# DEVELOPING BUSINESS MODELS FOR A CIRCULAR ECONOMY

## Development guided by strategy and dynamic capabilities

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**Abstract**

The Circular Economy (CE) proposes a new way of organizing production and consumption systems by introducing a circular flow of resources, materials and products in order to create economic, environmental and social value. Business have a crucial role, as they have the ability to redesign their products, services and processes in a way that addresses current resource inefficiencies. A tool that can help businesses in conceptualizing this redesign are business models (BMs). This thesis provides understanding on how these specific BMs are created by answering the following research question: What are the key elements for developing business models for a circular economy (BMCEs)? Most research has focused on types of BMCEs or appear to assume one-shot BM- innovations, while a continuous process of reconfiguration and development is more likely. A literature review on CE, BM(CE), dynamic capabilities and strategy was conducted in order to develop a theoretical framework that elaborates on this process of developing BMCEs. The elements identified were strategy, dynamic capabilities, resources, capabilities, stakeholder collaboration and multidimensional value. The theoretical framework, therefore, adds to the current body of knowledge by offering a dynamic perspective on how to develop BMCEs and by identifying possible manifestations of the identified elements.

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## INTRODUCTION

The harmful effects of our current economic system have become increasingly visible in the economic, social and environmental sphere, often reinforcing one another, and forewarn a bleak future. Climate change, for instance, as a result of greenhouse gas emissions is transforming drylands into dessert, has the potential of changing sea levels in such a way that coastal cities will be flooded, and threatens current agricultural areas. Acidification has altered the very nature of large parcels of fertile soil, perhaps even up to a point where restoration is no longer possible (WCED, 1987). Waste, and the processing of it, further exacerbates these issues as it toxifies the planet. India alone accounts for 62 million tons of waste on a daily basis, 80% of which is being dumped in landfills (Mallapur, 2014). These environmental problems cannot be separated from economic development, as they are intertwined (WCED, 1987). Based on the above examples it is quite conceivable how the environmental degradation can negatively affect economic development, while most of the degradation is a direct cause of economic development itself. Therefore, our current way of life has to be addressed.

One of the main causes of the current planetary state and focal point of change is the paradigm of a linear economy. A linear economy is based on the sequence of take-make-dispose, i.e. virgin resources are used as an input for production with the purpose of creating value for the customer, who eventually disposes of the product, resulting in waste (Goyal, Esposito & Kapoor 2016; Kopnina, 2014; Linder & Williander, 2017). This linear flow of materials is nurtured by the concept of planned obsolescence which was first introduced by Bernard London (1932). Planned obsolescence refers to the intended aim of accelerating the end-of-life of products and consequently the replacement of those products (Jonker, Stegeman & Faber, 2018). Companies are stimulated to do so, as long as success is solely measured by the profits made from selling products. To further exacerbate the situation, consumers have become consumption driven, causing them to buy products even before the planned point of obsolescence. Moreover, politicians have vigorously advocated increased consumption with the justification that it will alleviate states of economic contraction, when such are present. The linear economy, however, does not take into account the finite nature of virgin resources and the effect that unrestrained consumption and production have on the environment and society. Consequently, many of the unsustainability issues the world currently faces have been attributed to this linear thinking.

Recently, the concept of the Circular Economy (CE) has gained significant traction among scholars, business practitioners and policy makers as a possible avenue to help relieve the persisting economic, environmental and social issues. The European Union, for example, has devoted a considerable amount of resources to stimulate business practitioners to adjust their businesses in alignment with CE notions (European Commission, 2015). Implementing a CE implies a transition towards 'an industrial system that is restorative or regenerative by intention and design' (EMF, 2013, p. 7). It proposes a systemic change in which resource loops are closed through redesign of production and consumption systems (Yuan, Bi & Moriguichi, 2006). The redesign achieves this by addressing resource inefficiencies, i.e. focusing on the added value in resources, materials and products that is normally lost during the sequential stages of production and consumption. CE is therefore centered on a logic of preserving value through various activities that prevent, extend or recover previously lost value (Merli, Preziosi, & Acampora, 2018; Nußholz, 2017), thereby eliminating the concept of waste (Geisendorf & Pietrulla, 2017) whilst ensuring maximum utility of products (Kraaijenhagen, van Oppen & Bocken, 2016). Consequently, CE has the potential to create economic, social and environmental value (Korhonen, Honkasalo, & Seppäla, 2018) by introducing a restorative industrial system that alleviates the persisting unsustainability issues posed by the linear economy.

According to Bonciu (2014) several aspects are vital in the transition towards a more CE: (1) the redesign of products, services and processes; (2) A shift in how business is conducted towards preserving value through activities that address resource inefficiencies. This will require considerable collaboration between businesses, and between businesses and consumers; (3) A legislative and institutional framework that supports circular notions; (4) The conceptualization of indicators that enable the measuring of circularity and the monitoring of a more CE. Hence, both governments and businesses are considered to be two key actors in enabling the transition towards a more CE (Lewandowski, 2016; Jonker, Stegeman & Faber, 2018; European Commission, 2015). The former through policy that will put into place the necessary legislative and institutional framework and the latter through reconceptualization of their products and processes, geared towards addressing resource inefficiencies.

Business models offer an essential perspective into the manner in which businesses can reconceptualize their products and processes, in line with circular notions, and provide insights into its profitability (Geisendorf & Pietrulla, 2017; Bakker, Hollander, van Hinte & Zijlstra,

2014; Lieder, Asif & Rashid, 2017). A business model 'describes the design or architecture of the value creation, delivery, and capture mechanisms employed' (Teece, 2010, p. 191). It is the logic of how a business transforms resources and capabilities into value (Osterwalder & Pigneur, 2013; Teece, 2010). In conventional business models, this logic conveys a linear flow of materials; value is created for the customer by transforming resources into a service or product that is delivered to the customer and profit is made, regardless of the environmental or social cost. A CE, however, proposes a shift in how business is conducted as it aims to introduce an industrial system that is based on resource loops, and is no longer solely dependent on extraction of virgin resources, but rather focused on preserving value. Businesses have the ability to do so as they can create, deliver and capture value in a manner that reduces the excessive need for resources and continuous production of waste, by addressing the resource inefficiencies present within current production and consumption systems. Business practitioners can, therefore, enable the transition towards a more CE through business model innovation, i.e. the conceptualization of new ways of creating and capturing value (McGrath, 2010). Several scholars have already adopted this particular perspective of business models for circular economy (BMCEs) to further our understanding of the concept of CE and to provide stimulus for the transition. The extant literature on BMCEs, however, is very divergent, ranging from the enablers and barriers of BMCEs (Linder & Williander, 2017) to the assessment of such business models (Manninen et al., 2018).

In order to understand how businesses can help in the transition towards a more CE, a deeper understanding is needed of how to create BMCEs. Based on the previously mentioned research, several basic forms of BMCEs have been found either conceptually or empirically, but they are limited in scope and are often static in nature. Some focus on how to innovate business models to capture value in circular material chains by posing questions that need to be answered to accomplish such innovation (Roos, 2014). Others have developed a typology or taxonomy of BMCEs based on depth of adoption of CE notions (Urbinati, Chiaroni & Chiesa, 2017) or product design strategies (Bocken et al., 2016). Even those that seem to look more thoroughly at the different building blocks of BMCEs, miss empirical and theoretical integration (Lacy & Rutqvist, 2015) or use conventional business model thinking (Lewandoswki, 2016; Antikainen & Valkokari, 2016). Few of these researchers have looked at how the characteristics of CE affect the manner in which business create, deliver and capture value. Moreover, few researchers have focused on the development of a framework that elaborates on the components for BMCE innovation and resultant types of BMCEs from a

dynamic perspective, as transitioning towards a more CE will surely impact the business environment. This lack of understanding of the basic elements that lead to the development of BMCEs, indicates a research gap that needs further examination. This thesis, therefore, aims to conceptualize a theoretical framework, based on dynamic capabilities theory, that elaborates on the elements that lead to the creation of BMCEs. It does so by focusing on the following research question: *What are the key elements for developing business models for a circular economy?* To answer this question a deeper understanding of several aspects is needed, thus resulting in sub-questions that serve as a guide in this research:

- *What is circular economy?*
- *What is a business model?*
- *What is a business model for a circular economy?*
- *How are business models developed and what role does strategy have in the process?*
- *How are business models for a circular economy developed?*

As this research aims at conceptualizing a theoretical framework that elaborates on key elements underlying BMCE-development, it will be relevant to both academics and business practitioners. Firstly, it reduces the complex nature of developing BMCEs into a set of understandable and simplified elements, making it easier to understand and explain how BMCEs can be developed in a changing business environment. As a result, it will add to the current body of knowledge on CE and how to create BMCEs by offering clarity and possible future convergence on the subject. Secondly, the framework might be used prescriptively for developing BMCEs. The latter purpose of the framework will provide business practitioners with the necessary tools to innovate their business model in line with CE notions. As such, this research might help further the transition towards a future sustainable CE.

To achieve the purposes of this research it is set up as follows. In chapter 2, a literature review of the current research on CE is conducted in order to derive a definition of the concept of a CE. Furthermore, the characteristics that underlie the CE are identified, along with the key actors behind the transition towards a more CE. Subsequently, chapter 3 will discuss how businesses can contribute towards a more CE by introducing a new breed of business models also known as BMCEs. It will discuss the business model concept and the impact of the characteristics of CE on the configuration of business models. Furthermore, it will elaborate on the link between strategy and business models, the role that dynamic capabilities play in this

regard, and how BMCEs can be developed. Chapter 4 will consist of the discussion, thus elaborating on the insights the research has provided and how this relates to previous research. This is followed by some concluding remarks, the limitations of the above research and suggestions for future research.

## 2 CIRCULAR ECONOMY

The recent popularity of the CE concept might be perceived as an indication that CE notions are relatively new, however, notions of closing resource loops in combination with system thinking in economic systems have been around for some time. The earliest conception of CE itself has been traced back to Boulding in the 1960s (Geisendorf & Pietrulla, 2017; Ghisellini, Cialani & Ulgiati, 2016; Reike, Vermeulen & Witjes, 2017). The author argues that a necessity exists for circular systems in our future economy in order to sustain life on Earth and does so by portraying Earth as a spaceship with limited resources (Boulding, 1966). These initial thoughts on CE have, since then, been enhanced and refined as many scientific fields have developed other related and overlapping concepts such as industrial ecology (Frosch & Gallopoulos, 1989; Lifset & Graedel, 2001), performance economy (Stahel, 1994), regenerative design (Lyle, 1996), biomimicry (Benyus, 1997), Cradle-to-Cradle (McDonough & Braungart, 2002), blue economy (Pauli, 2010), natural capitalism (Hawken, Lovins & Lovins, 2013), among others (Geisendorf & Pietrulla, 2017; Korhonen, Honkasalo & Seppälä, 2018). The multitude of similar yet distinct concepts has consequently generated various perspectives in regard to the concept CE, even more so due to the different backgrounds of the stakeholders that employ the concept (Geisendorf & Pietrulla, 2017; Ghisellini, Cialani & Ulgiati, 2016; Kirchherr, Reike & Hekkert, 2017; Murray, Skene & Haynes, 2017). For example, Ragossnig and Schneider (2019) place large emphasis on waste management and, more specifically, the need for increased recycling as a method to close material loops. The increase in recycling rate would address the issue of environmental degradation that results from economic growth. Even though recycling is one of the strategies to close resource loops and preserve value, other methods exist that retain value to a larger degree. CE is much more than recycling and addressing waste. Therefore, closer examination of the CE is needed in order to determine what it actually entails and, more specifically, how CE can be defined, what basic characteristics can be synthesized from the extant literature and who will be the key actors in enabling the transition.

### 2.1 How to define Circular Economy

The abundance in perspectives in regard to the CE-concept is reflected in the absence of a universal definition for this concept. A large variety in definitions can be discovered, due

to the fact that they are related to different schools of thoughts and formulated with various purposes in mind. Kircher, Reike and Hekkert (2017), for example, analyze 114 different definitions of CE on similarities and differences. Hence, a clear definition of CE is needed, so that no ambiguity exists in relation to the concept and its purpose.

The most cited and used definition, with some notable variations (Ghissellini, Cialani & Ulgiati, 2016; Geissdoerfer, Savaget, Bocken & Hultink, 2017), is that of the Ellen MacArthur Foundation (2013, p. 7):

> A circular economy is an industrial system that is restorative or regenerative by intention and design. It replaces the 'end-of-life' concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through superior design of materials, products, systems, and, within this, business models.

The inclusion of business models in this definition points towards the important role that businesses can play in the transition towards a more CE, however, business models are important enablers (Planing, 2015), they are not constitutive to CE. Moreover, the definition does not explicitly mention the design of circular resource loops, even though this lies at the core of a CE. The closing of resource loops by focusing on preservation of value is how CE aims to ensure a sustainable future (Jonker, Stegeman & Faber, 2018). Although this circularity is most likely implied with 'restorative or regenerative', the particular phrasing remains slightly generic and vague, leaving some ambiguity. Furthermore, strong emphasis is placed on the 'end-of-life' concept and waste. CE, however, preserves value by addressing resource inefficiencies at multiple stages in the life cycle of products and processes, and not merely at the end. Lastly, the definition seems to limit elimination of the use of toxic chemicals where it impairs reuse. Toxic chemicals should be avoided in general in a CE, because they not only impair reuse, but also hamper the regeneration and restoration of earth's natural resources if not dealt with properly.

Geisendorf and Pietrulla (2017, p. 9) incorporate value preservation more prominently in their definition of a CE: "In a circular economy, the value of products and materials is maintained, waste is avoided, and resources are kept within the economy when a product has reached the end of its life". As such, the definition takes into account a wider sense of value preservation, which lies at the center of CE. Again, however, the closing of resource loops is

not explicitly mentioned. Moreover, maintaining value of products and materials, eliminating waste and keeping resources in the economy will require close collaboration between various stakeholders (Kraaijenhagen, van Oppen & Bocken, 2016; Korhonen, Honkasalo, & Seppäla, 2018). A business will most likely not possess all the required resources and capabilities to address the resource inefficiencies that occur during the multiple stages of a product's or process' lifecycle. Hence, the importance of collaboration in a CE should be highlighted by including it in its definition. Geisendorf and Pietrulla also do not include the creation of economic, social and environmental value. The inclusion of the purpose of CE in its definition is of importance since various stakeholders employ the concept for different purposes, often focusing on the beneficial economic or environmental potential of CE (Kirchherr, Reike and Hekkert, 2017). As CE aims to create a sustainable way of life, all three types of value are strived for and not just one or two. This should be apparent from the definition of CE.

A more elaborate and comprehensive definition is provided by Kirchherr, Reike and Hekkert (2017, p. 229):

> [CE is] an economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes. It operates at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, thus simultaneously creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations. It is enabled by novel business models and responsible consumers.

Most noteworthy, compared to the previous definitions, is the inclusion of multidimensional value creation, i.e. economic, environmental and social value. Many definitions do not include the social aspect, even though this is of equal importance for sustainable development (Kirchherr, Reike & Hekkert, 2017). It also includes the notion of value preservation by mentioning a few value retention options, also known as R-imperatives (Reike, Vermeulen & Witje, 2017). These R-imperatives denote manners in which the added value in products and processes can be preserved, i.e. activities that prevent, extend or recover value. By including a few R-imperatives, however, it remains limited in scope as many more exists. Hence, focusing on the general logic of value preservation would be more suited than restricting it to some of the R-imperatives. Lastly, the definition mentions two enablers, i.e. novel business models and responsible consumers, yet it does not include government policy as an important enabler.

Governmental organizations also have a pivotal role in the transition towards a CE as they can entice consumers and businesses to preserve value through implementation of certain policies (Planing, 2015; Esposito, Tse & Soufani, 2017).

Many of the current definitions therefore highlight important elements of CE, but none actually incorporate all of them. Few authors focus on collaboration, with the exclusion of Kraaijenhagen, van Oppen and Bocken (2016), and only some mention the purpose of CE. The definition of CE, and how it is understood in this research, should therefore emphasize these important elements, i.e. the logic of preserving value of CE, how preserving value through resource efficiency aims to close resource loops, which in turn requires close collaboration, and the purpose of creating multidimensional value. Based on these notions and previously formulated definitions, CE is defined as follows: A Circular Economy is a system predicated upon a value preservation logic, which revolves around circular resource loops established through close collaboration of various stakeholders, that results in the creation of economic, environmental and social value.

## 2.2 Characteristics of CE

At its core, the CE is centered around preserving value by addressing resource inefficiencies and thereby eliminating the concept of waste. It does so by creating an industrial system that mimics a natural ecosystem. A natural ecosystem does not include the concept of waste but rather regenerates and restores by continuous reintroduction of resources into the biosphere. CE mimics the natural ecosystem by creating resource loops, thus enabling the earth's ecosystem to regenerate and restore despite the extraction of virgin resources. These resource loops are achieved through redesign of production and consumption systems that address current resource inefficiencies and offer the possibility of cycling products, materials and resources multiple times. Besides the creation of resource loops and a logic of preserving value, several other characteristics that map out what the CE entails can be discerned from extant literature. Four characteristics can be identified, namely the closing of resource loops, a value preservation logic, the creation of multidimensional value and collaboration.

### *2.2.1 Characteristic 1: Closing loops*

CE focuses on the organization of circular closed-loop systems with the intent to preserve and restore value throughout the value chain. The first characteristic of CE is the redesign of the linear open-ended flow of materials into closed loops, ensuring that these materials, whether they are virgin resources, components or products, do not become waste but rather preserve their value through different modes that prevent, extend or recover value (Jonker, Stegeman & Faber, 2018; Yuan, Bi & Moriguichi, 2006; Esposito, Tse & Soufani, 2017; Stahel, 2016; EMF, 2014). This shows great similarity with the concepts of Cradle-to-Cradle and Industrial Ecology, that attempt to mimic natural ecosystems, with the focal points of change being products and industrial systems, respectively (McDonough & Braungart, 2002; Erkman, 1997). Kopnina (2014) vividly illustrates this basic tenant through the use of the metaphor of a cherry tree, where the waste produced by the tree, such as "leaves, bark, and cherries", fulfills a purpose by providing nutrition for "birds, insects and the soil". In effect, the closed-loops systems proposed by CE eliminate the notion of waste, as post-use materials are regarded as valuable resources for subsequent economic activity, implying that materials and resources are no longer perceived as temporary, but as part of a continuum (Bonciu, 2014; Jonker, Stegeman & Faber, 2018; EMF, 2014).

CE does not only focus on post-use materials, but also involves introducing circularity by addressing other resource inefficiencies through "narrowing resource loops" and "slowing resource loops" (Bocken, de Pauw, Bakker & van der Grinten, 2016). Narrowing resource loops aims at minimizing the amount of resources used per product. On its own, this would not result into circularity per se, as it does not alter the linear flow of materials. Hence, what initially might be perceived as beneficial can in reality have detrimental effects if it leads to increased production as a result of the accrual of cost reduction (Bocken et al., 2016). This is also called the rebound effect loops (Zink & Geyer, 2017), and it should be recognized when narrowing resource. Slowing resource loops, on the other hand, has the ambition to lengthen the lifecycle of products by using product design and activities that prevent, extend or recover value, such as repair, remanufacturing or refurbishment (Bocken et al., 2016). Taken together, introducing circularity implies eliminating waste through the closing of resource loops, moderating the depletion of natural resources through narrowing of resource loops, and intensifying the value and functionality of resources through the slowing of resource loops.

Important to acknowledge is the fact that a true perpetual cycle is not feasible; production will always result in some leakage of energy and the value of continuously used resources will eventually dilute (Jonker, Stegeman & Faber, 2018; Bonciu, 2014). The purpose of introducing circularity, as such, is to ensure that this loss is minimal. As many businesses tend to focus on a linear open-ended flow of materials, a drastic shift in how business is conducted will be required to close resource loops and effectively address the resource inefficiencies posed by linear thinking. Not only does this entail the acquisition or development of the right resources and capabilities, it will also require close collaboration with consumers and governments (Rizos et al., 2016), as they too offer certain resources and capabilities that are needed to close resource loops. Moreover, consumers will have to play their part by, for example, ensuring that products are returned and thus effectively closing the resource loop.

### *2.2.2 Characteristic 2: Value preservation logic*

Introducing circularity within the economy through closed-loop systems is guided by the underlying logic of value preservation and restoration, the second characteristic of CE. Simply put, CE focuses on maximizing the utility and value of resources, in whatever shape they may be encountered, both in time and intensity (Jonker, Stegeman & Faber, 2018; Korhonen, Honksalo & Seppälä, 2018). This would address the strain that is put on the earth's ability to regenerate and restore as the extraction of virgin resources is reduced and generation of waste is avoided. In general, this logic of value preservation should be central to all stakeholders and their activities. Consumers can address their level of consumption and can help businesses in closing resource loops. Governments can entice businesses to adopt a value preservation logic through formulation of tax policies that reward businesses that maximize the utility and value of resources. Businesses no longer focus on maximizing output for profit, but rather redesign their products and processes according to this logic (Jonker, Stegeman & Faber, 2018). This redesign focusses on addressing current resource inefficiencies and creates value as a result.

A frequently used method for operationalizing the logic of value preservation is that of the R-imperatives. The R-imperatives are activities that all economic actors can apply in order to prevent, extend or recover the value of resources and can be encountered throughout the literature. Most often different combinations of R-imperatives are formulated within the

definitions of CE (e.g. EMF, 2015; Kirchherr, Reike & Hekkert, 2017; Geissdoerfer et al., 2017; Geisendorf & Pietrulla, 2017). The abundant use of R-imperatives, sometimes also referred to as resource-life extending strategies (Blomsma & Brennan, 2017), value retention options (Reike, Vermeulen & Witjes, 2017) or end-of-life strategies (Sihvonen & Ritola, 2015), has obscured their comprehensibility as they often lack a clear definition or supported hierarchy (Reike, Vermeulen & Witjes, 2017). Both Reike, Vermeulen and Witjes (2017) and Sihvonen and Ritola (2015) address this by formulating a taxonomy of R-imperatives based on a comparative study.

Shivonen and Ritola (2015) use the four R-imperatives reduce, reuse, recycle and recover, prioritizing them based on the moment of application within the product's lifecycle. Unfortunately, their definition of the activity 'reduce' remains generic and vague, thus not alleviating the opacity in this regard. Furthermore, distinguishing between using components significantly different from their intended function (resynthesize) and using a whole product for another purpose then originally intended (repurpose) provides some unnecessary nuances. Placing them under the same category, i.e. repurpose, would be more suited as both activities aim at altering the original purpose, whether it is a product or component. Reike, Vermeulen and Witjes (2017) provide a more extensive and well-defined taxonomy of 10 R-imperatives (Table 1), acknowledging the role consumers can play. More specifically, the R-imperatives are placed in a hierarchy of short loops, medium long loops and long loops. Short loops involve materials and products staying close to their function and user (refuse, reduce, reuse, repair), medium long loops entail upgraded products thus requiring involvement of producers (refurbish, remanufacture, repurpose), and long loops involve altering the original function of products through activities that strongly relate to waste-management (recycle, recover and re-mine).

The importance of these R-imperatives is that they provide an operationalization of the different possible ways in which value can be preserved by offering activities that prevent, extend or recover value that is normally lost as a result of current resource inefficiencies. Organizations can choose to focus on a single activity to preserve value, but most likely multiple activities will be in place, working in concert with each other (Blomsma, & Brennan, 2017). As such, it can set the foundation for which resources and capabilities are needed in order to preserve value.

**Table 1.** Value retention options (derived from Reike, Vermeulen & Witjes, 2017)

| Loop & R-imperative | Definition | Function | Main actors involved |
|---|---|---|---|
| Short loop | | | |
| - *Refuse* | Refrain from buying or using specific hazardous materials and avoiding waste or extraction of virgin resources through design of production processes | N.A. | Consumer & producer |
| - *Reduce* | Use products less and minimize extraction of virgin resources for production | N.A. | Consumer & producer |
| - *Reuse* | Reusing product for its intended purpose, such as buying second-hand | Original | Consumer |
| - *Repair* | Extending product's life-cycle by restoring it to its original function | Original | Consumer & producer |
| Medium long loop | | | |
| - *Refurbish* | Repair and replacement of components of product to bring it up to date while overal structure stays intact | Original, upgraded | Producer |
| - *Remanufacture* | Disassembling of full structure of product and replacing or repairing of components where needed to bring product to its original state, like new | Original, upgraded | Producer |
| - *Repurpose* | Reuse of products or components for a different function than originally intended | New | Producers |
| Long loop | | | |
| - *Recycle* | Processing of post-consumer products or post-producer waste streams into secondary materials | New | Waste processor |
| - *Recover* | Capturing of energy within waste | New | Waste processor/energy company |
| - *Re-mine* | Selective retrievel of materials and parts from landfills | New | Waste processor |

#### 2.2.2.1 Servitization

The pivotal role of the value preservation logic and intensification of functionality of products will change the way business is done, leading businesses towards offerings services instead of ownership of products. This is process is also known as servitization, and although it is not a characteristic of CE, it is complementary to the notion of value preservation. Its footing can be found in the concept of product-service system (Mont, 2002; Tukker, 2004; Urbinati, Chiaroni & Chiesa, 2017). It will result in businesses retaining ownership of their products, becoming service providers and thus taking a larger responsibility for their products (Jonker, Stegeman & Faber, 2018; Urbinati, Chiaroni & Chiesa, 2017). This is logical, as consumers are no longer interested in owning products, but rather prefer a certain performance

or result (Planing, 2015). A product-service system (PSS) can be defined as "a system of products, services, supporting networks and infrastructure that is designed to be: competitive, satisfy customer needs and have a lower environmental impact than traditional business models" (Mont, 2002, p. 239). Within PSS a distinction can be made between three categories (Tukker, 2004; Planing, 2015): product-oriented services, use-oriented services and result-oriented services. Sales of products are still central within the product-oriented services, but they are accompanied by additional services. In use-oriented services, products still play a role, but selling those products is no longer the key objective. Businesses retain ownership and provide consumers with access to the product, possibly involving the sharing of one product among multiple consumers. In contrast to the first two categories, the result-oriented services do not involve a specific product in principle, but a specific result that is agreed upon between a client and the business. This latter category has been deemed the most effective vehicle for CE notions (Tukker, 2015; Bressanelli, Perona & Saccani, 2017).

In general, a PSS will play an important role in the CE and in how business models are configured. It holds implications for the relation between consumers and businesses, incentivizes businesses to take more responsibility for the product throughout its lifecycle, and alters the way revenue is generated. Consumers will buy solutions through services rather than products. This will impact consumption as functionality of products is intensified through shared use, possibly lowering the number of products needed and thus lowering the strain on the environment (Mont, 2002). The changed relationship between consumer and business will also alter how revenue is generated, as it will no longer involve a pay-per-product revenue model. Revenue will be generated based on a pay-per-use model, pay-per-result model, or through rental or leasing agreements (Tukker, 2004; Urbinati, Chiaroni & Chiesa, 2017). Furthermore, producers retain a larger responsibility for their product and its related risks as they do not relinquish ownership (Stahel, 2016; Mont, 2002). This will incentivize them to focus on ensuring maximum utility of their products, rather than maximizing sales (Bressanelli, Perona & Saccani, 2017). Businesses are encouraged to design durable products and to employ other activities that preserve value, while simultaneously aiming at reduction of the amount of resources and energy needed (Urbinati, Chiaroni & Chiesa, 2017; Mont, 2002; Bressanelli, Perona & Saccani, 2017). Hence, servitization will have a large impact on how organizations create, deliver and capture value. More importantly, it will engender the value preservation logic that underlines CE, thus lowering the impact of consumption and production on the environment.

### *2.2.3 Characteristic 3: Creating multidimensional value*

Improving circularity within our economy, and the underlying logic of value preservation, is aimed at the creation of multidimensional value. This creation of social, economic and environmental value is the third characteristic of CE. Contrary to this characteristic, however, emphasis has often been placed on one or two dimensions, namely environmental and economic value, as multiple stakeholders employ the concept of CE for different purposes (Kirchherr, Reike & Hekkert, 2017; Geisendorf & Pietrulla, 2017; Lieder, Asif & Rashid, 2017). Bocken et al. (2016), for example, place significant emphasis on the environmental value, diluting from the potential economic and social value that can be created. A truly sustainable CE focuses on all three dimensions of value creation (Jonker, Stegeman & Faber, 2018; Kirchherr, Reike & Hekkert, 2017; Geissdoerfer et al., 2017; Korhonen, Honkasalo & Seppälä, 2018). A circular system would reduce the utilization of virgin resources and output of emissions, lowering cost in energy, resources and emissions. This not only provides environmental but also economic value. Moreover, intensification of functionality of products and the logic of value preservation provide new opportunities for businesses and could also lead to increased employment, thus creating social, economic and environmental value. Figure 1 illustratively summarizes how this multidimensional value is created, as the win-win-win potential of CE.

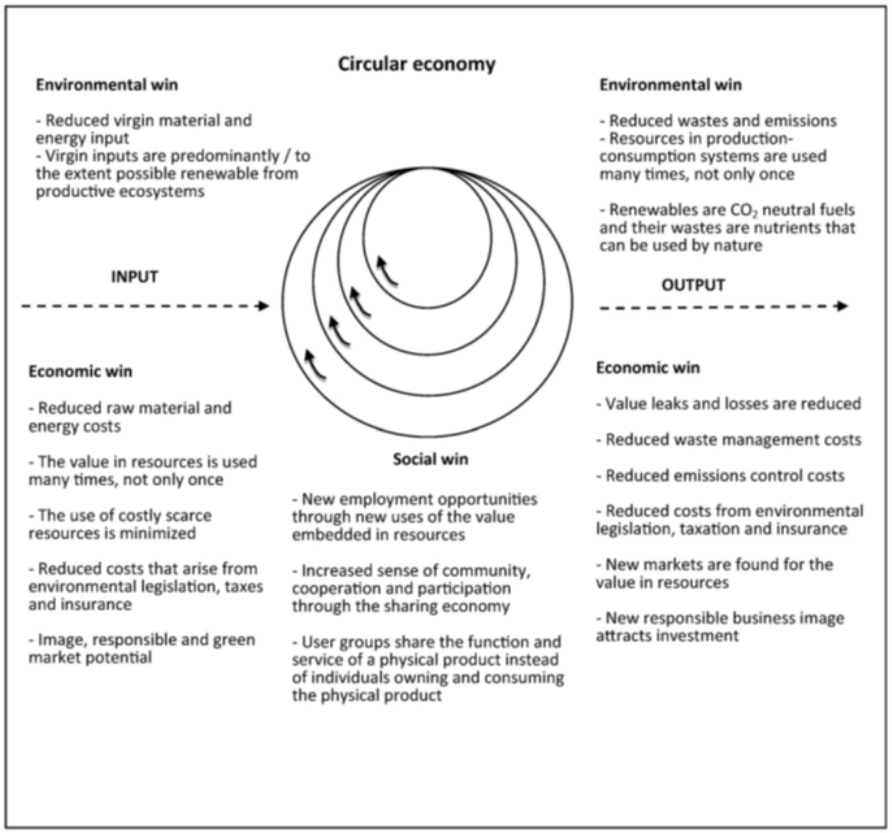


**Fig. 1.** The win-win-win potential of circular economy (Korhonen, Honkasalo & Seppälä, 2018)

### *2.2.4 Characteristic 4: Collaboration*

To achieve the creation of multidimensional value, closing of loops, and ensure that maximum value of resources is preserved, close collaboration is necessary. This is the fourth characteristic of CE. Collaboration involves close-knit relations among interdependent organizations with the aim of organizing patterns of activities and the sharing of knowledge (Cuijpers, Guenter & Hussinger, 2011; Witjes & Lozano, 2016). It allows for the exchange of various perspectives that can contribute toward innovative solutions, help increase efficiency, and so on (Witjes & Lozano, 2016; Fadeeva, 2004). These benefits and the collaboration itself are crucial for a CE, as no business or individual has the resources or capabilities to ensure circularity without the aid of other parties (Jonker, Stegeman & Faber, 2018). Close collaboration is necessary throughout the value chain, thus fully integrating the interdependent activities of all economic actors (Kraaijenhagen, van Oppen & Bocken, 2016; Jonker, Stegeman & Faber, 2018; Bonciu, 2014). As Bonciu (2014, p. 86) so accurately states: "a chain is as strong as the weakest link". Suppliers should therefore cooperate closely with their customer firms, firms should work closely with consumers, and vice versa. The transactional nature of the previous relations within the value chain will change towards partnerships and collaborative networks where all actors take part in the process of creating multidimensional value. Of course, this type of close collaboration can also give rise to tensions, as debates will ensue in regard to those that benefit from the created value without sharing in the costs, how the created value should be divided over the participants, and other related issues or conflicts (Chilosi, 2003). Collaboration is therefore an important characteristic of a CE, but the manner in which to shape this is a hurdle that still has to be addressed.

## 2.3 Key actors

Consumers, businesses, governments and institutions alike play large roles in the pursuit for a circular system (European Commission, 2015; Guo et al., 2017; Jonker, Stegeman & Faber, 2018; Kopnina, 2014; Planing, 2015). They can possess, develop or acquire the resources and capabilities to either foster or implement the CE characteristics in their respective activities.

Consumers are both able to hinder and advance circularity in our economy. People have, through their conscious behavior, choices and lifestyles, contributed their share of damage to

the environment (Connolly & Prothero, 2003; Dauvergne, 2008; Heiskanen & Pantzar, 1997). The motivation for consumption, despite such consequences, lies within the idealization of consumption itself (Kilbourne, McDonagh & Prothero, 1997). It has become central to our lives through its function as a tool for self-identification, self-gratification and as a main leisure activity (Planing, 2015; Ratneshwar, Mick & Huffman, 2000; Varey, 2010). In this consumer society, products are not valued based on their utility but rather their symbolic value (Pereira Heath & Chatzidakis, 2012). Therefore, a shift in the consumer's mindset towards a post-materialistic lifestyle is necessary, i.e. one where goods are valued for their use rather than some intrinsic symbolic value. This is not an easy feat, as many consumers tend to lack awareness in regard to the effect of their consumption on the environment or view it as a responsibility of those that provide the products (Connolly & Prothero, 2003; Heiskanen & Pantzar, 1997). Those that might acknowledge this effect tend to lack conviction to address their behavior, as one individual's actions are perceived as minor to the insurmountable environmental degradation. The accumulation of such actions, however, would have a noteworthy impact (Dauvergne, 2008). People can consume less (Reike, Vermeulen & Witjes, 2017), use products longer, actively take part in a share-economy, recycle (Jonker, Stegeman & Faber, 2018; Korhonen, Honkasalo & Seppälä, 2018), and help in the diffusion of innovations and technology relevant for the CE rather than hindering it (Kopnina, 2014; Planing, 2015). Consumers, therefore, have the capacity to be a key enabling actor for the transition towards a more CE.

Notwithstanding the responsibility and vital role consumers can play, emphasizing consumer choice alone detracts from the important role that governments and institutions alike can play. Even more so, when taking into account the fact that consumers are less powerful in enacting change (Hobson, 2002). Governments and other authorities, whether local, regional or supranational wield the power to foster this change towards a more CE through their role as consumer and policy maker. As a consumer, a large share of the overall demand for goods and services can be attributed to public procurement (Uyurra & Flanagan, 2010). Public procurement entails "the acquisition of goods and service by governments or public sector organizations" (Uyurra et al., 2014, p. 632), and is most often aimed at ensuring that public organizations hold that what is required to function effectively. Governments and such can further a CE and its characteristics through this economic activity, i.e. within their role as a consumer. They can do so by addressing their levels of consumption and, in the process of public procurement, also spur innovation related to CE (Witjes & Lozano, 2016).

Apart from public procurement, policy and related institutional regimes can function as enablers for the transition towards a more CE (Esposito, Tse & Soufani, 2017; EMF, 2015; European Commission, 2015; de Jesus & Mendonça, 2018; Moreau, Sahakian, van Griethuysen & Vuille, 2017; Stahel, 2016). Governments have, in this sense, many resources and capabilities at their disposal to create an environment that is conducive to a CE. Taxes, fiscal policy, subsidies (Esposito, Tse & Soufani, 2017; EMF, 2015; Moreau et al., 2017), infrastructure, R&D support (Jesus & Mendonça, 2018), and the increase of social awareness (Guo et al., 2017) can all serve as modes of operandi. A possibility, for example, would be to levy taxes on the use of (non-renewable) resources rather than labor, motivating businesses to reduce their consumption of resources (Stahel, 2016; Moreau et al., 2017). In conclusion, there is much to gain from government involvement in the transition towards a CE.

Businesses possess similar influence as governments to enact significant change and will therefore play a crucial part in introducing more circularity into our economy. It can even be argued that they will have to take the lead as the whole concept of CE is predicated on the assumption of closing resource loops through, among others, design of products, production processes and servitization (Lieder, Asif & Rashid, 2017; Murray, Skene & Haynes, 2017; Rizos et al., 2016). This holds even more true when taken into account that consumption and production can be seen as "two sides of the same coin" (Pereira Heath & Chatzidakis, 2012, p. 658). Through, for example, design for recycling, remanufacturing, reuse, disassembly, and environment (Urbinati, Chiaroni & Chiesa, 2017), businesses can ensure that fewer resources are extracted for the production of a product, that the lifecycle of products are significantly prolonged, and that subsequent recovery of resources can be achieved more easily (Bonciu, 2014; Jonker, Stegeman & Faber, 2018). Similarly, production processes itself can be designed in such a way that less resources and energy are used, and material cycles are closed (European Commission, 2015; Jonker, Stegeman & Faber, 2018; Urbinati, Chiaroni & Chiesa, 2017). Hence, businesses have the ability to decouple economic growth and production from a dependence on natural resources by adopting a value preservation logic (Esposito, Tse & Soufani, 2017), creating not only superior economic value but also social and environmental value (Korhonen, Honkasalo & Seppälä, 2018; Manninen et al., 2018). Moreover, businesses can attain (or maintain) a competitive advantage by employing circular thinking (Freudenreich, Schaltegger & Lüdeke-Freund, 2019). They will most likely have to alter their resource base, develop the necessary capabilities and collaborate with other businesses or consumers in order to accomplish these changes, and thus preserve value by addressing current resource

inefficiencies. How a business specifically intends to address these resource inefficiencies, and which resources and capabilities will allow them to do so, will differ as there are many ways in which a business can preserve value. A business model can provide the appropriate tool to represent and achieve this specific chosen path.

## 3 BUSINESS MODELS AND THE CIRCULAR ECONOMY

The concept of business models has predominantly been built on the paradigm of a linear economy, i.e. linear business models. A linear business model is one were virgin resources enter the value chain and further value is added to products and services throughout the value chain, for example, by user behavior and manufacturing (Linder & Williander, 2017). The central focus tends to be on creating economic value, as success is measured by the economic performance of a business (Upward and Jones, 2016; Manninen et al., 2018). The result is that these business models are organization-centric of nature, imbued with transactional thinking, and aimed at maximum volume. This is most often accompanied with large social and environmental costs, that are not taken into account by businesses or for which no responsibility is taken (Jonker, Stegeman & Faber, 2018). Moreover, existing infrastructure and established patterns of doing business provide incentives to uphold such linear thinking (EC, 2014; EMF, 2014). These linear business models clearly do not align with the characteristics of CE. It is apparent that a transition towards a more CE will require significant adaptation of the manner in which current and future businesses create, deliver and capture value. Business models should be predicated on the logic of value preservation and focus on addressing current resource inefficiencies, which will require new resources and capabilities. This offers a new category of business models specifically honed towards the characteristics of a CE, i.e. business models for circular economy (BMCE).

Current literature on BMCE has largely focused on the content of the components of BMCEs. In doing so, a static view of business models is taken while the market is dynamic, requiring businesses to continuously adapt their business models to the changing environment (Teece, 2010). For example, further developments in technology will allow for subsequent adaptations to how business is done and ensure that resource inefficiencies can be addressed more effectively. It will be argued that the dynamic capabilities theory offers a perspective on the process of how businesses can acquire the necessary capabilities and resources to compose BMCE, i.e. specific resource configurations, in order to enable the transition towards a CE. By using a dynamic view, it acknowledges that although business models represent a certain specific configuration of resources and capabilities in time (DaSilva & Trkman, 2014), continuous evolvement of that business model and future business models are necessary as possibilities to address resource inefficiencies emerge, and the competitive landscapes change. Moreover, the limitations in possible business models, as a result of path dependency, will

require businesses to closely collaborate with other stakeholders as those stakeholders will possess resources and capabilities that enable the focal firm to close their resource loops. Lastly, it will be argued that strategy, as a desired future state of the business, will guide the configuration of BMCE, both directly as indirectly through the dynamic capabilities of a business.

### 3.1 Business Models

The concept of a business model is used by a multitude of academics and practitioners, resulting in various definitions, meanings and components. The many schools of thought have elaborated on their view of the nature of business models, without a consensus being reached (Morris et al., 2005). Some authors view business models as a tool for marketing new technology (Mason and Spring, 2011), while others view them as the implementation of a strategy (Casadesus-Masanell and Ricart, 2010). Moreover, it is not always apparent where the distinction lies between the concept of a business model and other related concepts, such as strategy or a revenue model. Hence, some ambiguity exists concerning this frequently used concept.

Despite the lack of clarity in relation to the meaning of business models, current literature appears to converge on three aspects. Firstly, business models can serve as a useful unit of analysis for both practitioners and academics (Zott and Amit, 2007; Andreini & Bettinelli, 2017). Secondly, business models provide a simplified representation of how a business operates (Osterwalder et al., 2005; Zott et al., 2011; Andreini & Bettinelli, 2017). It offers a description or visualization of how a set of decisions, resources, activities, relations and/or processes are linked together in order to create value. Thirdly, value is a recurring element connected to B business models (Baden-Fuller and Morgan, 2010; Teece, 2010; De Angelis, 2018). Most definitions of a business model refer to some form of value creation. A business model thus aims to elaborate on how a company creates value. What this value actually entails and for whom it is created, is dependent on the specific school of thought employing the concept.

Not only does the term ‘value’ appear in the literature as the purpose of business models, but also as the frame for a business model. More specifically, the components of business

models are often subdivided along three main elements, notwithstanding some variations in terminology: the value proposition, value creation and delivery, and value capture (Teece, 2010; Chesbrough, 2007; Osterwalder et al., 2005). The value proposition establishes the value that a firm creates by solving a problem for the customer, where the value and solution are embedded within the offered products and services. Value creation and delivery centers on the configuration of resources, capabilities, relationships with stakeholders, and other factors that allow the firm to offer the value proposed. It thus defines how the business intends to fulfill the needs of their targeted customers, and where in the value chain the business aims to be situated, i.e. the key assets they require to create and deliver value (Teece, 2010). Value capture involves a financial model that elaborates on the revenue accrued and costs incurred from the previous elements and how it is distributed among the stakeholders. In short, business models are representations of how a business intends to create, deliver and capture value.

The actual content of the components of business models take on various meanings, such as relations, activities, decisions, process, etc. depending on the theoretical perspective that is applied. Osterwalder and Pigneur (2013), for example, distinguish between nine building blocks that together form a frequently used tool for designing business models, also known as the business model canvas (BMC). These nine building blocks (value proposition, partners, key activities, key resources, customer segments, customer relations, channels, cost structure and revenue streams) are linked through organized patterns of activities and can have many possible configurations to collectively form a specific business model. The strategic management field generally conceptualizes the content of business models as strategic activities that create, deliver and capture value with the purpose of acquiring a competitive advantage (Andreini & Bettinelli, 2017). Whether one takes the perspective of nine building blocks, strategic activities, decisions, or other components, the content of these components of business models emerge as a result of the resources owned or controlled by the company. Similarly, the resource-based view sees the firm as a bundling of resources and capabilities that allow the firm to gain a competitive advantage.

Within the resource-based view, resources are understood as those intangible and tangible assets that enable a business to create value (Barney, 1991; Penrose, 1959). These resources can be further subdivided into physical, human and organizational resources (Eisenhardt & Martin, 2000; Wernerfelt, 1995). Examples of physical resources are specialized equipment or access to raw materials, while human capital refers to, among others, labor.

Coordinating systems are an example of organizational resources, as are the standardized reporting structures within a firm. Capabilities, on the other hand, are specific assets that allow a firm to deploy their resources for a specific task (Cavusgil, Seggie & Talay, 2007). These capabilities are information-based processes in which human capital utilizes the resources available in order to perform a coordinated specific set of tasks (Amit & Schoemaker, 1993). The competitive advantage is gained as a result of the nature of these resources and capabilities, as they are or should be scarce and firm specific (Amit & Schoemaker, 1993; Barney, 1991). The scarcity of resources implies that firms are heterogeneous in the stock of assets they can own or control. Moreover, it is difficult for other firms to acquire these resources as they are not easily transferred. As a result, resource differences exist over longer periods of time. Due to these differences, firms are enabled to employ certain configurations of resources and capabilities that other firms cannot, and thus these resources and capabilities offer a source of competitive advantage (Eisenhardt & Martin, 2000; Cavusgil, Seggie & Talay, 2007). Hence, the content of business model can be portrayed as a specific configuration of resources and capabilities that enable a business to create, deliver and capture value.

### 3.2 BMCE and the implication of value preservation as a guiding logic

Although some research has already been conducted on BMCEs, few actually define a BMCE. Linder and Williander (2015, p. 183) define BMCEs as "a business model in which the conceptual logic for value creation is based on utilizing the economic value retained in products after use in the production of new offerings". The emphasis on value creation alone, and lack of circularity in the definition, lead to a definition that does not encompass the importance of value preservation in each element of the business model. Bakker et al. (2014, p. 2) have a more comprehensive definition that does include circularity:

> A circular business model describes how an organization creates, delivers and captures value in a circular economic system, whereby the business rationale needs to be designed in such a way that it prevents, postpones, or reverses obsolescence, minimizes leakage and favors the use of 'presources' over the use of resources in the process of creating, delivering and capturing value.

Even though it incorporates circularity, the assumption that it works in a circular economic system does not take into account that a BMCE could also be present in a largely linear

economic system. The shift towards a CE will be a gradual one, as more and more businesses start to adopt circular principles, governments introduce policy that incentivize value preservation and consumers address their consumption patterns. An alternative definition given by Mentink (2014, p. 24) defines BMCEs as: "the rationale of how an organization creates, delivers and captures value with and within closed material loops". The given definition neatly summarizes the business rationale that Bakker et al. mention and acknowledges that BMCEs can also operate in a linear economic system. Furthermore, it acknowledges the key difference with linear business models: value preservation. A BMCE is therefore understood as the representation of the logic through which a business creates, delivers and captures value by preserving value. Incorporating this specific logic of value preservation by addressing current resource inefficiencies will drastically alter how a business creates, delivers and captures value (Nußholz, 2017).

### *3.2.1 Value preservation guiding the value proposition*

As stated, the value proposition explicates the value that the product or service of a business offers towards solving a problem of the intended customer. A successful value proposition will provide the business with a good basis for gaining a sustainable competitive advantage, and within linear business models this success is measured by the economic performance of the business. In general, the larger the output the better. The predominant competitive strategies that shape such a value proposition are the cost (focus) leadership strategy and differentiation (focus) strategy (Porter, 1985). When a business chooses to follow the former strategy, it offers a product or service at low cost, thus enticing customers to buy their product or service even though it might be of average quality. The business is able to offer their product and service at low cost by reducing the cost of production through, for example, economies of scale and the creation of synergies. The differentiation strategy implies a value proposition that offers a product or service that is perceived by the intended customer as unique and of higher quality, allowing the business to charge a premium price. Further distinction can be made, based on whether the business focuses on a large or niche market.

Whatever strategy is chosen, the value proposition aims at creating economic value for the business through maximizing sales (Bonciu, 2014). It most likely revolves around the relinquishment of ownership of the product from the business to the customer. The relation

between customer and business is, as a result, purely transactional. In contrast, a BMCEs does not measure success solely based on economic performance. Social and environmental value are equally important within BMCEs, and their value proposition, as follows from the CE characteristic of multidimensional value creation (Charter, 2019; Manninen et al., 2018; Bocken et al., 2014). This trifecta is the direct result of the underlying rationale of value preservation of BMCEs. Therefore, BMCEs will not only create value for the intended customers or shareholders, but also for a much larger range of stakeholders (Manninen et al., 2018). Moreover, servitization will drastically affect the relation between businesses and customers. The transactional nature will change towards more frequent contact between customer and business, as the transference of ownership will play a lesser part. Customers will become users instead of buyers (Antikainen & Valkokari, 2016; Bocken et al., 2016; De Angelis, 2018; Urbinati, Chiaroni & Chiesa, 2017). These aspects indicate a very different value proposition for BMCEs compared to those of a linear business model (Bocken et al., 2014; Bocken et al., 2016; Nußholz, 2017). The underlying strategy, and thus sustainable competitive advantage, is based on circular notions rather than a cost leadership or differentiation strategy. Hence, the value proposition of BMCEs focus on proactively preserving value by addressing current resource inefficiencies, as a means to create value. It will most likely offer a solution rather than a product, building a foundation for a relationship between potential customers and businesses to preserve value together, and in turn create multidimensional value.

### *3.2.2 Value preservation guiding the value creation & delivery mechanism*

Significant alteration of the value creation and delivery system is also needed to construct BMCEs. Within a linear business model, the value creation and delivery system are comprised of the customer interface and identification of key partners within the value chain. The customer interface explicates how the business interacts with its customers. Again, this will involve single interactions as the relation between the business and customer is merely transactional. Identification of key partners is aimed at establishing who, up or down the value chain, is vital in fulfilling the posed value proposition. Although this means that other businesses are taken into account for the business model, it does not necessarily imply close collaboration. Hence, the business model is organization centric. A BMCE, on the other hand, presupposes collaboration, as this is necessary to address current resource inefficiencies. It might be possible that a business closes the resource loop on its own. More likely, however, it will need other

businesses to achieve such a feat (Leising, Quist & Bocken, 2018; Charter, 2019; De Angelis, 2018), possibly within one business model or through close alignment of several business models working in unison (Antikainen & Valkokari, 2016; Mentink, 2014). For example, a need might arise for reconfiguration of the value network in order to create a return chain and to implement reverse logistics (Bocken et al., 2016; Bressanelli, Perona & Saccani, 2017). A value network is an intentionally developed network of organizations, that defines how they interact by means of informational and material flows in order to create value together (Heikkilä & Heikkilä, 2013; Urbinati, Chiaroni & Chiesa, 2017; Romero & Molina, 2011). Supply chain management and design of production processes and products, focused on addressing current resource inefficiencies, will play an important part as a means to preserve value, avoid generating waste and ensure circularity of resources (Boons & Lüdeke-Freund, 2013; Urbinati, Chiaroni & Chiesa, 2017). The business model should reflect these activities and relational ties, resulting in a less firm-centric approach of business models (Nußholz, 2018; De Angelis, 2018). Moreover, the relation between customer and business will be structured in a manner that allows for frequent contact over time, and even to preserve value together through the use of digital technologies. This radical change toward very close-knit businesses and co-creation of value indicates the need for far reaching collaborative ties that foster the required collaboration.

### *3.2.3 Value preservation guiding the value capture mechanism*

The value preservation logic of BMCEs also has an impact on how value is captured. The revenue model of a BMCE will differ largely due to the increased functionality of products and the step towards servitization. Rather than the revenue of a product being generated at one point in time, the transaction, it is generated over time (Bakker et al., 2014; Bocken et al., 2016; Linder & Williander, 2017; Nußholz, 2017). During the initial lifespan of the product, the business can offer a solution instead of a product, thus using one product for multiple customers. Another option is the resale of products, possibly accompanied by remanufacturing or refurbishment, after the initial customer has no use for them anymore. Even when a product is at the end of its initial lifespan, it can be collected by the business and used for its parts or cascaded up or down the value chain (EMF, 2014; De Angelis, 2018; Planing, 2015). Additional revenue can also be generated through sales of by-products to other producers and their production processes (De Angelis, 2018; EMF, 2014). Hence, many new revenue streams will arise by adapting to circular notions.

Most revenue models will resemble those associated with a product-service system (Tukker, 2004; Lewandowski, 2016; Van Renswoude, ten Wolde & Joustra, 2015). In the case of product-oriented services, where sales of products remain central, the revenue model will be based on pay-per-product or service structure. Initial revenue is generated through sale of the focal product and additional revenue is accrued through offering of services such as maintenance. Progressive purchase is a possible variation, allowing businesses to charge a premium price for products with a long lifecycle, which customers might not be able to buy if they would have been fully charged immediately. Another possible variation is the freemium model where the product is provided free of charge and the services such as content, upgrades and add-ons form the foundation for the revenue that the business model generates (Lacy & Rutqvist, 2015). Multiple revenue models are possible in relation to the use-oriented services, where products are still part of the offering, but they are no longer central as access is provided (Lewandowski, 2016; Tukker, 2004; Planing, 2015). The first revenue model in use-oriented services is a subscription-based model, which implies a periodic fee for the usage of a service or product. An example of a company that implemented such a revenue model is Netflix. The second revenue model is that of product lease where the customer pays a regular fee to exclusively use the focal product for a longer period of time. The third revenue model is that of renting, where the customer pays a fee for the use of a product for periods of time. This model differs with that of leasing as multiple customers will rent the same product at different times, thus no exclusive rights are given. A one-time payment for each utilization of a service or product, i.e. pay-per-use, is a fourth possible revenue model for use-oriented services. Result-oriented services focus on delivering a specific performance rather than a specific product. Revenue models associated with result-oriented services will be based on pay-per-performance or pay-per-unit of service, i.e. a one-time payment for each performance/unit delivered or periodic fees if a continuous result is promised over time, such as a lighting during office hours. Hence, many possible revenue models exist, which largely depend on the choice whether to offer a product, service, access or result.

The logic of value preservation will also have an impact on the cost structure. Traditional linear business models focus on maximizing sales which, alongside with the transactional nature of the relation between customer and business, involves a cost structure that only takes into account economic value (Bonciu, 2014). Social, and especially environmental, costs are not included in the cost structure, while these costs will be high at large outputs in the form of excessive use of resources and creation of waste. As such, only one third of the whole picture

is taken into account. Material costs can be significantly lowered through maximum use of the value embedded in resources (Bocken et al., 2016; De Angelis, 2018; Nußholz, 2018). The costs of maintenance of a product used for multiple customers, or the reselling of a product, can be lower than the production of a new product. Furthermore, the revenue model and cost structure of a BMCE will need to take into account the environmental and social impact a business has when conducting its activities. One important tool to measure the environmental impact is that of the lifecycle assessment (Ruitenburg, Toxopeus & Braaksma, 2016; Antikainen & Valkokari, 2016). It analyzes the environmental footprint that is created by a service or product during its lifespan, from the moment of extraction of the raw materials needed up until the end-of-life treatments. Therefore, it is not only useful in mapping out the actual environmental cost a business accrues due to its activities, it is also helpful in the configuration of the value network and the redesign of production processes and products to address current resource inefficiencies (Nußholz, 2017; Winkler, 2011). Another useful tool has been proposed to assess the social impact of products and services: the product social impact assessment (Traverso, Bell, Saling & Fontes, 2018). Again, a product or service is analyzed from the beginning until the end of its lifecycle, only now in regard to the social impact it has. It is a fairly new method and its efficacy has yet to be fully tested, although an initial application has shown promise (Traverso et al., 2018). These tools can help businesses take into account all the costs and benefits that are created by their activities, thus giving a full picture.

### 3.3. The (r)evolution of BMCE

A BMCE clearly involves very different ways of creating, delivering and capturing value compared to that of the linear business model. A method to achieve such a goal is business model innovation, i.e. the conceptualization of new ways to construct a business model (Antikainen & Valkokari, 2016; Bocken et al., 2014; De Angelis, 2018; Nußholz, 2018; Van Renswoude, ten Wolde & Joustra, 2015). Within the extant literature, one can discern two approaches when applying business model innovation as a means to develop BMCEs: the reformist and the transformationalist approach (Reike, Vermeulen & Witjes, 2017). Lewandowski (2016), for example, formulates a conceptual framework for BMCEs by utilizing the business model canvas with the inclusion of two additional building blocks: take-back system, and adoption factors. This reformist approach is supported with the argument that business models are always circular and linear to some extent (Lewandowski, 2016; van

Renswoude, ten Wolde & Joustra 2015). Characteristics of CE are present, not always on purpose, due to use of resources and attempts to increase efficiency. Moreover, a fully circular business model is not yet feasible, as some waste will always be created, and the value of resources will always deteriorate over time. Future innovations might make full circularity possible, but with current technology we are not there yet. Although this reasoning holds true, the framework builds on the conventional organization-centric approach, focuses on economic value and, by utilizing the business model canvas, does not acknowledge that a more transformative approach is required (Antikainen & Valkokari, 2016; Nußholz, 2018). The need for these radical innovations and disruptive business models is a logical consequence of the impact that value preservation logic has on how business models create, capture and deliver. Even more so, when one takes into consideration that servitization will play a large part in a CE.

### *3.3.1 Dynamic capabilities*

The nascent literature on BMCEs and how to innovate business models has centered on the content of the components of BMCEs, yet few have focused on the actual process underlying the development of BMCEs. More specifically, a static view of business models is often taken. Current and future business models, however, will continuously be refined and adapted as new technologies are developed that allow a firm to address resource inefficiencies. Moreover, the transition towards a more CE will significantly alter the business environment, thus also requiring continuous evolvement of current and future business models to maintain a competitive advantage. The dynamic capabilities theory underlies this dynamic nature of business models. Furthermore, it acknowledges the ability of business models to change the business environment itself.

The dynamic capabilities theory can be perceived as a continuation of the RBV. According to this theory, business models can still be viewed as specific configurations of resources and capabilities. In comparison to the RBV, however, these configurations rather than the resources and capabilities themselves are a source of competitive advantage (Cavusgil, Seggie & Talay, 2007; Eisenhardt & Martin, 2000). The main distinction is that the dynamic capabilities theory acknowledges the ability of a firm to develop new or enhance current configurations of resources and capabilities. This is accomplished through use of dynamic capabilities to ensure

evolutionary fitness with the business environment and quite possibly alteration of the business environment itself (Teece, 2010). Dynamic capabilities are higher-order capabilities enabling a firm to integrate, build and reconfigure internal and external resources (Teece, Pisano & Shuen, 1997; Cavusgil, Seggie & Talay, 2007). Moreover, they include the manager's ability to sense threats, anticipate and seize opportunities, thus further guiding the alteration of the resource base of a firm to develop and implement new innovative business models. Dynamic capabilities can be viewed as a "set of specific and identifiable processes such as product development, strategic decision making, and alliancing" (Eisenhardt & Martin, 2000, p. 1116). The stronger the dynamic capabilities, the better equipped a firm is for implementation of radical business models to maintain or attain a competitive advantage (Teece, 2010). In this sense, the options available are limited by the strength of the dynamic capabilities of a firm. Further constraints of possible business models are the result of path dependency, i.e. previous investments made, and the actual value that is captured by the current business models, as it limits the ability of a firm to invest in a different avenue (Teece, 2010). This possible divergence between businesses and the strength of their dynamic capabilities explains why some businesses are able to introduce more radical and innovative business models, compared to others that introduce incremental changes. Hence, businesses that wish to address current resource inefficiencies but only possess weak dynamic capabilities, will gradually become more circular. Others with strong dynamic capabilities, in contrast, will have to take the role of pioneers in the transition towards a more CE by implementing radical new business models.

### *3.3.2 Strategy, a guiding factor for dynamic capabilities*

Dynamic capabilities enable a firm to implement new or enhance current business models. It does not, however, establish which dynamic capabilities are of particular importance for a specific business. Moreover, dynamic capabilities do not guide a firm in what it wants to achieve in the long run, this is where strategy comes into play. Strategy acts as a guide by offering a set of available business models, and subsequently by signaling which dynamic capabilities to invest in. Strategy is "the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals (Chandler, 1962, p. 42). It involves a deliberate and conscious process of formulating a plan on how to compete with the purpose of creating a unique position in a specific market (Porter, 1996; Teece, 2010). A strategy thus attempts to

create a competitive advantage by examining the external context, such as stakeholders, market conditions and competitive forces in general (Magretta 2002). By analyzing this context, opportunities and threats specific to the business can be mapped out to apprise managers of the possible approaches they can take in order to create a competitive advantage. A strategy, therefore, guides the business in what it wants to achieve, i.e. a specific future desired state. It evaluates the opportunities and threats in the business environment and states how the business will deal with these threats and capitalize on the presented opportunities by offering an approach.

Even though strategy offers an approach on how to compete, it does not offer a blueprint on how a business actually creates value and thus attains the competitive advantage that the strategy wishes to create. It is here that the link can be made between strategy and business models, as business models represent how a business creates, delivers and captures value at a certain moment in time (DaSilva & Trkman, 2014). Casadesus-Masanell and Ricart (2010, p. 195) also acknowledge this relation between business models and strategy, as they view business models as a "reflection of the firm's realized strategy". Hence, strategy guides the choice of a specific configuration of resources and capabilities. The number of possible business models is, however, limited by the strength of the dynamic capabilities of the firm and, if applicable, the business model in place (Teece, 2010; DaSilva & Trkman, 2014). As stated before, dynamic capabilities are crucial higher-order capabilities that allow a business to alter its resource base, and thus it determines whether a business can implement a certain configuration of resources and capabilities or not. Strategy therefore does not only guide the choice of a certain business model, but also the development of the dynamic capabilities as these will enable a firm to reconfigure or enhance their current resource base to attain their goals and objectives presented in larger set of possible business models (DaSilva & Trkman, 2014). Moreover, just as strategy guides the development of dynamic capabilities, dynamic capabilities impact strategy (Teece, 2010), because the processes of strategic decision making are dynamic capabilities. These specific dynamic capabilities, including the manager's ability to sense threats and seize opportunities, can determine which strategies are formulated. Dependent on the strength of the dynamic capabilities, some opportunities or threats will or will not be recognized and therefore result in fewer or more approaches on how a business wishes to compete. Further constrictions on possible or future business models, and thus success of a strategy, are the result of the viability of the chosen or current business model in place (Teece, 2010; DaSilva & Trkman, 2014). The ability of a business model to create and capture

value, more specifically the costs and profits incurred by the business model, have an impact on the investments a business can make to further develop their resources and capabilities, and more importantly their dynamic capabilities. Too little room for investment, due to lack of capital, will hamper further development of a business' dynamic capabilities and in turn its ability to formulate new strategies or alter its current resource base in order to implement new business models.

### 3.4 The antecedents and outcome of BMCEs

A radical shift in how business is done, and thus a significant change in resource configurations, is required to transition towards a more CE. The logic of value preservation centered on addressing current resource inefficiencies will drastically alter the value mechanism of business models and the resources and capabilities that form the basis for these value mechanisms. It will be argued here that a circular strategy will form the beginning point for businesses that wish to implement these new and innovative resource configurations that adhere to circular principles, i.e. BMCEs (Figure 2). Strategy guides the eventual choice of BMCEs and the development of dynamic capabilities, which in turn determines the possible configurations of resources and capabilities that enable a firm to address current resource efficiencies. A BMCE will involve different resources and capabilities, and close collaborative ties compared to a linear business model. This is due to the guidance of a circular strategy. Moreover, it aims to create multidimensional value.

#### *3.4.1 Circular strategy and dynamic capabilities*

A circular strategy is a strategy that engenders circularity (Bocken et al., 2016; Yuan, Bi & Moriguichi, 2006; Geissdoerfer, Morioka, Carvalho & Evans, 2018), in other words, the creation of resource loops through value preservation. The value preservation logic focuses on addressing the resource inefficiencies presented by the linear economy, i.e. capitalizing on added value of resources, materials and products normally lost in the sequential stages of production and consumption. The first moment where value is lost, is the continuous use of hazardous materials or finite virgin resources in production, as it greatly impacts the ecosystem

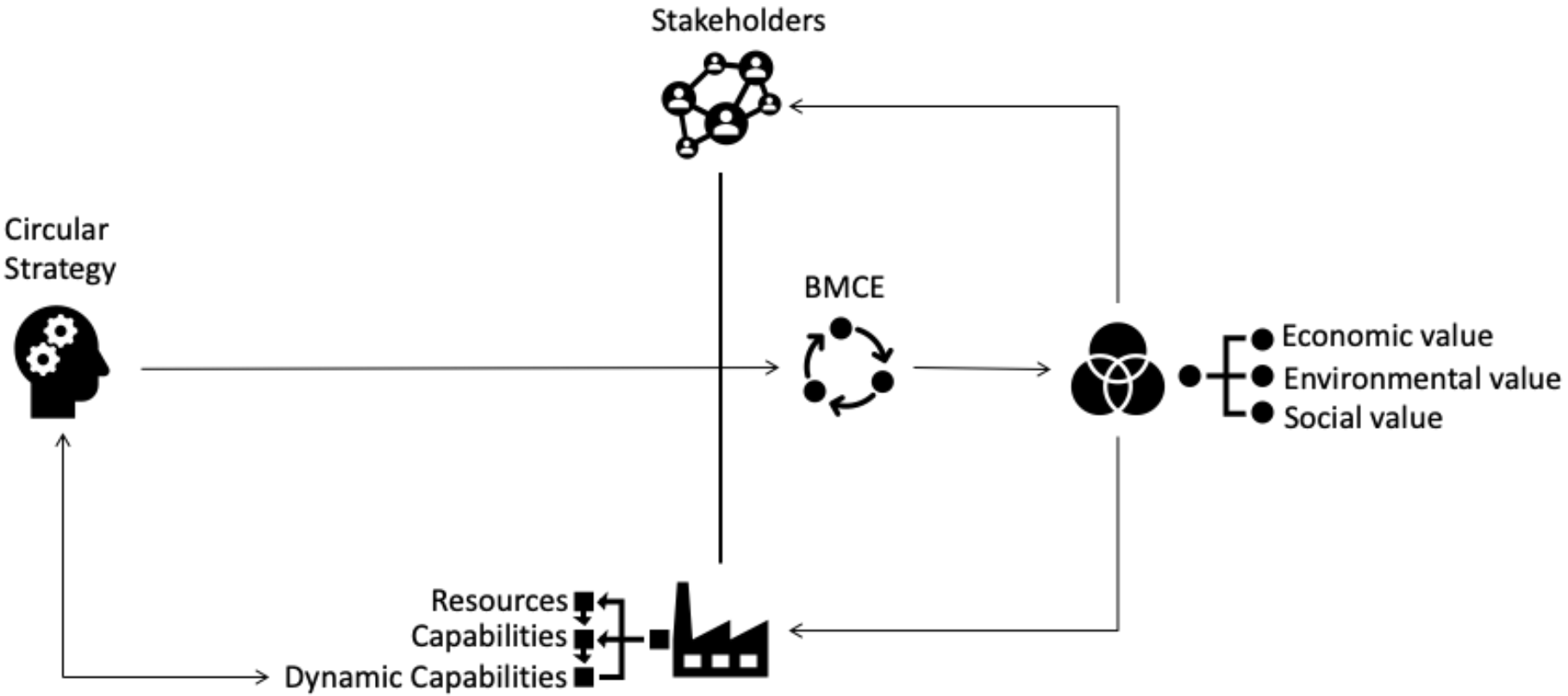


**Fig. 2.** Business Models for Circular Economy development framework

of the earth and hampers regeneration. As previously mentioned, this is partly fueled by the concept of planned obsolescence, which ensures that consumers are motivated to buy new products because products are purposefully designed to deteriorate. Secondly, a lot of value that products offer is underutilized as products lay idle. An example is that of the drill. Consumers buy a drill to only use it once or twice a year. While it is not being used by the buyer, it could offer significant value to other potential users. Thirdly, residual value in products and resources is lost, as these resources or products are treated as waste. More specifically, consumers prematurely discard products that could have been repaired or are still functional but do no longer fit their needs. Moreover, production itself generates copious amounts of waste. A circular strategy thus wishes to alleviate these resource inefficiencies by offering certain approaches. More specifically, each approach achieves the creation of a resource loop, which can be classified on length, as it will involve different activities to preserve value, i.e. the previously mentioned R-imperatives that operationalize how to prevent, extend and recover value.

The circular strategies that can be employed are the following: the closing, narrowing, extending, intensifying and dematerializing of resource loops (Table 2). Closing resource loops centers on ensuring that waste is no longer treated as such, but rather treated as input for production processes. The narrowing of resource loops aims to ensure that the amount of resources used for each product is minimized, thus lowering the strain put on the finite resources by production. Extending resource loops focuses on ensuring that the lifecycle of products is prolonged by increasing the use-phase of a product, thus lowering the need for consumers to buy new products. Intensifying resource loops addresses the resource inefficiency posed by idle capacity through intensification of the use-phase. Lastly, dematerializing of resource loops reduces the extraction of finite resources through service and software offerings.

Not only do circular strategies offer direction by presenting possible approaches, they also signal which dynamic capabilities need to be developed in order to acquire the necessary resources and capabilities that support these approaches. Therefore, dynamic capabilities play a crucial role in whether a certain approach, and thus circular strategy, can be realized. Some dynamic capabilities will evidently be more important than others, dependent on the chosen approach. For example, choosing the path of circular products will require a business to be adept at new product development, while the path of resource recovery might require new process development. For those businesses that venture into mergers and acquisitions to gain

**Table 2.** Circular strategies, resulting approaches, material cycles, and relevant resources & capabilities in developing BMCEs

| Circular strategies | Possible approaches | Material cycle created | Examples of relevant capabilities & resources | Literature |
|---|---|---|---|---|
| *Closing* | Circular Products | • Short<br>• Long | • Design for renewability & biodegradability<br>• Design for efficient cycling (disassembly, modularity, standardization)<br>• Reverse logistics | Bocken et al. (2016); McDonough & Braungart (2002); Van Renswoude et al. (2015) |
| | Circular Supplies | • Short<br>• Long | • Design for renewability & biodegradability<br>• Reverse logistics | Bocken et al. (2016); McDonough & Braungart (2002); Van Renswoude et al. (2015); Moreno et al. (2016) |
| | Resource Recovery | • Medium-Long<br>• Long | • Recycling<br>• Recovery (energy)<br>• Re-mine<br>• Reverse logistics | Bocken et al. (2016); Reike, Vermeulen & Witjes, (2017); Van Renswoude et al. (2015) |
| *Narrowing* | Resource Efficiency (limited to reduction of amount used) | • Short | • Optimization<br>• Miniaturization | Bocken et al. (2016); Mendoza et al. (2017); Vezzoli & Manzini (2008); Nußholz (2017) |
| *Extending* | Long-Life Products | • Short<br>• Medium-Long | • Design for attachment & trust<br>• Design for reliability & durability<br>• Design for product life extension | Bocken et al. (2016); Bakker et al. (2014); Moreno et al. (2016) |
| | Product Life Extension | • Short<br>• Medium-Long | • Maintenance & repair<br>• Remarket and resale<br>• Refurbishment<br>• Remanufacturing (upgradability)<br>• Repurposing | Bocken et al. (2016); Reike, Vermeulen & Witjes, (2017); Bakker et al. (2014); Moreno et al. (2016) |
| | Encourage Sufficiency | • Short<br>• Medium-Long | • Demand-side management<br>• Green marketing<br>• Consumer/user education | Bocken et al. (2014) |
| *Intensifying* | Platform | • Short | • Design platform for sharing and swapping | Bocken et al. (2016); Geissdoerfer, Morioka, Carvalho & Evans (2018); Bakker et al. (2014); Moreno et al. (2016) |
| | Inventory Management | • Short | • Inventory management to reduce obsolete stock | Mendoza et al. (2017) |
| *Dematerializing* | Digitalization | • Short | • Design digitized product | Van Renswoude et al. (2015) |
| | Servitization | • Short<br>• Medium-Long<br>• Long | • Offer functional result<br>• Offer acces to product<br>• Offer rent/lease of product | Bocken et al. (2016); Geissdoerfer et al. (2018); Tukker (2004); Mont (2002) |

the needed expertise to develop new processes or products, good restructuring and re-organizations skills will be necessary. Similarly, changing from selling a product to offering a service will also require reorganization skills. A few dynamic capabilities will be vital for the development of BMCEs in general. For example, sensing and interpreting the environment, surveillance of markets and technology, access to stakeholders' information, strategic decision-making routines, assessment of strategic alternatives and business model reconfiguration skills. These are all crucial in identifying possible approaches and for future improvements of current BMCEs. Furthermore, alliance and resource acquisitions skills will be a vital dynamic capability, as addressing resource inefficiencies throughout the value chain will often require close collaboration with other stakeholders. The intensity of collaboration needed will likely depend on whether the current resource base of the business allows it to realize its chosen approach and, if not, whether the strength of their dynamic capabilities enable them to alter their resource base accordingly. Since each business has its own specific specialties or most often a limited resource base, collaboration seems commendable.

### *3.4.2. Collaboration with stakeholders*

Collaboration through partnerships and alliances is a frequently used strategy by organizations when faced with environmental and social problems (Fadeeva, 2005). It entails a formal relationship between multiple stakeholders that invest time and resources to commit to a shared goal (Romero & Molina, 2011). Its popularity is a logical consequence of the many advantages associated with collaboration such as generating creative solutions, efficient use of time and resources, reduced risk and many more (Fadeeva, 2005; Romero & Molina, 2011). Alliances in particular provide organizations with additional benefits such as signaling legitimacy in regard to new businesses, markets and technologies and increased flexibility due to shared resources, responsibility and risk (Eisenhard & Schoonhoven, 1996). Alliance formation is therefore a useful tool in strengthening the strategic positioning of a business. Within the extant literature on CE and BMCEs, it has been widely accepted that collaboration is crucial in transitioning towards a more CE as closing material cycles on one's own might prove difficult (Charter, 2019; Jonker, Stegeman & Faber, 2018). Especially when taking into account that stakeholders can affect the firm by offering those resources that the focal firm might lack (Barney, 2018). Even though this implies the need for new organizational models

for collaboration, few authors examine how such models would manifest in developing BMCEs, simply stating the need for partnerships and alliances (e.g. Lacy & Rutqvist, 2015; Charter, 2019; Lewandowski, 2016; Bocken et al., 2014). Many forms of collaboration exist that differ in size, complexity, formality and activities (Fadeeva, 2005). In this regard, a distinction should be made between informal methods of collaboration, collaborative agreements, collaborative networked organizations, joint ventures and the joint business model.

The least intrusive method of collaboration is informal collaboration. Businesses can enter informal arrangements with their suppliers or retailers in order to implement a return chain. This ensures that products that have reached their end-of-life are not discarded as waste but collected and retrieved, and subsequently recycled, remanufactured or refurbished (Lacy & Rutqvist, 2015; Bocken et al., 2016; Lewandoski, 2016). This will require close communication, coordination and information sharing within one's value network or value chain (Lacy & Rutqvist, 2015; EU, 2015). Other methods of informal collaboration are simply sharing strategic intent (Beattie & Smith, 2013), or joint engagement and education of consumers (Bocken & Allwood, 2012) in order to encourage them to increase circularity of resources and reduce the use of resources. Businesses might opt to coordinate and communicate directly with their intended partners, but other vehicles exist such as trade associations or coordinating councils (Sheu, 2014). Hence, businesses can address current resource inefficiencies with actors within their value network by utilizing informal methods of collaboration. Most likely, however, more formal methods will lay the foundation for the collaborative ties that support the development of BMCEs.

Collaborative agreements will be instrumental as a linkage between actors within the value network and thus in creating material cycles that ensure value preservation. The content of these collaborative agreements will differ dependent on the parties involved and the circular strategy chosen by a business. For example, they can form the basis for the implementation of a return chain. Manufacturers can enter an agreement with their retailers or waste management companies to ensure collection and recycling of their products (Sheu, 2014; Bocken et al., 2016) Another example could be an agreement to exchange by-products, also known as industrial symbioses (Bocken et al. 2014; EU, 2015; Lacy & Rutqvist, 2015). Another frequently mentioned collaborative agreement is the sharing of assets and communal services among companies, thus ensuring cross-industry management of resources (Urbinati, Chiaroni & Chiesa, 2017; Bocken et al., 2014). Businesses can share infrastructure, maintenance services

and physical resources. In regard to repair and other services that extend the life of a product, businesses can enter contracts with local field services to provide those services, thus negating any negative environmental externalities from transportation (Lacy & Rutqvist, 2015).

Joint R&D agreements are another important type of collaborative agreements that link actors and their value network. They focus on innovating products and production processes (Hagedoorn, 1993) as technology continuously provides opportunities to increase circularity of resources. In effect, they enable businesses to address current resource inefficiencies, and thus achieve the creation of material cycles. These agreements involve joint development and lifecycle management projects that aim, for example, at minimizing energy leakages in production processes and at innovating products through design for recycling, remanufacturing, reuse, disassembly and environment (Urbinati, Chiaroni & Chiesa, 2017; Lacy & Rutqvist, 2015). Other examples that involve technological partnering are technology exchange agreements which involve cross-licensing or the sharing of technology among the contracted parties, co-production contracts, co-makership relationships, the outsourcing of an R&D project, franchising and licensing agreements (Hagedoorn, 1993). Especially the latter can be helpful in scaling up business models and technologies that have proven to help in the transition towards a more CE (Lacy & Rutqvist, 2015; Bocken et al., 2014). An example of such licensing is DSM and their bio-based Products & Services business unit which sells their bioconversion technology (Lacy & Rutqvist, 2015). Initially, these agreements will form the basis for collaboration. As businesses become more attuned to circular principles, the integration and complexity of the collaborative efforts they utilize will increase as well.

Collaborative networked organizations are the next step of integration of the value network that will allow for close collaboration in order to close resource loops achieved by focusing on preservation of value normally lost due to resource inefficiencies. These collaborative networked organizations (CNOs) can be defined as a collection of independent and heterogeneous businesses that, with the aid of digital technologies, collaborate in order to co-create value (Romero & Molina, 2011). They are value networks that consist of organizations that are linked with each other through close-knit relationships with the purpose of attaining a shared goal, in this case addressing current resource inefficiencies. The development of this collaborative network is a direct result of the shared belief that their ultimate goal is not attainable when pursued by individual businesses, as is the case with the transition towards a CE. The value that is co-created is no longer viewed as a process of

sequential activities but rather as an interconnected and intricate web of multiple coinciding activities (Romero & Molina, 2011). These collaborative networked organizations of suppliers, manufacturers, customers and partners allow for the aggregation of resources, knowledge and capabilities, thus providing businesses the opportunity to combine their respective core competences. Creating a fit between those actors, their capabilities and customers within the collaborative network will be vital and will require continuous reconfiguration of the value network (Romero & Molina, 2011).

A frequently mentioned method of collaborating, already visible in current BMCEs, is joint ventures (Sheu, 2014; Lacy & Rutqvist, 2015). These joint ventures are firms brought in existence by two autonomous businesses in order to combine their economic interests and involve an equity investment where both companies share the profit and losses incurred by the firm that has been set up (Hagedoorn, 1993). They can involve business activities but can also specifically relate to research, which is called a research corporation. Moreover, businesses might be satisfied with a lesser degree of control and only desire a minor stake in high tech companies that can help further the investors aim of increasing circularity through innovation. The choice to collaborate by means of joint ventures provide businesses a way to view their activities from a different perspective, share the associated risks and benefits, thus creating the potential to diverge from existing design and production models (Lacy & Rutqvist, 2015). This overcomes the issue of feared cannibalization that many businesses face. In order to ensure shared success, it will, however, require a level of trust, as information is shared at a degree that is not always easily accepted by the businesses.

As businesses progress and become more adapted to circular principles, their business models become more aligned, eventually even leading to the creation of a joint business model. The joint business model will serve as a dynamic boundary object that further integrates the linkages within collaborative networked organizations (Heikkilä & Heikkilä, 2013). It will provide a method for negotiating in regard to the internal changes and linkages between activities that the closing of material cycles necessitates. Hence, the value network itself and the willingness of its organizations to learn from each other will determine whether the joint business model is feasible. Part of the process will be the placement of those organizations that possess certain core capabilities at the center. Moreover, potentially increased networking might be required to ensure that all partners and functions vital to the business model are present. Furthermore, other aspects are relevant such as harmonization of strategies through

development of a shared strategic goal, harmonization of processes through formulation of rules, taxonomies and creation of databases, internal organizational changes and assessment of the viability of the joint business model. Especially the latter is important in establishing what portion of the co-created value is assigned to each actor within the joint business model, as a sense of fairness is required for cooperation to succeed (Heikkilä & Heikkilä, 2013). A joint business model that brings a BMCE into existence will harmonize the strategies of the actors involved by its focus on value preservation, while alignment of processes will center on harmonizing the processes that address current resource inefficiencies in order to close resource loops. Hence, the joint business model is one of the methods by which businesses can collaborate.

### *3.4.3 Multidimensional value creation*

In order to be categorized as a BMCE, a business model has to be sustainable, i.e. create economic, environmental and social value (Jonker, Stegeman & Faber, 2018). Multidimensional value is therefore the net outcome of a BMCE in relation to economic, social and environmental performance (Elkington, 2004; Freudenreich, Schaltegger & Lüdeke-Freund, 2019). Although most authors acknowledge the potential of BMCEs in creating measurable economic and environmental value, few mention the creation of social value (e.g. Bakker et al., 2014; Van Renswoude, ten Wolde & Joustra, 2015). Following a strategy that encourages circularity, and preserves value by addressing current resource inefficiencies, implicitly assumes the creation of economic and environmental value. This, in turn, might lead to some social value being created. Environmental value that can be created consists of reduced emissions and reduced use of virgin materials, allowing for regeneration of ecosystems. Moreover, environmental value is created as less to zero waste is generated, due to the use of renewable or biodegradable resources that can re-enter the natural ecosystem and due to continuous recycling of technical nutrients (Korhonen, Honksalo & Seppälä, 2018). This created environmental value can also provide economic value: raw material costs decline, emissions control costs are reduced and, as a result of increased functionality of resources, new markets emerge (Korhonen, Honksalo & Seppälä, 2018; Lacy & Rutqvist, 2015; Nußholz, 2017; Bocken et al., 2016; De Angelis, 2018). Ensuring maximum use of value in resources and increased functionality will also create social value as it will provide new employment opportunities. Moreover, community building as a result of setting up sharing platforms, co-

creating value with customers and increased user groups, that use products as a service together, will also provide some social value (Korhonen, Honksalo & Seppälä, 2018; Lacy & Rutqvist, 2018; Bocken et al., 2014). What value, for whom, and to what degree this is created, is dependent on the specific industry and chosen circular strategy.

### 3.5. An illustrative example[1]

Seacourt Ltd, a family-owned printing company from the UK, is a good example of the process of developing a BMCE and the theoretical framework proposed. It is a small to medium-sized enterprise that was founded in 1946 and offers a variety of printable products, such as brochures, leaflets, catalogues, display boards and so on. Somewhere in 1996, the directors of the company attended a conference on sustainability and printing, which informed them of the fact that the printing industry was the fourth or fifth-largest polluter in the world (Piesing, 2017). This paved the way towards innovating their business model towards a BMCE, as a shift in the mindset of the directors occurred towards preserving value: they saw an opportunity to address the resource inefficiencies present in this particular production process by preventing, extending and/or recovering previously lost value in their own production process.

Seacourt's first shift towards creating material cycles with their business model was taken in 2009, when it introduced and implemented its "zero-waste-to-landfill" production initiative. The initiative is a clear example of a 'closing resource loops' strategy: waste is no longer treated as such, but rather treated as input for production processes. In this particular case a focus was placed on ensuring that the materials used in the production process either end up in the end-product or are recycled. Hence, a resource recovery approach was taken. For Seacourt it meant several aspects: the recycling of cardboard and paper by re-pulping it into paper, the sorting and recycling of plastic components, the reuse of aluminum printing plates, the up-cycling of damaged printing blankets by delivering them to another company that uses them to produce wallets and handbags, and the implementation of reverse logistics. The latter implied the collection and recycling of customers' old stock when delivering new products. Seacourt

[1] Based on am example case study conducted by the European Commission in relation to the EU Eco-management and Audit Scheme, also known as EMAS (European Commission, 2017).

effectively created a long material cycle by adopting this particular circular strategy and approach, as it mainly focused on the R-imperative 'recycle'.

The next step Seacourt took in becoming more circular was the development of a new printing process. The new printing process, called LightTouch, was developed in collaboration with a printing press manufacturer and ink manufacturer. The LightTouch process involves a printing press which does not use water. Moreover, it uses a LED drying solution, requiring much less chemicals compared to conventional printing processes. Hence, a 'narrowing of resource loops' strategy was followed, as the main purpose was to reduce the amount of resources used for each product, thus lowering the strain put on the finite resources by production. The approach that follows from a 'narrowing of resource loops strategy' is that of 'resource efficiency', which helped Seacourt in creating a short material cycle. This is the consequence of their focus on one main activity to prevent, extend or recover previously lost value, namely the R-imperative 'reduce'. In this particular case the reduction is achieved in relation to usage of chemicals and water. To implement this approach, however, Seacourt needed to develop the new printing process in collaboration with other stakeholders. Two dynamic capabilities were, therefore, crucial in developing this particular BMCE: new process development skills and alliance building skills. The alliance building skills enabled Seacourt to engage with a printing press manufacturer and ink manufacturer willing to jointly create a new printing process. The collaborative tie that most likely would form the foundation for this project is a collaborative agreement, i.e. a joint R&D agreement.

Both steps taken by Seacourt has led to a new way of creating, delivering and capturing value, i.e. BMCE, that has been proven to be successful as it offers multidimensional value. Most of the value created by Seacourt is either economic or environmental. Economically the BMCE has ensured reduced costs in two ways. Firstly, the company requires 857 liters less ink each year compared to the previous printing process. Secondly, the company requires no water in the new printing process thus saving five million liters of water and its related costs. Additional economic value is created as Seacourt's BMCE, and resultant competitive advantage, has generated a pre-tax profit that is six per cent higher than that of the print industry average. Environmental value is also created by the employed BMCE. The previously mentioned reduction in water usage is an example. Moreover, Seacourt has reduced its volatile organic compound emissions with 98,5 %. Its "zero-waste-to-landfill" production also creates

environmental value as landfills, and the processing of waste in landfills, are less environmentally friendly than recycling or up-cycling.

Seacourt Ltd is a clear example of how a BMCE might be developed using the theoretical framework. A strategy is chosen as an opportunity to address a resource inefficiency, and thus preserve value, is recognized. The chosen strategy informs the business on which approach it can take, that will result in the creation of a specific material cycle. Whether this approach is feasible, however, depends on the current resource base of the business. Dynamic capabilities and collaboration with stakeholders, through different collaborative ties, can help implement one of the approaches, if the current resource base is lacking. The approach that is implemented results in a specific configuration of resources and capabilities that enables the firm to create, deliver, and capture value by preserving value, i.e. a BMCE. The BMCE itself, in turn, creates multidimensional value. In the case of Seacourt Ltd a combination of 'closing resource loops' and 'narrowing resource loops' strategy is chosen. The approaches within these strategies adopted are 'resource recovery' and 'resource efficiency', and thus long and short material cycles are created by the BMCE. In order to implement the 'resource efficiency' approach, however, a significant alteration of the current resource base was necessary, i.e. the new printing process. The dynamic capabilities new process development and alliance building enabled Seacourt to alter their resource base in collaboration with the two manufacturers. The collaborative tie that formed the foundation for this project was most likely a collaborative agreement, i.e. a joint R&D agreement. The benefits generated by the BMCE are both economic and environmental.

# 4. DISCUSSION & CONCLUSION

This thesis aimed to provide further insights on how businesses can contribute towards a more CE. Although commonly assumed that the concept of a business model provides businesses with the necessary tool to do so, previous research has mostly taken a static view of business models, centered on types of BMCEs and has often been grounded in traditional business model thinking. Therefore, it is unclear how business can develop business models that are attuned to the characteristics of a CE. A literature study was conducted by examining literature on CE, BM(CE)s, dynamic capabilities theory and strategy, which provided the foundation for the theoretical framework in this thesis.

## 4.1 Contributing to the transition towards a circular economy

Closer examination of the CE literature revealed that preservation of value is central to CE. Its intention is to create a sustainable way of life through introduction of resource loops by addressing current resource inefficiencies in production and consumption systems, i.e. prevent, extend or recover previously lost value. This will ensure that not only economic, but also social and environmental value is created. Close collaboration between various stakeholders will be required to achieve such a feat, as the ability to close resource loops in production and consumption systems is not easily achieved by one organization alone. Governments, consumers and businesses together will be able to implement the transition towards a more CE. Businesses specifically can decouple economic growth from its vast use of resources in production. A tool that will enable them to conceptualize this goal are business models.

In regard to business models attuned to a CE, few examine how the characteristics of CE affect our current understanding of business models (De Angelis, 2018) and the applicability of business models in a CE context. This thesis contributes to our current understanding of BMCE by further examining those aspects. It is clear that CE revolves around the concept of value and the manner in which resources are utilized. Closer examination of the business model literature revealed that business models are, similarly to CE, centered on value. More specifically, business models are a useful tool to elaborate on how a business intends to create, deliver and capture value. These value mechanisms are the result of a specific configuration of resources and capabilities owned and controlled by a firm. By altering these configurations in

a specific way, the loss of value present in current production and consumption systems can be addressed. Hence, business models can be used as a tool to enable CE as they too are centered around value and how resources are used. In order to understand how to innovate business models, however, one needs to understand how the CE characteristics affect our traditional way of BM-thinking. A focus on preserving value by addressing current resource inefficiencies greatly impacts how value is created, delivered and captured. Not only does this imply developing different resources and capabilities, but also increased collaboration, as heterogeneity of resource stocks limits businesses in their options. Moreover, the purpose of CE to create a sustainable way of life also implies a shift towards measuring value on more than economic terms. Social and environmental value and cost becomes part of the BM-equation. The example of Seacourt Ltd highlights the importance of the logic of value preservation engendered by CE and its impact on BM-thinking. The shift in mindset towards value preservation pushed Seacourt towards assessing its production processes and day-to-day operations on all fronts. It not only resulted in the profitable BMCE, but also spurred them towards addressing other aspects of their operations and creating a net positive contribution (European Commission, 2017). Seacourt's wish to take all costs into account, resulted in their investment in a project that restores deforested land in Brazil. In doing so, the company creates social value as opportunities for the local population to generate revenue are offered and offsets their carbon impact.

A guiding factor in developing these new business models are circular strategies. These circular strategies aim to close resource loops, thus preserve value, by addressing current resource inefficiencies. By adopting one of these strategies, businesses can frame these resource inefficiencies as opportunities on how they wish to compete, represented in the possible approaches. Whether an approach is feasible for a business, however, depends on the current resource base of the focal firm and its ability to acquire or develop those resources and capabilities that are lacking. Hence, dynamic capabilities provide the link between strategy and feasible business models as they allow a business to alter their resource base. Moreover, different collaborative ties will be crucial for businesses to gain access to those resources and capabilities that they cannot develop or acquire.

The theoretical framework proposed incorporates the identified elements (circular strategy, approaches, dynamic capabilities, resource, capabilities, stakeholder collaboration) necessary for the development of BMCEs and their resultant outcome of multidimensional value. As such

it takes into account the impact of the characteristics of CE on business models. Moreover, it holds a dynamic perspective towards the nature of business models. In doing so, it provides a new perspective on the process of developing BMCEs that acknowledges that businesses learn and as a result will continuously refine and reconceptualize their BMCEs as technological change, changing of the business environment and other factors will allow business to become more attuned to circular notions. The shift towards a CE is not a single moment occurrence but rather one that centers on slowly but surely introducing circularity. Most businesses will, for example, begin with closing their own material cycles, i.e. eliminating the concept of waste (Jonker, Stegeman & Faber, 2018). As businesses learn, and as changes in the environment occur, more value will be preserved. The extant literature on BMCE, however, seems to focus on a single business model innovation (Lewandowski, 2016; Lieder, Asif & Rashid, 2017; Bakker et al., 2014; Lacy & Rutqvist, 2015). The theoretical framework proposed, therefore, adds to the current body of knowledge on business model innovation for BMCEs as it incorporates these key elements and the associated learning process, while also leaving room for both incremental and radical business model innovation. The example of Seacourt Ltd illustrates this nicely as the company started their business model innovation focused on a 'closing resource loop' strategy, and subsequently continued with a new iteration that also followed a 'narrowing resource loop' strategy. Moreover, the example illustrated how the theoretical framework offers a way to assess and analyze BMCEs. It allowed for identification of the most prevalent manifestations of the key elements for developing this specific type of BMCE.

The above research has also facilitated the identification of other possible manifestations of the key elements of the theoretical framework, adding to the current body of knowledge on BMCEs. Previous research on circular strategies, for example, already pointed out towards the possibility of future research identifying different strategies or sub-strategies (Bocken et al., 2016). In this case, five strategies (closing, narrowing, extending, intensifying and dematerializing) and eleven approaches or sub-strategies (Circular products, circular supplies, resource recovery, resource efficiency, long-life products, product life extension, encourage sufficiency, platform, inventory management, digitalization and servitization) have been identified. Furthermore, the most relevant capabilities and resources necessary to implement these approaches have been identified. Not all the specific resources and capabilities are identified as they are embedded in the context of the business. Since structure follows strategy, both the context and the strategy will point towards which capabilities and resources are vital.

Moreover, several dynamic capabilities relevant to the development of BMCEs are identified, such as new product development, new process development, sensing of the environment, and so on. Again, both the context of the focal business and the chosen circular strategy will determine which dynamic capabilities are specifically of importance. Furthermore, five methods for collaborating with stakeholders in order to develop BMCEs are identified, based on level of integration (informal methods, collaborative agreements, collaborative networked organizations, joint ventures, joint business model). The addition of stakeholders and collaborative ties adds new depth to current business model innovation tools and might help businesses that wish to become more circular, but do not know how to go about it, by offering ways in which to collaborate with those stakeholders vital to realizing their chosen strategy. Lastly, the introduction of a feedback loop, offered by the multidimensional value created and captured, also adds depth as it allows for moments of evaluation on whether the employed BMCE should be reconfigured or not.

### 4.2 Conclusion

An alteration of the current course in regard to our consumption and production patterns is necessary in order to sustain this generation and future ones, as the current paradigm on economics is putting a strain on the earth and its resources. The concept of a CE wishes to address this issue by proposing a system that creates economic, social and environmental value through introduction of resource loops that allow the preservation of value of products and resources. Governments, consumers and businesses have the ability to contribute towards this transition and will have to collaborate in order to achieve this. These parties have certain tools that can enable this transition such as policies, addressing consumption patterns and the concept of a business model, respectively. These business models that enable the transition towards a more CE, are also known as business models for a circular economy. Research on these BMCEs is nascent, has largely focused on conventional business model thinking, is often static and is centered on BMCE types. This thesis aims to address this gap by offering insights on how these BMCEs can be developed by adopting a dynamic capabilities perspective and its link between strategy and business models.

The theoretical framework proposed, assumes that the resource inefficiencies that a linear economy inherently contains can be viewed as opportunities for businesses to compete

and thus to create a competitive advantage. By adopting a circular strategy, direction is given to a business as these strategies offer approaches to preserve value by addressing current resource inefficiencies. As a result, resource loops are introduced. The viability of these approaches, that result into a certain BMCE, will depend on the dynamic capabilities of the focal business, its current resource base and collaboration with stakeholders. The proposed framework identifies several circular strategies, approaches, dynamic capabilities, and the most likely shape of the collaborative ties between the focal business and its stakeholders. It thus contributes to the current BMCE literature and provides guidance for decision-makers of businesses that wish to contribute towards a more CE by offering insight on the key elements for developing BMCEs. Those decision-makers now have a selection of strategies and approaches towards developing BMCEs and how to implement said approaches. Moreover, it also contributes to the current BMCE literature by offering a dynamic perspective on the development of BMCEs. As businesses become more adept in applying circular notions and the benefits of the multidimensional value created are reaped, businesses are enabled and motivated to continuously reconfigure their BMCEs in order to create greater sustainable value. Some businesses will gradually become more circular, starting with only one circular strategy and approach, while others will introduce disruptive and innovative BMCEs resulting from several circular strategies and approaches.

### *4.3.1 Limitations and future research*

The extant literature on how to develop BMCE and its distinctive types is nascent, as such the theoretical framework formulated centers on the RBV and its extension of the dynamic capabilities theory in order to conceptualize how BMCEs might be developed. By doing so it assumes that the complexity of this new breed of business models can be encompassed by viewing them as configurations of resources and capabilities that underlie the manner in which businesses create, deliver and capture value. However, as thoroughly explained, these BMCEs revolve around a very different kind of value logic, that of preservation of value. Hence, it remains questionable whether this perspective can adequately portray the complex nature and intricacies of BMCEs. More specifically, the strong need for collaboration and significant alteration of how business is conducted due to a value preservation logic bring into question whether the concept of a business model, as a configuration of resources and capabilities and

which remains focal on an organization, can thoroughly capture the new ways of organizing needed to enable a transition towards a more CE.

Another limitation of the above research is the lack of empirical evidence to corroborate the proposed theoretical framework. As such no empirical evidence is put forward to establish whether these strategies and their proposed approaches are used in practice. Moreover, no empirical evidence affirms the assumption that these strategies and approaches will actually result in the creation of multidimensional value. Furthermore, empirical evidence on BMCEs and the adoption of the formulated strategies and approaches could offer insights on the impact of the context in which specific businesses are situated. The assumption is made that the feasibility of implementing an approach is dependent on the resources base, strength of dynamic capabilities and possible stakeholders of a business, yet other factors might prove significant. For example, the political, technological, social environment and competition of a business are all factors on which implementation of a certain approach might be contingent.

Future research could focus on further refining the proposed theoretical framework through empirical studies. For example, case studies could offer insights on the actual adoption of circular strategies, approaches and other possible strategies and approaches by examining BMCEs in practice. Moreover, it would provide insights on the recurring resources, capabilities, stakeholders and collaborative ties that underlie specific BMCEs, and the dynamic capabilities that proved most vital in developing them. Investigation into the dynamic capabilities involved, the strength of these capabilities, and specific contexts of a firm, could provide insights on whether some firms are more capable of implementing circular principles than other firms. Lastly, methods that allow to quantify multidimensional value would offer insights on the actual value created by these BMCEs. This would offer academics a means to assess the extent to which BMCEs offer a sustainable manner of doing business and might spur businesses to develop BMCEs as their benefits become more apparent.

**REFERENCES**


Amit, R., & Schoemaker, P.J.H. (1993). Strategic assets and organizational rent. *Strategic Management Journal, 14*, 33-46.

Andreini, D., & Bettinelli, C. (2017). *Business model innovation*. New York, NY: Springer.

Antikainen, M., & Valkokari, K. (2016). A framework for sustainable circular business model innovation. *Technology Innovation Management Review 6*(7), 5-12.

Bakker, C., Hollander, M.D., van Hinte, E., & Zijlstra, Y. (2014). *Products that last: Product design for circular business models*. Delft: TU Delft Library.

Baden-Fuller, C., & Morgan, M. S. (2010). Business models as models. *Long Range Planning, 43*(2-3), 156-171.

Barney, J.B. (1991). Firm Resources and sustained competitive advantage. *Journal of Management, 17*(1), 99-120.

Barney, J.B. (2018). Why resource-based theory's model of profit appropriation must incorporate a stakeholder perspective. *Strategic Management Journal, 39*(13), 3305-3325. doi:10.1002/smj.2949

Beattie, V., & Smith, S.J. (2013). Value creation and business models: Refocusing the intellectual capital debate. *The British Accounting Review 45*(4), 243-254.

Benyus, J.M. (1997). *Biomimicry*. New York, NY: William Morrow.

Blomsma, F., & Brennan, G. (2017). The emergence of circular economy: A new framing around prolonging resource productivity. *Journal of Industrial Ecology, 21*(3), 603-614.

Bocken, N.M.P., & Allwood, J.M. (2012). Strategies to reduce the carbon footprint of consumer goods by influencing stakeholders. *Journal of Cleaner Production 35*, 118-129.

Bocken, N.M.P., de Pauw, I., Bakker, C., & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering, 33*(5), 308-320.

Bocken, N.M.P., Short, S., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production, 65*, 42-56.

Bonciu, F. (2014). The European economy: From a linear to a circular economy. *Romanian Journal of European Affairs, 14*(4), 78-91.

Boons, F., Lüdeke-Freund, F. (2013). Business models for sustainable innovation: State-of-the-art and steps towards a research agenda. *Journal of Cleaner Production, 45*, 9-19.

Boulding, K.E. (1966). The economics of the coming spaceship earth. In: Jarret, H. (Ed.), *Environmental quality in a growing economy: Essays from the Sixth RFF Forum* (pp. 1-20). Baltimore, MD: Johns Hopkins University Press.

Bressanelli, G., Perona, M., & Saccani, N. (2017). Reshaping the washing machine industry through circular economy and product-service system business models. *Procedia CIRP, 64*, 43-48.

Cavusgil, E., Seggie, S.H., & Talay, M.B. (2007). Dynamic capabilities view: Foundations and research agenda. *Journal of Marketing Theory and Practice, Spring*, 159-166.

Chandler, A.D. (1962). Strategy and structure: Chapters in the history of the American industrial enterprise. Cambridge, MA: MIT Press.

Charter, M. (2019). *Designing for the circular economy*. New York, NY: Routledge.

Chesbrough, H. (2007). Business model innovation: It's not just about technology anymore. *Strategy & Leadership, 35*, 12-17.

Chilosi, A. (2003). *Coordination, cooperation, and the extended Coasean Approach to economic policy*. Pisa, Italy: Facolta di Scienze Politiche.

Connolly, J., & Prothero, A. (2003). Sustainable consumption: Consumption, consumers and the commodity discourse. *Consumption, Markets and Culture, 6*, 275-291.

Cuijpers, M., Guenter, H., & Hussinger, K. (2011). Costs and benefits of inter-departmental innovation collaboration. *Research Policy, 40*, 565-575.
DaSilva, C. M., & Trkman, P. (2014). Business model: What it is and what it is not. *Long Range Planning, 47*(6), 379-389. doi: 10.1016/j.lrp.2013.08.004
Dauvergne, P. (2008). *The shadows of consumption: Consequences for the global environment*. Cambridge, MA: The MIT Press.
De Angelis, R. (2018). *Business models in the circular economy*. Cham, Switzerland: Palgrave Macmillan.
De Jesus, A., & Mendonça, S. (2018). Lost in transition? Drivers and barriers in the eco-innovation road to the circular economy. *Ecological Economics*, *145*, 75-89.
Eisenhardt, K.M., & Martin, J.A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal Strat. Mgmt., 21*, 1105-1121.
Eisenhardt, K.M., & Schoonhoven, C.B. (1996). Resource-based view of strategic alliance formation: Strategic and social effects in entrepreneurial firms. *Organization Science 7*(2), 136-150.
Elkington, J. (2004). Enter the triple bottom line. In J. Elkington (Ed.), *The triple bottom line: Does it all add up?* (pp. 1-12). London, UK: Earthscan.
EMF (Ellen MacArthur Foundation). (2013). *Towards the circular economy. Economic and Business Rationale for an Accelerated Transition*. Retrieved from https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf.
EMF (Ellen MacArthur Foundation). (2014). *Towards the circular economy: Accelerating the scale-up across global supply chains*. Paper presented at the World Economic Forum, Geneva.
EMF (Ellen MacArthur Foundation). (2015). *Delivering the circular economy: A toolkit for policymakers*. Cowes, UK: Ellen MacArthur Foundation.
Erkman, S. (1997). Industrial ecology: An historical view. *Journal of Cleaner Production, 5*(1-2), 1-10.
Esposito, M., Tse, T., & Soufani, K. (2017). The circular economy: An opportunity for renewal, growth, and stability. *Thunderbird International Business Review, 0*(0), 1-5.
European Commission. (2014). *Towards a circular economy: A zero waste programme for Europe*. Brussels: European Commission.
European Commission. (2015). *Closing the loop: An EU action plan for the circular economy*. Brussels: European Commission. Retrieved from http://eur-lex.europa.eu/resource.html?uri=cellar:8a8ef5e8-99a0-11e5-b3b7-01aa75ed71a1.0012.02/DOC_1&format=PDF, on 12 February 2018.
European Commission. (2017). *Moving towards a circular economy with EMAS: Best practices to implement circular economy strategies (with case study examples)*. Luxembourg; European Union. Doi: 10.2779/463312.
Fadeeva, Z. (2005). Promise of sustainability collaboration: Potential fulfilled? *Journal of Cleaner Production, 13*(2), 165-174.
Freudenreich, B., Schaltegger, S., & Lüdeke-Freund, F. (2019). A stakeholder theory perspective on business models: Value creation for sustainability. *Journal of Business Ethics, (2019)*. https://doi-org.ru.idm.oclc.org/10.1007/s10551-019-04112-z
Frosch, R.A., & Gallopoulos, N.E. (1989). Strategies for manufacturing. *Scientific America, 261*(3), 144-152.
Geisendorf, S., & Pietrulla, F. (2017). The circular economy and circular economic concepts: A literature analysis and redefinition. *Thunderbird International Business Review, 2017*, 1-12.

Geissdoerfer, M., Savaget, P., Bocken, N.M.P., & Hultink, E.J. (2017). The circular economy: A new sustainability paradigm? *Journal of Cleaner Production, 143*, 757-768.

Geissdoerfer, M., Morioka, S.N., Monteiro de Carvalho, C., Evans, S. (2018). Business models and supply chains for the circular economy. *Journal of Cleaner Production, 190*, 712-721.

Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems. *Journal of Cleaner Production, 114*, 11-32.

Goyal, S., Esposito, M., & Kapoor, A. (2016). Circular economy business models in developing economies: Lessons from India on reduce, recycle, and reuse paradigms. *Thunderbird International Business Review, 2016*, 1-15.

Guo, B., Yong, G., Sterr, T., Zhu, Q., & Liu, Y. (2017). Investigating public awareness on circular economy in western China: A case of Urumiqi Midong. *Journal of Cleaner Production, 142*, 2177-2186.

Hagedoorn, J. (1993). Understanding the rationale of strategic technology partnering: Interorganizational modes of cooperation and sectoral differences. *Strategic Management Journal 14*, 371-385.

Hawken, P., Lovins, A.B., & Lovins, L.H. (2013). *Natural capitalism: The next industrial revolution*. London, UK: Routledge.

Heikkilä, M., & Heikkilä, J. (2013). Collaborative business model innovation process for networked services. In: Järveläinen, J., Li, H., Tuikka, A.M., & Kuusela, T. (Eds.), *Co-create effective, Agile, and Trusted eservices* (p. 133-147). Berlin, Germany: Springer Heidelberg.

Heiskanen, E., & Pantzer, M. (1997) Towards sustainable consumption: Two new perspectives. *Journal of Consumer Policy, 20,* 409-442.

Hobson, H. (2002). Competing discourses of sustainable consumption: Does the "rationalization of lifestyles" make sense? *Environmental Politics, 11*(2), 95-120.

Jonker, J., Stegeman, H., & Faber, N. (2018). *De circulaire economie: Denkbeelden, ontwikkelingen en business modellen*. (Whitepaper). Retrieved from https://www.researchgate.net/publication/322355778_De_Circulaire_Economie_Denkbeeld en_ontwikkelingen_en_business_modellen, on 7 February 2018.

Kilbourne, W., McDonagh, P., & Prothero, A. (1997). Sustainable consumption and the quality of life: A macromarketing challenge to the dominant social paradigm. *Journal of Macromarketing, 17*, 4-24.

Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation & Recycling, 127*, 221-232.

Kopnina, H. (2014). Consumption, waste and (un)sustainable development: Reflections on the Dutch holiday of Queen's day. *Environment Systems and Decisions, 34*(2), 312-322.

Korhonen, J., Honkasalo, A., & Seppälä, J. (2018). Circular economy: The concept and its limitations. *Ecological Economics, 143*, 37-46.

Kraaijenhagen, C., van Oppen, C., & Bocken, N.M.P. (2016). *Circular business: Collaborate and circulate*. Amersfoort, NL: Circular Collaboration.

Lacy, P., & Rutqvist, J. (2015). *Waste to wealth: The circular economy advantage*. New York, NY: Palgrave Macmillan.

Leising, E., Quist, J., & Bocken, N. (2018). Circular economy in the building sector: three cases and a collaboration tool. *Journal of Cleaner Production 176*(1), 976-989.

Lewandowski, M. (2016). Designing the business models for circular economy: Towards the conceptual framework. *Sustainability, 8*(1), 43.

Lieder, M., Asif, F.M.A., & Rashid, A. (2017). Towards circular economy implementation: An agent-based simulation approach for business model changes. *Autonomous Agent and Multi-Agent Systems, 31,* 1377-1402.

Lifset, R., & Graedel, T.E. (2002). Industrial ecology: Goals and definitions. In: Ayres, R.U., & Ayres, L. (Eds.). *A handbook of industrial ecology*. Edward Elgar: Brookefield, 3-15.

Linder, M., & Williander, M. (2017). Circular business model innovation: Inherent uncertainties. *Business Strategy and the Environment*, *26*(2), 182-196.

London, B. (1932). *Ending the depression through planned obsolescence*. Retrieved from https://upload.wikimedia.org/wikipedia/commons/2/27/London_(1932)_Ending_the_depression_through_planned_obsolescence.pdf.

Lyle, J.T. (1996). *Regenerative design for sustainable development*. New York, NY: Wiley.

Mallapur, C. (2014). *3 Million truckloads daily: India's real trash problem*. Retrieved from http://www.indiaspend.com/cover-story/3-million-truckloads-daily-indias-real-trash-problem-68539.

Manninen, K., Koskela, S., Antikainen, R., Bocken, N., Dahlbo, H., & Aminoff, A. (2018). Do circular economy business models capture intended environmental value propositions? *Journal of Cleaner Production, 171*, 413-422.

Magretta, J. (2002). Why business models matter. *Harvard Business Review, 80*(5), 85-92.

McDonough, W., & Braungart, M. (2002). *Cradle to cradle: Remaking the way we make things*. New York, NY: North Point Press.

McGrath, R.G. (2010). Business models: A discovery driven approach. *Longe Range Planing, 43*(2), 247-261.

Mendoza, J.M.F., Sharmina, M., Galeggo-Schmid, A., Heyes, G., & Azapagic, A. (2017). Integrating backcasting and eco-design for the circular economy. *Journal of Industrial Ecology, 21*(3), 526-544.

Mentink, B. (2014). *Circular business model innovation: a process framework and a tool for business model innovation in a circular economy*. Leiden, NL: Delft University of Technology & Leiden University.

Merli, R., Preziosi, M., & Acampora, A. (2018). How do scholars approach the circular economy? A systematic literature review. *Journal of Cleaner Production, 178*, 703-722. https://doi.org/10.1016/j.jclepro.2017.12.112

Mont, O.K. (2002). Clarifying the concept of product-service system. *Journal of Cleaner Production, 10*(3), 237-245.

Moreau, V., Sahakian, M., van Griethuysen, P., & Vuille, F. (2017). Coming full circle: Why social and institutional dimensions matter for the circular economy. *Journal of Industrial Ecology, 21*(3), 497-506.

Moreno, M., De los Ricos, C., Rowe, Z., & Charnley, F. (2016). A conceptual framework for circular design. *Sustainability, 8*, 1-15.

Morris, M., Schindehutte, M., & Allen, J. (2005). The entrepreneur's business model: Toward a unified perspective. *Journal of Business Research, 58*(6), 726-735. doi:10.1016/j.jbusres.2003.11.001

Murray, A., Skene, K., & Haynes, K. (2017). The circular economy: An interdisciplinary exploration of the concept and application in a global context. *Journal of Business Ethics, 140,* 369-380.

Nußholz, J.L.K. (2017). Circular business models: Defining a concept and framing an emerging research field. *Sustainability 9*(10), 1810-1826.

Nußholz, J.L.K. (2018). A circular business model mapping tool for creating value from prolonged product lifetime and closed material loops. *Journal for Cleaner Production 197*(1), 185-194

Osterwalder, A. & Pigneur, Y. (2013). *Business model generation*. Lausanne, Switzerland: Osterwalder & Pigneur.
Osterwalder, A., Pigneur, Y., & Tucci, C. L. (2005). Clarifying business models: Origins, present, and future of the concept. *Communications of the Association for Information Systems, 16*(1), 1.
Pauli, G.A. (2010). *The blue economy: 10 years, 100 innovations, 100 million jobs*. Taos, NM: Paradigm.
Penrose, E.V. (1959). *The theory of the growth of the firm*. New York, NY: John Wiley.
Pereira Heath, M.T., & Chatzidakis, A. (2012). 'Blame it on marketing': Consumers' views on unsustainable consumption. *International Journal of Consumer Studies, 36*, 656-667.
Piesing, M. (2017, October 11). Is this smallest printing company in Oxford the greenest in the world? *I-News*. Retrieved from https://inews.co.uk/news/environment/seacourt-greenest-company-printing-oxford-96737.
Planing, P. (2015). Business model innovation in a circular economy: Reasons for non-acceptance of circular business models. *Open Journal of Business Model Innovation, 2015,* in press.
Porter, M.E. (1985). *Competitive Advantage*. New York, NY: The Free Press.
Porter, M. E. (1996). What is strategy? *Harvard business review, 74*(6), 61-78.
Ragossnig, A. M., & Schneider, D. R. (2019). Circular economy, recycling and end-of-waste. *Waste Management & Research: The Journal of the International Solid Wastes and Public Cleansing Association, Iswa*, *37*(2), 109–111. https://doi-org.ru.idm.oclc.org/10.1177/0734242X19826776
Ratneshwar, S., Mick, D.G., & Hufmann, C. (2000). *The Why of Consumption: Contemporary Perspectives on Consumer Motives, Goals and Desires*. London, UK: Routledge.
Reike, D., Vermeulen, J.V., & Witjes, S. (2017). The circular economy: New or refurbished as CE 3.0? - Exploring controversies in the conceptualization of the circular economy through focus on history and resource value retention. *Resources, Conservation & Recycling*. In press. https://doi.org/10/1016/j.resconrec.2017.08.027.
Rizos, V., Behrens, A., van der Gaast, W., Hofman, E., Ioannou, A., Kafyeke, T., Flamos, A., Rinaldi, R., Papadelis, S., Hirschnitz-Garbers, M., & Topi, C. (2016). Implementation of circular economy business models by small and medium-sized enterprises (SMEs): Barriers and enablers. *Sustainability, 8*(11), 1212-1230.
Romero, D., & Molina, A. (2011). Collaborative networked organisations and customer communities: value co-creation and co-innovation in the networking era. *Production Planing & Control 22*(5-6), 447-472.
Roos, G. (2014). Business model innovation to create and capture resource value in future circular material chains. *Resources, 3*(1), 248-274.
Ruitenburg, M.K., Toxopeus, M.E., & Braaksma, A.J.J. (2016). Embedding the circular economy in investment decision-making for capital assets: A business case framework. *Procedia CIRP 48*, 425-430.
Sheu, J. (2014). Green supply chain collaboration for fashionable consumer electronics products under third-party power intervention: A resource dependence perspective. *Sustainability 6*, 2832-2875.
Sihvonen, S., & Ritola, T. (2015). Conceptualizing ReX for aggregating end-of-life strategies in product development. *Procedia CIRP, 29*, 639-644.
Stahel, W. (1994). The utilization-focused service economy: Resource efficiency and product-life extension. In Richards, D.J., & Allenby, B.R. (Eds.). *The greening of industrial ecosystems*. National Academies Press: Washington DC, 178-190.
Stahel, W. (2016). Circular economy. *Nature, 531*(7595), 435-438.

Teece, D.J. (2010). Business models, business strategy and innovation. *Long Range Planing*, *43*(2-3), 172-194.
Teece, D.J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal 18*(7), 509-533.
Traverso, M., Bell, L., Saling, P., & Fontes, J. (2018). Towards social life cycle assessment: A quantitative product social impact assessment. *The International Journal of Life Cycle Assessment 23*, 597-606.
Tukker, A. (2004). Eight types of product-service system: Eight ways to sustainability? Experiences from SusProNet. *Business Strategy and the Environment, 13*(4), 246-260
Tukker, A. (2015). Product services for a resource-efficient and circular economy: A review. *Journal of Cleaner Production, 97*, 76-91.
Upward, A., & Jones, P. (2016). An ontology for sustainable business models. *Organization & Environment, 29*(1), 97-123.
Urbinati, A., Chiaroni, D., & Chiesa, V. (2017). Towards a new taxonomy of circular economy business models. *Journal of Cleaner Production, 168*, 487-498.
Uyurra, E., Edler, J., Garcia-Estevez, J., Georghiou, L., & Yeow, J. (2014). Barriers to innovation through public procurement: A supplier perspective. *Technovation, 34*, 631-645.
Uyurra, E., & Flanagan, K. (2010). Understanding the innovation impacts of public procurement. *European Planing Studies, 18*(1), 123-143.
Van Renswoude, K., ten Wolde, A., Joustra, D. (2015). *Circular business models – part 1: An introduction to IMSA's circular business model scan*. Amsterdam, NL: IMSA.
Varey, R. (2010). Marketing means and ends for a sustainable society: A welfare agenda for transformative change. *Journal of Macromarketing, 30,* 112-126.
WCED (World Commission on Environment and Development). (1987). *Report of the World Commission on Environment and Development: Our common future*. Retrieved from https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf, on 7 February 2018.
Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal, 5*(2), 171-180.
Winkler, H. (2011). Closed-loop production systems: A sustainable supply chain approach. *CIRP Journal of Manufacturing Science and Technology 4*(3), 243-246.
Witjes, S., & Lozano, R. (2016). Towards a more circular economy: Proposing a framework linking sustainable public procurement and sustainable business models. *Resources, Conservation and Recycling, 112*, 37-44.
Yuan, Z., Bi, J., & Moriguichi, Y. (2006). The circular economy: A new development strategy in China. *Journal of Industrial Ecology, 10*(1-2), 4-8.
Zink, T., & Geyer, R. (2017). Circular economy rebound. *Journal of Industrial Ecology, 21*(3), 539-602.
Zott, C., & Amit, R. (2010). Business model design: An activity system perspective. *Longe Range Planing, 43*(2), 216-226.
Zott, C., Amit, R., & Massa, L. (2011). The business model: Recent developments and future research. *Journal of Management, 37*(4), 1019-1042. doi:10