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Influencing factors driving collaboration in circular business models

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ABSTRACT

The transition from a linear to a Circular Economy is considered a revolutionary step toward a greener economy. Ensuring a successful transition requires radical changes in our current siloed approach to applying circular business models. Such models aim to mitigate negative environmental impact whilst fostering growth and prosperity. This research focuses on three models ('Circular Supply', 'Resource Recovery' and 'Product-Life-Extension'). It aims to explore their collaborative aspects and influencing factors in the transition process towards circular ecosystems. By applying the theoretical lens of Social Capital Theory, with its characteristics of bonding, linking and bridging, findings revealed a snapshot of current circular practices in various industry sectors. In addition, the influencing factors for the specific Circular Business Models were identified based on the seven categories of: (1) Awareness/Social/Community; (2) Circular Workplace Environment; (3) Circular Material; (4) Customer and Market demand; and (5) Business and political standards, (6) Perception and individual standards/expertise, and (7) Communication skills. Finally, the findings were used to offer practical insights for organizations beginning their circular journey, with the categories being mapped alongside the CBMs.

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Circular economy; social capital theory; product life extension; resource recovery; circular business models

1. Introduction

The circular paradigm gained growing attention amongst practitioners, policymakers, the public and academia as an approach to jointly reaching sustainability based on the common grounds of the Brundtland Report. Therefore, the paradigm aims to decouple economic growth from overconsumption and resource extraction (Bressanelli et al. 2018). Raw material use is minimised and kept in loops for as long as possible (Urbinati, Franzò, and Chiaroni 2021). In parallel, the evolving working and living environment has made consumers more contemplative and reflective of the current climate crisis which our planet faces. Changes in consumer viewpoints are apparent and have direct consequences for the economy and its applied business models (Baldassarre et al. 2017). Although research agrees that Circular Economy (CE), in its core, unites various concepts and principles to ultimately close material and production loops (Geissdoerfer et al. 2017), there is not yet a unified definition for circularity (Kirchherr, Reike, and Hekkert 2017).

Circularity is proposed as systems changing concept aiming to close the loop in industrial ecosystems whilst recreating and maintaining value over the long term (Stahel, 2016; Jabbour 2019).

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This approach is in its depth guided by three circular principles (EMF 2013; Veleva, Bodkin, and Todorova 2017). The first principle refers to the thought of *designing out waste* and explains the idea of CE, where waste does not exist. Products and services need to be designed to join the disassembly cycle at any point in the life cycle (EMF 2013). The second principle pleads for a strict separation of consumable and durable products. Therefore, biological nutrients should be returned to the biosphere, whereas technical nutrients should be reused infinitely. The third principle looks at the energy required to fuel circular cycles. It aspires to change energy usage mainly to renewable energies, to decrease resource dependence and to foster a resilient system (EMF 2013; Veleva, Bodkin, and Todorova 2017).

With further evolution of the circular paradigm, the principles of the circular economy have been adapted to a variety of archetypes and frameworks, supporting the implementation of circularity in the wider context (Battista 2018; Bocken et al. 2014; Jabbour 2019). In addition, the R-strategies are increasingly popular in aiding organisations to identify their level of circularity (Kirchherr, Reike, and Hekkert 2017). This undergoing transformation has an impact on the way how organisation run their business. Hence, there is notifiable change towards circular business models (CMBs).

CBMs are described as 'business models that are suited for the Circular Economy by incorporating elements that slow, narrow and close resource loops' (Geissdoerfer, Vladimirova, and Evans 2018b, 13). In doing so, resource input to the organisation and its wider network is decreased and possible waste out of the system is minimised (Bocken et al. 2016; Geissdoerfer, Vladimirova, and Evans 2018b, 13). In adopting a circular business model, organisations are now more and more involved in exploring new ideas and innovations with innovative concepts to include and incorporate CBMs (Elzinga et al. 2020; Teece 2010; Wells and Seitz 2005). Reviewing the literature indicated that CBMs gained greater momentum over the years (Geissdoerfer, Vladimirova, and Evans 2018b). Their implementation, however, is far from being accomplished (Hina et al. 2022). The outputs from CBMs could be the following: resource optimisation, closed-loop systems, innovation and knowledge sharing, policy and regulatory support, market creation and scale-up, traceability and transparency; each of which requires more coordination and collaboration between stakeholders involved in the closed-loop supply chains. In achieving these significant and sustainable changes, organisations need to work in a more systematic and collective manner, compared to currently applied silo approaches (Brown and Bajada 2018; Heath 2016; Kraaijenhagen, van Oppen, and Bocken 2016).

For their successful implementation, CBMs rely on collaborative practices to fulfil their potential in the greater ecosystem (Kraaijenhagen, van Oppen, and Bocken 2016). Therefore, individual actors can be limited in the opportunities and synergies arisen from CBMs, if they aim to unilaterally fulfil the transition to circularity without partnering other organisations. Hence, collaborative initiatives remain an essential part for the successfull implementation and operationalisation of CBMs (Brown and Bajada 2018; Kraaijenhagen, van Oppen, and Bocken 2016). Although previous literature has identified partners for circular collaboration (Kirchherr et al. 2018; Millar, McLaughlin, and Börger 2019), little is known about the perception of and the interplay between these collaborative partners in collaborative constructs such as CBMs. Circular collaborative activities are increasingly considered as an effective solution to mitigate the negative impact on the environment while fostering growth and prosperity (Geissdoerfer, Vladimirova, and Evans 2018b). A variety of authors have investigated influencing factors from individual perspectives with some focusing on the customer perspective (Gomes et al., 2022) and others concentrating on collaborative networking approaches (Kraaijenhagen, van Oppen, and Bocken 2016). However, a systematic overview, including a clear classification and identification of influencing factors in relation to CBMs is missing. Geissdoerfer, Vladimirova, and Evans (2018b) posed new research directions by stating that 'the influence of a better understanding of the relationship between the Circular Economy and sustainability and their influences over the performance of supply chains, business models, and innovation systems' (767).

How important this gap still is can be emphasised in a recent publication by Aloini et al. (2020), who identified influencing factors in the form of enablers and barriers of circularity based on a review. However, despite research having identified barriers and challenges for circularity (Aloini et al. 2020), little is known about practical solutions for overcoming such barriers and challenges and the factors aiding in the process when applying a CBM. Thus, this research aims to explore the collaborative aspects of CBMs and their influencing factors fostering the transition process to circular ecosystems. Therefore, this paper poses the following research questions:

(1) How is circular collaboration perceived in different industry sectors?
(2) What are the influencing factors driving circular initiatives for different Circular Business Models?

In answering the research questions, the objectives include the exploration of a range of circular practices, their challenges and benefits, and the identification of influencing factors aiding the transition process to circular ecosystems.

The remainder of the paper proceeds with Section 2, which describes the context of the study by providing insights into Circular Business Models, influencing factors and the R-Strategies in the form of a literature review. Next, section 3 introduces the method applied in conducting the empirical case study research, followed by Section 4, which presents and discusses the findings for the influencing factors by mapping them against their industry sector and R-Strategy as part of the discussion. Finally, in Section 5, concluding remarks and future research directions are given under careful consideration of the research limitations.

2. Literature review

2.1. Circular business models

CE is being praised as the solution to harmonising the co-existence of economic growth and environmental protection in business processes (Lieder and Rashid 2016). To fulfil these, circularity needs to be inclusive and adaptable across different industry sectors. This could be achieved by applying multidimensional concepts, which emphasise the idea of open material flows, waste prevention- and resource efficiency strategies (de Jesus and Mendonça 2018; Loiseau 2016). A variety of frameworks have been explored over the years (Lewandowski 2016), including the Business Model Canvas for value creation (Nußholz 2017; Osterwalder and Pigneur 2010), a diverse range of resource efficiency strategies (Nußholz 2017), and the ReSolve framework as an operational decision-making tool (Jabbour 2019). The development of these frameworks has provided the theoretical baseline for circular concepts (EMF 2015). However, as a next step, these concepts need to be successfully implemented in daily business processes and consumption patterns (Su et al. 2013). Seemingly approachable and popular in that regard appear to be the *R-Strategy*. Initially the R-strategy consistent of the 3Rs of *reduce, reuse and recycle* (Sakai 2011). Over the years, the strategy expanded to 10Rs, illustrating in greater depth the possibilities of smarter material and product usage and circularity (Kirchherr, Reike, and Hekkert 2017; van Buren et al. 2016). Therefore, it is argued that the 10R strategy promotes smarter material and product usage, similar to the waste hierarchy. Table 1 shows the Rs in their context of application.

However, in implementing the R-strategies, a shift from linear to circular business models is required. Research has shown the concept of CBMs has been discussed from an early stage, often in the context of circular value creation (Geissdoerfer et al. 2020; Schwager and Moser 2006). The circular paradigm and the concepts of CBMs have received greater attention from academics, practitioners, and politicians from various perspectives (Charter 2016). Despite huge efforts, CBMs are still interpreted and defined from a multitude of angles. For this research, Nußholz (2017) definition has been selected

Table 1. R-strategies (Source: adapted from Kirchherr, Reike, and Hekkert 2017).

R-strategies		
Smarter product use and manufacture	R0	Refuse
	R1	Rethink
	R2	Reduce
Extend the lifespan of a product and its parts	R3	Reuse
	R4	Repair
	R5	Refurbish
	R6	Remanufacture
	R7	Repurpose
Useful application of materials	R8	Recycle
	R9	Recover

> A circular business model is how a company creates, captures, and delivers value with the value creation logic designed to improve resource efficiency through contributing to extending useful life of product and parts (e.g. through long-life design, repair and remanufacturing) and closing material loops. (12)

Considering the depth of interpretation for CBMs, the research identified a variety of CBMs and attempted to classify them. Table 2 shows the breadth of interpretations and attempts for classification. Some scholars revealed classifications based on possible cycle times of materials (van Renswoude, ten Wolde, and Joustra 2015), while others differentiate based on the execution of the business models for commercial and operational purposes i.e. commercial and operation business models (Weetman, 2017). Nevertheless, most models offer categorisations based on the circular activity conducted (i.e. cycling, extending). For this research, the focus has been on three of the five CBMs identified by Lacy (2014): Circular Supply, Resource Recovery and Product-Life Extension. Lacy et al.'s (2014) classification has found a wide application as key studies in the field of circularity (Bressanelli et al. 2018; De Angelis 2016; Geissdoerfer et al. 2020), as well as political- and industrial institutions at European level.

Independent of their classification, CBMs require collaborative behaviour among actors to fulfil their goals in a greater ecosystem. Organisations cannot achieve circularity on their own; neither can an individual sector fulfil such a tremendous change independently (Heath 2016). Preston (2012) states,

> In a world of high and volatile resource prices, a CE offers huge business opportunities. […] but to drive broader change it is critical to collect and share data, spread best practice, invest in innovation, and encourage business-to-business collaboration. (Preston 2012, 1)

Hence, willingness towards courageous partnerships and collaboration in circular networks is vital (Heath 2016). The different stakeholders in circular networks, including governmental agencies and legislators, have previously been identified by scholars (Brown and Bajada 2018). Therefore, collaboration is a crucial prerequisite for required system change driving circular initiatives forward.

Successful CBMs manage to create micro level systems in which partners collaboratively work in a circular manner on an inter- and intra-organisational level (Kraaijenhagen, van Oppen, and Bocken 2016). Hence, there is a growing rise to explore archetypes for circularity and circular supply chains, which are often referred to as Circular Supply Chains Networks (Battista 2018; Leising, Quist, and Bocken 2018; Touboulic and Walker 2015). Research considers collaboration as critical success factor (Bertassini et al. 2021; Blomsma 2018; Brown et al. 2021; Geissdoerfer et al. 2018a) aiding to unlock circular value, which manages the thin line between financial, environmental, and societal change (Heath 2016; Kraaijenhagen, van Oppen, and Bocken 2016; Stephenson 2015; Weetman 2017). It is argued that circular change can only occur at the business and network levels (Brown and Bajada 2018).

Another difficulty identified is the inverse motivation among multiple stakeholders involved in a CBM. Aligning and converging stakeholders' aims and sharing a common vision is vital but finding and including a multitude of stakeholders for a CBM is a different matter (Kirchherr et al. 2018; Millar, McLaughlin, and Börger 2019). A variety of stakeholders driving the way towards

Table 2. Overview circular business models.

	Identified CBMs	
A	1. The Access Model	*(Bakker et al. 2014)*
	2. The Performance Model	
	3. The Hybrid Model	
	4. The classic long-life model	
	5. The gap exploiter	
B	1. Encouraging sufficiency	*(Bocken et al. 2016)*
	2. Industrial Symbiosis	
	3. Access and Performance Model	
	4. Classic long life	
	5. Extending product value	
C	1. Short Cycle	*(van Renswoude et al. 2015)*
	a) Pay-per-use	
	b) Repair	
	c) Waste reduction	
	d) Sharing platforms	
	e) Progressive purchase	
	2. Long cycle	
	a) Performance-based contracting	
	b) Take-back management	
	c) Next-life sales	
	d) Refurbish & resell	
	3. Cascades	
	a) Upcycle	
	b) Recycling	
	c) Collaborative production	
	4. Pure circles	
	a) Cradle-to-cradle	
	b) Circular sourcing	
	5. Dematerialised service	
	a) Physical to virtual	
	b) Subscription-based rental	
	c) Produce on-demand	
	d) Produce on-order	
D	1. Cycling,	*(Geissdoerfer et al., 2020)*
	2. Extending	
	3. Intensifying,	
	4. Dematerialising	
E	1. Pay-per-use,	*(Whalen and Whalen 2020)*
	2. Product life extension	
	3. Resource Value Extension	
F	1. Circular Supply Models	*(Lacy et al. 2014; Lacy and Rutqvist 2015; Moreno et al. 2016; OECD 2019; Sehnem 2019)*
	2. Resource Recovery Models	
	3. Product Life Extensions	
	4. Sharing Models	
	5. Product as a service model	
G	1. Sharing and extended use	*(Larsson 2018)*
	2. Recycling and upcycling	
	3. Biologically based material	
H	1. Commercial Models	*(Weetman 2017)*
	a) Sell	
	b) Exchange	
	c) Share	
	d) Rent or lease	
	e) Service, performance, or results	
	2. Circular Operating Models	
	a) Recovery and recycling	
	b) Resell and reuse	
	c) Refill and maintain	
	d) Remanufacture	

sustainable and circular practices have been identified. Besides suppliers, customers, policy, and the overarching society, collaborative networks can include investors, government agencies, non-profit organisations, or other special interest groups, as well as media, manufacturers, and retailers (Brown and Bajada 2018). Interestingly, there is not yet a consensus about how to incorporate all stakeholders in one big circular setting, including identifying the challenges and benefits of such collaborative partnerships or their implementation alongside (Leipold and Petit-Boix 2018; Millar, McLaughlin, and Börger 2019).

The development and realisation of CBMs require a widespread and accelerated transition to a more sustainable society (Santa-Maria, Vermeulen, and Baumgartner 2021). This includes an enhanced understanding of the factors that influence the adoption of CBMs, to ultimately ensure a smooth and successful transition period. Therefore, the influencing factors are discussed in Section 2.2.

2.2. Influencing factors

Numerous studies have looked at the influencing factor in achieving circularity (Aloini et al. 2020; Rizos 2016; Sandvik and Stubbs 2019; Urbinati, Franzò, and Chiaroni 2021). In support of further fostering the transition to CE, these identified factors have often been grouped based on the triple bottom line perspective (Aloini et al. 2020), as well as the three perspectives of micro, meso and macro (Urbinati, Franzò, and Chiaroni 2021). Moreover, organisational, institutional, and technological influencing factors were identified from the literature (Aloini et al. 2020; Urbinati, Franzò, and Chiaroni 2021). Emerged groupings will be further explored and discussed.

In most cases, *economic influencing factors,* such as the volatile market price for virgin material or higher procurement costs, are considered positive influence for circularity (Andersen 2007; de Jesus and Mendonça 2018; Esposito, Tse, and Soufani 2017; Ghisellini, Cialani, and Ulgiati 2016; Linder and Williander 2017; Urbinati, Franzò, and Chiaroni 2021; Zhu and Geng 2013). The usage of effective material recovery systems supports reducing material recovery- and disposal costs. Additional cost savings can be achieved when sharing by-products or waste resources, rather than paying high disposal costs or landfill tax (Atasu and Subramanian 2012; Budak and Ustundag 2017; Galbreth, Boyacı, and Verter 2013; Kumar and Putnam 2008). Nonetheless, high investment and upfront costs were listed as economic barriers to circularity (Grafström and Aasma 2021; Masi, Day, and Godsell 2017; Preston 2012; Rizos 2016; Urbinati, Franzò, and Chiaroni 2021; Vanner 2014).

A growing knowledge shift towards environmental initiatives, and an increasing green awareness from the customers were listed as *environmental influencing factors* (Sehnem et al. 2019a; Todeschini et al. 2017). This has positively influenced the development of green and circular procurement strategies (Julianelli et al. 2020; Sehnem et al. 2019a; Todeschini et al. 2017).

As the last of the triple bottom line factors, *societal influencing factors* appear to relate to the end consumer. Literature notes that end-consumers emerging from a B2B and B2C market are more aware of the current CE movement than consumers from a B2C market. Therefore, the literature states consumers' knowledge of circular practices (Guo et al. 2017), environmental-friendly disposal strategies (Richter and Koppejan 2016), and the benefits of being part of a circular loop, vary between the consumer groups of different markets. Many studies have focused on consumer behaviour in the context of remanufactured products. Remanufactured products are said to increase the well-being of consumers and their social and personal benefits (Wang et al. 2013). Nevertheless, remanufactured products must be consumer-attractive, suiting their specific needs (De los Rios and Charnley 2017). Moreover, applying them in a circular setting requires trust and commitment from the end-consumers (Wang et al. 2013). In addition, a strong reputation combined with social recognition is a huge enabler (Rizos 2016; Sehnem 2019). Nonetheless, a gap has been identified, as a definition of social value in the context of circularity, and how this value is being measured, is missing (Preston 2012; Rizos 2016; Sehnem et al. 2019b).

Besides the triple bottom line groupings, scholars have also started filtering influencing factors based on organisational and institutional factors. In doing so, organisational influencing factors refer to factors generated by internal and administrative aspects, whilst institutional factors are defined as external factors influencing the adoption of circular approaches.

To begin with, product complexity and circular design initiatives have been identified as positive and negative influencing factors (Grafström and Aasma 2021). It is argued that complex production processes or product components can often hinder the adoption of circular initiatives (de Jesus and Mendonça 2018). Changes in product and market demands, as well as volatility in quality and amount of returned materials, are seen as barriers (den Hollander, Bakker, and Hultink 2017; Fischer and Pascucci 2017; Grafström and Aasma 2021; Kirchherr et al. 2018; Masi, Day, and Godsell 2017; Urbinati, Franzò, and Chiaroni 2021). In this context, often feared but unspoken is the threat of losing reputation or legitimacy when customers might falsely associate a lower quality with recycled products (Fischer and Pascucci 2017; Park, Sarkis, and Wu 2010; Su et al. 2013). A further identified barrier is managerial decision-making (Su et al. 2013; Urbinati, Franzò, and Chiaroni 2021; Veleva, Bodkin, and Todorova 2017). Managers

Table 3. Overview influencing factors identified in literature.

Influencing Factors Overview	
Economic Factors	
Amortisation and Investment costs	Atasu and Subramanian 2012; Galbreth, Boyacı, and Verter 2013; Rizos 2016; Masi, Day, and Godsell 2017; Kirchherr et al. 2018; Grafström and Aasma 2021;
Cost reduction for recovery-, disposal-, operational costs	Atasu and Subramanian 2012; Julianelli et al. 2020; Urbinati, Franzò, and Chiaroni 2021
Material costs	Schulte 2013; Linder and Williander 2017; Ghisellini, Cialani, and Ulgiati 2016; Esposito, Tse, and Soufani 2017; de Jesus and Mendonça 2018; Kirchherr et al. 2018; Urbinati, Franzò, and Chiaroni 2021
Environmental Factors	
Consumer perception, awareness, willingness	Rizos 2016; Masi, Day, and Godsell 2017; Todeschini et al. 2017; Kirchherr et al. 2018; Sehnem 2019
Material recovery systems	Geng et al. 2009; Zhu et al. 2015
Procurement	Julianelli et al. 2020
Social Factors	
Knowledge and Social Recognition	Rizos 2016; Sehnem 2019; Aloini et al. 2020
Technological Factors	
Information systems (information sharing, and -flow)	Julianelli et al. 2020; Urbinati, Franzò, and Chiaroni 2021
Data availability	Masi, Day, and Godsell 2017; Kirchherr et al. 2018
Lack of training	Aloini et al. 2020
Availability of technology, and development	Mathews and Tan 2011; Bakker et al. 2014; Todeschini et al. 2017; de Jesus and Mendonça 2018; Sehnem et al. 2019b; Aloini et al. 2020; Julianelli et al. 2020; Urbinati, Franzò, and Chiaroni 2021
Organisational Factors	
Collaborative actions (including stakeholders)	Sehnem et al. 2019b; Aloini et al. 2020; Grafström and Aasma 2021; Urbinati, Franzò, and Chiaroni 2021
CSR, company culture	Rizos 2016; Todeschini et al. 2017; Grafström and Aasma 2021
Management ambitions	Masi, Day, and Godsell 2017; Lahti, Wincent, and Parida 2018; Urbinati, Franzò, and Chiaroni 2021
Market management (demand & changes)	Franco 2017; Linder and Williander 2017; Rizos 2016; Todeschini et al. 2017; Sehnem et al. 2019a; Julianelli et al. 2020; Urbinati, Franzò, and Chiaroni 2021
Partner availability	Barquet et al. 2013; Bakker et al. 2014; Urbinati, Franzò, and Chiaroni 2021
Product complexity, -design	Govindan, Jha, and Garg 2016; Despeisse 2017; Masi, Day, and Godsell 2017; de Jesus and Mendonça 2018; Sehnem et al. 2019a; Julianelli et al. 2020; Urbinati, Franzò, and Chiaroni 2021
Supply Chain / reverse SC	Masi, Day, and Godsell 2017
Volatility of input resources	den Hollander, Bakker, and Hultink 2017; Masi, Day, and Godsell 2017; Kirchherr et al. 2018; Grafström and Aasma 2021
Institutional Factors	
Circular Business Models & approaches	Julianelli et al. 2020
Legislations, waste directives	Govindan, Jha, and Garg 2016; de Jesus and Mendonça 2018

face immense cost pressures in adopting circular concepts, resulting in ultimate avoidance. An additional difficulty appears to be the lack of encouragement of employees towards a stronger sustainable business culture (Veleva, Bodkin, and Todorova 2017). Collaborative activities are considered challenging regarding data exchange and the control of material flows in circular settings (Niero et al. 2017).

In an age of technological transition, technology is considered a strong influencing factor. Research has so far focused on information and communication technology and its capabilities of closing the loop in Supply Chains (Park, Sarkis, and Wu 2010; Sihvonen and Partanen 2017; Urbinati, Franzò, and Chiaroni 2021). Furthermore, the availability of technical solutions for *R-Strategies* (Urbinati, Franzò, and Chiaroni 2021) has been identified as a positive influencing factor. Nonetheless, criticism is still raised about the true impact and persistence of technology. Not all authors regard new technologies as a positive influence on circularity. Scholars claim that it is not yet certain *how* and *whether* new technologies, such as 3D printing or machine-to-machine communication, could influence circular settings. In addition, new technologies challenge the willingness and creativity to adapt to the new and unknown (Despeisse 2017; Fischer and Pascucci 2017; Su et al. 2013). Such willingness is especially needed when developing circular product design but equally in the context of new BMs. Hence, it is claimed that the strongest impact of technology will be made by circular product design and new CBMs (Elia, Gnoni, and Tornese 2017).

Legislation, waste directives, and the support that comes with government standards and guidelines are one of the predominantly discussed *institutional influencing factors* (Atasu, Özdemir, and Van Wassenhove 2013; den Hollander, Bakker, and Hultink 2017; Khor et al. 2016; Niero et al. 2017; Singh and Ordoñez 2016; Zeng et al. 2017). Governmental commitments, new environmental legislation (Abu-Ghunmi et al. 2016; Östlin, Sundin, and Björkman 2008; Richter and Koppejan 2016) and the corporate image and sustainability agenda of organisations (Geissdoerfer et al. 2017; Schenkel et al. 2015) are a powerful influence in the shift towards circularity. In addition, SCs and the phenomenon of eco-industrial parks will be impacted and mainly driven forward by new and global political legislation (Fischer and Pascucci 2017; Zeng et al. 2017).

An overview of identified influencing factors is provided in Table 3.

2.3. Social capital theory in the context of circular business models

Reviewing the literature indicates a clear trend of scholars investigating circularity (Geissdoerfer et al. 2018a). It appears to be popular to take either a certain perspective (e.g. customer perspective or supplier perspective) or to look at circularity from an individual industry sector. In doing so, the research identified influencing factors of circularity to a greater extent at an unstructured level, ultimately leading to a snapshot of a specific sector or perspective, as a clear classification and identification of a holistic perspective is missing. Geissdoerfer et al. (2018a) suggested investigating 'the influence of a better understanding of the relationship between the Circular Economy and sustainability and their influences over the performance of supply chains, business models, and innovation systems' (767). With scholars beginning to differentiate between the levels of circularity (macro, meso and micro), the emphasis shifts towards the ecosystems CBMs generate, and the influence partners have on the entire CBM. This highlights the need for investigating collaborative initiatives and their influence on the range of CBMs (Kraaijenhagen, van Oppen, and Bocken 2016). Influencing factors accompanying this shift towards the diverse range of CBMs must be identified (Aloini et al. 2020). Only a few papers have discussed the idea of influencing factors in the context of CBMs with the majority focusing on either a particular perspective or a specific industry sector, ultimately neglecting the holistic CBMs perspective. Hence, this research investigates the variety of circular practices applied in different industry sectors, and the influencing factors for specific CBMs.

From a circular perspective, the theoretical lens of SCT allows to provide insights to gain a greater understanding on collaborative aspects and influencing factors. As previous sections of

the literature review indicate, CBMs rely on aspects of collaboration, and are influenced by a diverse range of factors. Previous research has identified SCT as important theoretical lens for research in sustainability and circularity (Liu et al. 2018). SCT is underpinned by the notion that social capital is the sum of the actual and potential resources embedded in and derived from a network of relationships possessed and developed by an organisation (Putnam, 1995). Therefore, SCT values relationships (Callahan et al. 2015; Andriani and Christoforou, 2016) formed and established from investing in social relations based on expected returns (Lin, 2001). Hence, trust, cooperation, and reciprocity are considered to generate positive impact on society's wealth created from collective actions (Andriani and Christoforou, 2016). From a network perspective, SCT advocates reflection on the different characteristics of such networks and their role in shaping economic development (Claridge 2018; Sabatini 2009). SCT uses, therefore, three perspectives of bonding, bridging, and linking, which are defined as:

Bonding: strong nexus among entities that share commonalities (Callahan et al. 2015; Claridge 2018; Sabatini 2009). For bonding to occur, there needs to be trust among the network partners and the belief that they can fulfil their role in the network adequately (Callahan et al. 2015).

Bridging: weaker than *Bonding* but not less important or intense to the network relationships (Claridge 2018; Halpern 2005). In fact, bridging activities are considered more valuable to the network construct, as it creates bridges to other sectors or societies (Sabatini 2009), ultimately providing access to information, organisations, people and resources that would otherwise be inaccessible (Callahan et al. 2015; Levin and Cross 2004).

Linking: refers to activities that connect individuals or organisations with institutions of political or financial background, allowing access to resources, ideas and information from institutional power and enabling an organisation to 'scale up social capital and social action to a politically and economically effective level' (Sabatini 2009, 430).

As CBMs are seen as systematic ecosystem building up on activities and partners within circular networks (Kraaijenhagen, van Oppen, and Bocken 2016), the three perspectives of bonding, bridging and linking should be considered when investigating the perception of circular collaboration and the influencing factors driving circular initiatives. For this research, bonding activities are assumed to be present in individual CBMs with relevant circular supply chain partners; whilst bridging activities can occur through circular collaboration amongst different CBMs. Lastly, linking activities are observed amongst CBMs when linkages with external institutions are visible.

3. Methodology

Most real-world systems are complex systems, which are difficult to understand or analyse in their individual parts. This is due to participants and actions being strongly intertwined. Small changes, however, can have large effects. The shift towards a circular economy, with different resource flows and collaborative actions, adds complexity to current business models (Heinrich and Jamsin 2020). Therefore, this research applied an abductive, multiple case-study approach to understanding how companies in the network can jointly transition towards the application of CBMs.

Abductive reasoning engages with complex, almost puzzle -like situations (Mirza et al. 2014). It gains knowledge from elaborating on different possibilities and pursuing to explain its evidence (De Brito and Van der Laan 2010; Rescher 1976). As abductive reasoning builds up from rule to result to case (Danermark 2002; Spens and Kovács 2006) it starts with a real-life observation. In doing so, this research started with 7 expert encounters, in a roundtable format, to understand current circular practices in different industry sectors and, secondly, the current state of the application of CBMs.

An abductive case study approach aims to create learning loops by simultaneously looking for a theoretical lens while conducting empirical research. This creative, iterative process of theory

Table 4. Overview case study.

Overview case study	
Sampling strategy:	Non-probability sampling – judgemental sampling
Unit of analysis	Circular Business Models
– **CBMs covered** ◦ ***Models***	– Circular supplies ◦ *Bio-based material* – Resource and recovery ◦ *Recycle* ◦ *Valorisation* – Product Life Extension ◦ *Refurbishment and remanufacturing* ◦ *Refill* ◦ *Upcycle* ◦ *Repair*
Number of case organisations	25
Number of interviews	*36* (on average 1-3 interviews per organisation)
Interview time	60-90 minutes
Site visits	8
Case Org. Type:	– Original equipment manufacturer – Social enterprise – Public organisation – Non-profit organisations – Technology provider – Waste service provider – Government institutions
Industry sector	– Manufacturing – Health – Public sector – Food and drinks – Waste sector – Construction and steel – Paper and plastics – Arts and architecture – Textiles

matching (Taylor, Fisher, and Dufresne 2002) is suitable for action research and case study approaches as it allows one to move back and forth between theory and empirical research (Dubois and Gadde 2002; Spens and Kovács 2006). As CBMs are carefully constructed networks, this research applied the lens of Social Capital Theory (SCT).

Due to access restrictions to supplier and customer networks of case organisations, a multiple case study design with non-probability sampling was selected. Besides generalising from the findings, multiple case study design allows to establish whether findings occur in more than one case and to build a solid construct (Dyer and Wilkins 1991; Eisenhardt 1989; Ojasalo 2008), which aids in the expansion or independent corroboration of individual cases (Burrell and Morgan 1979; Eisenhardt 1989; Ojasalo 2008). Furthermore, following a case study approach allowed moving between the theory and real-life scenarios whilst applying non-probability sampling.

In total, the case study consisted of 25 case organisations from 9 industry sectors. The case companies were categorised and included 12 Original Equipment Manufacturer (OEM), two public organisations (Public), three social enterprises (SE), two technology providers (Tech), four non-profit organisations (NGO), one waste service provider (WSP), and one national

Table 5. Challenges and benefits of CBMs.

Challenges and benefits of CBMs	
Challenges	**Benefits**
Rigidity ◦ Rigidity towards established production methods, material, and habits **Circular material** ◦ Volume, quality, quantity ◦ Contamination of circular material due to sharing of production lines and machines **Operative execution** ◦ Confidentiality, openness, and transparency to be part of a circular network ◦ Size of the organisation ◦ Corporate Social Responsibilities **Policies and guidelines** ◦ policies, guidelines **Supply chain** ◦ geographical dispersion, ◦ transport issues for (hazardous) material **Communication skills** ◦ time investment for collaboration ◦ collective viewpoints over strategic decisions	**Facilitators** ◦ to enable access to funding, and investors ◦ to establish relationships (i.e., with charities) **Cross-departmental collaboration** ◦ to establish digital platforms

governmental body (Gov). The selection of case organisations was based on the organisation's ability to apply a CBM. It was irrelevant how far the implementation of the CBM progressed, or for how long it had been implemented. The focus was on the three CBMs of 'Circular Supply', 'Resource Recovery' and 'Product Life Extension'-models. Interviewees were selected based on their knowledge on the respective applied CBM. In total, 36 semi-structured interviews were conducted which allowed the researchers to collect in-depth data to investigate the three selected CBMs. On average, an interview lasted between 60–90 min and was conducted by telephone, online or on-site. Interviewees were familiar with the relevant CBM, and their job positions varied from Founder or Executive Director to Sustainability or Operations Manager to Innovation Manager. Whenever possible, site visits were included after the interview to see the discussed circular processes in a real-life setting. Detailed information around the data collection and case organisation are summarised in Table 4.

The semi-structured interviews were thematical coded and analysed. In doing so, Hahn's (2008) three levels of coding were applied. This begins with an initial and open coding level to deal with a larger data set. A second level is applied to refines the established coding themes by categorisation and thematical coding. The final coding activity referred to the theoretical concepts underpinning the research. During coding and analysis process, the theoretical lens of Social Capital Theory was applied. The following Section 4 investigates and discusses the results from the data analysis.

4. Findings

Section 4.1 presents the results and analysis obtained from the interviews on circular practices in the industry sectors that participated in the study. In doing so, a diverse range of circular practices, their challenges and benefits were identified, discussed, and summarised in Table 5.

Table 6. Summary of circular practices and models in different industry sectors.

Industry Sector	CBM	Example(s) of Circular Practices	Link to CBM *R-Strategy*	Main Influencing Factors
Waste Service	Resource Recovery	• Collection of coffee grounds	*R7 – Repurpose*	• Material • Customer and Market demand
		• Household Collection for energy recovery and repurposing	*R4 – Repair* *R7 – Repurpose* *R9 – Recovery*	• Business and political standards • Awareness /Social /Community • Perception and individual standards/ expertise
	Product-Life-Extension	• Technology to foster resource exchange	*R3 – Reuse*	• Perception and individual standards/ expertise
Manufacturing	Product-Life-Extension	• Refurbishment of interior (i.e., carpets and furniture)	*R3 – Reuse* *R5 – Refurbish*	• Business and political standards • Perception and individual standards/ expertise • Customer and Market demand • Awareness /Social /Community
		• Refurbishment of office IT-equipment	*R3 – Reuse*	• Perception and individual standards/ expertise • Customer and Market demand
Public	Product-Life-Extension	• Repairment of broken products	*R4 – Repair*	• Perception and individual standards/ expertise • Awareness /Social /Community
Fashion	Resource Recovery	• Technology to recapture non-reusable product for repurposing	*R7 – Repurpose* *R9 – Recovery*	• Perception and individual standards/ expertise • Awareness /Social /Community
Cement, Steel, Chemicals	Resource Recovery	• Turning Cement Waste into a resource	*R8 – Recycle* *R9 – Recover*	• Business and political standards
		• Turning steel into a resource	*R8 – Recycle* *R9 – Recover*	• Perception and individual standards/ expertise
Cosmetic Sector	Circular Supply	• Refillable boxes and containers for cosmetic products	*R1 – Rethink* *R2 – Reduce*	• Circular workplace environment • Perception and individual standards/ expertise • Awareness /Social /Community
Plastic, paper, and glass	Product-Life-Extension	• Reusing the plastic from bottles	*R3 – Reuse* R7 – Repurpose	• Circular workplace environment
		• Reuse of plastic for art tiles	R7 – Repurpose	• Perception and individual standards/ expertise • Circular workplace environment
		• Circular use of silicon release liner	*R3 – Reuse*	• Perception and individual standards/ expertise • Circular workplace environment
		• Collection of glass to create art	R7 – Repurpose	• Perception and individual standards/ expertise • Circular workplace environment
Food and Drinks	Resource Recovery	• Collection of bread for repurposing	*R9 – Recover*	• Awareness /Social /Community
Health Care	Product-Life-Extension	• Repurposing of plastic surgical material	R7 – Repurpose	• Perception and individual standards/ expertise

In Stage 2 of the analysis of findings, the identified circular practices were classified alongside R-strategies and the influencing factor categories that emerged from the literature, as summarised in Table 6. As a last stage of the analysis, in section 4.2, the influencing factor categories were further refined, identifying patterns related to the three investigated CBMs as presented in Table 7.

4.1. Challenges and benefits of circular practices in the participating industry sectors

The research investigated nine industry sectors and three CBMs. The variety of different industry sectors, such as waste service sector, health care, public sector, and manufacturing, allowed a holistic perspective on the currently applied circular practices. It, furthermore, allowed to investigate the challenges and benefits when applying CBMs.

Table 7. Influencing factors for CBMs.

Influencing Factor	Circular Business Models: Circular supplies	Resource and Recovery	Product-Life Extension	All CBMs
Awareness /Social / Community				
• to raise awareness for recyclable materials		X		
• to contribute purposely towards the well-being of the society and community			X	
• usage of local suppliers, aiding the local community, and strengthening the region				X
• positive reputation				X
Circular Workplace Environment				
• flexible and leaner working environment			X	
• health and safety of their employees			X	
• to manage their own waste streams		X		
• the pressure to apply to internal guidelines and CSR standards				X
• aiding other organisations in fulfilling environmental requirements				X
• to provide another circular opportunity	X		X	
• to be able to pull one single waste stream out		X	X	
• monetary incentives				X
Material				
• to reuse and recycle niche material		X	X	
• creating something novel with existing material		X		
• makes circular actions, such as reuse, easier and more effective	X	X		
• demographics		X	X	
• missing infrastructure		X		
• manual skills and cultural values				X
Customer and Market demand				
• market demands				X
• demand towards more sustainability				X
• selecting the right partner				X
• higher request to establish circularity thoughts in the legislation				X
Business and political standards				
• local and international policy				X
• new laws, statutory requirements, and directives				X
• political pressure				X
• funding				X
Perception and individual standards / expertise				
• personal experience				X
• the passion and enthusiasm of partners and colleagues				X
• to follow new and forward-thinking approaches				X
• the realisation that collaborative CBMs are fruitful				X
Communication skills				
• communication and conversation				X
• network events				X
• the right business partner to approach				X

The wide breadth of circular practices investigated is summarised in Table 6. Investigated practices included in the Reuse and Recovery model practices such as, the collection and reusage of coffee ground waste, specifically assorted household waste collection for recovery perspective, collection of by-products such as bread for recovery in the food and drinks industry as well as the application of technology to recovery textile material in the fashion industry. The model of Circular Supply included the production and usage of refillable containers in the cosmetic sector whilst in Product-Life-Extension Model, identified circular practices included a broad variety of remanufacturing and refurbishment procedures. The practices were observed predominantly for office interior, such as carpet, IT equipment and a diverse range of office furniture.

Looking at the challenges and benefits for investigated CBMs, it appeared that all CBMs across the industry sectors make use technology, some to a greater extent than others. A noticed difficulty appeared to be in establishing circular networks and convincing partners about new circular production methods and material. There is noticeable rigidity towards established production methods, ingredients, or habits. Convincing possible partners to change these well-established production methods seemed to be especially difficult in sectors where sterile working conditions and material are required, such as the health care sector.

Quality and volume of circular material were emphasised as another hurdle across the sectors. Possible contamination is high, especially when sharing production lines and machines on a cross-industrial basis. An example was based on a circular network of grocery production and animal food production. As consequence, circular collaborations can get more challenging based on sector-based regulations.

Transportation of by-product or material-to-be-refurbished in product-life extension models remains a multifarious challenge. Geographical issues that might hinder collaboration in the first place were commonly addressed. Explanations refer to the geographical dispersion of partners, which can cause problems in transporting the waste material in the first place, followed by haulage issues and general transportation problems when considering safety issues for products or material classified as hazardous. An example was given for reusing waste paint:

> For instance, you can't crush waste paint, obviously. You can't just crush liquids; you mix them all up and put them in a tanker. You end up in certain material streams by preserving the quality of the waste product, transporting air around, and air is very expensive and has a high carbon footprint of measuring. (NGO3)

Recovery model in the health care sector argued that storage space can be an issue, leading to higher carbon footprints i.e. when trying to recover surgical material on the health care site by specialised equipment. To save on transport really, they ask that we have at least 100 blocks before they come and collect just so that they're not taking a half-empty van back. (Public2).

Other difficulties were addressed in the operative execution, which raised issues regarding the ethical and sustainable handling of SCs. Therefore, an emphasis was put on fair and ethical working manners in circular collaborative networks. However, fair, and honest trading requires building commercial confidentiality, which was identified as a hurdle.

The size of the organisations to collaborate with is also a challenging factor. On occasion, it appears more difficult to build CBMs with smaller organisations. Criticism was raised in Product-Life-Extension model applying the strategy of refurbishment, where networking and collaborating with smaller organisations appears to be more difficult, as their awareness about the quality of refurbished products varies strongly. On the contrary, global players, organisations or councils have been identified as easier collaborative partners. Possible explanations for the said phenomenon are given in more developed and stricter KPIs, Corporate Social Responsibilities policies or accreditations of bigger clients.

When considering the process of establishing collaborations, the starting phase is challenging. Finding information about adequate CBMs and access to potential partners, as well as initial knowledge about material cycles, is difficult to gather. Once collaborations are established, moving projects forward in a timely manner due to possible uncertainties and external factors seems challenging. Hence, communication and knowledge exchange has been prioritised.

But even, once collaborations are established, CBMs are not a *one-size-fits-all models*. Circular practices of one model might not work with different collaborators in a similar model. Hence, common, and individual needs need to be identified, especially with regards to a strategic decision in product marketing or product innovation. An example was shared in the Food and Drink sector, in which the branding element for a circular beer was discussed: 'We work with a different brewery, and we come together to do a beer, it's just figuring out, like, how we talk about it and how it looks, the branding element, the story' (OEM4).

Fear of failure is still one of the points listed that hamper CBMs. Hence, the importance of finding like-minded partners willing to collaborate was emphasised. Interestingly, country boundaries do not appear to influence such CBMs. Notably, the original purpose of these models does not always have to be business driven. It appears that organisations value the social interaction between like-minded circular-affine organisations. This results in organisations having close contact with each other and inviting each other to their sites to do communally beneficial activities. An example was shared when the team travelled to their international circular partner to participate in a social event promoting circularity.

One of the major benefits of CBMs is the presence of facilitators. Facilitators can act as lynchpins connecting the partners and driving them in the same direction. Benefits are additionally seen when policy bodies collaborate and across different departmental sections. In addition, marketing promotion with a vast majority of patterns (NGOs, policy partners, councils etc.) has been noted as beneficial in attracting more consumers. Facilitators are additionally useful and required in cross-industrial collaboration. A circular practice example was shared by a facilitator that helps to arrange by-product exchange between partners in the Food and Drink sector and Farming industry.

From a supply chain network perspective, suppliers are pleased to see their materials being used, including the publicity that could be reached by being part of a CBM. Greater publicity has also got a positive impact on reachability for external funding and investors. From a social perspective, being part of a CBM that provides circular services free of charge to their clients, such as repair cafes, provides value to the community. Table 5 presents an overview of the challenges and benefits of the CBMs. The circular activities of the case organisations were classified based on their R-strategy and the influencing factors identified from Section 2 Literature Review, as summarised in Table 6.

4.2. Influencing factors in the context of circular business models

Section 4.1 identified categories for influencing factors based on the circular practices in each industry sector. In this section, these influencing factors are explored and discussed in greater depth by mapping them in accordance with investigated CBMs. Table 7 provides an overview of the influencing factor categories based on the CBM before discussing them in greater depth.

The first category of influencing factors relates *to raising awareness in the community* for CBMs and the positive aspects that these will bring were highlighted throughout all business models. Participants summarised it as 'value set around waste having the potential as a community asset […] and having the potential to create employment, wealth and job creation' (OEM1, Int.1) or as an attempt 'to engage with the community in our city' (SE3, Int.1). These viewpoints were echoed across different industry sectors and business models. Usage of local suppliers, aiding the local community and strengthening the region were listed as social factors amongst all CMBs. It seems that organisations applying R4-Repair in the Product-Life Extension model appear to follow these communal motives of community strengthening actions – culture and resilience – more than others. The educative factor of building a community by raising awareness for the usage of recyclable materials was hereby mentioned especially in Resource and Recovery models and Product Life Extension models. Circular partners seem to be actively encouraged to explore their processes and supply chains to identify where the resources are not being kept in the loop (OEM4). In addition, the community and customers are not only aware of circularity but also increasingly looking for alternatives to landfills and incineration (OEM6). This directly links to the reputation of organisations, which enhances once there is a clear commitment to transitioning to a CBM. A further side effect is the contribution to local communities and to strengthening the local region.

The second category of influencing factors is more internally orientated and can be summarised under the umbrella of *circular workplace environment.* Understanding the design and components of the material and ultimately being able to manage the created resource stream is a key element of any CBM. Especially the latter aspect in being able 'to pull a waste stream out, that would've gone off for incineration' (OEM3, Int.3) and *is* a major influencing factor in Resource and Recovery and

Product Life Extension models. The importance of collaboration was emphasised in the context of resource and recovery models and especially in the waste management sector. Aiding other organisations in fulfilling their environmental requirements and reaching circularity appears to be a common influence factor. Similarly, technology can positively influence the adaption of CBMs. Technology organisations described their support to partners as 'responding to the existing demand in textile supply chain and the brand cycle. Especially, the brand cycle needs to meet different standards, specifically committed to circularity' (Tech1). However, there is an opposite side, where organisations refer to an occurring pressure to act in accordance with internal environmental guidelines and CSR standards. Especially in the model of Circular supplies and Product-Life-Extension, sees room to expand on unused potential and opportunities. In doing so, innovation appeared to have a huge influence and potential, particularly in industry sectors that recently transferred to CBMs. Organisations increasingly see the benefits in creating CBMs that have never been done before (OEM3, Int.2). Different sectors have adapted circularity to a different extent. The fashion sector revealed that there are still a lot of reusable textiles designed for reuse but will be incinerated.

In addition, social motives were mentioned with respect to inner-organisational well-being and a circular workplace environment. Examples were shared in which R5-Refurbishment in Product-Life-Extension models had a positive development towards a more flexible and leaner work environment. In addition, a positive impact on health and safety was noticed. Case companies experienced up to a 50% reduction in staff sickness levels *(Public2*). These social aspects seemed to be predominantly noticed in Public or Social enterprises.

From an economic perspective, there has been a common agreement amongst all CBMs that costs maintain great importance. Waste service providers stated, 'for the last 15 years waste was going from '90% to landfill' to under '9% landfill' (WSP1, Int.1). This development has been attributed to circular development and the recognition of value in used material. Hence, monetary incentives resulting from resource recovery maintain a great influencing factor. This includes less waste disposal costs, or taxation systems for landfill disposal were only a few incentives listed amongst resource recovery models.

Another category of influencing factors is Circular Material, which is an inner drive for the ability to promote reuse and recycling models was noticed. By now, industries have the knowledge to recycle more complex materials. Therefore, reusing and recycling niche material, is influential to organisations in joining a resource recovery model. This is characterised by features of disruptive innovators and transfer a genuine interest in creating something novel with existing material. Another influencing factor for R5-refurbishment and R6-Remanufacturing in Product-Life-Extension, and R7-Recycle in Resource Recovery models is related to the handling, consistency, and quality of sustained material. To provide this quality in CBMs, it is essential to understand and know the market and customer demand which has been changing over the years towards more sustainable actions amongst all CBMs. However, OEMs applying an R5 strategy (refurbishment) felt particularly pressured to think circular. Often, customers demand certain percentages of remanufactured products or materials. Hence, the business entities felt they could only survive in the market when they started considering customer specifications about circularity (OEM1, OEM2, Public1).

Not to neglect in this context is the role of suppliers. It has been a common phenomenon that suppliers either push for more progress or organisations deliberately search for circular suppliers ready to take over circular responsibility. Product-Life-Extension Models, following an R4-Repair strategy, raised demographics as major influencing factors. This included the 'transient nature of population' and 'cultural identity'. In addition, infrastructure in remote areas and manual, as well as cultural skills were pointed out as influencing factors.

Besides local and international policies, as well as *business standards* such as CSR regulations, have been named as influential factors amongst all CMBs. Although, new laws, statutory requirements, and directives are commonly expected or known and maintain an essential role in fulfilling standards and supporting existing CBMs (NGO1, NGO3, NGO4, OEM1). Investigating that viewpoint from the side of policymakers revealed a greater willingness to join a CBM network from

organisations as soon as legislation opposes fees (Gov1, Int.1 and Int.2). However, this slight political pressure is perceived in different ways. NGOs explained, some clients are more likely to think in a circular way due to funding opportunities via governmental regulations, while other clients consider fees solely as a powerful governmental tool.

Another influential factor was the *personal experience and expertise* of members of the staffs on the subject of CE. Particularly in smaller-sized organisation the motivation to go circular emerged from personal experience and passion for the environment 'the only motivation was to set up a business that recycles material' (OEM6) or 'there was a passion there to do something in the right way' (OEM3).

Communication skills are often seen as a key influencing factor. Hence, they were raised in all investigated CBMs. The power and multifacetedness of communication and conversation came to light when the participants shared their stories. Fruitful conversations can take place behind closed doors with critical partners when discussing the merger of two separate systems into one bigger circle. Networking events have been seen as a good conversation starter in finding the right circular business partners and a suitable circular approach.

The general proud feeling of knowing how to make a difference and contribute towards the solution for this climate crisis was listed, especially amongst social enterprises involved in a CBM. The knowledge and personal passion of knowing to do something the right way, and being able to follow new and forward-thinking approaches with positive long-term sustainable effects seemed important. In addition, realising that collaboration can lead to fruitful circular outputs is an overarching influential factor amongst CBMs.

5. Discussion

CBMs are social constructs with powerful collaborative ties that aid in the growth process of organisations. This research provides an enhanced understanding of the three CBMs of Resource and Recovery, Circular Supplies, and Product-Life Extension by applying SCT and its characteristics of bonding, bridging and linking. In comparison to recent studies that classified factors based on the wider Triple Bottom Line perspectives (i.e. economic, environmental, social, organisational, institutional, and technological influencing factors) (Aloini et al. 2020; Urbinati, Franzò, and Chiaroni 2021), the findings of this study identified slightly different classification categories. Based on the data, the following groups emerged: (1) Awareness/Social / Community, (2) Circular Workplace Environment, (3) Circular Material, (4) Customer and Market Demand, (5) Business and political standards, (6) Perception and individual standards/ expertise, (7) Communication skills. Most of the identified influencing factors are shared amongst the investigated CBMs. But there are exemptions which tend to impact some CBMs more than others. This indicates the importance that influencing factors should be seen in the light of their individual model and environment (micro, meso and macro), rather than being replicated from the greater circular context. A detailed overview is displayed in Table 7 of findings section, with most relevant observations subsequently discussed. Despite having identified the role of collaborators, the size of partnerships and circular networks, their connection amongst each other remain widely unclear (Brown and Bajada 2018; Urbinati, Franzò, and Chiaroni 2021). By exploring the findings from the SCT perspective of bonding, bridging and linking, the discussion aims to highlight further linkages between circular practices and the identified influencing factors in circular collaborative networks.

It appeared that collaborative relationships influence the maturing process of all investigated CBMs. These strong networks between entities (bonding, bridging) that know each other or share commonalities (Callahan et al. 2015; Claridge 2018; Sabatini 2009) seemed to nurture influencing factors linked to customer and market demand, plus material. This includes aspects such as trust, selection of right partners and identification of common waste streams. These results replicated findings from the literature in which identifying a common purpose with partners has been described as essential activity (Kraaijenhagen, van Oppen, and Bocken 2016).

As collaboration has been identified as essential for the adoption of circular principles (Brown and Bajada 2018; Kraaijenhagen, van Oppen, and Bocken 2016), finding commonalities around the same mindset and allocation of resources of each partner remains challenging (Urbinati, Franzò, and Chiaroni 2021). Findings further elaborate on the complexity of circular collaborations, which can vary depending on the level of cross-sectional collaboration and the size of the network. In doing so, linking activities were often observed as fostering (1) awareness with the wider community, and institutions of political or financial background. These relationships, ultimately, influence access to resources, ideas, and information from institutional power (5 Standards/ 6 Expertise). Unexpected was the strong contribution linking industry associations to CBMs and the inclusion of private households in Resource Recovery and Product-Life-Extension models. Bridging activities are perceived as aiding the maturing process by providing access to information, organisations, people, and resources.

A novel finding is the demographical and infrastructural influence on CBMs. Particularly in Product-Life-Extension models applying a R4-Repair, R5-Refurbish, R6-Remanufacture strategy, the demographical impact and the available infrastructure for circular products have been controversially discussed (2 Circular workplace/ 3 Circular Material). With some responses stating it aids in maturing their CBM, whilst others oppose this. Resource Recovery models, on the other hand, are more driven by the idea of identifying their own waste streams and developing creative ideas in niche markets (3 Material). Although aware of created resource streams, there is still hesitation amongst Resource Recovery Models to bridge collaboration with waste service providers. An identified fear that influences meaningful bridging collaboration with such providers refers to the risk of circular material being lost in the circle.

As reflected in the designed influencing categories, environmental and social matters appear increasingly valued factors compared to purely economic reasons (Rizos 2016). This contrasts the general perception that economic factors such as the potential of improving cost efficiency, profitability, revenue streams and competitiveness are predominant (Aloini et al. 2020; Masi, Day, and Godsell 2017). Although, financial aspects such as funding is not entirely excluded. Like previous studies, funding has been identified as an influential factor for all CBMs (Atasu and Subramanian 2012; Grafström and Aasma 2021; Rizos 2016) linking governmental institutions and councils to offer support in the realisation of more complex CBMs (5 Standards/ 6 Expertise).

Based on the findings circular collaboration is vital in any CBMs. Although there seems to be a linkage between the level of collaborative actions and organisation size, as well as identification of appropriate and openness of circular partners. For instance, SMEs and entrepreneurs often face difficulties in finding like-minded partners who have the financial abilities and are willing to collaborate on a circular level. Whilst Global Players can rely on a greater network and enjoy more financial opportunities when setting up circular collaborations. In addition, they are often driven by business and political standards to achieve circularity in foreseeable time.

6. Conclusions

This study provides an overview about the circular practices whilst linking them to the three investigated CBMs of Circular Supply, Resource Recovery and Product Life Extension. This is the first study of its kind of presenting an in-depth analysis on the three investigated CBMs, namely Circular Supply, Resource Recovery and Product Life Extension, based on a rich interview-based dataset representing expert views from a diverse group of stakeholders from several industry sectors.

In doing so, the focus of the research was first on the perception of circular collaborative actions across different industry sectors and identify challenges and benefits in the transition towards the adoption of the investigated CBMs. Perceived challenges included the circular material and its rigidity, company size and executive support in the organisation, and political guidelines, whereas collaborative actions and facilitators were named as beneficial. Using a SCT lens allowed to investigate collaborative relationships based on the characteristics of bonding, bridging, and linking. The

findings revealed that collaborative relationships influence the maturing process of all investigated CBMs. These strong networks ties among entities seem to nurture influencing factors such as trust, selection of right partners and identification of common waste streams.

This leads to the second research question focuses on the influencing factors of circularity. Unlike recent studies, which classified influencing factors of circularity based on five categories -economic, environmental, social, organisational, institutional, and technological influencing factors (Aloini et al. 2020; Urbinati, Franzò, and Chiaroni 2021), this study identifies more in-depth categories of influencing factors of CBMs, namely (1) Awareness/Social/Community; (2) Circular Workplace Environment; (3) Circular Material; Customer and Market demand; (4) Business and political standards; and (5) Business and political standards, (6) Perception and individual standards/expertise, and (7) Communication skills. Furthermore, this research made a novel contribution in setting the identified factors in relation to individual CBMs, see Table 7. Two influencing factors for first time in the context of Product-Life-Extension models, namely demographics, and infrastructure, were identified specifically.

From a theoretical perspective, this paper provides a novel contribution to the literature as it investigates the influencing factors with the theoretical lens of SCT. It links the influencing factors with its characteristic of bonding, bridging, and linking in the context of CBMs.

Managerial implications derived from the research include the importance of understanding the link among the levels of circularity (micro, meso and macro) for a successful adoption of the three investigated CBMs. The study also provides managers with a greater understanding of circular activities and their linkage to the R-strategies. It equips them with guidance on how to work collaboratively by proposing influencing factors of investigated CBMs. In doing so, managers can identify respective influencing factors and necessary considerations and precautions during the implementation process. The study also enhances managers' decision making processes in the transition to circularity. For example, the newly identified factor of demographic and infrastructure is especially important for organisations aiming to implement a Product-Life Extension models, such as a repair café.

The research is constrained in its ratio and representation of case organisations replicating the three investigated CBMs. Geographically the research is restricted to case organisation in the United Kingdom, with a focus on English and Welsh case organisations. This can lead to bias compared to countries leading the circular development.

Future studies can consider a variety of pathways and opportunities that opened with the further progression of this research. More broadly, future research can further investigate the influencing factors in different CBMs. In doing so, a focus could be specifically on sharing models or product-as-a-service models. Closer and more in-depth investigations could include the selection of one industry sector to establish the CBMs, and the R-Strategies imposed in greater depth.

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Data availability statement

The participants of this study did not give written consent for their data to be shared publicly, so due to the sensitive nature of the research supporting data is not available.

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