



The implementation of the Circular Economy: Barriers and enablers in the coffee value chain



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ABSTRACT

The Circular Economy (CE) promises an alternative to the current 'take-make-dispose' economic model of high energy consumption and waste production. There are a range of examples of CE implementation in literature, but few focus on complex product value chains. Consequently, there is a lack of sector-specific understanding of barriers and enablers. This research addresses this gap with a case study from the coffee industry. Over a 7-month period, we observed a business model experimentation (BME) in the value chain of an Amsterdam based specialty coffee importer. The BME is aimed at changing both the producing and consuming side of the value chain, with the intention to minimize waste and balance ecological with social and financial sustainability. It was concluded that coherence in governmental policies, "silo thinking" of industries and standardization of circular design remain major barriers. Having a common awareness and vision as well as designing solid business models were found to be crucial enablers. Next to this, additions to existing literature are presented. Firstly, the sensitivity to identity and market perception of companies with regards to the adoption of CE initiatives was observed as a barrier. Secondly, "knowledge" in CE literature often refers to the technical barrier, where it was found that more specific fact-based communication can be an enabler for CE initiatives when perceptions of a linear economy are false. Thirdly, clear interaction between barriers and enablers was observed, which additionally allowed a clear role for the focal firm. The study at hand complements existing literature on CE with a sector-specific perspective of the coffee industry.

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1. Introduction

It is estimated that, in the Netherlands alone, between 2.3 and 3 billion disposable cups are thrown away every year (de Bruijn, 2002; Ruiter, 1990). The Dutch data may be indicative for the global waste generation caused by disposable cups; the vast majority ending up in landfills or burned for energy generation (Häkkinen and Vares, 2010; Van der Harst and Potting, 2013). A product that is only used for 10 min before disposal is a striking example of the 'take-make-dispose' model prevalent in most societies today (Ellen MacArthur Foundation, 2013; Murray et al., 2017). The circular economy (CE) promises an alternative to this system by proposing a closed-loop of material flows, and has already gained considerable interest from both scholars and practitioners (Kirchherr et al., 2017b). As such, CE can be seen as a

practical tool, or starting point, of sustainability concepts or corporate social responsibility (CSR), by focusing on the closure of material loops and consequently minimizing the environmental impacts.

This study sets out to contribute to the literature on CE barriers and enablers through the action-based business model experimentation in an intercontinental complex product value chain, following a call for more in-depth field studies from Bocken and Antikainen (2018); Bocken et al. (2018) and Kirchherr et al. (2017a). The research question this study attempts to answer is: which barriers and enablers, respectively hamper or help, the implementation of CE initiatives into the coffee value chain? The aim of this study is thus to identify which barriers and enablers are encountered when implementing CE initiatives in an active product value chain. The research gap that will be addressed is that of lacking industry-specific knowledge on circular economy initiative implementation within the coffee industry, and especially at a start-up level, which is the focal business under research. By going deep into circular initiatives through business model

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experimentation (BME), as opposed to more passive research methodologies, barriers and enablers found in literature are put to the test.

The coffee industry is chosen as our focus industry since coffee is one of the worlds mostly traded commodities, with a complex and linear value chain that utilises little of its many residues and side-products (Murthy and Madhava Naidu, 2012; Nabais et al., 2008; Pendergrast, 2010). Specialty coffee actors in particular are under research, as this industry niche strongly connects product quality to ethical standards, serving as a fertile ground for new sustainability and quality approaches and as such the implementation of CE principles.

The remainder of this paper is organized as follows; Section 2 presents an overview of CE literature reviews and provides a short introduction into the coffee industry. Section 3 outlines the methodological approach, and section 4 provides an overview of the case studies. Section 5 presents and discusses the findings, before the paper is concluded in section 6.

2. Literature

This section consists out of three parts: the meaning of business model innovation, consequently a thorough analysis of identified barriers and enablers to CE implementation literature and finally an introduction to the value chain under research, before moving to the methodological approach of business model experimentation. This study understands CE as “a regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops [...] through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling.” (Geissdoerfer et al., 2017a, p. 759).

2.1. Circular business model innovation

Circular business models combine the business model concept with CE elements. They describe the value proposition, value creation, value capture elements that a business uses for slowing, closing, narrowing, intensifying and/or dematerialising resource loops (Bocken et al., 2016; Geissdoerfer et al., 2018a). “From a resource perspective, circular business models are about slowing, closing and narrowing resource loops: strategies to provide products that last and support product life extension (slowing); strategies to close material loops through recycling (closing); and strategies to use less material and energy per product (narrowing loops). The sustainable value proposition to be experimented with can focus on achieving these resource strategies,” write Bocken and Antikainen (2018, p. 3). The concept is thus often seen as a sub-category, or strategy of business model innovation that can help companies to improve their sustainability performance (Bocken et al., 2014; Geissdoerfer et al., 2018b). While a comprehensive review of Kirchherr et al. (2017b, p. 224) identified a range of prescriptive definitions that imply that CE is “creating environmental quality, economic prosperity and social equity, to the benefit of the current and future generations.” these definitions try to tackle one of the biggest criticisms on CE: the lack of a proper balance between all three sustainability pillars (financial, ecological and social), driving a divide between what is sustainable and what is circular (Geissdoerfer et al., 2017a,b; Muñoz-Torres et al., 2018; Murray et al., 2017). Topics like intra- and intergenerational equity, equality of social opportunities and diversity are especially insufficiently considered (Muñoz-Torres et al., 2018).

As Bocken and Antikainen (2018) make clear, there is a clear need to start with all kinds of novel solutions to make the transition to a more sustainable and balanced economy possible.

Experimentation is a good approach to finding solutions balanced between people (society), planet (ecology) and profit (finances) (Bocken and Antikainen, 2018; Weissbrod and Bocken, 2017). Next to these sustainable impacts, experimenting can also help to identify and overcome bureaucratic hurdles and other barriers that hamper the implementation of more sustainable solutions to the business model (Andries et al., 2013; Bocken et al., 2017; Chesbrough, 2010).

2.2. Barriers and enablers

Table 1 shows an overview of barriers and enablers identified for CE implementation processes, grounded in literature reviews done by de Jesus and Mendonca (2018), Tura et al. (2019) and Kirchherr et al. (2018) and were selected for their extensiveness and thoroughness on the matter. From this, this study distilled descriptions that were used in the results section to define if either a barrier or enabler was encountered in the business model experiments performed. As such, the presented table is not a literature review nor a newly presented framework as this was thoroughly done by the mentioned papers, but an amended overview that would allow itself to be easily used for BME of CE initiatives in the field.

2.2.1. Values

Having company values and a **culture** that is in favour of change and connected to a mindset of awareness and commitment is a strong prerequisite to successfully adopt CE practices (Rizos et al., 2016). On a broader level, creating new networks and collaborations of like-minded firms can be a strong enabler in the transition towards CE, though in many cases situations of **social span** result in “organizational silos” and poor collaboration can be counter-productive (Geng and Doberstein, 2008). Long-term relationships with suppliers can be a cause, as can conflicting interests and difficult, dragging negotiation procedures between partner companies (Preston, 2012). Developing a shared mental image or “**leitbild**” of the future which all parties are striving to achieve can be supportive, especially when a definition is still diffused (Gorissen et al., 2016).

2.2.2. Technology

Changing to a waste-free system requires designing products and services in a different way to the current linear economic model, though the technical **know-how** and skills of how to achieve and plan this are often lacking (de Jesus and Mendonça, 2018; Van Eijk, 2015; Vanner et al., 2014). Once solutions to circular design are found, an exchange of this information and knowledge is often rare due to intellectual property and competitiveness, which impedes the pace of development towards CE (Preston, 2012; Ritzén and Sandström, 2017). Additionally, information on the material quality of used products is often lacking, hampering a continuous supply of “waste as food” for new products and services and the creation of an efficient take-back system, also known as **reverse logistics** (Kalmykova et al., 2018; Lieder and Rashid, 2016). “It is hard to **standardize** a product from something (waste streams) that is not standard.” (Singh and Ordoñez, 2016, p. 348). To add to the sourcing difficulties, products made from recovered materials must also compete within conventional markets to attract customers, where technology standards have the potential to remove a lot of the bottlenecks and encourage economies of scale (Preston, 2012; Singh and Ordoñez, 2016).

2.2.3. Business cases

For businesses, CE needs to be financially attractive to change the current (linear) business model to a circular business model, overcoming the (high) upfront investment costs of change and

Table 1
CE barriers and enablers.

Barrier/Enabler basket	Barrier/Enabler specified	Example from literature source	Enabler, used description	Barrier, used description	Literature sources
Values	Awareness, culture	“The mindset and commitment of the staff is an important aspect to ease the transition to a circular economy model” (Rizos et al., 2016, p.11, p.11)	The company culture is in favour of transitioning towards CE, and constant training and sharpening of this culture is nourished.	The company culture is in favour of linear thinking which prevents change towards CE.	de Jesus and Mendonça (2018), Kirchherr et al. (2018), Mont et al. (2017), Pheifer (2017), Rizos et al. (2016).
	Leitbild	“Develop a shared mental image, leitbild or vision” (Gorissen et al., 2016, p.17, p.17)	There is a strong comprehensive vision on CE that is shared by all participants, either internally in the company or externally between actors.	There is no clear and comprehensive vision on CE that is shared by all participants, either internally in the company or externally between actors.	Gorissen et al. (2016), Rizos et al. (2016), Tura et al. (2019).
	Social span	“The silo mentality, certain departments or sectors show reluctance to share information with others” (Pheifer, 2017, p.11, p.11)	Company thinks across company and industry barriers and looks for circular solutions beyond own “borders.”	Company only thinks within own company realms and own industry.	Liu and Bai (2014), Pheifer (2017), Preston (2012), Rademakers et al. (2011), Tura et al. (2019).
Technology	Know-how, Knowledge	“The availability of technical solutions is a condition for adaptability” (de Jesus and Mendonça, 2018, p.81, p.81)	The know-how on CE solutions is available and applicable.	The know-how to develop CE solutions is not available and/or not applicable.	Bakker et al. (2014), de Jesus and Mendonça (2018), Tura et al. (2019), Van Eijk (2015) Vanner et al. (2014).
	Reverse logistics	“Reverse supply chains in order to reach and maintain operational efficiency” (Lieder and Rashid, 2016, p.47, p.47)	Reverse supply chains to enable CE are available, applicable and viable.	Reverse supply chains to enable CE are not available and/or applicable and/or viable.	Ghisellini et al. (2016), Kalmykova et al. (2018), Lieder and Rashid (2016), Tura et al. (2019).
	Standardization	“Technology standards can play an important role in accelerating innovation in an industry” (Preston, 2012, p.17, p.17)	CE solutions are standardized to foster the growth of the uptake.	CE solutions are not standardized, and therefore there exists a broad variety of non-matching CE solutions that hamper uptake.	Kirchherr et al. (2018), Lacy and Rutqvist (2015), Preston (2012), Singh and Ordoñez (2016), Tura et al. (2019).
Business Cases	Value proposition	“Services enabling take back of products and reverse logistics may also be a part of a circular business model value proposition” (Mont et al., 2017, p.12, p.12)	There is a strong value proposition with economic viability that can compete with existing linear products and/or services.	There is a value proposition, yet holds weak economic viability which struggles to compete with existing linear products and/or services.	de Jesus and Mendonça (2018), Jones et al. (2013), Linder and Williander (2015), Mont et al. (2017), Tura et al. (2019).
	Consumer demand	“Without broad public involvement, it will be difficult to coordinate their contributions toward the circular economy” (Geng and Doberstein, 2008, p.236, p.236)	There is a strong public demand for the CE product and/or service that has been developed.	There is a weak public demand for the CE product and/or service that has been developed.	Andrews and deVault (2009), Geng and Doberstein (2008), Zhu and Geng (2013),
	Scalability	“Only scaling up the collection of such products could maintain the profitability of the process of recovering such materials” (Singh and Ordoñez, 2016, p.349, p.349)	The CE product and/or service is easy to scale, leading to lowering fixed costs, which eases competitiveness versus the linear competitor.	The CE product and/or service struggles to scale, leading to high fixed costs, which hampers the competitiveness versus the linear competitor.	Illic and Nolic (2016), Rizos et al. (2016), Singh and Ordoñez (2016), Tura et al. (2019).
Governmental policies	Procurement	“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” (Witjes and Lozano, 2016, p. 42, p. 42)	The government regulates in favour of CE products and/or services.	The government does not regulate in favour of CE products and/or services, and possibly even actively regulates against it.	Kirchherr et al. (2018), Su et al. (2013), Tura et al. (2019), Velis and Vrancken (2015), Witjes and Lozano (2016).
	Regulation and tax incentives	“Inadequate public tax incentives prevent enterprises from innovating more environmental friendly technologies” (Su et al., 2013, p.222, p.222)	The government has tax incentives that lower the tax pressure on CE products and/or services.	The government has no tax incentives that lower the tax pressure on CE products and/or services.	Geng et al. (2010), Gumley (2014), Rizos et al. (2015), Su et al. (2013), Witjes and Lozano (2016).
	Coherence	“Weaknesses in policy coherence at different levels” (Vanner et al., 2014, p.12, p.12)	The government has a clear CE policy and makes sure that all policies are aligned towards the goal of CE implementation.	The government has no clear CE policy, hence its different policies may not support, or sometimes even compete, with one another.	Geng et al. (2009), de Jesus and Mendonça (2018), Mont (2008), Vanner et al. (2014).

providing a financially sustainable future (Kirchherr et al., 2018; Preston, 2012). In other words, the **value proposition** of CE should be attractive enough to entice companies to get involved. Moving away from planned obsolescence in products and resisting low virgin material prices are challenges, as can be attracting financing for circular business propositions (Kirchherr et al., 2018; Pheifer, 2017; Van Eijk, 2015; Vanner et al., 2014). On an aggregated level, firms require consumer enthusiasm around CE products and services in order to create viable business models. As Pheifer (2017, p.13) writes about consumers: “As a civilian, they can be very

engaged with the problems of the world and longing to act on the issues at hand. But as a consumer they could be less willing to buy the more expensive ‘responsible’ products as price has the final say.” Consequently, **consumer demand** is difficult to predict and control within CE business models, placing importance on creating consumer awareness whilst minimizing fixed costs to improve profitability of CE products and services. **Scaling** up is important, particularly regarding recovering materials (Singh and Ordoñez, 2016). Collaborative business models can be a route to achieve scale whilst simultaneously providing protection against market

uncertainty (de Jesus and Mendonça, 2018; Lieder and Rashid, 2016).

2.2.4. Governmental policies

Public sector organizations are, in addition to their own institutions and entities, able to deliver their services through public contracts within the private sector, known as public procurement (Brammer and Walker, 2011; Kiiver and Kodym, 2014). With government and companies comprising the two key players of the CE, public procurement can provide test cases for business models in the CE while simultaneously allowing companies to gain experience (Su et al., 2013; Witjes and Lozano, 2016). Governments also play a role in redesigning the current (waste-) legislation and tax incentives, which are designed on the basis of a linear economy and do not focus on resource efficiency. Additionally, ownership of waste is often organized in ways which make it difficult for firms to use as a resource (Mont et al., 2017; Singh and Ordoñez, 2016). Next to this, taxes on pollution emissions are often very low, as is the legal enforcement of stricter regulation (Geng and Doberstein, 2008; Su et al., 2013). The correct mix of policies, leading to “smart regulation,” varies from country to country; what is clear, however, is that weaknesses in policy coherence across various levels damage the transition towards CE, particularly in regards to the concept of waste (Van Eijk, 2015; Vanner et al., 2014).

2.3. The coffee value chain

The research done in this paper finds itself at the end of two developments within the coffee industry, in the specialty coffee niche where the quest for better coffee quality and ethical consciousness come together (Borrella et al., 2015). On one hand, the quest for better quality originated as a reaction to the initial, big bulk coffee as a “caffeine container” product, but also as part of the continued development of coffee houses like Starbucks, where flavour and consumer experience stand central (Hartmann, 2011; Manzo, 2010; Ponte, 2002). Conversely, ethical consciousness was spawned as a result of the volatility of the world coffee market and its crises that, until 2008, lead to hunger, homelessness, migration and the damaging of farming practices, resulting in fair trade and organic product labels being introduced (Babin, 2015; Elder et al., 2014; Igami, 2015; Ponte, 2002). Specialty coffee combines these two developments; it provided an incentivize for coffee farmers to produce high-end quality coffee, whilst guaranteeing coffee roasters a steady supply of high-end quality coffees as well as strong marketing options for story telling (Borrella et al., 2015; Hartmann, 2011; Raynolds et al., 2007; Rosenberg et al., 2018).

Due to the connection this industry niche formed between product quality and ethical standards, it served as a fertile ground for experimenting with the implementation of CE principles. An intrinsic curiosity developed within specialty coffee, focused around making sustainability synonymous with quality, and business models created a protected area where the diffuse CE idea is tested in a local and loosely joined system across value chains (Deuten, 2003).

The value chain of the coffee industry is presented in Fig. 1 and visualizes the different actors at play from the coffee farm to the coffee cup (Borrella et al., 2015). The dotted line represents the divide between the producing countries in the tropical coffee belt, and consuming countries, predominantly in the global North. Colombia and the Netherlands can be taken as an example; Colombia being the third largest coffee exporter in the world, with the Netherlands as the 6th biggest importer of coffee in the European Union, the latter being the largest market for coffee in the world (ICO, 2019; CBI, 2019). Research on the value chain can take other major coffee producing countries like Brazil and Vietnam as an example, and pair them to top importers in the EU, like France, Italy and the Scandinavian countries. Coffee grows like a fruit on a tree, in red cherries as big as a marble. When processing the cherry, two beans are produced, with their characteristic curved line formed in the middle. The processing is conducted by one of two methods: the wet processing method, which utilises a water mill to remove the skin, or the dry processing method by which the cherries are dried on a bed or patio in the sun for the skin to be removed later (Viere et al., 2011). This results in parchment coffee, referring to the parchment-like layer that remains after the process and still covers the bean. Once this is milled off, the coffee is called “green coffee” and is then ready for export (Ponte, 2002). After being shipped to the consuming country, the importer sells the bags to the coffee roasters, who roast the beans to become the brown coffee beans most consumers relate to. Along this value chain, many residues and side-products are created, most of which are seldom used (Murthy and Madhava Naidu, 2012).

3. Methods

Business Model Experimentation is a deliberate approach to test a hypothesis about a potential business approach and its assumptions (Bocken et al., 2017). In the context of CE, it focuses on hypotheses for slowing, closing, narrowing, intensifying and/or dematerialising resource loops, as mentioned before in the literature section. Even though its direct CE impacts can be limited, business model experimentation can have a range of advantages for companies engaged in circular business model innovation: companies can gain a better understanding of the overall impacts of a system; can identify emission reduction opportunities; and can track performance and stimulate supply chain collaborations (Genovese et al., 2017; Stewart et al., 2018). A practical way of conducting BME is organizing an arena workshop where the envisioned change is translated into a transition pathway by, for example, designing a new business model canvas (Gorissen et al., 2016). Through workshops, but also in the experimentation phase itself, barriers and enablers are expected to be found, which either help or hamper the experiment and its implementation (Bocken et al., 2017).

The primary goal of BME is not to obtain the activated change, but to obtain scientific results. In this study it focused on barriers and enablers for CE initiatives in an industry specific setting, which means that the failure of an intended change (a CE initiative) was

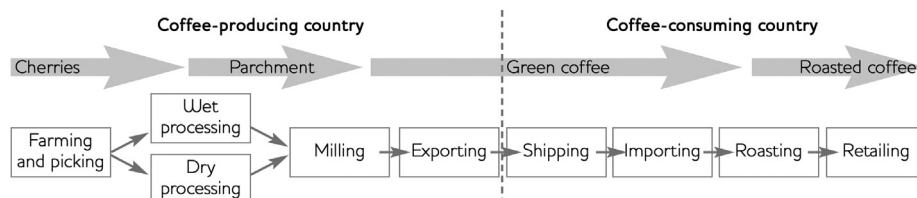


Fig. 1. Coffee value chain (Borrella et al., 2015).

found be part of a successful study as well (Antikainen et al., 2017; Baskerville, 1997; Thomke, 2003). BME initiatives were initiated by the researchers but performed by the focal firm and value chain under research and then observed. Rigorous documentation and theoretical justifications were made consistently in order to guarantee the scientific value of the results (Baskerville, 1997; Gummesson, 2000; Kanuha, 2000).

“Business model experimentation mainly involves the focal business, sometimes with or a handful of stakeholders (e.g., supplier, customer), and is low in resource intensity.” (Bocken et al., 2018, p. 3). In the context of this study, a coffee importer is such a focal business as it acts in the middle of the value chain, between the source (coffee farmer) and end-consumer, therefore having the possibility to invite and mobilize all stakeholders. Coffee importer This Side Up in Amsterdam, the Netherlands, was chosen as it is a sustainability-focused importer with an active network of both coffee farmers and coffee roasters, both of whom could be relatively easily mobilized for business model experiments. Being a start-up, it was expected to be of more useful results in a BME setting, as “it has been questioned whether incumbents will or can fully embrace the more ‘radical’ business model approaches to CE” (Henry et al., 2020, p. 2).

This study follows Susman and Evered’s (1978) research approach, which has strong similarities to the “Rapid Business Model Experimentation” by Antikainen et al. (2017) and the “Stepwise Process of Business Model Experimentation” by Bocken and Antikainen (2018). It uses a five-step (cyclical) process of researching while developing a client-system infrastructure: (1) diagnosing, (2) action planning, (3) action taking, (4) evaluating and (5) specifying learning and are shown in Fig. 2. Diagnosing refers to “the identification of the primary problems that are the underlying causes of the organization’s desire for change” (Baskerville, 1997, p. 27). The action-planning phase refers to the planning of the measures to be implemented, and action taking refers to the actual implementation process. In evaluation, the results of the experiments will be discussed with the value chain actors involved in the study, before comparing it to the literature review (as presented in Table 1) in the final phase.

Fig. 2 describes the used research process. First, we observed a workshop with stakeholders from all parts of the coffee value chain that were connected to the focal firm. At the workshop, specific CE

initiative opportunities were identified. In the following phase, ideas that lie closest to the used CE definition and that received most enthusiasm by the stakeholders were picked up by the involved companies for the business model experimentation phase. When the final date of the business model experimentation came, all stakeholders were invited to discuss what had been achieved, and what had been difficult. Together with the data collected during the process, the barriers and enablers of the implemented initiatives were identified by, inter alia, drawing on the table of barriers and enablers presented previously.

Data collection was carried out by taking fieldnotes, reviewing company documents and doing interviews with participating actors (Chevalier and Buckles, 2013; Robson and McCartan, 2015; Silverman, 2013). No maximum of stakeholders was decided beforehand, neither for the workshop as for the experiments. Three points of note making were used: the workshop, attendance at meetings and correspondence with the experimenters. The fieldnotes were taken during or as close as possible to the documented events. Considered documents included for example, workshop materials, presentations, business cases, correspondence between actors (such as emails and notes from phone calls) and notes made during meetings. 15 people attended the initial workshop and 46 people participated in the experiments, which are presented in Table 2. Data analysis focused on content and theme analysis (Creswell, 2014; Easterby-Smith et al., 2015; Gibbs et al., 2007; Robson and McCartan, 2015; Silverman, 2013). The analysis was done by cross-checking the manuscripts of the interviews, field notes and other documentation with the framed literature review illustrated in Section 2. The thematic coding was done by searching for the specific words, (parts of) the descriptions, or synonyms of the data presented in Table 1. This coded data was consequently distilled from this raw data and organized according to both the individual experiments as well as according to the outline of Table 1, being organized according to specific barriers and enablers. Following Eisenhardt (1989), the comparison of the data and the literature was done several times, and also cross checked with the underlying literature that Table 1 refers to. The research was as such inductive, as the analysis with CE literature was done after the experiments were done, as presented in Fig. 2. The next section will go into detail about the taken business model experiment approaches for the three chosen experiments.

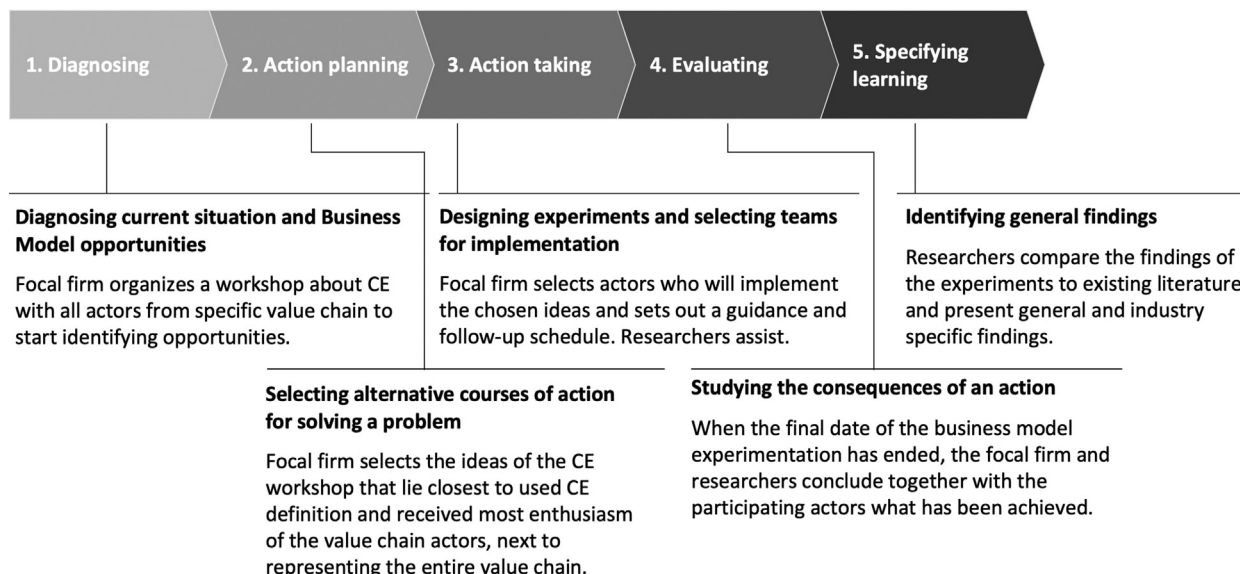


Fig. 2. The research process.

Table 2
Overview of participants.

#	Position	Organization	BME
1	Farmer	Coffee Farm	Circular Coffee Fund
2	Farmer	Coffee Farm	Circular Coffee Fund
3	Farmer	Coffee Farm	Circular Coffee Fund
4	Chief Executive Officer (CEO)	Coffee Exporter	Circular Coffee Fund
5	Chief Executive Officer (CEO)	Coffee Exporter	Circular Coffee Fund
6	Chief Executive Officer (CEO)	Coffee Importer	Focal firm
7	Head Quality control	Coffee Importer	Focal firm
8	Head Coffee Buyer	Coffee Importer	Focal firm
9	Chief Executive Officer (CEO)	Coffee Roaster	Coffee sludge
10	Chief Executive Officer (CEO)	Coffee Roaster	Packaging loops
11	Head Roaster	Coffee Roaster	Coffee sludge
12	Managing Director	Coffee Roaster	Packaging loops
13	Media Manager	Coffee Roaster	Coffee sludge
14	Chief Executive Officer (CEO)	Coffee Shop	Packaging loops
15	Managing Director	Coffee Shop	Packing loops
16	Managing Director	Coffee Shop	Coffee sludge
17	Barista	Coffee Shop	Coffee sludge
18	Barista	Coffee Shop	Packaging loops
19	Barista	Coffee Shop	Packaging loops
20	Head Consultant	Sustainability Consultancy Firm	Circular Coffee Fund
21	Consultant	Sustainability Consultancy Firm	Circular Coffee Fund
22	Managing Director	Non Governmental Organization	Circular Coffee Fund
23	Head researcher	Non Governmental Organization	Circular Coffee Fund
24	Assistant researcher	Non Governmental Organization	Coffee sludge
25	Assistant researcher	Non Governmental Organization	Coffee sludge
26	Media Manager	Non Governmental Organization	Circular Coffee Fund
27	Industry Manager	Non Governmental Organization	Circular Coffee Fund
28	Industry Manager	Non Governmental Organization	Circular Coffee Fund
29	Chief Executive Officer (CEO)	Circular Economy Startup	Packaging loops
30	Chief Executive Officer (CEO)	Circular Economy Startup	Packaging loops
31	Chief Executive Officer (CEO)	Circular Economy Startup	Coffee sludge
32	Chief Executive Officer (CEO)	Circular Economy Startup	Coffee sludge
33	Managing Director	Non-coffee Retailer	Packaging loops
34	Managing Director	Non-coffee Retailer	Packaging loops
35	Managing Director	Non-coffee Retailer	Packaging loops
36	Managing Director	Non-coffee Retailer	Packaging loops
37	Sales executive	Non-coffee Retailer	Packaging loops
38	Sales assistant	Non-coffee Retailer	Packaging loops
39	Sales assistant	Non-coffee Retailer	Packaging loops
40	Managing Director	Waste Collector	Packaging loops
41	Managing Director	Waste Collector	Coffee sludge
42	Head of board	Civil Society Organization	Coffee sludge
43	Head of board	Civil Society Organization	Circular Coffee Fund
44	Board member	Civil Society Organization	Circular Coffee Fund
45	Managing Director	Non-coffee farm	Coffee sludge
46	Managing Director	Non-coffee farm	Coffee sludge

4. Case description

4.1. The focal firm and value chain

The investigated client system is the value chain of the Amsterdam based specialty coffee importer This Side Up, being the focal firm of this research. In 2017 and 2018, when the research was done, This Side Up was a three-year-old start-up with 3 employees. This Side Up aspires to be a sustainable company by being 100% transparent on all transactions as well as delivering a cake-diagram of every cost for all 13 producing farms and cooperatives in 11 countries. The clients of This Side Up are coffee roasters in the European Union, and the importing company makes money by buying unroasted coffee, doing quality control, organizing logistics and consolidation of containers and selling it at a slightly higher margin. Coffee roasters then roast the coffee and sell it through their coffee shops to the hospitality industry, or via their own respective webshops. As the importer is the key middleman in the coffee value chain, the company is guided by literature on tackling the CE implementation process from the perspective of a progressive focal firm (as proposed by [Genovese et al., 2017](#)) providing an

excellent overview and touch point to initiate and observe Business Model Experiments. The company wants to focus both on social and environmental aspects of sustainability. While it is already paying at least 50% more than market prices to the coffee farmers for their products, This Side Up is still exploring how to adequately incorporate the ecological pillar in their value chains. This study is concerned with the company exploring whether CE could fill this gap.

4.2. Three experiments: case descriptions

We investigated this exploration by taking part in the company's business model experimentation efforts for three CE initiatives: (1) packaging loops, (2) coffee sludge, and (3) the Circular Coffee Fund. The three initiatives were selected based on different concept developed in a workshop on the November 9, 2017 at the Amsterdam headquarters of This Side Up which was organized by the focal firm and observed by the researchers. The workshop consisted of a 15-min presentation introducing the CE concept, two brainstorm sessions and a group discussion. A total of 23 problems and 61 solutions to CE connected problems in the coffee chain were

ideated based on applying the CE definition on the value chain, from which a total of 12 problems were prioritised by the participants based on their urgency within the specific value chain node. Of these, three measures were selected in a group discussion for implementation within the 7-month research period. The selection of the experiments was based on three criteria. First of all, representation of experiments must be relative to the entire value chain, to prevent “clustering” and representation of, for example, only the coffee consuming side, and not the production side. Secondly, stakeholder enthusiasm created an easy start to experimentations of participating companies and thirdly, the feasibility of obtaining results in the research period was a major selection criterium. An overview of the initiatives is provided in Table 3.

4.2.1. Packaging loops

At the workshop packaging waste was extensively discussed, spanning from packaging in the producing countries (canvas bags and their internal plastic lining) to a broad span in the consuming countries (paper cups, milk cartons, roasted coffee bags, internal transportation). The focal firm decided to focus on the internal transportation packaging at the end of chain, being the transportation of roasted coffee from roasters to coffee shops, which predominantly happened in cardboard boxes in which (250g or 1 kg) bags of roasted coffee are stacked. The focal firm did an open call in its network to find connected value chains with a surplus of cardboard boxes, which could be picked up and distributed within the coffee value chain, thus avoiding the need to buy virgin packaging. The call for possible donators was done through the social media of the focal firm, which within several hours resulted in a list of candidates. A watchmaker directly volunteered, having a weekly excess of more than 100 cardboard boxes. In the following weeks of discussions around logistics with the watchmaker, a start-up pioneering in the trade of commercial waste streams joined the process. During the negotiation process of this pilot, an entrepreneur came forward and showed interest in the cardboard boxes trade, and proposing to take over the logistics, picking up the cardboard boxes (saving the watchmaker waste treatment costs), warehousing, and selling them for half the price of new cardboard boxes to actors in the coffee value chain. The business model was as such fairly straight forward. The proposed value for the potential clients lied at the marketing potential of ecological friendly activities and cheaper material and/or waste treatment costs. This value was delivered through a courier service and captured at the sale of the cardboard boxes, which were picked up for free and sold for half the price of a new box, and in turn paying for the logistical operations as well as leaving space for a profitable margin.

4.2.2. Coffee sludge

A substantial waste stream in the coffee value chain is that of coffee sludge, the water-soaked coffee residue remaining after a cup of coffee is made. One of the roasters proposed a ready-to-go system at the workshop, where the sludge from the coffee shops would be picked up when delivering fresh coffee beans, storing it at

the roastery ready to be collected by a third party. Taking into account the significance of the waste stream within the coffee value chain, and the enthusiasm of a value chain actor, it was planned to find a suitable candidate to pick up the coffee sludge and organize the logistics. With the strong benefits of the coffee sludge as an agricultural fertilizer demonstrated already by several researchers, the search started at farms and communal gardens, before moving to different chains (Ballesteros et al., 2014; Bouchenafa-Saïb et al., 2014; Chalker-Scott, 2016; Fenoll et al., 2014; Kim et al., 2014; Morikawa and Shinohara, 2016).

Focal firm This Side Up wanted to co-create this solution together with the enthusiastic roaster. The first opportunity lied at closing the system of the indoor food market where the roasting company resides. The roaster reached out to both the bakery and the vegetable retailer as combining bread waste and coffee sludge would make a solid basis for compost for the vegetable farmers (Chalker-Scott, 2016). Simplified diagrams and fact sheets were provided by the researchers, which lead to an initial enthusiasm. Fears around complicated logistical systems in the respective value chains grew too dominant, and the focal firm was unable to convince the potential parties to overcome these concerns. As a next step, communal gardens in the region were approached, without success. This led to a social media campaign through the roaster’s network, with good responses, but no breakthroughs. Taking a step back to the focal firm, This Side Up came forward with a possible candidate: a communal garden in a greenhouse facility 50 km away from the roaster. The facility responded positively to the proposal of the focal firm, however the distance was too great and the quantity insufficient to work together with the initial enthusiastic roaster. A second coffee shop in the observed value chain was approached, with a weekly amount of close to 200 L of sludge and only 6 km from the facility. The two parties were introduced to each other, and collaboration was started. Eventually, the focal firm also found a suitable candidate for the initial roaster: a start-up that planned to produce ink out of coffee sludge. The efforts of This Side Up got the attention of a third coffee shop in the value chain, whom with a little bit of help of the researchers found an enthusiastic communal garden nearby themselves. The business model focused as such mainly on the money saving value proposition for both the sender and receiver of the coffee sludge, where this value could be captured by making clear agreements between these two parties, as the financial incentive was observed to not be high enough to compensate for an external logistical party. The value was thus captured by doing proper match making between sender and receiver, where the logistical side would fit in existing movements of either of the two (or more) participants.

4.2.3. Circular Coffee Fund

At the end of the value chain, disposable cups for to-go coffees end up incinerated or landfilled after just a short usage time, resulting in serious ecological impacts (Häkkinen and Vares, 2010; Van der Harst and Potting, 2013). At the beginning of the chain, monoculture has negative effects on soils, biodiversity and

Table 3
Overview of the executed initiatives.

Initiative	CBMI strategy ^a	Start date	Length	Summary
Packaging loops	Slowing resource loops	November 15th, 2017 (following workshop)	6 months	Creating a system of used cardboard systems in transport instead of virgin boxes
Coffee sludge	Closing resource loops	December 14th, 2017 (following workshop)	5 months	Finding and applying alternative uses to coffee sludge instead of disposal
Circular Coffee Fund	Slowing resource loops	September 26th, 2017 (as part of research proposal)	Ongoing	Connecting the minimization of disposable cups and investing in sustainable initiatives on coffee plantations

^a Following the five CBMI strategies classification presented in Section 2.3: slowing, closing, narrowing, intensifying and dematerialising resource loops.

economic resilience (Wintgens, 2004). A transition to more circular practices at the farm-level, therewith avoiding biological and material waste materials, is costly and time intensive, which was also expressed at the workshop with comments that funds are often lacking. The investment in a water efficient wetmill, which prevents wastewater going into the biosphere, was identified as an expensive bottleneck. The savings made by cafés for not needing to buy disposable cups (when customers bring their own cups) could be invested in sustainable farming practices in the beginning of the chain, creating a money stream, which could simultaneously slow down resource loops on both ends, those being the disposal of paper cups and the excess waste water on the plantations.

During the workshop and the continuing months, the issues were separated as many approached actors found the system too complex. For an increased use of reusable cups, an awareness week was planned. As a means of financing the sustainable farming practices, the social premiums on the coffee kilo price at This Side Up were converted to pay for broader sustainability measures, including more ecological friendly farming. A 10-day visit of the focal firm to a coffee farm in the Nariño region in Colombia was made to co-create a system on spending the sustainable premiums. The researchers joined this visit and observed the discussions and creation of the system.

Preparing the awareness week, heavy resistance was encountered. Cafés that originally were enthusiastic to use promotional materials now backed off since the impacts also required measurement even though anonymity was guaranteed. The premium system on the coffee kilo price to invest in broader sustainability also had to be abandoned due to a lack of support, which put the original idea of connecting the issues together back on the table. The connection meant stimulating consumers to bring their own cups and put the saved expenses on paper cups in a fund, which would invest in sustainable farming practices at farms connected to the focal firm. By doing this, production and waste pollution were avoided while also creating a new way of financing circular farming practices. The initial concerns of the participants were tackled by simplifying the donation system. An independent non-profit fund with its own board of legal, financial and implementation experts was established. Clear aims were set on how many disposable cups had to be avoided within the first year in addition to the establishment of concrete ecological goals at the participating farms. A two-edged approach was taken, going bottom-up by mobilizing small cafés and increasing visibility of the project – and going top-down by engaging big firms and banks to apply this system within

their companies. The project got the name “Circular Coffee Fund.”

The business model focused on a different value proposition on both ends of the value chain. At the coffee plantation side, it allowed for a “green labelled fund” to be used for CE initiatives, which farmers could apply for by sending in a proposal for a CE farming idea. This financial incentive was observed to be high enough to create enthusiasm. On the coffee consumer side, the value proposition focused on motivating the use of reusable coffee cups, thus in turn not contributing to the local waste problem with one-time disposables as well as being rewarded by the “good feeling” of supporting the coffee farmers. The value was delivered through clear communication efforts – both physically in the cafés as well as online – and setting up a non-profit organization and independent board to guarantee for the promised use of the funds. The value was captured by developing a system at the cafés; they could easily register how many people brought their own cups, multiply this figure by €0,10 per cup and donate the total on a monthly basis to the bank account of the fund. The model is represented in Fig. 3.

5. Results and discussion

The findings of the business model experiments are compared to the literature review presented in Table 1 with an overview of the results illustrated in Table 4. The minus indicates a barrier and the plus an enabler. No plus or minus means that this barrier or enabler was not of relevance for the initiative. The table is populated based on the definitions used in Table 1. Below, we present the found barriers and enablers in the three experiments.

5.1. Packaging loops

5.1.1. Values

The packaging initiative shows (in Table 4) enablers for all three subdivisions of “values”. During the workshop, all parties were very aware of the linear model of current packaging in the coffee industry, making awareness a clear enabler. Participants expressed their annoyance, especially café owners and roasters, with the amounts of cardboard boxes they would see coming through their businesses on a weekly basis, with the vast majority going straight into the paper bin, even when the pieces would be in excellent state. Donors from other value chains were found within several hours after the call on social media for more cardboard boxes, indicating a similar awareness, and annoyance, in other industries



Fig. 3. Circular Coffee Fund diagram.

Table 4
Overlap of implemented initiatives with the presented literature review, a plus represents an enabler and minus a barrier.

	Values			Technology			Business cases			Governmental		
	Awareness, culture	Leitbild	Social distance	Knowledge	Reverse logistics	Standardization	Value proposition	Consumer demand	Scalability	Procurement	Regulation and Tax incentives	Coherence
Packaging	+	+	+	n/a	-	+	+	+	+	-	-	-
Sludge	+	-	+	-	-	-	+	+	+	n/a	-	-
Cups fund	+	-	+/-	-	+	-	+/-	-	-	-	-	-

as well. The barrier of organizational or industry “silos” was thus not applicable as cross industry matches were easily made. Selecting the cardboard boxes situation as a clear starting point in the workshop led to a very practical and understandable initiative with a clear “leitbild” as an enabler: that of minimizing the single-usage of cardboard boxes, which activated and motivated the participating companies to jump to action.

5.1.2. Technology

The reverse logistics of picking up excess packaging material was found to be a barrier. It required a decent amount of organization, commitment, planning and calculation as the courier needed to be paid as well as providing financial benefits for both sending and receiving parties. The complexity of this “match-making” led to an initial barrier, which lasted fairly long. This barrier was only overcome by collaborating with an online platform for excess materials as well as an enthusiastic entrepreneur, both from other industries, referring back to the enabler of matching values. A positive side effect of working with cardboard packaging was the standardized material, a clear enabler. The initiative did not require any specific know-how, making the barrier and/or enabler not applicable.

5.1.3. Business cases

The value proposition was strong for both involved parties: for the watchmaker, handing the excess cardboard boxes to a different industry meant lower waste treatment costs. To the coffee roasters, having as-good-as-new boxes for half the price led to a financial benefit. The financial benefits as well as the simplicity of the value proposition proved to be a clear enabler. The system’s scalability, its straightforward option of expanding logistical operations, the ease of getting more companies with excess cardboard boxes aboard and enticing more coffee roasteries to participate led to a prognosis of further cost reduction, resulting in the conclusion of another enabler. The awareness of the single-use problem of cardboard boxes was evident for many of the participating companies, leading to a broad enthusiasm and participation and the conclusion that there was an enabling consumer demand. The use of these boxes, next to the initial cost reduction for the coffee roasteries, opened also for a “green marketing” aspect, where these companies could show their sustainability approach to their clients, strengthening the enabling role of the business case as a whole.

5.1.4. Governmental policies

Regarding governmental policies, only barriers were experienced. The procurement policy of the municipalities’ waste management to solely waste treatment companies led to a barrier for CE innovation. Next to this, no tax benefits stimulated the reusing of packaging, meaning that the business case had to be strong enough to compete with the linear economic system. These notable difficulties show a clear discrepancy with the ambitions of the Dutch government to be less resource intensive, hence the barrier for governmental policy coherence. In almost all interviews and field visits, this annoyance was expressed, especially by café owners and coffee farmers, who felt that they were “on the frontline”.

5.2. Coffee sludge

5.2.1. Values

Both coffee shops and end-consumers were easily convinced and motivated to a common “leitbild”, originating from internal frustrations (and thus awareness) with the sheer size of wasted sludge that coffee generates and needs to be disposed at coffee shops on a daily basis. This awareness was a strong enabler, which was so clear and strong, that it led to a sentiment of action-taking and enthusiasm to do something about it. In some cases, frustration that no solutions were easily available in the market motivated companies to participate. This motivation was observed to be strong enough to overcome the barrier of social distance, though with its limits. Both sender and receiver of the coffee sludge were particularly selective on the proposed “matches” by focal company This Side Up, strongly wanting to avoid hassle of picking up the sludge themselves, or bringing it somewhere, and staying in their own “silo” and habits (such as setting the garbage outside on specific days), instead of making agreements with other industries that could benefit from it directly.

5.2.2. Technology

The matchmaking of supplying and receiving parties by focal company This Side Up was observed to be difficult, and thus a barrier, even though the initial propositions looked fairly straightforward both from a scientific business model experimentation perspective, as that of the focal firm. The reverse logistical system was in the first occasion connected to the delivery of fresh coffee beans, where the roaster would take back the sludge. This idea worked, but having the sludge at the roastery led to the problem of not being able to find parties that wanted to pick it up. In this sense, the barrier of reverse logistics was taken care of, but the awareness barrier blocked the proper functioning of it. Conveying knowledge on why this sludge should be picked up, and why it was beneficial for private gardens for example, proved to be a hard task, with a lot of in-depth knowledge required and persuasion that needed to be done by the participating coffee shops to their respective customers and network. As such, the knowledge gap in regards to what is currently done with coffee sludge and what could be done instead proved to be a strong barrier. In the end, the matches were found but there turned out to be new logistical lines as opposed to reverse logistics. These new connections proved to be very specific, where for example 50 km was considered as too much hassle, yet a 6 km link between sender and receiver was perceived as manageable. The standardization of such a system therefore was observed as a barrier, as a lot of tailor-made connections needed to be provided by the focal firm.

5.2.3. Business cases

The coffee sludge initiative shows an enabling business case. The value proposition of avoiding many kilos of waste – and therefore waste treatment costs – next to using it for agricultural and horticultural purposes was appealing to many coffee shops and parties using fertilizers. It was observed, however, that this business case needed to be specifically pointed to the right audience, as

communicating the use of coffee sludge to home gardens of customers at the coffee shops did not work. This increased the stress on the focal firm, to keep trying to find proper matches between parties, and being flexible in the possible combinations. The three executed cases showed a diversity of size, spanning from a few dozen kilos, to several hundreds, indicating a clear possibility and thus enabling factor of scaling. Having witnessed the strongly expressed frustration of disposing coffee sludge by the cafés as well as the consumer demand of doing something with it, this case was perceived as strong and enabling.

5.2.4. Governmental policies

Regarding governmental policies, frustrations were observed about the limitation of what percentage organic waste (and thus coffee sludge) fertilizer can consist of, as Dutch law prescribes that waste cannot be dumped on farmlands. Instead of creating tax incentives for creative CE solutions for organic waste, it was experienced as a legislative barrier. The governmental coherence of avoiding waste and functioning in a less resource intensive manner conflicted strongly with the slow pace of re-evaluating the criteria of waste in light of the CE developments, and thus the use of coffee sludge in CE initiatives and experiments. Governmental coherence was thus observed as a strong barrier. During the research period, no public procurement on the topic of coffee sludge solutions was encountered.

5.3. The Circular Coffee Fund

5.3.1. Values

The impact of billions of discarded paper (or plastic) take-away cups was easy to communicate, as was the need for more financing at the coffee plantations to invest in circular measures. It was observed that it connected to the already existing knowledge of the participating companies, making awareness a clear enabler. The different types of reusable cups available on the market, the abundance of other “social initiatives” companies participated in, and the different customer base was strongly felt as part of a firms’ identity and led to a stronger sphere of organizational silos than the focal company anticipated. It meant that some cafés and companies were immediately positive and generated savings – possibly since the initiative correlated closely with their identity. In this sense, the “leitbild” corresponded closely on one hand to the awareness and identity of participating firms, but not always, making it hard for the focal company to mobilize and motivate many companies to participate the experiment.

5.3.2. Technology

The identity diversity resulted into a difficult and troublesome standardization of the initiative, hence being a barrier. Finding standardized reusable cups was observed to be challenging for the focal firm, both because of an existing vast array of offerings of the product and the connection of reusable cups to the identity and marketing exposures of the coffee shops. This led to resistance against a standardized product or system which would be shared with experienced competitors. The reverse logistics of bringing your own cup was observed to connect to many awareness campaigns about useless waste. Participating companies were able to motivate their customers to bring their own cups, though it was observed that it required clear explanation of how this would contribute to the Circular Coffee Fund. In this sense, reverse logistics are observed to be an enabler, yet knowledge was perceived to be a barrier. Next to this, in order to bring more companies on board, the focal firm needed often to provide thorough in-depth scientific knowledge to challenge perceptions favouring disposable cups.

5.3.3. Business cases

The system that was proposed – taking your own reusable cup to the café or coffee machine, saving the expenses of a paper cup and investing this in a sustainable fund – was a value proposition that received mixed responses. Connecting two circular initiatives on both ends of the value chain, turned out to be an experiment in itself. The importance of identity diversity of cafés that lead to a troublesome standardization hampered the scalability of the project, and the expression that they were already involved in several other “green” or “social” initiatives shows that the consumer demand of the initiative was not strongly felt, creating the consumer demand and scalability barriers. The value proposition on the other end of the value chain, in Colombia, showed a clear enabling and positive reception to the “green” investments, used to slow down resource loops at the plantation level, including improved water efficiency and the usage of discarded vegetative matter. As a result, the value proposition of the Circular Coffee Fund, was observed as being both an enabler and barrier.

5.3.4. Governmental policies

Regarding governmental policies it was noted that the Dutch governmental institutions with a high consumption of paper cups did not respond enthusiastically to the initiative, though resource minimization is part of their policy. This was observed at communication with various layers of the government. Government procurement, which, in the eyes of the focal company, could really boost CE initiatives with no disposable materials, were observed as a barrier to quick uptake. Incorporating tax initiatives to minimize the consumption of disposable coffee cups did not constitute a part of the current policies. Whilst the official governmental stance is to promote CE initiatives, it did not support experiments as such, marking government policy coherence as a barrier.

5.4. Specifying learnings

Many barriers were encountered regarding governmental policies. We clearly recognized the barrier mentioned by [Rizos et al. \(2016\)](#) where small and medium sized enterprises struggle with having an overview of the policies regarding CE. Strong frustration was observed regarding the incoherence of government policies, where on the one hand the Dutch government expressed the clear aim to enable CE business opportunities, but on the other hand, legislation and the enforcement of it, still favoured linear businesses. The observed experiments show that this will lead to pressure on the business cases, as these need to compete with their linear counterparts, for which the overall policies are designed – thus fighting an uphill battle. As [Geng and Doberstein \(2008\)](#) state on the Chinese situation, we also found in our study that the low price of new virgin materials versus recycled or reused materials made the CE business cases difficult. Price, but also convenience or culture, was observed to be a barrier, as is also observed by [Tura et al. \(2019\)](#). The habit of disposing a disposable coffee cup after usage and not bringing your own reusable cup to the café needed strong and compelling arguments to be changed. In this sense, there is a clear overlap and mutual influencing of barriers. Governmental policies lead to lower prices for virgin materials, which create a business model built around the disposal of single-use products, which in turn causes a habit, which can – to some extent – root in a local culture. Chain reactions like this are also observed by [Kirchherr et al. \(2018\)](#), which can amplify specific barriers or enablers.

Scalability of the initiatives, as [Singh and Ordoñez \(2016\)](#) refer to, seemed in the observed experiments not to be the major issue, but the journey to get there – from developing particular knowledge of CE, know-how on how to carry out its principles and

fostering skills to agreeing on which standards to use – proved to be a time-consuming and difficult matter. Finding the right business model with proper CE design as such, was observed as the biggest barrier. The chain reactions of having proper reverse logistics and CE standards in order to scale an initiative, became clear in the Coffee Sludge experiment as a sequence of barriers. In the Packaging Loops experiment however, the opposite was the case. Since the standardized shape of cardboard boxes and the clear financial business case, customer demand grew and a scalable initiative was easily designed.

Having clear and similar values on CE within the different stakeholder businesses and amongst them, were found to be a crucial driver in CE initiative implementation, which also could keep the “moral” of participating companies up when encountering barriers, hence leading to new ideas and experimental approaches to achieve the set aim, or “leitbild” of the CE initiative (Jones et al., 2013; Gorissen et al., 2017).

Three other findings add to existing literature, which are also represented in Fig. 4. Firstly, a point that is less clear in literature, is the observed sensitivity to identity and market perception of companies on the adoption of CE initiatives. In the case of the Circular Coffee Fund, the brand identity connected to coffee cups for branding purposes, was observed to be a strong barrier. It had strong impacts on the standardization of the initiative, and therefore also the scalability of it. In its extension, the sense of competition and being different than competitors played a role in this as well. On the other hand, it also meant that cafés and firms that had an identity that correlated closely with the initiative, were very positive and immediately started generating savings.

Secondly, in existing literature, knowledge often refers to the barriers and enablers of the technical “know-how” of a CE initiative, where in the three experiments, the communication of the knowledge about linear economy effects were observed to be very important, a could function as a strong enabler for overcoming certain barriers. For example, there is compelling research on the positive effects of coffee sludge as agricultural fertilizer (Ballesteros et al., 2014; Bouchenafa-Saïb et al., 2014; Chalker-Scott, 2016; Fenoll et al., 2014; Kim et al., 2014; Morikawa and Shinohara, 2016). This information, however, needs to be shared, both to end-users (like customers or owners of coffee shops) and policy makers alike. Knowledge, or more specific fact-based communication, can be an enabler for CE initiatives when perceptions of a linear economy are false or incomplete. This changing of perceptions or belief systems, by showing facts in an easy and digestible manner, was also observed at the Circular Coffee Fund, where it was observed that cafés that explained the initiative well to their clientele, had more customers joining.

Thirdly, clear interaction between barriers and enablers was observed. In the Coffee Sludge and Circular Coffee Fund

experiments, the observed frustration by companies about the vast quantities of waste produced on a weekly basis was a clear awareness of the issues of a linear economy, and thus fuelled motivation to do something about it. This intrinsic motivation led to overcoming the barrier of social distance, or “silo mentality” as mentioned by Pheifer (2017) and stimulated the participants to connect with others to make these circular solutions happen. In the coffee sludge case for example, a communal garden facility on the countryside connected with a coffee shop in the middle of a city centre, a case of respective “silos” that in “business as usual” have little to do with each other. Another example is the Packing Loops experiment, where a strong business case was presented with an easy value proposition, financial gains and clear scalability and standardization opportunities, which proved to be a combination where costly reverse logistics could be overcome. The perceived easiness of the system then stimulated enthusiasm of participants, which made the experiment “roll”. In the case of the initial trials of the coffee sludge experiment, the reverse logistics system of picking up the coffee sludge was solved by picking it up whilst delivering fresh coffee beans. When back at the roastery, it was observed to be very difficult to find parties that wanted to pick it up – the value of the product was not understood. In this sense, one barrier was taken care off, but another barrier blocked the proper functioning of it. As such, one could suggest that next to a clear interaction between barriers and enablers, there can also be observed a certain sequence of barriers and enablers in some experiments. These examples also show that the interaction between barriers and enablers function across the different baskets of values, technology, business cases and governmental policies.

6. Conclusion

This study set out to identify barriers and enablers that hamper the implementation of CE initiatives in an active product value chain, that of the coffee industry. An overview of literature reviews done on CE barriers and enablers was used as a template for identification in a real life and “moving” experimental situation of a business value chain. Three Business Model Experiments were performed by a Dutch coffee importer in the coffee value chain, spanning from Colombia to the Netherlands. In addition to the presented overlap with and additions to the literature, there are three learnings we would like to shed some light on.

First of all, the role of the focal company as a matchmaker and motivator, was perceived to be crucial for the organization and continuation of the experiments. Organizing a kick-off workshop, calling and emailing stakeholders, connecting the dots, especially between value chains that would not normally interact, made the experiments possible and kept them going. CE initiatives were often seen as “an extra job” for participating companies next to

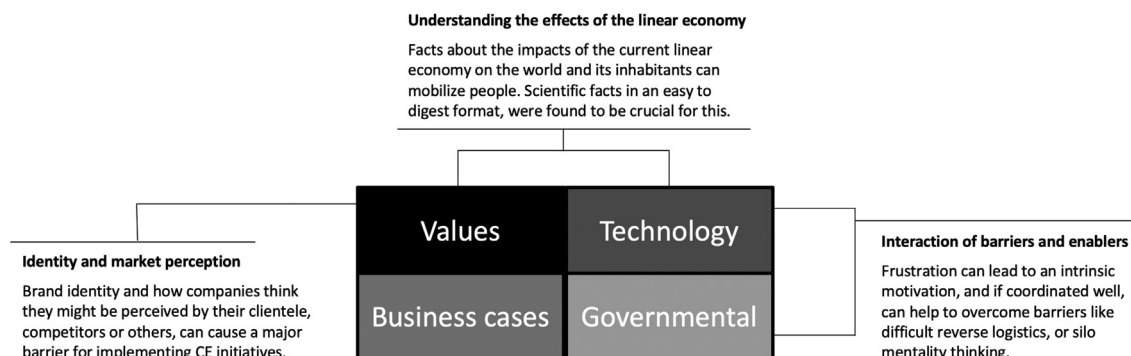


Fig. 4. Additional barriers and enablers identified by the study.

their day-to-day businesses, so in order to make the experiments work, it needed to be perceived as being as easy as possible. The consequence of having a strong focal firm was that the motivation of the participating companies, which often started out with great enthusiasm, was observed to be preserved even when initial barriers were encountered.

Secondly, the clear interaction between barriers and enablers goes further than the aforementioned chain reactions, and also allowed for a clear role for the focal firm. The observed experiments show that the root cause of a certain barrier and enabler can vary from being cultural (habit of disposable cups) to lack of knowledge (coffee sludge is a good fertilizer) to social span (a watchmaker hardly ever talks to a coffee roaster) and beyond. This can lead to a chain reaction, but it was observed that the focal firm can change the course of this. The lack of knowledge on what to do with coffee sludge for example, was easily connected to the observed frustration (and thus awareness) of the daily disposal of vast quantities of the matter, where the focal firm could, with an easy “injection” of information, motivate the participant companies to start experimenting enthusiastically, thus overcoming the initial barrier.

Thirdly, the influence of the researchers visiting implementation sites in all parts of the value chain was observed to moderately increase the implementation success. Trust towards the CE project and focal firm was observed to be increased. When the focal firm visited a site together with the researchers, participating companies expressed that they now took the experiments more seriously. This was clearly seen when the Colombian coffee plantation was visited together with the focal firm, or the potential cafés regarding the Circular Coffee Fund.

In short, the focal firm was observed to be the general motor and motivator of the CE initiative experiments. This Side Up kept the goals clear and the “puzzles” of finding good matches alive. Being a start-up, and as such being less entrenched in a fixed identity or patterns, proved to be of real added value for the flexibility that the experiments required. It demonstrates that having motivating values and a clear “leitbild” of the focal firm in addition to a compelling story founded on fact-based knowledge (possibly provided by the researchers) and a savvy business case can overcome the barriers of governmental policies, difficult reverse logistics, and “silo thinking”. This study adds to the scientific research on CE barriers and enablers on how these interact in an active international product value chain. Practitioners of CE initiatives are advised to identify a strong focal company or focal player that has a strong mediating and connecting capacity in order to increase the success of CE initiatives implementation.

The time frame of 7 months for the research must be noted as a limiting factor, especially regarding the time-consuming aspect of finding of proper “matches” between companies across industries by the focal firm and exhausting all potential barriers. The small number of experiments and validity of these for the Dutch or the coffee industry as a whole, is a limiting factor, as are the environmental and societal impacts that were not quantified through an LCA study. The literature overviews used for the framework are encompassing, though potentially not exhaustive. From our experiments, it is hard to deduct a conclusion on the “degree of circularity” – it cannot be measured “how circular” a firm or system is, following a hierarchy like the R9 system (Van der Harst and Potting, 2013). Future researchers are invited to develop an applicable circularity hierarchy for CE initiatives, to prevent firms and organizations implementing only the most low-hanging fruits and hampering a thorough shift from the current economy. Researchers are also invited to research on the generalization of the results and lessons learned, and test its applicability beyond the (Dutch) coffee industry.

Declaration of competing interest

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

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