliminating waste (Bilitewski, 2012).

According to the European Commission (2014), some of the ways to achieve resource efficiency include light-weighting, durability, efficiency, substitution, eco-design, industrial symbiosis, and leasing/renting. The transformations needed to achieve

<sup>1</sup> The concept of CE has been used since the 1930s in its original conception by Leontief (see Leontief, 1928); however, discourses relating it to environmental issues are recent, such as research in China and the Ellen McArthur foundation (Naustdalslid, 2014), CE still lacks a thorough definition.

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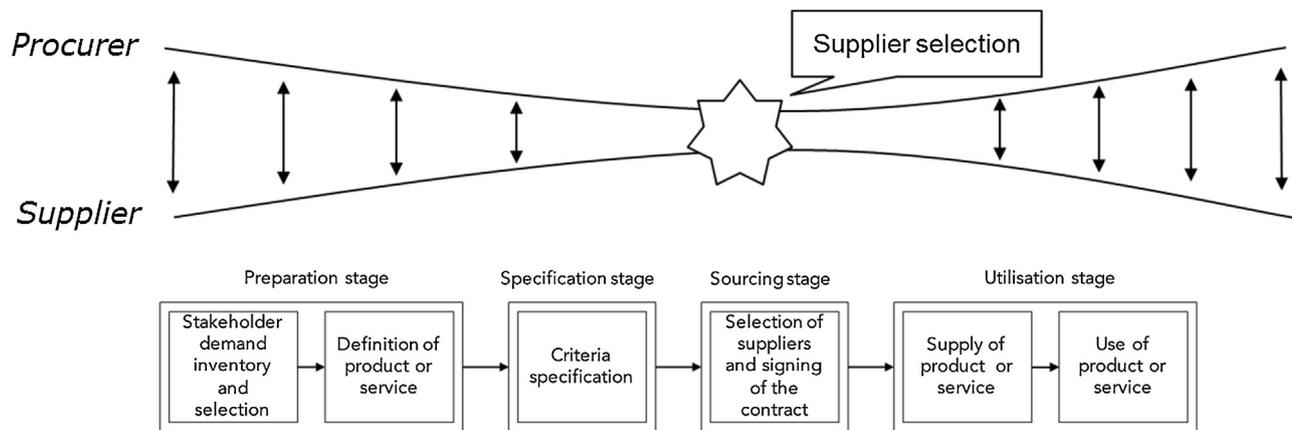


Fig. 1. The changing contact between the procurer and supplier during the PP process showing the different stages from preparation to utilisation (based on UNEP (2014)).

such resource efficiency are based on technical, social, and organisational innovations throughout the value chain, which connect production and consumption (European Commission, 2014). The components that achieve these transformations include (European Commission, 2014): (1) Skills and knowledge, including entrepreneurship and capacity-building and multi-disciplinarity; (2) Organisational innovation, including integrated solutions and systems, logistics, business models, and policy supporting tools; (3) Social innovation, including new production and consumption models, citizens' involvement, product service models, and design services; (4) Technological innovation, including design of materials and processes, product design, and resource management (waste, water, energy and raw materials); (5) Financial instruments; (6) Awareness, dissemination and internationalisation; and (7) Multi stakeholder involvement.

Government and companies have been two of the key players addressing a number of CE's components and transformations through redesigning their products and processes (Murray et al., 2015). The United Nations Environmental Programme (UNEP), as one of the outcomes of the Rio + 20 conference in 2012, set up an initiative to promote sustainable public procurement (SPP) (UNEP, 2014). The goal of the initiative is to link the consumption side, through governmental public procurement, to the production side, through the development of more sustainable business models (SBM). In spite of such calls, there has been little academic research focusing on linking SPP and SBM.

The aim of this paper is to contribute to CE by expanding knowledge of the relationships between SPP and the development of more sustainable business models, and is structured in the following way: Section 2 discusses the literature on SPP; Section 3 reviews sustainable business models discourses; Section 4 focuses on collaboration, as a means to linking SPP activities and sustainable business models; Section 5 presents the methods used; Section 6 proposes a framework for linking the public procurement process with the development of business models to better contribute to CE; and Section 7 presents the conclusions.

## 2. The link between public procurement (PP), business models and sustainability

Public procurement (PP) is a key economic activity of governments (Brammer and Walker, 2011). It refers to the acquisition of goods and services by governments or public sector organisations through a public contract (Kiiver and Kodym, 2014), and allows public sector organisations to perform their functions and deliver its services (Uyarra et al., 2014).

PP includes education, leisure, and social services (Walker and Preuss, 2008). It ranges between 8 and 25 per cent of the gross domestic product (GDP) of countries falling under the Organisation for Economic Co-operation and Development (OECD) and 16 per cent of countries in the European Union (EU; Brammer and Walker, 2011).

According to UNEP (2014), the procurement process consists in four stages: (1) Preparatory stage, where the problem is defined, and an inventory is made of the demands of related internal and external stakeholders, resulting in a first set of specifications. This set is integrated into the first concepts of a product or service that will be procured; (2) Specification stage, where the first concepts are further analysed and developed, leading to the definite specifications of the product or service; (3) Sourcing stage, also called the tender process, where the product or service specifications are made public to potential suppliers, and where the selection of the supplier and their signature on the contract finishes the tender; and (4) Utilisation stage, where, after signing the contract, the product or service is supplied. Fig. 1 shows the PP process including these four stages.

In the PP process, the tender process plays a central role, as it links governmental specifications to potential suppliers (Kiiver and Kodym, 2014). Contact between suppliers and the procurer is not allowed prior to the publication of a tender in order to ensure healthy competition (Kiiver and Kodym, 2014). With the publication of the tender, the procurer details the required specifications. The suppliers develop a particular business model to satisfy the procurer's specifications, such as operational excellence, product leadership or customer intimacy (Kamann, 2007). The procurer then selects the most suitable supplier (Kiiver and Kodym, 2014).

According to Uyarra et al. (2014), the influence of the PP process on a company's business model is usually linear (see Fig. 2), where over-specified tenders and price per unit are the main focus of negotiations between the supplier and procurer (Kiiver and Kodym, 2014). Once the procurer decides on the product's technical specifications (e.g. size, weight and colour), the supplier defines the necessary raw materials for the production process, and the product is then delivered to the procurer as per specification. After the use period, the product partly becomes waste and the procurer decides whether to dispose of it. The optimization of used raw materials or generated waste is not explicitly addressed in the product's technical specifications.

In linear frameworks, such as the one presented in Fig. 2, raw materials are defined as inputs for the manufacture of the product, and the generation of waste as an output of product use. In a product specification, raw materials and waste are defined (e.g. specific environmental friendly materials, or a product that can be

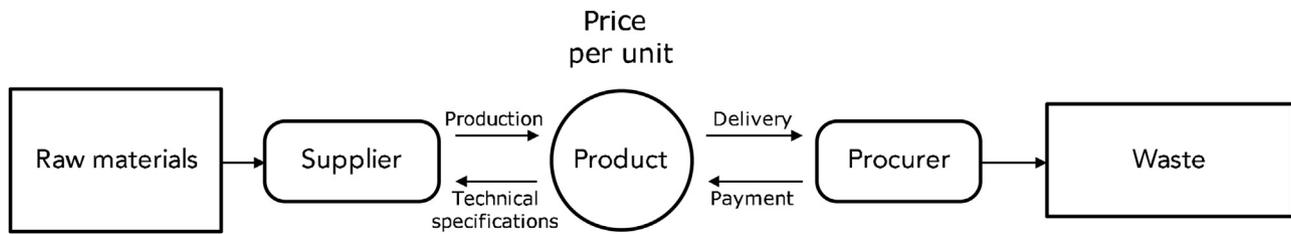


Fig. 2. A linear framework of the PP process showing the influence on business models.

recycled), obliging suppliers to be aware of the need for efficiency of resources and processes that lie within or outside of the supplier's direct sphere of responsibility (Preuss, 2009), and which focus on closing the life cycle of the product to be delivered (Guide and Van Wassenhove, 2001).

### 2.1. Sustainable public procurement (SPP)

According to the EU Public Procurement Directive (European Union, 2014), the procurer has to award a contract to the tender (i.e. select a supplier) that is economically the most advantageous. Depending on the choice of the contracting organisation, this could imply the tender offering: (1) the lowest price; (2) the lowest overall cost; or (3) the most value for money based on its price-quality criteria ratio. In the latter, the quality criteria could also include other non-pecuniary criteria (Parikka-Alhola, 2008), which allows for the incorporation of environmental or social oriented criteria into the product specification (Kiiver and Kodym, 2014; Rietbergen and Blok, 2013). Incorporating social, environmental and economic (i.e. sustainability) specifications into the PP process can have indirect effects on product development and on consumer demand for more sustainable products (Parikka-Alhola, 2008), which results in the promotion of improvement in the impact products or services have on society (Preuss, 2009; Srivastava, 2007). The incorporation of sustainability criteria (i.e. sustainability issues) into the tender and, therefore, into the procurement process embodies sustainable public procurement (SPP) (Brammer and Walker, 2011).

Given the purchasing power of public organisations, considerable demand for sustainable products and services can be promoted (Parikka-Alhola, 2008; Walker and Brammer, 2012), and can set a trend for other organisations (Day, 2005), and thereby enlarge the market for sustainable products or services (Uyarra et al., 2014). For example, if all public authorities in the European Union switched to green electricity, they would save more than 60 billion tonnes of carbon dioxide (CO<sub>2</sub>), and if they used energy-efficient desktop computers, another 830,000 t of CO<sub>2</sub> (Day, 2005).

Several countries have started using the potential of their purchasing power and have included SPP into their public policies. For example, Japan is a leading country in SPP (Thomson and Jackson, 2007). The Philippines has eco-procurement legislation that obliges federal government departments and agencies to adopt SPP programmes, while Canada has committed to implementing SPP policies (Day, 2005). The European Commission (EC) has also been engaging with European public authorities to include sustainability criteria in their procurement processes (European Commission, 2011). For example, through a guideline for including environmental criteria in the PP process, and a guide on Socially Responsible Public Procurement, which proposes how to integrate social considerations into the PP process (UNEP, 2014). Within the European Union, Sweden has been top of the list of countries applying SPP, followed by Denmark, Germany, Austria, the United Kingdom, and the Netherlands (Brammer and Walker, 2011; Day, 2005; Melissen and Reinders, 2012).

### 3. Sustainable business models (SBM)

A business model is a comprehensive understanding of how a company does business (Beattie and Smith, 2013; Teece, 2010) and how value is created (Afuah, 2004), and it articulates the logic, the data, and other evidence that support a value proposition for the customer, and a viable structure of revenues and costs for the company delivering that value (Teece, 2010). By clarifying the chosen position of the company within the value chain, i.e. what are the key assets to own and control in order to capture value (Teece, 2010), a business model is a reflection of the company's strategy (Casadesus-Masanell and Ricart, 2010). As a result of this strategy, the company is linked to several stakeholders generating a dependency relation: the external stakeholder demands are converted into the stipulated characteristics constituting a product or service by the stakeholders having a considerable effect on the company's business model (Hienerth et al., 2011).

A business model is based on three main elements (Boons and Lüdeke-Freund, 2013; Osterwalder et al., 2010): (1) value proposition; (2) value creation and delivery; and (3) value capture. A selection of activities, the development of an activity system structure, and the definition of actors performing these activities are necessary to link the business model elements (see Zott and Amit, 2010). In general, business models should be seen through the lens of permanent interactions between these elements and activities, and the implications of their changes (Demil and Lecocq, 2010). This emphasises the need for a retrospective and prospective analysis of these interactions as a key to the understanding of how companies work and how they create value for the different internal and external stakeholders (DaSilva and Trkman, 2014). By ratifying this value creation process for stakeholders (e.g. through formalizing businesses with suppliers or customers) a company can reduce its costs (Boatright, 1996; Coase, 1937; Demsetz, 1988).

Since a company may have different value propositions, it may have more business models at different organisational levels (Demil and Lecocq, 2009) and, consequently, hierarchical relationships between these business models (Burkhart et al., 2012). All business models present in a company should coalesce to meet the company's overall strategic objectives (Burkhart et al., 2012). This coalescence is influenced by the stakeholder demands influencing the business model elements and activities (Perthen-Palmisano and Jaki, 2005).

With increasing stakeholder demands on sustainability issues encompassing the entire life cycle of a product or service, from downstream (i.e. extraction), to upstream (i.e. disposal), and its use, the third dimension (DeSimone and Popoff, 2000; Holliday, Schmidheiny, and Watts, 2002; Robèrt, 2000), the compliance of companies' business models with these evolutionary stakeholder issues must be addressed holistically (as highlighted by Linnenluecke et al., 2009). With the concept of Corporate Sustainability (CS) defined as "...meeting the needs of a firm's direct and indirect stakeholders, such as shareholders, employees, clients, pressure groups, communities without compromising its ability to meet the needs of future stakeholders as well" (Dyllick and Hockerts, 2002),

it can be argued that CS is a journey for companies as they seek continuously to adjust and improve their business models (Lüdeke-Freund, 2010; Porter and Kramer, 2011; Stubbs and Cocklin, 2008) and how they engage and empower stakeholders (Lozano, 2013a).

The integration of CS into a company's traditional business models (Baumgartner, 2009; Lozano, 2012; Murray et al., 2015) has driven companies to rethink and redesign their business models to better engage with stakeholders, while creating competitive advantages for customers, the company, and society (Lüdeke-Freund, 2010; Porter and Kramer, 2011; Stubbs and Cocklin, 2008). Recently, a number of authors have discussed the redesign of business models in order to move to more sustainable business models (SBM; e.g. Bocken et al., 2014; Bohnsack et al., 2014; Demill and Lecocq, 2009).

This redesign process can be classified into (see Bocken et al., 2014): (1) Technological (maximise material and energy efficiency, create value from 'waste', and substitute products and process with renewable and natural ones); (2) Social (deliver functionality, instead of having ownership, adopt a stewardship role, and encourage sufficiency); and (3) Organisational (re-purpose the business for society and the environment, and develop scale-up solutions). The choice of redesign process has implications for the business model elements (i.e. value proposition, value creation or value capture bases), and related activities (see Section 3.1). A full integration of the redesign process classifications into the business model elements and interrelated activities helps in making a business model become more sustainable (Rauter et al., 2015).

The redesign of business models changes the relationship between the supplier and procurer of goods, and moves from fully product-focused to include service-focused operations (Lay et al., 2009). This change results in a shift from selling products to providing service solutions offering multi-issue (i.e. economic, environmental and social) value for the customer's needs (Lay et al., 2009; Mont et al., 2006), including the time dimension. The customer moves away from being seen as just the person that pays for the product but includes other important stakeholders throughout the life cycle of the product, or even society in general (Vermeulen and Witjes, 2016).

A concept that could help to explain value-focused, more sustainable business models is 'product-service systems' (PSS), which is directed at reducing the total environmental burden of consumption (Mont, 2002), and could, therefore, contribute to the more efficient use of resources. According to Mont (2002), PSS can be divided into: (1) products/services combinations/substitutions; (2) services at the point of sale; (3) different concepts of product use (subdivided into use oriented and result oriented); (4) maintenance services; and (5) revalorisation services. PSS models requiring close collaboration between producers and consumers (Lozano, 2013b); however, shifting to PSS requires changes in the levels of information exchange between stakeholders, as well as in the nature of relationships between the stakeholders (Lockett et al., 2011).

The shift to PSS, the development of more sustainable business models, and the resulting integration of CS into business activities provide the bases for a company to better contribute to CE (Murray et al., 2015). Although a number of authors (e.g. Bocken et al., 2014; Bohnsack et al., 2014; Demill and Lecocq, 2010) have discussed sustainable business models, there are still limited studies on the contribution of more sustainable business models to CE (Rauter et al., 2015), or on the link between SPP and more sustainable business models (as discussed by Brammer and Walker, 2011).

SPP requires a collaborative supplier engagement strategy (Meehan and Bryde, 2011). Such collaboration directly affects the company's business model elements and activities (Hienerth et al., 2011), including adjustments throughout value chains, where producers, consumers, investors, distributors, and recyclers are better

connected to ensure a fair distribution of costs and benefits (Bocken et al., 2014). In the SPP process, these adjustments are the result of a collaborative process between suppliers and procurers and the combination of their multiple business models (Uyarra et al., 2014).

#### 4. Collaboration

Collaboration harvests its benefits from differences in perspectives, knowledge and approaches, solving problems while at the same time offering benefits to all those involved in the process (Lozano, 2007). Collaboration requires exchange of information (Troy et al., 2008) and coordination of activities across interdependent organisational units, such as research and development, procurement, and sales (Cuijpers et al., 2011).

Collaboration can help a company in changing and redesigning its business models (see De Luca and Atuahene-Gima, 2007; Swink and Song, 2007; Troy et al., 2008). Collaboration increases the number of potentially useful ideas (Milliken and Martins, 1996), enhances flexibility of the workforce (Troy et al., 2008), and improves product performance (Olson et al., 2001). Collaboration may lead to less efficient decision making (Troy et al., 2008), conflicts over resources and technical issues (Troy et al., 2008), budget overruns (Olson et al., 2001), and project failures (Mishra and Shah, 2009; Swink and Song, 2007).

Some of the benefits of collaboration include the ability to optimise both financial and human capital, including better access to markets and knowledge, enriched creativity, avoidance of confrontation, a decrease in the time needed to accomplish objectives, increased trans disciplinary learning, and making processes more efficient (Fadееva, 2004). However, collaboration has inherent difficulties (Lozano, 2007) and costs (Cuijpers et al., 2011), such as: (1) Coordination costs, referring to operational dependence between the activities of the different actors (Genefke, 2000); (2) Vulnerability costs, referring to the safeguarding of important and unique resources (Genefke, 2000); (3) Information, referring to who gets the benefits and the real, or hidden, agenda (Chilosi, 2003); (4) Bargaining, how to split the gains (Chilosi, 2003); and (5) Free riding, where those who choose not to participate still get the benefits (Chilosi, 2003).

In general, collaborative relations increase the level of cohesion within groups and between their members (Luukkonen and Nedeva, 2010). Such cohesion depends on the proximity between the members (Bansal and Roth, 2000; Glavič and Lukman, 2007). Borgatti (2003) proposed this proximity as the coalescence between the physical (i.e. propinquity) and the socio-cultural proximity (i.e. similarity of beliefs and attitudes, amount of interaction and affective ties of the individuals in a group). The physical and socio-cultural proximity between two members, such as a procurer and a supplier, is a prerequisite for a successful collaboration (Dietrich et al., 2010; Hannon, 2012; Walker and Brammer, 2012).

#### 5. Methods

Grounded Theory (GT) helps to frame exploratory research, where the researcher has little control over the phenomena under study (in this paper, how sustainable procurement leads to the development of more sustainable business models). GT allows the identification of causal connections between phenomena, and to generalise from a specific context (Bryman, 2004; Yin, 1984). GT was developed as a response to the neglect of theory discovery (Glaser and Strauss, 1999), the concerns over the predominance of quantitative methods in social sciences, and the tendency to test existing grand theories (Jupp, 2006). GT refers to the strategy that emphasises developing and building theory from data (Glaser and Strauss, 1999; Jupp, 2006; Saunders et al., 2007; Strauss and

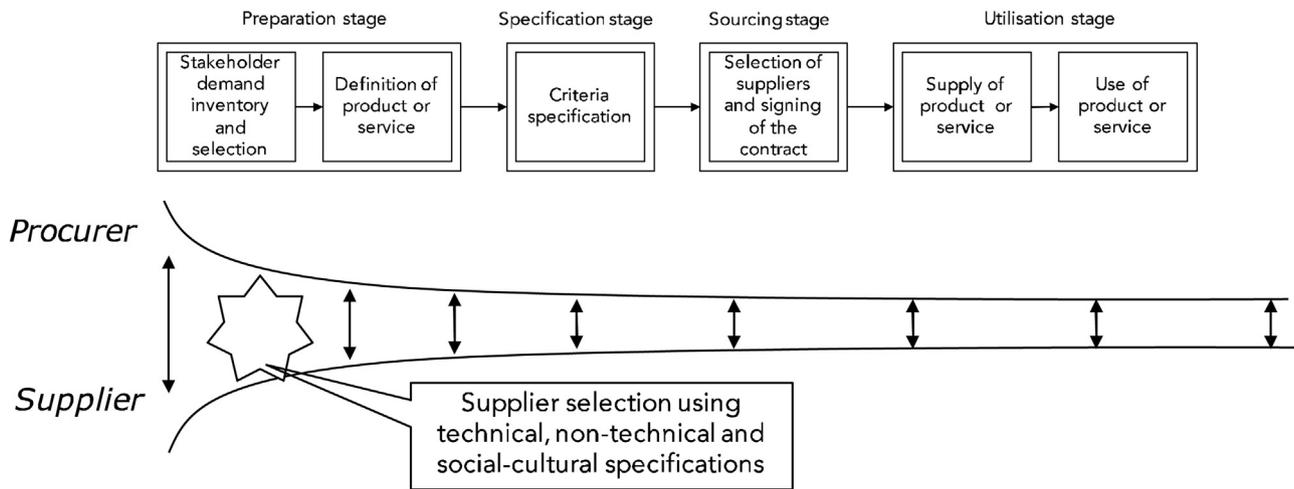


Fig. 3. Procurer/supplier proximity and supplier selection during the SPP process (based on UNEP (2014)).

Corbin, 1998). In this paper the literature on sustainable procurement, more sustainable business models and collaboration). Glaser and Strauss (1999) proposed four general approaches to help analyse qualitative data using GT. This study uses the fourth, known as analytic induction, which is concerned with generating and providing an integrated, delimited, universally applicable theory of the causes accounting for a specific behaviour (here, the contribution of the collaboration between procurement and business models to CE). Two types of theory can be generated: (1) Substantive, developed for a substantive or empirical area of inquiry, and (2) Formal, developed for a formal or conceptual area of inquiry (Glaser and Strauss, 1999). The latter is more appropriate for the objectives, and addressing the research questions, of this paper. GT is based on generating conceptual categories or their properties from evidence, which is then used to illustrate or propose a concept (Glaser and Strauss, 1999). In this paper, the generated concept is the proposed framework linking sustainable public procurement and business models.

## 6. Proposing a collaborative framework between SPP and SBM to contribute to CE

Government and companies have been two of the key players addressing a number of CE components and transformations. This section aims at proposing a collaboration-based framework linking SPP and SBM

Whilst in the traditional PP process the product unit is the main object of negotiation between suppliers and procurers (see Fig. 2) and, in general, the tender is based on the lowest price or overall cost (see European Union, 2014). In the SPP process the focus of the tender is on the most value for money, where environmental or social specifications may be included (as discussed by Kiiver and Kodym, 2014; Rietbergen and Blok, 2013). In this case, the main object of the negotiation between supplier and procurer switches from product oriented to PSS (see Mont, 2002), thus switching from a price per product unit to price per delivered service, as the functional unit of the tender negotiations. Two important elements of this service-oriented functional unit are closing loops (as indicated by Yong, 2007; Yuan et al., 2006) and improving resource efficiencies through recovery (as discussed by Klettner et al. (2013) and Webster (2013)).

By incorporating sustainability criteria into their business models (as discussed by Lay et al., 2009) companies are more likely to fulfil SPP process specifications. This, however, requires closer proximity between the supplier and the procurer in

the procurement process (as discussed by Meehan and Bryde, 2011). Collaboration between the procurer and potential suppliers changes to the beginning of the tender (i.e. the preparation stage), as illustrated in Fig. 3, instead of the sourcing stage (see Fig. 2).

Long term collaboration during the SPP process requires a shift from the technical specifications set up by the procurer to a more collaborative discussion on, and definition of, the proposed technical and non-technical specifications between the supplier and procurer. In addition, socio-cultural specifications, such as beliefs and attitudes of the people contributing to the procurement process (as proposed by Borgatti, 2003), must be included in the SPP process. While the technical and non-technical specifications drive the supplier and procurer to develop products or services aiming for more resource efficiency, the socio-cultural specifications will help the parties to hire and train personnel specifically for the co-development process, addressing the Social innovation and Multi-stakeholder involvement components of the resource efficiency transformations proposed by the European Commission (2014).

During collaboration in the process between procurement and business models for CE, a company can gain experience in defining product or service specifications to close loops and optimise the use of resources at product or service level (as proposed by Mont, 2002). Such collaboration can provide experience for further partnerships between suppliers and procurers.

Considering the aforementioned transactional elements, it is possible to propose a CE alternative to the linear framework of the PP process presented in Fig. 2. This new framework centres on reducing waste, and consequently raw materials, by changing from a product focus to a PSS where loops are closed through recovery. In this process the value generation switches from price per unit to price per service (of a functional unit). The successful outcome of the process depends on the procurer and the supplier collaborating to establish the technical and non-technical specification, and a shared ownership of the PSS. The collaboration starts to take place in the preparation stage of the tender, rather than at the sourcing stage. Fig. 4 shows the integration of these elements into a proposed "Procurement and business model collaboration for CE (ProBiz4CE)" framework.

The procurement of an office desk by a governmental agency can provide an illustrative example of the ProBiz4CE framework. According to the linear framework, the technical product specifications (e.g. material, dimensions, and colour of the desk) are decided by the procurer (e.g. the R&D department) during the preparation and specification stage and before the sourcing stage (i.e. actual ten-

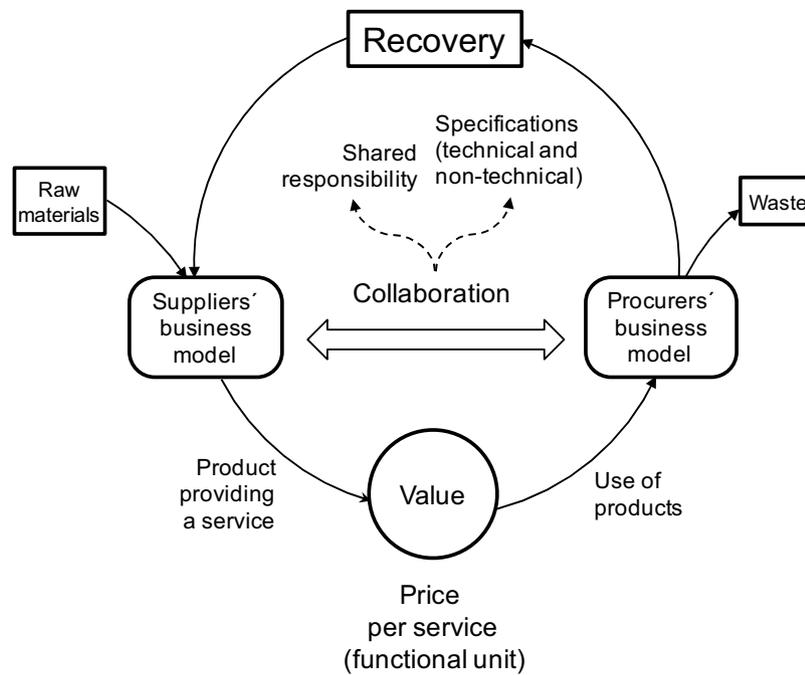


Fig. 4. Collaboration between procurement and business models for CE (ProBiz4CE) framework.

der), without any input from the supplier. In a process following the ProBiz4CE framework, such technical specifications, as well as non-technical ones (e.g. maintenance and end-of-life take-back), are co-developed and decided between the government agency and the potential suppliers (e.g. office furniture manufacturers). In the tender stage, the agency decides which of the suppliers is the most suitable to fulfil the technical and non-technical specifications, depending of the economic and environmental characteristics of the business model proposed by the suppliers. The functional unit switches from number of desks sold to, for example, area of desk space needed. The interaction between the parties increases their propinquity in the preparation stage, and enables a more sustainable use of resources by focusing on closing loops throughout the life cycle of the desk. The supplier owns the desks and is responsible for their maintenance and final disposition, whilst the governmental agency is responsible for a fair use of the product and allowing the supplier to undertake any repairs and determine the ultimate disposing of the product. Both parties are responsible for reducing the environmental impact of the product/service. The ProBiz4CE framework can lead to better collaboration and conflict resolution between the parties, alignment of specifications, understanding of the possibilities and challenges in delivering the product/service combination, and closing loops that will reduce the amount of raw materials needed and waste generated, thus better contributing to CE.

## 7. Conclusions

Sustainability is aimed at addressing the environmental and socio-economic issues of this generation and future ones. The concept of CE has been proposed to address environmental issues by transforming waste into resources, and bridging production and consumption activities. The transition to a functioning CE regime requires a systemic multi-level change, including technological innovation, new business models, and stakeholder collaboration.

Although there have been calls to bridge production and consumption activities, there has been limited research on the topic. This paper aims at bridging that gap by linking SPP and SBMs. The ProBiz4CE framework is based on CE by closing loops through

recovery, while at the same time changing the scheme from price per unit to value provided per service, and including technical, non-technical and socio-cultural specifications and shared responsibility of the product/service combination. The ProBiz4CE framework was developed under the aegis of SPP. However, it may also be applicable in private procurement settings, where tenders are not usually advertised publicly. This facilitates decision-making by the parties, and may reduce the time needed to reach a mutually agreed outcome.

This research proposes that collaboration between procurers and suppliers can lead to reductions in raw material utilisation and waste generation, whilst promoting the development of more sustainable business models, thus better contributing to making societies more sustainable.

Further research is needed to help refine the ProBiz4CE framework. For example, a case study could provide insights into the practices of linking SPP and SBMs, whilst engaging with stakeholders could help identify the challenges in managing the relationship between SPP and new business models.

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## References

- Afuah, A., 2004. *Business Models: A Strategic Management Approach*, 1st ed. McGraw-Hill/Irwin, New York.
- Atkinson, G., 2000. Measuring corporate sustainability. *J. Environ. Plann. Manag.* 43 (2), 235–252.
- Bansal, P., Roth, K., 2000. Why companies go green: a model of ecological responsiveness. *Acad. Manag. J.*, 717–736.
- Baumgartner, R.J., 2009. Organizational culture and leadership: preconditions for the development of a sustainable corporation. *Sustain. Dev.* 17, 102–113, <http://dx.doi.org/10.1002/sd>.

- Beattie, V., Smith, S.J., 2013. Value creation and business models: refocusing the intellectual capital debate. *Br. Account. Rev.* 45, 243–254, <http://dx.doi.org/10.1016/j.bar.2013.06.001>.
- Bilitewski, B., 2012. The circular economy and its risks. *Waste Manag.* 32, 1–2, <http://dx.doi.org/10.1016/j.wasman.2011.10.004>.
- Boatright, J.R., 1996. *Business ethics and the theory of the firm*. *Am. Bus. Law J.* 34, 217–238.
- Bocken, N.M.P., Short, S.W., Rana, P., Evans, S., 2014. A literature and practice review to develop sustainable business model archetypes. *J. Clean. Prod.* 65, 42–56, <http://dx.doi.org/10.1016/j.jclepro.2013.11.039>.
- Bohnsack, R., Pinkse, J., Kolk, A., 2014. Business models for sustainable technologies: exploring business model evolution in the case of electric vehicles. *Res. Policy* 43, 284–300, <http://dx.doi.org/10.1016/j.respol.2013.10.014>.
- Boons, F., Lüdeke-Freund, F., 2013. Business models for sustainable innovation: state-of-the-art and steps towards a research agenda. *J. Clean. Prod.* 45, 9–19, <http://dx.doi.org/10.1016/j.jclepro.2012.07.007>.
- Borgatti, S., 2003. The network paradigm in organizational research: a review and typology. *J. Manage.* 29, 991–1013, [http://dx.doi.org/10.1016/S0149-2063\(03\)00087-4](http://dx.doi.org/10.1016/S0149-2063(03)00087-4).
- Brammer, S., Walker, H., 2011. Sustainable procurement in the public sector: an international comparative study. *Int. J. Oper. Prod. Manag.* 31, 452–476, <http://dx.doi.org/10.1108/01443571111119551>.
- Bryman, A., 2004. *Social Research Methods*, Second edition. Oxford University Press, Oxford.
- Burkhardt, T., Wolter, S., Schief, M., Krumeich, J., Di Valentin, C., Werth, D., Loos, P., Vanderhaeghen, D., 2012. A comprehensive approach towards the structural description of business models. In: Proceedings of the International Conference on Management of Emergent Digital EcoSystems—MEDES '12, ACM Press, New York, New York, USA, p. 88, <http://dx.doi.org/10.1145/2457276.2457294>.
- Casadesus-Masanell, R., Ricart, J.E., 2010. From strategy to business models and onto tactics. *Long Range Plann.* 43, 195–215, <http://dx.doi.org/10.1016/j.lrp.2010.01.004>.
- Chilosi, A., 2003. *Coordination, Cooperation, and the Extended Coasean Approach to Economic Policy*. Facoltà di Scienze Politiche, Pisa.
- Coase, R.H., 1937. The nature of the firm. *Economica* 4, 386–405.
- Costanza, R., 1991. *Ecological Economics. The Science and Management of Sustainability*. Columbia University Press, New York.
- Cuijpers, M., Guenter, H., Hussinger, K., 2011. Costs and benefits of inter-departmental innovation collaboration. *Res. Policy* 40, 565–575, <http://dx.doi.org/10.1016/j.respol.2010.12.004>.
- DaSilva, C.M., Trkman, P., 2014. Business model: what it is and what it is not. *Long Range Plann.* 47, 379–389, <http://dx.doi.org/10.1016/j.lrp.2013.08.004>.
- Day, C., 2005. Buying green: the crucial role of public authorities. *Local Environ.* 10, 201–209, <http://dx.doi.org/10.1080/1354983042000388214>.
- Demil, B., Lecocq, X., 2010. Business model evolution: in search of dynamic consistency. *Long Range Plann.* 43, 227–246, <http://dx.doi.org/10.1016/j.lrp.2010.02.004>.
- Demil, B., Lecocq, X., 2009. *Business models evolution: towards a dynamic consistency view of strategy*. *Univ. Bus. Rev.*, 86–107.
- Demsetz, H., 1988. The theory of the firm revisited. *J. Law Econ. Organ.* 4, 141–162.
- Dietrich, P., Eskerod, P., Dalcher, D., Sandhawalia, B., 2010. The dynamics of collaboration in multipartner projects. *Proj. Manag. J.* 41, 59–78, <http://dx.doi.org/10.1002/pmj.20194>.
- Dyllick, T., Hockerts, K., 2002. Beyond the business case for corporate sustainability. *Bus. Strateg. Environ.* 11, 130–141, <http://dx.doi.org/10.1002/bse.323>.
- Elkington, J., 1998. *Cannibals with Forks: the Triple Bottom Line of 21st Century Business, Conscientious Commerce*. New Society Publishers, Gabriola Island, <http://dx.doi.org/10.1002/tqem.3310080106>.
- Escobar, A., 1999. *El Final Del SalvaJe*. Colección. ed. Giro Editores Ltda., Bogotá, Colombia, Bogotá, Colombia.
- European Commission, 2011. *A renewed EU strategy 2011–14 for corporate social responsibility*. *J. Chem. Inf. Model.*
- European Commission, 2014. *Towards a Circular Economy: A Zero Waste Programme for Europe*. European Commission, Brussels.
- European Union, 2014. *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*. *Off. J. Eur. Union*, 65–242.
- Fadeeva, Z., 2004. *Promise of sustainability collaboration—potential fulfilled?* *J. Cleaner Prod.* 13, 165–174.
- Genefke, J., 2000. In: *Collaboration costs!*. University of Aarhus, Aarhus.
- Glavič, P., Lukman, R., 2007. Review of sustainability terms and their definitions. *J. Clean. Prod.* 15, 1875–1885, <http://dx.doi.org/10.1016/j.jclepro.2006.12.006>.
- Guide, V.D.R., Van Wassenhove, L.N., 2001. Managing product returns for remanufacturing. *Oper. Prod. Manag.* 10, 142–155, <http://dx.doi.org/10.1111/j.1937-5956.2001.tb00075.x>.
- Hannon, M.J., 2012. *Co-Evolution of Innovative Business Models and Sustainability Transitions: The Case of the Energy Service Company (ESCo) Model and the UK Energy System*. The University of Leeds.
- Hienert, C., Keinz, P., Lettl, C., 2011. Exploring the nature and implementation process of user-centric business models. *Long Range Plann.* 44, 344–374, <http://dx.doi.org/10.1016/j.lrp.2011.09.009>.
- Hjorth, P., Bagheri, A., 2006. Navigating towards sustainable development: a system dynamics approach. *Futures* 38, 74–92.
- Hopwood, B., Mellor, M., O'Brien, G., 2005. Sustainable development: mapping different approaches. *Sustain. Dev.* 13, 38–52, <http://dx.doi.org/10.1002/sd.244>.
- Jupp, V. (Ed.), 2006. *The SAGE Dictionary of Social Research Methods*. SAGE Publications, London.
- Kamann, D.-J.F., 2007. Organizational design in public procurement: a stakeholder approach. *J. Purch. Supply Manag.* 13, 127–136, <http://dx.doi.org/10.1016/j.pursup.2007.05.002>.
- Kiiver, P., Kodym, J., 2014. *The practice of public procurement: tendering, selection and award*. Intersentia.
- Klettner, A., Clarke, T., Boersma, M., 2013. The governance of corporate sustainability: empirical insights into the development, leadership and implementation of responsible business strategy. *J. Bus. Ethics* 1–21, <http://dx.doi.org/10.1007/s10551-013-1750-y>.
- Lay, G., Schroeter, M., Biege, S., 2009. Service-based business concepts: a typology for business-to-business markets. *Eur. Manag. J.* 27, 442–455, <http://dx.doi.org/10.1016/j.emj.2009.04.002>.
- Lüdeke-Freund, F., 2010. *Towards a conceptual framework of business models for sustainability*. In: ERSCP-EMSU Conference, Delft, The Netherlands, October 25–29, 2010, pp. 1–28.
- Leontief, Wassilij, 1928. *Die wirtschaft als kreislauf*. In: PhD Dissertation. Mohr.
- Linnenluecke, M.K., Russell, S.V., Griffiths, A., 2009. Subcultures and sustainability practices: the impact on understanding corporate sustainability. *Bus. Strateg. Environ.* 18, 432–452, <http://dx.doi.org/10.1002/bse.609>.
- Lockett, H., Johnson, M., Evans, S., Bastl, M., 2011. Product Service Systems and supply network relationships: an exploratory case study. *J. Manuf. Technol. Manag.* 22, 293–313, <http://dx.doi.org/10.1108/17410381111112684>.
- Lozano, R., 2007. *Collaboration as a pathway for sustainability*. *Sustain. Dev.* 15, 370–381.
- Lozano, R., 2008. Envisioning sustainability three-dimensionally. *J. Clean. Prod.* 39 (16), 1838–1846, <http://dx.doi.org/10.1016/j.jclepro.2008.02.008>.
- Lozano, R., 2012. Towards better embedding sustainability into companies' systems: an analysis of voluntary corporate initiatives. *J. Clean. Prod.* 25, 14–26, <http://dx.doi.org/10.1016/j.jclepro.2011.11.060>.
- Lozano, R., 2013a. Are Companies Planning their Organisational Changes for Corporate Sustainability? An analysis of three case studies on resistance to change and their strategies to overcome it. *Corp. Soc. Responsib. Environ. Manag.* 20, 275–295, <http://dx.doi.org/10.1002/csr.1290>.
- Lozano, R., 2013b. *Chemical leasing; green chemistry; sustainable chemistry; sustainability business models*. *Conserv. Recycl.*
- Luukkonen, T., Nedeva, M., 2010. Towards understanding integration in research and research policy. *Res. Policy* 39, 674–686, <http://dx.doi.org/10.1016/j.respol.2010.02.008>.
- Meehan, J., Bryde, D., 2011. Sustainable procurement practice. *Bus. Strateg. Environ.* 20, 94–106, <http://dx.doi.org/10.1002/bse.678>.
- Melissen, F., Reinders, H., 2012. A reflection on the Dutch sustainable public procurement programme. *J. Integr. Environ. Sci.* 9, 27–36, <http://dx.doi.org/10.1080/1943815X.2012.658815>.
- Mont, O.K., 2002. Clarifying the concept of product–service system. *J. Clean. Prod.* 10, 237–245, [http://dx.doi.org/10.1016/S0959-6526\(01\)00039-7](http://dx.doi.org/10.1016/S0959-6526(01)00039-7).
- Mont, O., Dalhammar, C., Jacobsson, N., 2006. A new business model for baby prams based on leasing and product remanufacturing. *J. Clean. Prod.* 14, 1509–1518, <http://dx.doi.org/10.1016/j.jclepro.2006.01.024>.
- Murray, A., Skene, K., Haynes, K., 2015. The circular economy: an interdisciplinary exploration of the concept and application in a global context. *J. Bus. Ethics*, <http://dx.doi.org/10.1007/s10551-015-2693-2>.
- Naustdal, J., 2014. Circular economy in China—the environmental dimension of the harmonious society. *Int. J. Sustain. Dev. World Ecol.* 4509, 1–11, <http://dx.doi.org/10.1080/13504509.2014.914599>.
- Olson, E.M., Walker, O.C., Ruekert, R.W., Bonnerd, J.M., 2001. *Patterns of cooperation during new product development among marketing, operations and R&D: implications for project performance*. *J. Prod. Innovation Manag.* 18, 258–271.
- Osterwalder, A., Pigneur, Y., Smith, A., Movement, T., 2010. *Business model generation: a handbook for visionaries game changers and challengers*. *J. Bus. Parikka-Alhola, K., 2008. Promoting environmentally sound furniture by green public procurement*. *Ecol. Econ.* 68, 472–485, <http://dx.doi.org/10.1016/j.ecolecon.2008.05.004>.
- Porter, M.E., Kramer, M.R., 2011. Creating shared value. *Harv. Bus. Rev.*, 63–77, <http://dx.doi.org/10.1108/09600039410055963>.
- Preuss, L., 2009. Addressing sustainable development through public procurement: the case of local government. *Supply Chain Manag. Int. J.* 14, 213–223, <http://dx.doi.org/10.1108/13598540910954557>.
- Rauter, R., Jonker, J., Baumgartner, R.J., 2015. Going one's own way: drivers in developing business models for sustainability. *J. Clean. Prod.*, <http://dx.doi.org/10.1016/j.jclepro.2015.04.104>.
- Rietbergen, M.G., Blok, K., 2013. Assessing the potential impact of the CO<sub>2</sub> Performance Ladder on the reduction of carbon dioxide emissions in the Netherlands. *J. Clean. Prod.* 52, 33–45, <http://dx.doi.org/10.1016/j.jclepro.2013.03.027>.
- Rees, W.E., 2002. *An ecological economics perspective on sustainability and prospects for ending poverty*. *Popul. Environ.* 24 (1), 15–46.
- Reinhardt, F., 2000. Sustainability and the Firm. *Interfaces (Providence)*, 30, 26–41.
- Robèrt, K.-H., 2000. Tools and concepts for sustainable development, how do they relate to a general framework for sustainable development, and to each other? *J. Clean. Prod.* 8, 243–254, [http://dx.doi.org/10.1016/S0959-6526\(00\)00011-1](http://dx.doi.org/10.1016/S0959-6526(00)00011-1).

- Saunders, M., Lewis, P., Thornhill, A., 2007. <EDN></EDN>. In: *Research Methods for Business Students*, 4th ed. Pearson Education Limited, Harlow, UK.
- Srivastava, S.K., 2007. Green supply-chain management: a state-of-the-art literature review. *Int. J. Manag. Rev.*, <http://dx.doi.org/10.1111/j.1468-2370.2007.00202.x>.
- Stubbs, W., Cocklin, C., 2008. Conceptualizing a Sustainability Business. *Organ. Environ.*, <http://dx.doi.org/10.1177/1086026608318042>.
- Teece, D.J., 2010. Business models, business strategy and innovation. *Long Range Plann.* 43, 172–194, <http://dx.doi.org/10.1016/j.lrp.2009.07.003>.
- Thomson, J., Jackson, T., 2007. Sustainable procurement in practice: lessons from local government. *J. Environ. Plan. Manag.* 50, 421–444, <http://dx.doi.org/10.1080/09640560701261695>.
- Troy, L.C., Hirunyawipada, T., Paswan, A.K., 2008. *Cross-functional integration and new product success: an empirical investigation of the findings*. *J. Market.* 72, 132–146.
- UNEP, 2014. *Buying for a Better World; A Guide on Sustainable Procurement for the UN System*. UNEP, Paris, France.
- Uyarra, E., Edler, J., Garcia-Estevez, J., Georghiou, L., Yeow, J., 2014. Barriers to innovation through public procurement: a supplier perspective. *Technovation* 34, 631–645, <http://dx.doi.org/10.1016/j.technovation.2014.04.003>.
- Vermeulen, W.J.V., Witjes, S., 2016. On addressing the dual and embedded nature of business and the route towards corporate sustainability. *J. Clean. Prod.* 112, 2822–2832, <http://dx.doi.org/10.1016/j.jclepro.2015.09.132>.
- WCED, 1987. *Our Common Future*, 1st ed. Oxford University Press, Oxford.
- Walker, H., Brammer, S., 2012. The relationship between sustainable procurement and e-procurement in the public sector. *Int. J. Prod. Econ.* 140, 256–268, <http://dx.doi.org/10.1016/j.ijpe.2012.01.008>.
- Walker, H., Preuss, L., 2008. Fostering sustainability through sourcing from small businesses: public sector perspectives. *J. Clean. Prod.* 16, 1600–1609, <http://dx.doi.org/10.1016/j.jclepro.2008.04.014>.
- Webster, K., 2013. What might we say about a circular economy? Some temptations to avoid if possible. *World Futures: J. New Paradig. Res.* 69, 542–554, <http://dx.doi.org/10.1080/02604027.2013.835977>.
- Yin, R.K., 1984. *Case Study Research: Design and Methods*. Sage, CA.
- Yong, R., 2007. The circular economy in China. *J. Mater. Cycles Waste Manag.* 9, 121–129, <http://dx.doi.org/10.1007/s10163-007-0183-z>.
- Yuan, Z., Bi, J., Moriguchi, Y., 2006. *The circular economy: a new development strategy in China*. *J. Ind. Ecol.* 10, 4–8.
- Zott, C., Amit, R., 2010. Business model design: an activity system perspective. *Long Range Plann.* 43, 216–226, <http://dx.doi.org/10.1016/j.lrp.2009.07.004>.