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# Mapping Multidimensional Value(s) for Co-Creation Networks in a Circular Economy

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**Abstract.** The transition towards a circular economy cannot be achieved if individual organizations advance their own interests independently. Companies need to build new collaborative networks for value co-creation. Therefore, identification of what kind of value will be created or destroyed for different partners in the networks is critical. In this paper, we propose a framework for mapping multidimensional value in co-creation networks by combining streams of literature on three topics: (1) Circular Economy, (2) Co-Creation and Collaborative networks, (3) Sustainable value creation. The specific contribution of the framework is that it recognizes that the value created in different parts of networks is linked, and the change of value in one link influences others. Moreover, the approach of the paper adds the dimension of circularity into analyses of value creation.

**Keywords:** Circular Economy, Multidimensional Value, Co-Creation, Collaborative Networks.

## 1 Introduction

If the current consumption trend continues, the Earth's carrying capacity will be greatly exceeded. Recently, the Circular Economy (CE) has attracted increasing interest as a way to overcome the problems of the current production and consumption model [1]. CE refers to a concept which aims at creating a system that is restorative by design [1, 2]; and recently, emphasizes economic aspect, seeing CE business models as enablers to create competitive advantage [3]. The CE enables future growth through a supportive relationship with ecological and social systems [2]. The CE cannot be achieved if individual actors advance their own interests independently. The transition towards the CE will require new value chain partners, or new roles of existing partners and a new kind of collaboration between the participating partners. Companies need to build new collaborative networks for value co-creation. Therefore, identification of what kind of value will be created or destroyed for different partners in the networks, aiming to create win-win-win business models, is critical [4]. With "win-win-win" we refer to the possibility that more than bilateral value can be created.

In this paper, we propose a systematic approach for identifying multidimensional value in co-creation networks. The paper addresses the following research questions: (1) How can multidimensional value(s) be identified for the actors' co-creation

networks? (2) How are the multidimensional values linked together from the viewpoint of different actors? The aim of the framework developed in this paper is twofold. First, the aim is to provide rich data for the research to develop an understanding of value creation in a CE. Second, the aim is to guide managers to recognize the implications of novel CE business models for different actors in a co-creation network.

## 2 Research Design

For our research design, we first advance a conceptual framework of mapping multidimensional value in a CE by combining streams of literature on three topics: (1) Circular Economy, (2) Co-creation and Collaborative networks, (3) Sustainable value creation. This is presented in Section 3.

We chose a qualitative case study design to match the state of current theory and the exploratory goals of the study, as suggested by [5]. A case study design is applicable for identifying emerging themes and patterns as it allows for acquiring rich and detailed data of the studied phenomenon. Our unit of analyses is ‘a value proposition for the business model (of a network)’. As cases, we sought companies that are putting effort into developing a circular business, and who already have at least some experience of CE business. For particular cases, we selected business models that focal companies can see will create competitive advantage. This enabled us to get rich and relevant data. The cases are presented in Table 1. The main data collection method was workshops with companies. The selected participants in the workshops were mostly from a focal company, but in one workshop there were also stakeholders (see Table 1). One workshop lasted for three hours, and was led by two or three researchers.

We used the data from cases for two purposes; (1) to empirically test the framework, and (2) to illustrate the framework with one of these cases. So far, we have tested the framework in three cases. We selected one case, Case A, to illustrate the framework.

**Table 1.** Description of the cases

Case	Company	Tentative business model of a network	Workshop participants
Case A	Company 1: SME	Profitable processing of mixed construction site waste into secondary raw material.	Managing Director Head of production Head of R&D Quality manager
Case B	Company 1:	High-quality sorting including data bank, collection equipment and methods, and logistics centers close to the waste source.	Managing Director Head of production Head of R&D Quality manager
Case C	Company 2: Startup, social enterprise Service provider, digitalization	Digitalized concept, which enables recycling centers to digitalize the process, and add value-added services.	CEO (owner) Chairman of the board, Investors (2)

### 3 The Framework for Identifying Multidimensional Value in Co-Creation Networks

#### 3.1 Circular Economy

A CE is an industrial system that is restorative or regenerative by intention and design [2]. Current trends, such as growing consumption, new generations of consumers, technological leaps, and urbanisation are accelerating the transformation towards a CE. The CE discussion has recently started to highlight the economic aspect, seeing CE business models as enablers to create a competitive advantage [6, 7]. The circular concept is proposed to give an even greater competitive advantage in the future as it generates more value from each unit of resource than the traditional 'take-make-dispose' model [2].

The CE sets new expectations on business network actors related to present product and service deliveries. The future business models will be radically different compared to current models, and the value of the material itself can increase instead of diminishing. These will affect the roles of actors as well as value distribution among the actors. Therefore, the transformation towards a CE sets challenges, especially for established companies as it may destroy the usefulness of their existing capabilities and business models, and require changes to their business networks. Previous literature has presented several approaches to CE business models and for evaluating product sustainability. One of the most recognized is the 6R methodology. The six R's come from the words *reduce, reuse, recycle, recover, redesign* and *remanufacture*. The methodology represents a 'science-based, comprehensive and quantitative' framework for the evaluation of product sustainability [8]. Promoting 6R sustainable manufacturing practices will require collaboration and integration across businesses in the product life-cycle stages, which all must be considered holistically if sustainability benefits are to be derived [9]. EMF [10], in turn, includes in the value circle five activities: share, maintain/prolong, reuse/redistribute, refurbish/remanufacture and recycle.

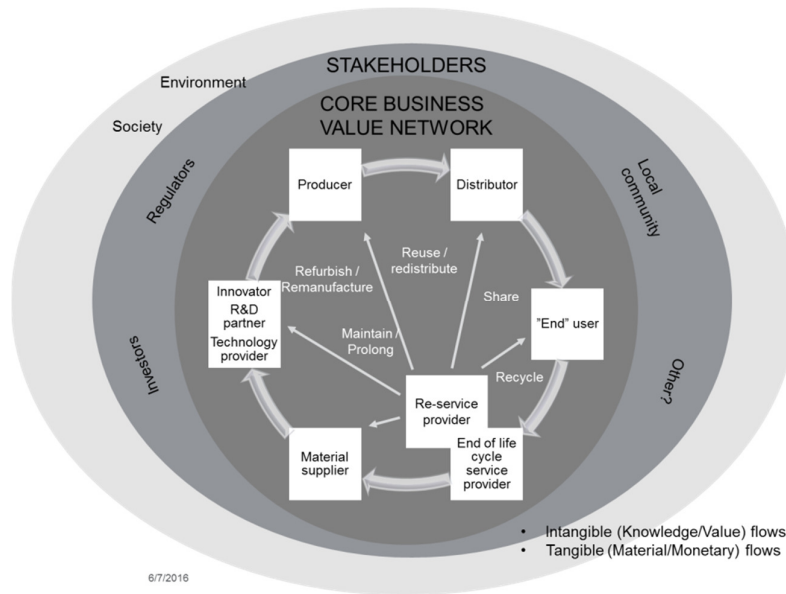
#### 3.2 Co-creation and Collaboration Networks

The co-creation paradigm highlights interactions, joint resource bases, engagement platforms and an ecosystemic approach as new means for business [11]. Therefore, collaborative networked organisations (CNOs) show a high potential as drivers of value co-creation [12]. A distinction has been made between different types of co-creation in networks, and the characteristics are summarized in 3C's as: *cooperative, coordinative, and collaborative* [13]. Collaborative networks (CN) are defined as autonomous, geographically distributed, and heterogeneous, dynamic and often temporary in their nature [14]. Further, the concept of CNO's highlights that there is an organization responsible for the participants' activities, roles and shared governance rules. To summarize, these categorizations of co-creation and collaborative networks distinguish the network models based on the interdependency

of the participants and levels of co-creation. A co-creation network can be distinguished from the value network based on the development orientation, i.e., a co-creation network aims to generate new business opportunities, whereas a value network focuses on the present supplier – customer deliveries.

Based on the literature of collaborative networks, Romero and Molino [15] have introduced the concept of A Green Virtual Enterprise Breeding Environment (GVBE) as a model for reaching sustainable development through collaboration. The GVBE is defined as a long-term strategic alliance of green enterprises. In the area of CN there are several tools and methods developed that can assist the commitment and interaction of the multiple stakeholders [16]. Thus, more studies focusing specifically on *dynamics of collaborative co-creation networks* (i.e., building and re-building them) are needed for further advancement of the existing literature.

In this study, we define the *circular economy co-creation network* as a dynamic network including both the actors of the *core business value network* and other relevant *stakeholders*. The key element of co-creation is that actors have a shared, jointly generated purpose, i.e., a CE business innovation case that can be based on 6R strategies, sharing assets or providing services [9, 10]. Figure 1 illustrates the actors and their relationships in the layered circular economy co-creation network.



**Figure 1:** Actors in the circular economy co-creation network

Here, the circular economy co-creation network consists of two main types: actors in the core business value network and other stakeholders such as regulators and investors. In addition to them, environment and society are highlighted as beneficiaries in line with the sustainability paradigm [17,18]. The challenge of co-creation, which is required in CE, is to find the ‘win-win-win’ setting and therefore

value for each of these stakeholder groups as well as members of core-business network needs to be identified [4]. This includes identification of both intangible and tangible flows [19] between the actors. In a CE, value is not created in a firm in isolation, but firms and their stakeholders acting together. There are often game-changing changes in business models [20] and the considerations of value for the broad range of new network actors and stakeholders become vital.

### 3.3 Sustainable Value Creation and Value Creation in a CE

Sustainable value creation and value creation in a CE are closely linked research streams, but as the research of value creation in a CE is still in its infancy, we base the framework mainly on sustainable value creation. Traditionally, value has been treated only as revenues from customers minus the costs incurred [21]. Businesses have rarely approached environmental and social topics from a value perspective, but have treated them as peripheral matters [22]. Sustainable value creation recognizes the three bottom lines, i.e., economic, environmental and social aspects of value creation [23]. Porter and Kramer [22] introduce a shared value concept which refers to creating economic value in a way that also creates value for society by addressing its needs. Here, value is defined as benefits relative to cost. Sustainable value creation includes a consideration of value to different actors of a business network, and other stakeholders such as investors, shareholders as well as government and regulators [24, 25]. In sustainable business thinking, also the environment and society are considered stakeholders[24].

Bocken et al. [22] recognize four different forms of value that enhance the balance between the self-interests of involved actors and facilitate collaboratively shaping the value for different stakeholders. The forms are: value captured, value missed, value destroyed and new value opportunities. Value captured represents the positive benefits delivered to stakeholders. Value missed refers to situations where stakeholders fail to capitalize on existing assets, capabilities and resources. Value destroyed represents negative outcomes of the business, and usually concerns the forms of damaging environmental or social impact. In the CE, the same principles can be applied; however, more research is needed to elaborate the different aspects of value. CE emphasize the multidimensional aspects of value creation, as achieving only economic benefits doesn't guarantee the business to be restorative and regenerative [2].

### 3.4 The Preliminary Framework for Mapping Multidimensional Value(S) for Co-Creation Networks in a Circular Economy

The framework adapts a qualitative approach to identifying the multidimensional forms of value for different actors in the co-creation network, aiming to provide rich data. This includes three steps in order to coordinate and guide the work. *The first step* in the framework is defining the preliminary value proposition of the circular co-creation network. In *the second step*, the actors of the (prospective) co-creation

network, which is needed to deliver the value proposition, are identified. These are the actors and stakeholders that exchange multiple dimensions of value. This forms the core of the framework. The actors, both existing and new ones, will each have to find their own role, and potential for value creation. The network needs to find a new win-win-win structure. An example of actors in a CE co-creation network is described in Figure 1. This is a preliminary proposition and it will be further developed based on the data when applying the framework. The picture is naturally unique to every value proposition.

*The third step*, called value hunting, starts from identifying who is the customer and what value is created for the customer as well as what is missed or perhaps destroyed. Next, the same dimensions of value are identified for other main actors and stakeholders that are identified in step 2. The value can be either tangible or intangible. However, the value missed can be challenging when ideating CE business models, as value missed relates to business models of today, and CE business models might be totally new and radical. Finally, these are synthesized into one figure, presenting the main actors and main value dimensions between the actors.

## 4 Empirical Results

### 4.1 Experiences of Using the Framework

We tested the preliminary framework in three cases in order to obtain feedback of applying the framework. The testing was performed in three-hour workshops with persons described in Chapter 2. According to the three steps described in Chapter 2.4., the participants first defined their value proposition of the networked business model. Then they identified the actors in their future network. Based on these, they continued with value hunting concerning the key players in the network. The three steps were documented in a table that is described in the next chapter. Key findings of the test workshops gave us information on its advantages, development needs and also of companies' general challenges in picturing the prospective networks and its value creation.

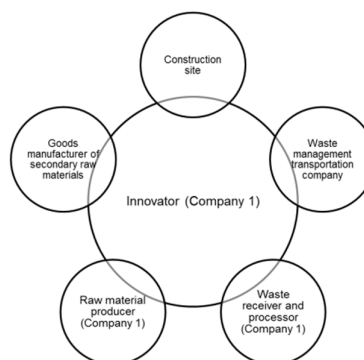
The framework was seen beneficial in helping the focal company to perceive the perspectives of other actors in the network. It seems to be an appropriate tool for identifying value in a co-creation network in the CE. First, it supports the need to involve several partners in value creation in the CE in order to find win-win-win solutions for the network. Secondly, it guides the users into seeking and establishing collaboration with the co-creation network partners. The framework worked especially well as an inspiration to start to picture the whole co-creation network when planning new CE business models. It seems to guide the mind to seeing the viewpoint of other actors in the network. Also, the framework helped to identify a wide range of different actors and other stakeholders. We observed that the companies were interested mainly in their closest partners, who are often also their everyday contacts. Companies seemed to also focus on partners who relate to the material flow, and not as much to partners who take part in, e.g., R&D or other expertise. We also observed that the outermost circle (see Figure 1) is not very interesting to the

companies. Depending on the business field, however, some actors of the outer circle might be interesting. E.g., for Company 1, regulators are important because it needs licences to sell their products. Thus, special care should be taken, when using the framework, that the companies consider their stakeholders widely enough.

We identified some development needs for the framework. We observed that the framework should guide the users to better recognize who actually is the “final” user. In two of our cases, the actual final user was not listed as a stakeholder. Additionally, more precise snapshots from certain parts of the value circle might be helpful in order to be better able to map the key partners, and consequently to be able to concentrate on the right actors in the value-hunting step. Also, based on the data when applying a framework, we plan to develop the actors in the circular economy co-creation network (Figure 1).

#### 4.2 The Illustration of the Framework

We illustrate the framework based on results from one case, Case A “*Profitable processing of mixed construction site waste into secondary raw material.*” The case company 1 is originally a waste management company, but now also produces ecological paving stones out of recycled wood. It also plans to develop various secondary raw materials for other manufacturers. The company is at a stage where it has developed and tested the paving stones, and is now aiming to increase their sales by establishing profitable new business models related to the stones. It is looking for new business opportunities for the whole network: sorting the waste also at the origin, processing the waste further into raw materials, and developing and selling the products out of the processed waste. In the workshop, the company went through the 3 steps described earlier in the paper. Figure 2 presents the core business network in Case A.



**Figure 2:** Roles of Company 1 in its core-business network in Case A

Figure 3 presents the results of using the framework in Case A.



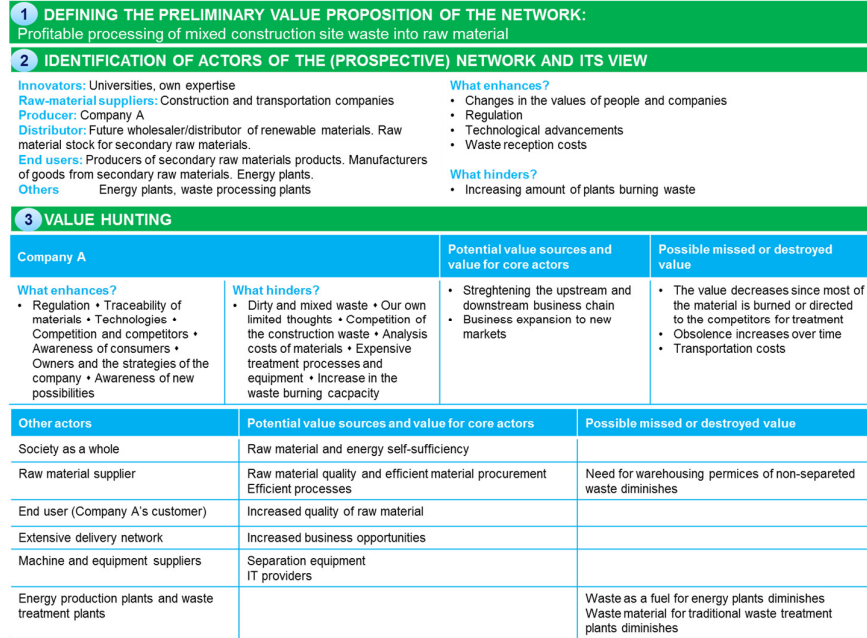


Figure 3: Illustration of the framework based on Case A

## 5 Discussion and Conclusions

Collaboration across a wide set of stakeholders is necessary in transformation towards CE [3, 26]. However, currently, there is a lack of a framework for aiding the companies to identify the multidimensional value in a CE. Based on the previous literature, we develop a systematic approach to identifying multidimensional values for their co-creation networks, emphasizing interlinkages of values and actors, and to understand the new roles of the existing and new partners. The specific contribution of the approach we propose is that it recognizes that the value created in different parts of a network is linked, and the change of benefits and costs in one link influences others. Moreover, the previous literature has studied both value creation and capture in a linear way – in value chains or networks. The approach of the paper adds the dimension of circularity.

The framework will both guide the companies in developing a circular business and achieving win-win-win business models as well as researchers in creating novel knowledge of value creation in a CE. We tested the conceptual framework in three cases, and based on the feedback it was seen as valuable by the companies, the main value being adding the understanding of the implication towards the co-creation network as a whole. For research, the use of a framework offers many possibilities.

The framework will allow us to further analyze what kind of value is created in a CE and further categorize this value. This forms the basis for the research of CE business models. We will also be able to form archetypes of co-creation networks in different kinds of business models. Moreover, applying a framework in data collection will also enable the creation of knowledge of what kind of value is missed today and what are the major value creation opportunities in a CE.

The proposed framework focuses on the very first phase in developing and implementing networked CE business models and building a circular economy co-creation network. As the next phase, the identified key players of the network will be motivated for actual collaboration, in order to address the possibilities, challenges and value issues together at network level.

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