Grassroots solutions to large-scale problems

How circular start-ups contribute to the transformation towards a circular economy

Kleinschalige oplossingen voor grootschalige problemen

Hoe circulaire start-ups bijdragen aan de transformatie naar een circulaire economie

(met een samenvatting in het Nederlands)

Proefschrift

ter verkrijging van de graad van doctor aan de

Universiteit Utrecht
op gezag van de

rector magnificus, prof.dr. H.R.B.M. Kummeling,
ingevolge het besluit van het college voor promoties
in het openbaar te verdedigen op

woensdag 21 december 2022 te 16.15 uur

door

Marvin Henry

geboren op 1 december 1988
te Gütersloh, Duitsland

Promotor:
Prof. dr. M.P. Hekkert

Copromotor:
Dr. J.W. Kirchherr

Beoordelingscommissie:
Prof. dr. E. Worrell
Dr. W.J.V. Vermeulen
Prof. dr. N.S. Bosma
Prof. dr. ir. C.A. Bakker
Prof. dr. T.B. Ramos

Dit proefschrift werd mede mogelijk gemaakt met financiële steun van Friedrich Naumann Foundation for Freedom / Friedrich-Naumann Stiftung für die Freiheit.

In love and gratitude to my parents, Margret and Leroy.

Grassroots solutions to large-scale problems

How circular start-ups contribute to the transformation towards a circular economy

Marvin Henry

Contents

1

General Introduction

1.1. Who will lead the charge in transforming the linear paradigm?

1.1.1. Roots and trajectory of the circular economy concept

Global socio-economic systems are material-intensive and dependent on growing resource inputs. The extraction of these resources from nature and respective production throughput increased over the past decades - particularly driven by industrial nations and in most developed regions (Sariatli, 2017; Steffen et al., 2015). At the same time, the value retention in materials and products over their entire lifecycle is relatively low due to dominant linear systems. In linear economic structure, resources are extracted, processed into desired products (while by-products are discarded), sold at a profit, and disposed of at their end of life (produce→use→waste or take→make→dispose). This is problematic for a number of reasons: finite resources can become exhausted, damages from excessive extraction of organic materials can lead to biodiversity loss, the high energy usage in resource extraction and processing accelerates climate change, and massive waste streams. The latter are often inadequately collected and processed which leads to massive littering and landfills that can cause local pollution and wider environmental harm (e.g., microplastics in the ocean, soil toxicity). In short, the resilience of the Earth System is decreasing in the Anthropocene (Circle Economy, 2021; Li et al., 2021; Ryberg et al., 2020; Wu et al., 2021).

Already since the 1960s, researchers are calling for more efficient resource usage and have recognised the boundaries of ecological systems and respective limits to growth (Calisto-Friant et al., 2020). Accordingly, the ideas of increasing resource efficiency through the creation of resource loops and circular material flows in industrial systems were coined in the scholarly fields of industrial ecology and ecological economics during that time. Boulding's (1966) publication 'Spaceship Earth' is credited to have been the first description of an economy ('spaceman economy') in which the earth is considered as a closed system in which humans must emulate the continuous reproduction cycles of natural systems by increasing resource-use efficiency (Blomsma, Brennan, 2017; Blewitt, 2017; Persson, 2015;

Reike et al., 2018). However, researchers and practitioners were lacking a systemic perspective and neoliberal economic trends during the second half of the 20th century thwarted the efforts to continuously understand and value the natural and biophysical roots of socio-economic activity (Melgar-Melgar, Hall, 2020; Washington, Maloney, 2020). So, approaches to increase resource efficiency were operationalised as ‘waste avoidance’ for a long time, i.e., end-of-life treatment, waste management and recycling. Only a few voices were raised about mitigation strategies and potential economic gains from environmental efficiency (Blomsma, Brennan, 2017). So, it took until the end of the 20th century for lifecycle perspectives and holistic waste prevention strategies to be formalised in theory (Dantus, High, 1999; Phillips et al., 1999). Still, these topics did only incidentally resonate in policy and practice. Examples of early attempts to more holistic perspectives on resource efficiency were the build-up of Danish eco-industrial parks in the 1970s where companies co-located and exchanged resources across organisational boundaries to prevent waste, and the introduction of Lansink’s waste hierarchy (prevention>reuse>recycling>recovery) into the Environmental Management Act of the Netherlands in 1993 (Chertow, 2004; Gilissen et al., 2009; Körner, 2015; Jun et al., 2006).

In the early 2010s resource efficiency considerably gained popularity - partly in response to the global financial and environmental crises. As such, a more systemic perspective on global resource flows was established and the emergencies of resource depletion, global warming, water shortages and loss of biodiversity became apparent. Proponents were able to position the topic of resource efficiency high on public and private agendas. In this context, the circular economy (CE) was established as a “hyped” concept to lead humanity away from the enormous - and increasing - resource usage that is a consequence of the dominance of linear economic systems. Broadly, CE is defined as an economic system “designed with the intention that maximum use is extracted from resources and minimum waste is generated for disposal” (Deutz, 2020). Approaches to CE are often described as R-strategies in theory and practice. R-strategies create resource loops to improve resource value extraction over their lifetime, and they are usually sorted according

to their value retention potential. They range from lower-impact strategies such as recycling and (energy) recovery at the end of product lifecycles to more preventive, high-impact strategies like reuse and regenerate (Gebhart et al., 2022; Henry et al., 2020; Potting et al., 2017; Reike et al., 2018). However, even though such insights were (re-)gained 10 years ago, and CE is an integral topic on today's agendas of private and public actors (e.g., European Union, UK, China), the world still falls far short from making a path-breaking shift towards truly circular economic systems and effective resource conservation (Circle Economy, 2021; EMF, 2013; Geng et al., 2009; Reike et al., 2017; Urbinati et al., 2017). However, action towards more sustainable economic systems is required because the abovementioned scientific evidence on anthropogenic environmental degradation is increasingly complemented by unprecedented catastrophic natural events with wider socio-economic consequences such as floods and bushfires (cf. Hautier et al., 2015, 2020; Rosenzweig et al., 2008; Taylor-Brown et al., 2019).

1.1.2. Entrepreneurship can be a relevant driver of CE innovation

The private sector is considered critically relevant in driving transformational processes towards CE. However, the oftentimes disruptive innovation that is required for wider CE transformation processes is difficult to implement for large, established companies. They operate historically grown business models in long-standing supply chains that are built on the concept of linear information and resource flows. They largely struggle to initiate transformational innovation because they are hampered by systemic lock-ins and path dependency. Therefore, large, established organisations are more inclined to innovate incrementally without radically changing their core processes, structures, and systemic environments to the extent that is required for systemic CE transformation (Chesborough, 2010; Bidmon, Knab, 2018; Henderson and Clark, 1990; Hill, Rothaermel, 2003; Johnson, 2010; Schot, Steinmueller, 2018).

Still, research on CE innovation largely focuses on established corporate organisations' approaches to drive CE while only a few studies exist that analyse young

SMEs or start-ups - and if so, in a regionally or sectoral limited context, and in small- to medium-N samples. Examples are Bocken's analysis of 8 CE case studies (of which some are start-ups) or Osterman's recent analysis of 10 fashion start-ups in CE (Asgari, Asgari, 2021; Bocken et al., 2018; Osterman et al., 2021; Singh et al., 2018; Stewart, Niero, 2018). A bibliometric analysis of more than 4,000 CE articles that were published before 2020 showed that only 4 out of a total of 8 articles that contain the term 'start-up' in their abstract actually deal with the organisational form (e.g., De Angelis, 2018; Henry et al., 2021). However, grassroots, independent entrepreneurship can contribute to sustainable transitions either by impacting them directly through introducing and scaling innovations, or indirectly by influencing other actors and creating supportive structures for their innovations (Geels, 2008; Long et al., 2019).

Innovation theory suggests that particularly entrepreneurship may yield more radical solutions with higher – in this case CE – impact that could eventually contribute to increased legitimacy for CE (Bocken et al., 2017; Christensen, 1997; Frishammar, Parida, 2018; Geissdoerfer et al., 2020; McIntyre, Ortiz, 2015; Närvänen et al., 2020; Singh et al., 2018; Stewart, Niero, 2018). Sharing economy business models such as airbnb and Uber – which this research proposed as a subgroup of circular business models – provide good examples of bottom-up, entrepreneurial innovations that disrupted entire industries. At the same time, these cases revealed the need for change and lack of socio-technical embedding in terms of regulation, norms or technological adaptation (cf. Frenken, 2017) that would allow these promising ventures to reach their full sustainability potential. Following Hockerts et al. (2010) it is the compound impact of such entrepreneurial ventures and corporate sustainability entrepreneurship that underlies industrial sustainability transformations ("emerging davids" and "greening goliaths"). The growth process to bring a sustainable innovation to maturity and advance towards the mass-market requires varying, co-evolutionary engagement from both types of actors (Hall et al., 2010).

1.1.3. Circular business models can become vehicles of the transformation

The focus of this thesis lies on private sector efforts to increase circularity. When talking about grassroots entrepreneurship, business models need to be taken into consideration as they are the vehicles by which grassroots entrepreneurs operationalise their entrepreneurial vision. There is a strong alignment that a shift from today's business practices towards fully circular business models is significant for individual companies (micro-level), industries and business networks (meso-level) and larger economic systems (macro-level; Aminoff et al., 2017; Antikainen, Valkokari, 2016; Bidmon, Knab, 2018; Bocken et al., 2018; Boons et al., 2013; Lieder, Rashid, 2016; Nußholz, 2017; Pieroni et al., 2019; Santa-Maria et al., 2021). The circularity aspects in CBMs are typically conceptualised as the R-strategies (cf. Potting et al., 2017). Alternatively, Bocken et al.'s (2016) conceptualisation of CBMs as either closing, narrowing or slowing of resource loops is a commonly used approach to classify circular business models. Closing of loops refers to the recycling of post-consumption resources so that these can be utilised as production inputs again (cf. Boulding's (1966) spaceman economy); narrowing of loops aims at increasing resource efficiency by using less resources per product or service; lastly, the slowing of loops addresses the increase of usage efficiency by extending or intensifying products' use periods. Other studies build on or extend this framework such as Geissdoerfer et al. (2018) who add dematerial to it, i.e., the substitution of physical product features through software or services. Circularity strategies either need to be conceptually fitted to existing business models, or business models need to change to adopt the strategies. Such interventions can be incremental (e.g., waste separation) or more transformative and disruptive (e.g., offering services instead of products; Lewandowski, 2016)

When building CBMs, companies strive for a functioning configuration of value creation and capture while integrating the principles of CE through managerial practices. In other words, CBMs are "operationalised version[s] of circular economy within the breadth of organisations' business models" (Ünal, Shao, 2018; Ünal et al., 2019). The breadth of a

business model in which CE principles are implemented commonly includes organisational structures and core processes such as supply chain management, production, human resources, and sales (value creation and delivery), the offer and customer interface (value proposition) which are typically embedded in a cost-revenue model (value capture; Bocken et al., 2014; Lewandowski, 2016; Tukker, 2015; Urbinati et al., 2017). For effective CE implementation across all elements of a business model, a variety of firms and solutions across economic systems need to engage. Thus, CBMs can be considered as “islands of rules” (Närvänen et al., 2021) where adequate conditions and configurations for CE innovation are implemented, tested and proven (Kanda et al., 2021; Konietzko et al., 2020).

An effective application of the above strategies influences business practice beyond individual actor perspectives and therefore require alignment on a network or systems level. Business systems that adhere to circular principles require significant changes to current practice because

- value creation and capture obtain a stronger reciprocal and systemic than unilateral character. For instance, the added value that Design for Recycling innovation approaches may yield requires involvement - and may yield value for - a variety of actors in historically loosely connected supply chains,
- the boundaries of traditionally unconnected value chains converge. Examples for this can be found in cases of material innovation that allow the upcycling of one industry’s by-products by players from an unrelated industry, e.g., cushions from the poultry industry waste feathers,
- established material categories, standards and declarations get overhauled, for instance, where bio-based materials are introduced as high-quality substitutes to produce the same finished product that was made from finite raw materials before,
- product/service design choices become increasingly complex. This becomes evident in a variety of cases, e.g., in mobility-as-a-service models where the focus on product

maintenance or tracking increases, or for product longevity innovations where modularity/upgradability of product features come to the fore,

- and the agency and power balance between individual network actors change, e.g., where tech-enabled supply-demand matching leads to higher market transparency and lower transaction costs for consumers (Bertassini et al., 2021; Centobelli et al., 2020; den Hollander et al., 2017; Narayan, Tidström, 2020; Ranta et al., 2020a).

Also, the increasing regulatory and legislative efforts to advance a CE have not yet led to corresponding, desired outcomes. The reasons for this are diverse and are not at the core of this research. However, also policymakers could benefit from a better understanding of favorable conditions, as well as current regulatory barriers, for bottom-up circular innovation. Transformational policies that aim to foster CE may be inspired and strengthened by taking bottom-up solutions stronger into account (European Commission, 2018; Kirchherr et al., 2018; Pontoni, Bruschi, 2018; PRC, 2008).

1.2. Barriers to a wide-scale implementation of CE principles

The barriers to a wide-scale implementation of CE are extensively scrutinised in recent scientific literature. The list of potential barriers is long. It includes lack of technological expertise, lack of financing, lack of regulatory and policy support, corporate and political greenwashing, little consumer awareness, organisational risk aversion, lack of information exchange and missing performance metrics (Corvellec et al., 2021; Galvao et al., 2018; Grafström, Aasma, 2021; Kirchherr et al., 2018; Kopnina, 2021; Rizos et al., 2016). The strong heterogeneity of the barriers indicates that the challenges that arise from a far-reaching CE transition are not only of endemic (specific to a particular population, environment, sector, region) but also systemic (cross-regional, cross-organisational, cross-sectoral) character. Both endemic and systemic perspectives are represented by recent literary studies (Ritzen, Sandström, 2018; Shahbazi et al., 2016). Still, the research and knowledge development on CE require structuring and currently only provide the base for a

rather explorative agenda in policy and practice (Bocken et al., 2017; Bianchini et al., 2018; Muñoz, Cohen, 2018).

To take a step towards this, we need an understanding of those instances where holistic CE approaches are implemented and solve real problems. The magnitude of the challenge illustrates that the departing point can not only be on the macro- or meso-level because large-scale holistic and distinct CE implementations are scarce. In contrast, entrepreneurial activity - as a source of novelty creation in innovation systems (Hekkert et al., 2007) - is worth a closer examination in this context. New business models and value propositions need to evolve that are not hampered by “carrying the weight” of the establishment which inherently nurtures the linear economy.

1.3. Start-ups in the circular economy are on the rise

Recently, start-ups that build their business models based on CE principles make headlines. Similarly, they may hold the potential to significantly contribute to a sustainability transition. These start-ups often formulate their mission statements according to R-strategies and explicitly mention the creation of circular products and systems as an organisational objective or vision. For instance, clean energy start-ups Aceleron designs batteries according to CE principles so that they are modular and can be maintained, upgraded and fully recycled (Lim, 2021). Thereby they allow for increased value extraction throughout the product lifecycle and mostly contribute to the closing and slowing of resource loops in the energy industry. Bambooder, a Dutch bio-material start-up, narrows resource loops by offering bio-based fibre alternatives for produced composites that are traditionally made from fossil fuels. Thereby, they do not only provide a more resource-efficient approach to fibre production but also include the sequestration of carbon in their core business process (i.e., Bamboo forests; van der Lugt et al., 2020). Berlin-based food start-up SirPlus focuses on closing the loops in the downstream part of the grocery and retail industry by “rescuing safe-to-eat” food that was rejected by others shops (mislabelled, visual characteristics, etc.). SirPlus offers these products via an online retail channel (European Commission, 2021).

However, these start-ups often operate in highly uncertain, complex and radically new business environments due to the systemic character of CE innovation. Still, they seek for creative solutions to solve these unprecedented challenges and thereby are pioneers that may lead the way or show the direction for others.

This is the first major scholarly contribution to scrutinise these organisations in depth – even coining the term *circular start-up (*CSU*)* in scholarly literature (Chapter 2). Not only conceptually, but also in practice CSUs are gaining increasing attention. Corporate venture arms, venture capital firms and private equity funds such as Circularity Capital, Henkel Ventures, PepsiCo or John Lewis Partnership specialise in dedicated circular economy start-up investments (Chaplin, 2021; Henkel, 2019; PepsiCo, 2022; The Times, 2021). Some examples of CSUs that generated significant early-stage funding, and that attracted attention from incumbent organisations are

- London-based Biohm who develop mycelium-based insulation material and modular construction concepts. Biohm raised a multi-million seed funding and collaborates with Indian giant Tata Construction
- Twig who raised $35mn in Series A funding for their broker-based fin-tech business model that allows customers to re-circulate pre-owned fashion and electronics items by instantly cashing out on them
- Australian GoTerra who secured almost $10mn in Series A funding for their automated waste management system that uses maggots for waste conversion and protein production. GoTerra is an example of CSUs striving for higher levels of circularity as they developed a modular system in which their biological waste conversion sites can be installed flexibly in size and location to avoid leakage (e.g., through transport) and serve a larger customer base (Baron, 2020; Butcher, 2021; Curtis, Mont, 2020; Frenken, 2017; Cheng, Foley, 2018; Cherry, Pidgeon, 2018; Hobson, Kiernan, 2020; Lynch, 2016; Lacy, Rutqvist, 2016; Ranta, Saari, 2019; Walsh, 2018).

Apart from private sector traction, CSUs also gain attention among global NGOs and governmental bodies such as the World Economic Forum with their Platform for Accelerating the Circular Economy (PACE) or the World Business Council for Sustainable Development who collaborate with CSU CircularIQ (Burdett et al., 2021; WBCSD, 2021).

This research focuses on roles and activities of start-ups in the circular economy which have inherent advantages when implementing circular practices. They can adopt and valorise circular practices in all aspects of their business from scratch as these start-ups do not face sunk costs and are less hampered by past dependence than established companies. They can root their company culture in circular principles and be more transparent in the communication about their value proposition as well as the environmental and social impact of their products and services. Thus, start-ups may have structural advantages over established and corporate actors and can adopt relevant roles as contributors to circular innovation (Hockerts and Wüstenhagen, 2010; Lawrence, Suddaby, 2006; Schaltegger et al., 2016). In contrast, some of the barriers might also be amplified for start-ups in comparison to large organisations, such as missing policy and governance support, lack of access to finance or missing capacities to measure and evaluate circular performance. It is worthwhile to further explore how start-ups can elucidate new visions for the future, create distinct knowledge, and build legitimacy for other system actors on the backdrop of these opportunities and challenges. Therefore, this thesis will provide a perspective on their approaches to CE implementation and complement scientific approaches that analyse and attempt to structure the problem rather than zooming in on "actual solutions to actual problems" (Corvellec et al., 2021).

1.4. Relevance of innovation systems research for a CE transformation

CE innovation requires the simultaneous mobilisation of actors on various societal levels and alignment of agendas among private and public stakeholders. This creates a high level of complexity for decision-makers. Most studies that analyse CE in a systemic context so far, face the challenge of balancing integrative (individual actor) and holistic (socio-

economic system and flows) perspectives. Researchers like Lieder et al. (2017), Moreno et al. (2018), Rizos et al. (2017) and Hobson (2019) apply a relatively narrow scope and focus on circular properties and potential benefits of production-consumption systems based on literature reviews and case studies. More recent publications by Guzzo et al. (2021), Tseng et al. (2020) and Bertassini et al. (2021) apply systems thinking and sustainability transitions literature as well as scenario modelling to map and classify complex CE systems and resource flows on more abstract levels. Even if the latter are partly tested on actual case studies, both approaches rarely provide a comprehensive view on dynamics and exchanges between actors in CE innovation systems, and the insights are either context-specific or relatively abstract. Also, the relative importance and respective composition of value creation strategies, policies and systemic principles to enable CE innovation are barely elucidated in the current body of research (cf. Bassi et al., 2021; Guzzo et al., 2021; Konietzko et al., 2020).

The concepts of multi-level-perspective (MLP) and technological innovation systems (TIS) – which are typically applied to analyse pathways and dynamics in complex sustainability transitions – face criticism of providing too little insight into directionality. In general, the MLP takes the perspective that transitions occur through interactions between a regime from which dominant institutionalised structures are stipulated, emerging niches in which innovations can flourish, and an influencing landscape that describes wider society and its influence on regime and niches (Geels 2002; Geels, 2011). So, according to the MLP, sustainability transitions can be driven either top-down, bottom-up, or through a compound of both dynamics (Loorbach, 2007; Verbong, Geels, 2010). The TIS concept brings detailed insight into the processes that inhibit or drive the development, adoption and diffusion of an innovative technology. From a TIS perspective, sustainability transitions occur around the development and diffusion of an innovation that can lead to more desirable sustainability outcomes than dominant practices and systemic configurations (Walrave, Raven, 2016). Although MLP could principally conceptualise multiple innovations and their systemic interactions, both concepts are mostly applied to scrutinise one focal technological

innovation - such as biogas or electric vehicles (Braams et al., 2021; Hekkert et al., 2007; Geels, 2002; Guzzo et al., 2021). However, CE innovation transcends these theoretical approaches because a variety of technological and non-technological innovations across regions and/or sectors need to be coordinated.

We face the challenge of simultaneously widening and deepening the current scope of systemic analyses in order to provide structured insight in systemic relationships, interventions and requirements that enable CE transformations. However, research on CE innovation dominantly emerged around problems rather than solutions. This is in line with developments in sustainability transition research in the past decades, particularly in the context of transformative change, where the complexity of systems failures to meet sustainability goals is increasingly scrutinised (Boon, Elder, 2018; Weber, Rohracher, 2012). So, while the problems that inhibit the strategic coordination of large-scale innovation systems are increasingly analysed, we lack knowledge about the characteristics and configurations of actual solutions to better prioritise problems and to formulate the associated objectives, practices and policies to foster CE practices. To advance knowledge on this and to shed further light on the potential impact of ‘grassroots’ circular entrepreneurship on a transformation towards CE, this thesis takes on an actor-based view on CSUs and analyses them as nascent builders of innovation systems for circular solutions (cf. Musiolik et al., 2020; Planko et al., 2016; Planko, Cramer, 2021). A more in-depth study of CSUs’ roles, interactions, and relations in innovation systems can help to advance the understanding of those configurations that are relevant for CE innovation to occur - and to spread beyond the focal *island of rules* to form *archipelagos of rules* (cf. Närvänen et al., 2021). A stronger actor-based view is proposed for CE transformation research. It provides an inside perspective that is oriented towards co-constituting the innovation system (e.g., through reflexive processes between individual actors and the regime) rather than the more common outside perspective where the innovation system is objectified (Corvellec et al., 2021; Kern et al., 2020; Smith, Stirling, 2007).

1.5. There is much to learn from start-ups in the circular economy

1.5.1. Research questions and structure of the thesis

To address the discussed challenges and gaps in the literature, this thesis aims to analyse the role of CSUs and circular entrepreneurship in larger CE transformation processes. The work is guided by the following research question:

> How do circular start-ups contribute to the transformation towards a circular economy?

The answer to this question is broken down into subsequent elements which are presented by largely following the four elements of Gartner's conceptual framework for describing new venture creation: the organisation, the individual, the environment, and the process (Gartner, 1985). The model stems from the 1980s and was an early attempt to grasp and organise the complexities of entrepreneurship as well as the early development stages of new businesses. The interrelations of the four dimensions constitute unique combinations that can be described and analysed. Therefore, the model allows us to describe the creation and development of CSUs, to compare them among each other and also to put them in context of other sustainable and non-sustainable entrepreneurial ventures or other system actors. Accordingly, the answer to the overarching research question should first provide a comprehensive analysis of the *organisations* and scrutinise the technical solutions and business models that are developed by CSUs. Subsequently, the persons that found these ventures are analysed as the *individual* element comes to the fore. Next, the ventures are put into conceptual and systemic context as the surrounding *environment* as well as the mechanisms through which the start-ups interact with - and influence - socio-technical systems are focused. For this, we use the innovation systems framework as it nicely conceptualises the socio-technical environment in which the innovation is embedded. The compound insights from the study of the other three perspectives combined with existing research on circular business model innovation (e.g., Aminoff et al., 2017; Antikainen, Valkokari, 2016; Antikainen et al., 2017; Linder, Williander, 2017) can provide a robust base

for gaining insight into the *process* perspective. Particularly, the study of entrepreneurial motivation and identity in Chapter 3 as well as systemic interactions in Chapter 4 provide insight into opportunity recognition, resource accumulation, market positioning, and societal and governmental interaction (cf. Gartner, 1985). The last element of this thesis takes a more theoretical approach and compares CE innovation with the sharing economy where conceptual overlaps as well as examples for transformative entrepreneurial dynamics could be observed recently. By focusing the chapter on a deeper literary discourse and adjacent themes in the scholarly context of CE, this research aims to contribute to a better literary anchoring of grassroots CE research. Common patterns of CE innovation and related concepts in sustainable development need to be identified and structured to avoid further dilution and contribute to definitional consensus. Furthermore, potential overlaps and learnings from adjacent literature help guide the analysis and support a further bottom-up diffusion of CE innovation.

The above elements lead to the framing of 4 scientific studies that address different aspects of the problem and are presented in the 4 chapters of this thesis as described below. Chapter 2 is based on an extensive empirical analysis and contains a large-N study on CSUs' innovation types, circularity strategies and business models. Chapter 3 elaborates on the relevance of the founder in the entrepreneurial process and focuses on 'born' circular entrepreneurs' motivations and identities. Chapter 4 analyses CSUs' roles as builders of innovation systems as well as the impacts that CSUs have on an overall CE transformation beyond novelty creation. Chapter 5 contains a comparative literature review to identify links between the circular economy and the sharing economy (SE) concepts. The necessity for this study was derived from the evidence of sharing and platform business models and various approaches to collaborative consumption among CSUs which are all dominant themes in SE literature and practice. Also, a literary exchange of the two themes may strengthen CE's bottom-up perspective due to existing cases of venture scaling in SE (Table 1).

Table 1. Overview of theoretical perspectives and research design

Chapter	Research question	Theoretical perspective	Research design and data
2	**Which circular business model strategies and innovation types are adopted by circular start-ups?**	Circular business model innovation Circularity / *R*-strategies	Semi-structured interviews with 30 founders of circular start-ups in Europe *Outside-in* analysis of additional 98 circular start-ups' business models Qualitative research combining inductive and deductive approaches for data analysis
3	**What are the motivations and entrepreneurial identities of grassroots circular entrepreneurs?**	Entrepreneurial motivation Entrepreneurial identity Sustainable entrepreneurship	Semi-structured interviews with 57 founders of circular start-ups in the Western World* Qualitative research combining inductive and deductive approaches for data analysis
4	**What are circular start-ups' roles in building innovation systems in the circular economy?**	Innovation systems and sustainability transitions Mission-oriented innovation Institutional theory	Semi-structured interviews with 40 founders of circular start-ups in the Western World* Systematic literature review of institutional theory and systems transition literature Qualitative research combining inductive and deductive approaches for data analysis
5	**What are links between the circular economy and sharing economy concepts in scholarly literature?**	Industrial ecology, environmental economics Anthropology, reciprocity Lifecycle analysis, material flow analysis ICT & digital platforms Sustainability transitions (consumer behaviour, governance, business models)	Systemic literature review & bibliometric analysis of a database of >4,500 scholarly writings on circular economy and sharing economy Combination of quantitative and qualitative methods (bibliometrics, content analysis)

*Increased sample size due to additional data from ancillary research projects that followed the same methodological approach to data gathering

1.5.2. Research design

Two dominant methodological approaches are combined in this study. In general, the combination of research methods can balance the respective weaknesses and strengths of individual approaches (Bryman, 2015; Eveleens, 2019). Thus, the case study focus, and the conduction of new empirical work that was applied for the majority of this research (Chapters 2-4), was amended by an extensive bibliometric analysis of the CE literature body and adjacent literature (Chapter 5).

To create the database for Chapters 2, 3 and 4, 60 case studies across various regions were examined in-depth through semi-structured founder interviews, and more than 130 CSUs were examined 'outside-in' (i.e., through press and desk research). A relatively large sample size was chosen – typically, 20-30 interviews are considered sufficient for achieving theoretical saturation – to address the risk of desirable answers and interviewee bias (Charmaz, 2006; Creswell, 2002; Low, 2019). Thus, there was a higher chance of grasping relevant nuances and increasing generalizability of the findings. The approach for chapters 2-4 was chosen because it allows for theory building and knowledge development for relatively new phenomena (Eisenhardt, Gräbner, 2007; Yadav, 2010, 2018). The regional scope of this research spans metropolitan areas in the Western world. The ventures that were interviewed are from the Amsterdam (Randstad Metropolitan region), London, Berlin, Sydney Metropolitan region and Melbourne (cf. Luo et al., 2020). These locations were chosen because the respective municipal governments established CE policies in recent years (see Chapters 4 and 5) and they are among the world's top start-up hubs. The interviews for this research were conducted between October 2017 and May 2020.[1]

[1] All interviews with Europe-based CSUs were conducted in 2017 and 2018. The interviews with Australia-based founders were conducted in 2020. CE experienced an upswing and appeared on municipal policy agendas in Berlin, Amsterdam and London already in 2017/2018 while this upswing happened in 2019/2020 in Australia (see sources mentioned above). As Chapter 2 of this thesis was written in 2019, the Australia-based CSU data is not included in the data sample. A subsequent analysis of the business models represented by Australian CSUs showed that they could be grouped into 5 CSU business model archetypes that are defined in Chapter 2.

All interviews were recorded, transcribed and compiled into a database that allowed for further analysis and operationalisation of key concepts. I combined inductive and deductive methods for the data analysis. Since neither CSUs nor CE entrepreneurs' motivations and identity have been scholarly scrutinised, this research initially applied conventional coding (Hsieh, Shannon, 2005). Next, literature review articles, recent publications and work from highly cited authors were screened for the themes that were identified during initial (bottom-up/conventional) coding. Thus, the scientific approach in Chapters 2, 3 and 4 took on a deductive character because the analysis of the interview data was amended with existing theory to contextualise, explain and build on the observed phenomena (Alvesson and Kärremann, 2007; van Maanen et al., 2007). The inductively identified operationalisations of the key concepts were embedded in the respective theoretical context (Gioia et al., 2012).

Chapter 5 builds on a systematic review of more than 4,500 scholarly writings on the topics of circular economy (3,200 articles) and sharing economy (1,200 articles). Here, bibliometrics, and as such a stronger quantitative and statistical approach, guided the analysis. The dominant scientific techniques were keyword and (co-) citation analyses. This methodological choice allows for elucidation of the conceptual and historic foundation as well as thematic context that are necessary for a better qualitative assessment and interpretation of the findings in previous chapters.

Chapter 2

As outlined above, there exists little insight into the approaches to circularity that young start-ups take on, and there is a paucity of literature that analyses actual, working solutions in a CE. This exacerbates the prioritisation of problem statements and the creation of fitting supporting structures to address them. Therefore, the research question of the first study is

> Which circular business model strategies and innovation types are adopted by CSUs?

Building on existing CBM research, a business model typology is developed of the potentially most innovative players in private sector CE that implement holistic CBMs. Therefore, we analysed the business models of 128 CSUs and interviewed founders of 30 of these start-ups. The start-ups were identified in three major ecosystems for circular innovation in Europe, i.e., Amsterdam/Rotterdam, London and Berlin. To derive a dynamic typology, the CSUs were classified based on the circularity strategies (R-strategies) and the circular innovation types that they pursue. This chapter defines the core research object of this project and coins the term *circular start-up* (CSU). Identifying clusters and thematic emphasis among the business models helps to guide the search for opportunities for circular innovation. Furthermore, applicable combinations of CBM strategies and respective innovation types are presented, which can serve as an important source of information and inspiration for circular practices and circular value chains.

Chapter 3

Apart from the business models, the profiles of the entrepreneurs who found innovative ventures are the other central determinant for the organisations' development path and success – particularly, when the business model breaks with existing practices and designs. However, little to nothing is known about the people that develop ideas for circular innovation and commit to their growth and diffusion. This is particularly relevant because there are indications that founders of circular ventures are a distinct group among sustainability-oriented entrepreneurs (Geissdoerfer et al., 2020; Hobson, Lynch, 2016; Santini, 2017). Therefore, this chapter aims to answer the following research questions:

> What are the underlying motivations for a circular entrepreneur to launch their venture? What are their entrepreneurial identities?

The insights on CE entrepreneurs' motivation and identity were gained through a series of interviews with 57 CSU founders in Germany, the UK, Australia and the Netherlands. Beyond the personality traits and personal value systems, this study also sheds light on the background of CE entrepreneurs and their drivers to start their entrepreneurial journey in

CE. These insights may contribute to more targeted grassroots support for CE innovation. An analysis of the vision and objectives of the founders helps to predict potential development paths for CSUs on a larger scale. New forms of collaboration are required for circular innovations to thrive, so the entrepreneurial positioning and entrepreneurial self-understanding of circular entrepreneurs are also scrutinised in Chapter 3.

Chapter 4

It was established that CE is a complex, systemic concept that requires buy-in and alignment of objectives among a variety of public and private stakeholders. The strategic coordination of the efforts of system actors is pivotal for the effective diffusion of CE in the private and public domain. Therefore, the research moves away from the endemic perspective on CSUs but lays focus on their roles in innovation systems. As vehicles for circular innovation, CSUs often need to create legitimacy for their own business models and build an adequate systemic embedding from scratch. In doing so, they apply external strategies and interventions that involve and influence other actors and their institutional environment. In this chapter, CSUs‘ systems building activities are scrutinised to draw learnings on how the various directionalities of CE innovation can unfold and how to manage them more strategically. So, the fourth chapter focuses on the research question:

> What are CSUs’ roles in building innovation systems in the circular economy?

Here, we zoom in on the approaches that CSUs take to overcome the systemic challenges of CE implementation. The analysis is based on 40 case studies and respective founder interviews in Europe and Australia. Building on the insights from previous chapters, this study maps the most relevant systemic stakeholders for CSUs and reflects on CSUs as system builders that pursue the common mission of CE. The analysis presents the underlying strategies and categorises the dominant roles that CSUs adopt to increase circularity in innovation systems. This chapter builds on literature on institutional work,

mission-oriented innovation, and sustainability transitions. It aims to enrich the little theoretical substance that the concept of CE is often critiqued for (Corvellec et al., 2021).

Chapter 5

CE is - and circular innovation are - not developed and diffused in silos but in context of other sustainable innovations and concepts related to sustainable development. Research on CSUs should be contextualised with existing work to prevent definitional dissent, to advance interdisciplinary exchange, and to strengthen the academic field. A concept that is often referred to by CSUs' is the sharing economy (SE). In that, CSUs build their strategies and business models on principles and mechanisms of SE such as collaborative consumption, rental mechanisms, open innovation and platform design. However, CE literature is barely linked with SE and provides little insight into sharing practices and approaches to collaborative consumption - apart from rather indirect links, e.g., in context of industrial symbiosis and service-based business models.

There are examples of SE start-ups that have reached global scale and disrupted industries. Even though the distinct view on CSUs is a novel perspective in scientific literature, the struggles, pitfalls and opportunities faced by related ventures might yield relevant learnings and provide guidance and context for the analysis. Furthermore, a comparative examination of historic and present links between CE and SE will allow for mutual enrichments between the concepts and provide structure for these hyped and partly diluted topics. Thus, the fifth chapter of this thesis aims to answer the following research questions:

> What are the links between the concepts of CE and SE in scholarly literature? And how can the two literary bodies enrich each other?

Chapter 5 focuses on the literary exchange between CE and SE and analyses links and relations as base for a mutual enrichment. For the analysis, a database was built that contained more than 4,500 articles on CE and SE which were published between 1996 and 2020. These articles were analysed with bibliometric and content analysis to identify

prevalent overlaps and opportunities for mutual enrichment. We explain why CE is often approached top-down while SE has a bottom-up dynamic to provide valuable insight into mechanisms that enable a more strategic management of circular innovation and CSU activity in socio-technical systems. SE innovation's literary origins and historic emphasis on the societal dimension are examined in light of CE innovation's structural prioritisation on ecologic and economic aspects. Furthermore, SE case examples and literature provide extensive knowledge on platform approaches and distributed networks which are considered to be of central relevance for value allocation in circular systems (Kosmo et al., 2019; Li et al., 2019; Plewina, Guenther, 2018).

2

A Typology of Circular Start-Ups – An Analysis of 128 Circular Business Models[2]

[2] This chapter has been published in the Journal of Cleaner Production as

Henry, M., Bauwens, T., Hekkert, M., Kirchherr, J. (2020). A typology of circular start-ups: An Analysis of 128 circular business models. Journal of Cleaner Production, Volume 245, ISSN 0959-6526, https://doi.org/10.1016/j.jclepro.2019.118528.

A later, mostly unaltered version of this chapter was published as two book chapters in The Routledge Handbook of Waste, Resources and the Circular Economy as

Henry M., Kirchherr J. (2020). Conceptualising circular start-ups.

and

Henry M., Kirchherr J. (2020). Circular start-ups - Five business model archetypes as frontrunners of circular disruption.

In

Tudor, T., & Dutra, C.J. (Eds.). The Routledge Handbook of Waste, Resources and the Circular Economy (1st ed, Chapters 11/27). Routledge. https://doi.org/10.4324/9780429346347 & https://doi.org/10.4324/9780429346347.

An earlier version of this chapter was presented at the Ingenio Research Days at Universidad Politecnica de Valencia in 2018 and won the Best Research Award.

2.1. Introduction

Moving away from ‘business as usual’ appears to be necessary to break with the current trends of resource use. Extraction of fossil fuels, ores, minerals and biomass rose 12-fold during the 20th century, amounting to 84.4 billion tonnes in 2015, with further doubling expected in 2050 (Circle Economy, 2018; Krausmann et al., 2009). This accelerating material extraction and use pose serious threats to the sustainability of the environment and societies. A circular economy (CE) proposes a shift from this model to one in which materials are circulated in closed-loop systems to maximise utilisation, reduce resource depletion and eliminate waste (Ellen MacArthur Foundation, 2012; Geng et al., 2009; Murray et al., 2017). There are many competing CE definitions (Kirchherr et al., 2017). The authors define a CE throughout this chapter as ‘an economic system that is based on models that replace the “end-of-life” concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes, thus operating at the micro-level (products, companies, business models, consumers), meso level (eco-industrial parks, business networks) and macro level (cities, regions, nations and beyond), with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations’ (Kirchherr et al. 2017, pp. 224–225).

CE has become a widely discussed topic among policy-makers, scholars and industry professionals alike (Urbinati et al., 2017). In its recent interpretations, CE received a strong push after the financial crisis in 2008 and was (re-) introduced as a suitable concept to transform the capitalist, linear economic model according to more environmentally-inclusive and sustainable principles (Cave, 2015; Kok et al., 2013; Pratt, 2014; Richardson, 2015). CE literature grew significantly after the publication “Towards the CE: Economic and Business Rationale for an Accelerated Transition” by the Ellen MacArthur Foundation (2012; Lieder, Rashid, 2016; Murray et al., 2017). Despite the current numerous discussions, the implementation of CE remains extremely limited. For instance, a study showed that in 2005,

only 6% of waste materials were recycled at the global level, with the remainder were incinerated, landfilled, or dispersed into the environment; similarly, a more recent study by Circle Economy evinced that global material circulation level (at least recycling) is at less than 9% (Circle Economy, 2021; Haas et al., 2015). While it has been argued that governments hold pivotal roles in building a vision and steering market actors towards a CE, the roles that the private sector can play have been particularly highlighted in recent years (Accenture, 2014; Lieder, Rashid, 2016; Lüdeke-Freund, 2018; Urbinati et al., 2017; Antikainen et al., 2017). Indeed, changes in business models are considered by many scholars as a key enabler for the shift from a linear to a circular economy (van Renswoude et al. 2015; Ellen MacArthur Foundation 2012; McKinsey & Co. 2015; Ghisellini et al. 2016; Bocken et al. 2016; Lewandowski, 2016).

In principle, CE pioneers can be start-ups as well as incumbents – the drive towards CE is mainly determined by the respective organisations' circular spirits and entrepreneurial capabilities (De los Rios, Charnley, 2017). However, a common view in innovation research is that incumbents are seldom the source of innovations that break with existing dominant designs because they are locked into previous investments, existing supply chains and business models that are hard to rapidly adapt once fully developed (Christensen, 1997; Henderson, Clark, 1990; Hill, Rothaermel, 2003; Johnson, 2010). Similarly, it has been questioned whether incumbents will or can fully embrace the more 'radical' business model approaches to CE, such as sharing platforms (e.g., peer-to-peer) or product-service systems (PSS; Lieder, Rashid, 2016). Empirical evidence indicates that large incumbents tend to focus on widespread strategies like recycling, which are incremental and do not necessitate shifting their core business models (Bocken et al., 2017; Stewart, Niero, 2018). In contrast, start-ups, as new market entrants, are attributed with a higher capacity to adopt more disruptive circular business models (CBMs; defined in section 2.2.2), due to their higher flexibility and responsivity to market changes (Bergset, Fichter, 2015; Bos-Brouwers, 2010; Hockerts, Wüstenhagen, 2010; Rizos et al., 2016). Entrepreneurship has been recognised

as a major conduit for sustainable products and processes, and new ventures are being held up as an answer to many social and environmental concerns (Hall et al., 2010).

Circular entrepreneurship is still a quite novel concept in scientific literature (Zucchella, Urban, 2019). The present article aims to shed further light on the CBM strategies and circular innovations pursued by circular start-ups (CSUs) to contribute to the theoretical body of sustainable innovations and to existing frameworks operationalising CBMs. Thus far, research on CBMs has mainly focused on approaches to CE by large incumbents, such as Google, Carlsberg, Renault or Unilever, possibly because of their higher visibility and the influence they have on their respective markets (Bocken et al., 2017; Franco, 2017; Frishammar, Parida, 2019; Ma et al., 2014; McIntyre, Ortiz, 2016; Niero et al., 2017; Stewart, Niero, 2018; Urbinati et al., 2017; Williams, 2007). In contrast, little empirical scholarly work had been carried out on CSUs directly when this chapter was written. In this research, CSUs are defined as new, independent and active companies that pursue a CBM (selection criteria further detailed in section 2.2.2).

Therefore, the objective of this research is to build on existing literature on circularity strategies and circular (sustainable) business model innovation to develop a business model typology of the potentially most innovative players in private sector CE. Following Gartner's (1995) framework for new venture creation, the element of the *organisation* is in focus of this study while the other three elements of *individual*, *process*, and *environment* are scrutinised in the two following chapters. The questions addressed by this chapter are as follows:

RQ1: Which CBM strategies are adopted by CSUs?

RQ2: What types of CBM innovations do CSUs pursue?

The authors address these questions by analysing the CBM strategies and innovations of 128 CSUs[3] located in three major CSU ecosystems in Europe, i.e., the Randstad region in the Netherlands,[4] London and Berlin. The dataset was newly compiled

[3] The full list of start-ups scrutinised in this study can be found in the Appendix

[4] The Randstad region comprises Amsterdam, Rotterdam, Utrecht and The Hague.

and evaluated for the purpose of this study and has not been used for any other peer-reviewed publications before, and to the best of the authors knowledge there has been no research conducted on CSUs' actual business models. Therefore, the data can be proclaimed as novel. Relying on this empirical analysis, a novel typology of CSUs is proposed, distinguishing between five business models: design-based start-ups, waste-based start-ups, platform-based start-ups, service-based start-ups and nature-based start-ups. In addition, the findings show that CSUs across all types tend to embrace activities that correspond to a higher level of circularity than incumbents.

The CSU typology shown in this chapter is a step towards better understanding the role of entrepreneurship in circularity and sustainability transitions. The envisaged findings based on extensive empirical analysis are of value to foster a link between scientific and practical approaches to CE and will contribute to deepen the insight on business models of CSUs. The typology of CSU archetypes will help to guide a future scientific agenda through expounding and highlighting innovative CBMs and thereby inspiriting and enabling more systematic research on circular innovation and entrepreneurship in a wider context. For firms interested in CE, applicable combinations of CBM strategies and respective CBM innovation paths are elucidated, which will serve as an important source of information and inspiration. At the same time, by highlighting the characteristics, especially of those CSUs that have achieved high levels of circularity, lessons can be drawn for managers that are willing to increase the level of circularity of their businesses. Managers could, for instance, examine CSUs' activities to identify promising opportunities both within and between industries, and adopt best practices in their own business models. The findings can also be relevant to policy-makers who intend to support circular (start-up) activity and circular innovation in their respective districts.

The remainder of this chapter is structured as follows: a literature review on sustainable and circular business models and the conceptual framework underpinning this investigation are presented in section 2.2, the methodology is presented in section 2.3, the

empirical analysis and the discussion of the results are shown in section 2.4, and concluding remarks about policy and management implications are provided in section 2.5.

2.2. Literature

2.2.1. Literature review

This section outlines how sustainable and circular business models, innovations and private actor strategies have been defined in existing research, and succinctly reviews the extant literature on the relevant concepts of environmental or sustainable entrepreneurship. In line with previous developments of the business model literature (Beattie, Smith, 2013; Osterwalder et al., 2010, 2005; Richardson, 2008), three main elements that compose sustainable business models can be highlighted: the value proposition (i.e., the offer and the target customer segments), the value creation and delivery (i.e., the core activities, resources, and partners and distribution channels), and the value capture (i.e., the cost structure and the revenue model; Bocken et al., 2014). Accordingly, a sustainable business model (SBM) - when appropriately designed - should create, deliver, and capture economic value while appealing to customers and contributing to environmental and/or social sustainability (Boons, Lüdeke-Freund, 2013; Lüdeke-Freund et al., 2018; Schaltegger et al., 2016).

CBMs incorporate CE principles as guidelines for business model design (Heyes et al., 2018; Pieroni et al., 2019). They can be defined as circular operations on the micro-level that aim at closing, narrowing or slowing material flows and thereby minimise waste or keep resources in use for as long as possible by reducing, alternatively reusing, recycling or recovering them (Bocken et al., 2016; Kirchherr et al., 2017; Linder, Williander, 2017). Circular is a more concrete term than sustainable, since it describes ways *how* to achieve sustainability (Geissdoerfer et al., 2017). Indeed, while the concept of SBM is centred around the finality of creating economic, environmental and social value without prescribing specific directions for achieving it (Lüdeke-Freund, Dembek, 2017; Stubbs, Cocklin, 2008), CBMs are more narrowly framed and establish specific ways to address the negative

consequences of business operations that lead to excessive waste generation and resource depletion.

The overlap of CBMs with SBMs may lead some authors to see the former as a subset of the latter (e.g., Bocken et al., 2014; Lüdeke-Freund et al., 2018). However, the authors of this chapter disagree because - as noted by Pieroni et al. (2019) - SBMs can also generate unsustainable effects if design options for CE are only partially in place (e.g., encouraging over-consumption or fast replacement when the respective reverse-logistics processes are not in place). Furthermore, while SBMs hold social relevance or work enrichment as a driver for value creation on top of environmental and economic impacts, these aspects have been described as secondary benefits instead of core drivers for value creation in the case of CBMs (Pieroni et al. 2019). The lack of inclusion of social elements in CE practice and theory is critised as one of the concepts weaknesses to date (Hobson, Lynch, 2016).

Closely related streams of literature have developed around sustainability-oriented innovations (Adams et al., 2016; Klewitz, Hansen, 2014; Schiederig et al., 2012) and, in particular, SBM and CBM innovations (Geissdoerfer et al., 2018). SBM innovations incorporate sustainability principles into the business model innovation process (Foss, Saebi, 2016; Massa, Tucci, 2014), seeking to conceptualise and implement new business models while also benefiting society and the environment (Boons, Lüdeke-Freund, 2013; Lüdeke-Freund et al., 2018; Pieroni et al., 2019). CBM innovations seek to create CBMs by integrating the more concrete circularity principles into the business model innovation process (Diaz Lopez et al., 2019; Geissdoerfer et al., 2018; Linder, Williander, 2017). An emblematic example of CBM innovations is the product-service system (PSS) model, which entails a conversion from selling a product to providing leasing and sharing services, and thereby decoupling the service provision from the ownership of physical goods (Tukker, 2004; Tukker, Tischner, 2006; Vezzoli et al., 2015). This model financially incentivises the supplier to invest in the durability and reuse of products and materials (Baines et al., 2007; Mont et al., 2006; Williams, 2007).

CBM innovations can occur at different positions along the value chain of goods and services. Urbinati et al.'s (2017) approach (adjusted version further discussed in section 2.2.3) distinguishes between upstream, downstream and full business model adoptions for circularity:

- *Downstream* circular companies adopt circular innovations related to their revenue model and customer interfaces, but they do not necessarily make relevant changes at the supplier level and at internal practices or product design;
- *Upstream* circular companies are classified as adopting circular innovations internally, and with a focus on interaction with their suppliers. Thus, they concern innovations during the pre-usage or pre-customer face of a product or service. This can happen through design practices (e.g., design for recycling/reuse/disassembly (Jawahir et al., 2007), source material innovation, the collaboration with suppliers to utilise external waste streams, or by selecting partners which can provide biodegradable materials;
- *Full* circular companies are those which adopt both upstream and downstream CBM innovations.

In addition, CBM innovations should be distinguished from CBM strategies, which can be viewed as firms' general approach towards CE. That is, CBM innovations are the processes by which firms practically implement their CBM strategies. Several conceptualisations of CBM strategies exist (e.g., Bocken et al. 2016, Ünal, Shao, 2018, Urbinati et al. 2017, Willer, Williander 2017). Among those, the so-called R-framework distinguishes between different strategies to embrace circularity, known as R-strategies. Literature and practice offer different versions of the R-frameworks (Blomsma, Brennan, 2017; Sihvonen, Ritola, 2015; Yan, Wu, 2011), ranging from the 3 Rs (reduce, reuse, recycle) – in the Chinese government policy on CE (Geng et al., 2009; PRC 2008) – to 10 Rs in a more recent literature review by Reike et al. (2018; adding, e.g., refurbish or repair). While the number of Rs differ from list to list, most of the R-lists establish a priority order for approaches to circularity, with the first R viewed to be a priority to the second R and so on. These R-strategies can be developed within the two types of material cycles characterising

the CE (Ellen MacArthur Foundation, 2012; McDonough, Braungart, 2002): the biological cycle, which encompasses the flows of food and biologically-based materials (e.g., cotton, wood) that are designed to return back to the biosphere through processes like composting or anaerobic digestion, and the technical cycle, which relates to the flows of inorganic or synthetic materials. The 4R-framework, which is the most commonly used R framework in the CE literature according to Kirchherr et al. (2017), will be used as theoretical base for this chapter (see section 3.2.2 for further details).

Adopting SBMs and CBMs and corresponding innovations and strategies is often seen first in new entrants, such as start-ups, due to their higher flexibility and their capacity to stimulate disruptive sustainability innovation (Cohen, Winn, 2007; Dean, McMullen, 2007; Hall et al., 2010; Hockerts, Wüstenhagen, 2010). Start-ups can be defined as 'new' (i.e., typically operating for four to six years) and 'independent' entrepreneurial ventures designed to effectively develop and validate a scalable, repeatable and at least break-even business model (Brush, Vanderwerf, 1992; Klyver, Terjesen, 2007; Luger, Koo, 2005; Rabideau et al., 2016; Robehmed, 2013; ahra et al., 2000). The literature on innovation and entrepreneurship typically views incumbents in a stronger path dependency than start-ups (Christensen, 1997). Indeed, once the business model is established, typically a high effort is required from a company to change it. As Chesbrough (2010) argues, companies may invest extensively in the development of new products and technologies that will be commercialised through their business model, but they often have little if any ability to innovate the business models through which these inputs will pass. Empirical evidence indicates that large incumbents tend to focus on lower-impact CBM strategies, like recycling, and make marginal changes instead of shifting their core business models (Bocken et al., 2016; Stewart, Niero, 2018).

In contrast, start-ups, as new market entrants, can adopt CBMs from the start, take a holistic perspective at their business model and monetise design-to-last and maintenance efforts. In addition, they are not exposed to the risk of cannibalising the market share of their prior products or devaluating previous investment in manufacturing processes (Hockerts, Wüstenhagen, 2010). Furthermore, typical limitations to the implementation of CBMs – like

company environmental culture, technical know-how, or administrative burden – only partly apply to start-ups. For the latter, more horizontal management styles, decreased bureaucratic structures and more informal communication channels lead to higher flexibility and responsivity to changing market circumstances (Bos-Brouwers, 2010; Hockerts, Wüstenhagen, 2010; Rizos et al., 2016; Schaltegger et al., 2016).

Various streams of research have looked at the relationship between different aspects of sustainability and start-ups or entrepreneurship, including environmental entrepreneurship or ecopreneurship (Lenox, York, 2011; Schaltegger, 2002), social entrepreneurship (Borzaga, Defourny, 2001; Doherty et al., 2014) and sustainable entrepreneurship (Choi, Gray, 2008; Cohen, Winn, 2007). While environmental entrepreneurship exclusively focuses on the simultaneous creation of economic and environmental value (Jiang et al., 2018) by addressing environmentally relevant market failures, social entrepreneurship seeks to achieve social goals (e.g., work enrichment, ethical sourcing) and to secure funding for it. Sustainable entrepreneurship aims to embrace sustainability more comprehensively across a "triple bottom line" perspective, integrating its economic, environmental and social dimensions (Schaltegger, Wagner, 2011; Thompson et al., 2011). The specificity of CSUs is that they have adopted a CBM.

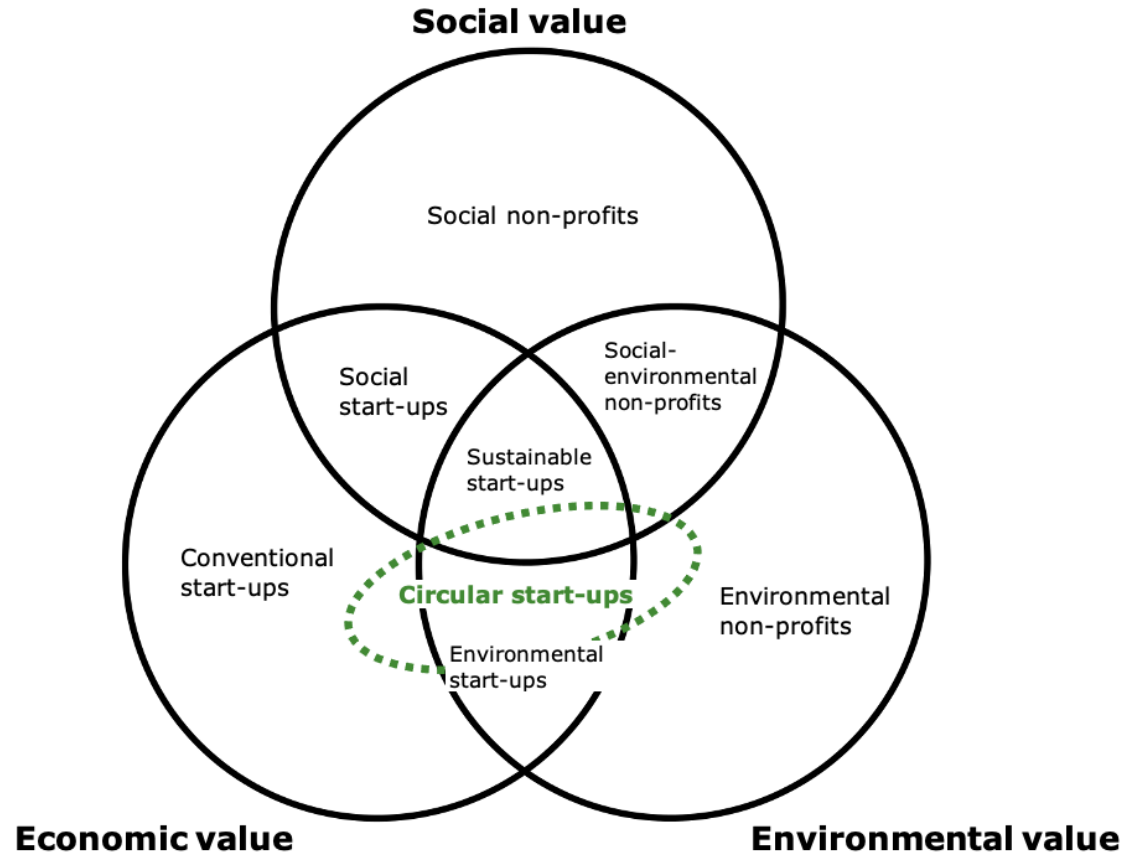
The relationships between CSUs and closely related types of ventures are illustrated in the Venn diagram below (see Figure 1). CSUs have a large overlap with environmental start-ups[5] and environmental entrepreneurship, as both types of organisations simultaneously pursue the creation of economic and environmental value. However, CSUs are more specific in their operationalisation, focusing on closing product or material loops, while environmental start-ups include a broader range of business models, for example biodiversity protection. Moreover, CSUs partly overlap with sustainable start-ups when, on the top of economic and environmental value, they also generate societal value or work enrichment as secondary effects. This distinguishes them from social start-ups (e.g., fair

[5] The terms "green start-up" or "clean-tech start-up" are also used in the literature as synonyms for environmental start-up (Bergset, 2017; Bergset, Fichter, 2015; Colombelli, Quatraro, 2017).

trade organisations, social enterprises), for which this aspect is the essential driver for value creation. CSUs may overlap with conventional start-ups when the implementation of CBM strategies and innovations are only partial and lead to the creation of economic value, but not environmental or social value as a primary focus. Finally, CSUs can be for-profit (i.e., their main goal is to maximise economic value for those who control them), not-for-profit (i.e., economic value creation potential is deprioritised) or non-profit (i.e. the economic value is entirely retained by the organisation for the fulfillment of its social and/or environmental missions)[6]. For this reason, CSUs partly overlap with (social or environmental) non-profits.

Figure 1. The relationships of circular start-ups with other types of enterprises

[6] For definitions of “for-profit”, “not-for-profit” and “non-profit”, see for instance Defourny, Nyssens (2010).



Source: constructed by the authors.

Within the literature on environmental and sustainable entrepreneurship, which are the concepts closest to CSUs, there is a dearth of research on the actual business models developed by sustainable entrepreneurs, that is, what entrepreneurs practically do to achieve (environmental) sustainability. Instead, several studies have focused on defining the concepts (Schaltegger, Wagner, 2011; Shepherd, Patzelt, 2011) and on understanding the entrepreneurial opportunities and challenges that arise from the existence of externalities and market inefficiencies (Cohen, Winn, 2007; Dean, McMullen, 2007; Jiang et al., 2018; Pacheco et al., 2010; York, Venkataraman, 2010). Other studies have explored the relationships between different actors (e.g., start-ups and incumbents; Hockerts, Wüstenhagen, 2010; Schaltegger et al., 2016) or strategic issues, such as the entrepreneurship process (Belz, Binder, 2017; Keskin et al., 2013), and the potential necessity of sustainable entrepreneurs to engage in institutional work to achieve their goals (Pinkse, Groot, 2015; Thompson et al., 2015). A research stream has looked at the skill sets and motivations of sustainable

entrepreneurs and how they differ from those of conventional entrepreneurs (Kirkwood, Walton, 2010; Nhemachena, Murimbika, 2018; Parrish, 2010).

While research on sustainable or circular innovations and strategies often cites entrepreneurship as a major conduit for these, it has rarely focused on the business models specifically developed by new entrants or start-ups (Boons, Lüdeke-Freund, 2013; Klewitz, Hansen, 2014). For instance, Geissdoerfer et al. (2018) mention sustainable start-ups as a way to develop SBM innovations without discussing it further. Several recent studies present taxonomies or typologies of circular strategies and innovations adopted by firms, but do not distinguish between incumbents and new entrants (Lüdeke-Freund et al., 2018; Ünal, Shao, 2019). The typology of CSUs presented in the current chapter seeks to address this research gap.

2.2.2. Theoretical framework

This section presents the theoretical framework that was developed to code the empirical data that was collected for this chapter, based on the literature just outlined. RQ1 is concerned with the CBM strategies adopted by CSUs. To code these, the 4R-framework as presented by Kirchherr et al. (2017) was chosen over the other versions of the R-framework, because the former has been used more frequently in previous literature than any of the latter (Kirchherr et al., 2017; Stewart, Niero, 2018). Therefore, this analysis is easier to compare with existing studies like Stewart and Niero's analysis of incumbents' business model approaches to increase circularity (2018).

The hierarchy among the R-strategies in the 4R-framework corresponds to different degrees of resource value retention, with higher strategies corresponding to higher value retention. The retention of resource value here means "conservation of resources closest to their original state, and in the case of finished goods retaining their state or reusing them with a minimum of entropy as to be able to give them consecutive lives" (Reike et al., 2018, p. 254). Hence, activities that explicitly deal with the resource streams after product usage (*Recover*, *Recycle*) are ranked lowest, because they tend to lose any of the original product structure

and, therefore, correspond to low value retention. In addition, recycling materials often requires high energy inputs for collection and re-processing, which may supersede the retained value (Ghisellini et al., 2016; Reike et al., 2018). Recycling and energy recovery are also typically easier to implement than other strategies, since they require little changes to the fundamentals of the business model (Ranta et al., 2018) and are, therefore, still largely compatible with a linear economy (Potting et al., 2017). Following this logic, *Reuse*, which is aimed at extending the use phase of products, is ranked higher than Recycle and Recover, because products are generally used again for the same purpose for which they were conceived, thereby retaining most of the resource value (Castellani et al., 2015). However, it is not considered as desirable as *Reduce*, where potential residual resource streams are avoided before the product even gets in circulation.

A dimension that has not been well covered so far by the existing versions of the R-frameworks is the preservation and enhancement of natural/biological ecosystems to deliver products or services. This dimension is important to consider as far as CSUs are concerned, because some of them are engaged in the development of so-called 'nature-based solutions', which is a structural cluster resulting from the dataset (see section 2.4.3.5), and a widely discussed topic in theory and policy (Davies, Lafortezza, 2019; European Commission, 2015; Faiver et al., 2017; Frantzeskaki, 2019; Kabisch et al., 2016). These companies utilise ecosystems with decreased input of non-renewable natural capital and increased investment in renewable natural processes (Maes, Jacob, 2017). Thus, beyond the existing 4R-framework, the CBM strategy *Regenerate* was inductively included to cover CSUs engaged in the development of solutions that are based on natural/biological ecosystems. This strategy was placed above Reduce because Regenerate seeks not only to use less resources in production and consumption processes, but also to restore natural or modified ecosystems. Thereby, they do not only contribute to retaining resource value, but also to increasing it. The authors summarise the relevant R strategies for this chapter in Table 2.

Table 2. Coding categories for CSUs' business model strategies (RQ1)

CBM strategy	Definition
Regenerate	Maintain and increase the delivery of biological ecosystem services (i.e., the benefits provided) to society, for instance through urban agriculture, green roofs or aquaponics
Reduce	Increase efficiency of product design or manufacturing by preventing or minimising the use of specific hazardous materials or any virgin materials, or allowing for more intensive product use
Reuse	Bring products back into the economy after initial use, or extend the lifespan of products and their parts (through repair, second-hand markets etc.)
Recycle	Process materials through, e.g., shredding or melting to obtain the same (upcycling) or lower (downcycling) quality
Recover	Incinerate residual flows with recovery of embodied energy

Source: definitions adapted from Brennan et al. (2015); European Commission (2008); Ghisellini et al. (2016); King et al. (2006); Kirchherr et al. (2017); Potting et al. (2017); Reike et al. (2018).

Table 1 provides insight on and structure for organisations' CBM strategies (i.e., their general approach towards CE) but is not informative about the types of CBM innovations they pursue.[7] In order to address this, and to gain insight into the modes of adoption of the CBM strategies, the authors included CSUs' innovation types in the analysis. The CBM innovations developed by CSUs were coded based on their positions along the value chain (supplier or customer) and on their organisational focus (external or internal; see Table 3). Adjusting the taxonomy of CBMs proposed by Urbinati et al. (2017), the authors introduced the additional '*source*' category to differentiate, within upstream activities – those conducted by the focal organisation internally (source) and those conducted in interaction with suppliers and partners (upstream). It can be argued, that – due to their collaborative nature – especially the upstream-oriented innovations require a strong business network and high social capital, i.e., fostered and crosscutting relationships as a communal base for cooperation and collective action (Nahapiet, Ghoshal, 1998; Peng et al., 2018). Thus, early-on effort on (strategic and public)

[7] The innovation types were not compared to incumbents' innovation types because the authors newly developed the innovation type framework wherefore there existed no comparative studies.

relationship-building to build up social capital is highly relevant for CSUs to enable upstream circular innovations (Paunescu et al., 2014; Saffer, 2019).

This differentiation in source and upstream is deemed necessary especially on the backdrop of innovation ecosystem and systems building theory where it is argued that new technologies or innovations require a favourable socio-economic embedding to last and scale (Hekkert et al., 2007; Planko et al., 2016). The downstream and upstream activities are, therefore, those directly related to sociological, institutional change because they entail modifications of the relationships with other actors in the value chain (e.g., in terms of changes in ownership, consumption habits or collaborative practices along the supply chain) and thereby can create legitimacy for the focal organisation. Activities primarily determined by the direct goals of the focal organisation – which are subsequently achieved through market acceptance or favourable market structures for their developed goods and services – are mainly technological, i.e., source (Carvalho et al., 1999; Carvalho et al., 2017). Since only one start-up's business model in the entire sample turned out to be service-based (maintenance etc.) while including ownership transfer to the customer (Amsterdam-based Fairphone), only business model archetypes in which the producer retains ownership were included as PSS in the CBM framework. Following, integration-oriented PSS, product-oriented PSS and service-oriented PSS (Neely, 2008; Pereira Pesoa et al., 2017; Tukker 2004; Wallin et al., 2013) are not included based on an inductive approach. (Customer) experience orientation is considered a value element (Tukker, 2004) or antecedent of value (Schallehn et al., 2019) of a PSS business model but not an archetypal model on its own.

Table 3. Coding categories for RQ2: CBM Innovation types.

Key actor	Innovation Category	CBM Innovation Type	Description
Downstream (consumers)	**PSS** (servitisation/ no customer ownership)	*Use phase-oriented*	Improved usage efficiency through renting, leasing, sharing, extended after-sales services
		Result/ performance-oriented	Improved usage efficiency through subscription-based business models or pay-per-use, i.e. focusing on the functionality
	Active consumer involvement	*Return, repair, reuse*	Inclusion of consumers in after-use product/resource lifecycle; enabled by value recovery and take-back processes at the source
		Collab. consumption	(Cultivation and) Usage of shared assets within communities, potentially including shared ownership
		(Educ.) Consumer engagement	(Open-source) Knowledge sharing to change customer preferences and/or diffuse distinct CE practices, materials or processes
Source (focal organisation)	**Core technol.**	*Source material*	Substitution of source materials with less resource-intensive, novel alternatives (bio-based, more durable, biodegradable, recyclable)
		Product design	Increase interchangeability, upgradability, modularity, energy-efficiency or maintainability of products and product components
		Key process	Novel production method or innovation of sub-processes enabling circularity
	Enabling technol.	*Sharing platform*	Increased product utilisation and reduced material throughput through shared use/access/ownership
		Trading platform	(Web) Platform to facilitate the exchange and resale of products and materials
		Asset tracking	Tracking of products/components to enable adequate end-of-life treatment or create transparency on resource availability and origin
Upstream (suppliers, partners)	**Industrial symbiosis (IS)**	*Input-oriented*	Structured inter-organisational collaboration to create value from residual resource streams **of external organisations** or usage of shared assets
		Output-oriented	Structured inter-organisational collaboration to create value from residual resource streams **of focal organisation** or usage of shared assets
	Circularity standards	*Sourcing, manuf., shipping*	Establishing of process/material standards with suppliers through knowledge sharing and backward integration of activities along the supply chain

Source: constructed by authors.

The difference between core and enabling technology (Potting et al., 2017) within source activities is that the former is specific to a certain product or process, while the latter can be applied to many industries and across social, technological, economic and cultural systems (Allenby, 2010). Within downstream activities, the authors distinguished between consumers' active involvement and the adoption of PSS models (Ren et al., 2019; Tukker, 2004; Tukker, Tischner, 2006; Vezzoli et al., 2015). The major difference between these two **innovation categories** is that in PSS, the producers remain owners of the product (Tunn et al., 2019), while in active involvement, they facilitate the (shared) consumption and return of externally owned products. For this research, reverse logistics are understood as (technical) materials that routed reversely to the main resource flow. This corresponds with the dominant view in academic literature (Bernon et al., 2017; Carter, Ellram, 1998; Lambert, Stock, 1982; Murphy, 1986; Murphy, Poist, 1988; Rogers, Tibben-Lembke, 1999). Therefore, reverse logistics are an enabler for a multiplicity of value creating CBM innovations (PSS, industrial symbiosis (IS), Return/Repair/Reuse; Farooque et al., 2019; Spring, Araujo, 2017). Reverse logistics run transversally across the categories presented in Table 3, but are not a stand-alone innovation type. The following section describes the methodology that was followed to collect and analyse empirical data with the help of this theoretical framework. Thereby, the circular business model strategies and innovations developed by CSUs are further illuminated.

2.3. Material and methods

2.3.1. Regional and organisational scope

The three hubs under scrutiny were chosen because they host a vibrant movement towards circularity that is driven by public and private organisations. Table 4 provides examples of initiatives that aim at strengthening the development of CE and/or circular start-ups in these locations. In addition, they are key hubs for start-up activity, often positioned in the top five European start-up hubs (e.g., European Startup Initiative, 2017). These start-up hotspots are thus likely to host the circular innovations that are essential to consider if one seeks to understand how the CE will look like in the future. In addition, many CSUs were

expected to be found in these cities. Only firms corresponding to the definition of CSUs as presented in Section 2.2.2 were included in the analysis.

Table 4. Municipal CE initiatives in analysed hubs

Region/city	Rationale	Source
Randstad (Amsterdam, Rotterdam, The Hague, Utrecht)	Setup of acceleration program in Amsterdam to facilitate knowledge exchange, funding and networking for anyone pursuing innovative CE concepts Rotterdam launched a CE initiative, hosts circular innovation hub (BlueCity010), and one of the municipalities communicated measures to embed CE in the region is through attracting CSUs	Veen, n.d.; Amsterdam Smart City, 2017; Gemeente Rotterdam, 2016; Hofnaegels, 2016
Berlin	Berlin is the base for more than 400 companies identifying themselves as circular and has more than 8,000 employees in this sector Recently, 'CRCLR'[8] was launched in Berlin, a think- and do-tank dedicated to CE on more than 2,500 sqm	Berlin Business Location Center, 2017
London	The London Waste and Recycling Board (LWARB) launched the 'Circular London' and 'Advance London' initiatives in 2018, aiming at strengthening collaborations and stakeholder engagement around CE, and enabling small- and medium-sized companies to leverage the benefits of CE	London Waste and Recycling Board, 2017

A list of 128 CSUs was created to present a comprehensive overview of CSUs in the three geographical areas under scrutiny (see appendix for a full list). The search for CSUs was performed until no additional organisation could be found, with the view of having a list that was as exhaustive as possible. A total of 68 (54%) companies are located in the Randstad region, 28 (22%) are from Berlin and 31 (24%) are from London. The companies were identified through the existing resources of their respective municipal authorities, and via CSU awards and circular hubs (see appendix). The data was collected using three main sources:

[8] CRCLR is a hub and think- and do tank for CE in Berlin.

- Publicly available information from the websites and social media profiles of start-ups as well as relevant press articles;
- Existing case studies in the grey literature describing these start-ups; and, for part of our sample,
- Semi-structured interviews with founders. These interviews were intended to obtain a more in-depth understanding of the business models of CSUs and the CBM strategies they implement.

Overall, interviews were conducted with 30 of the identified CSUs: 10 in the Netherlands, 14 in Berlin and 6 in London. They were selected to cover the diversity of sectors, regions, and business models that was reflected in the entire dataset. Interviews – which lasted between 45 and 75 minutes – were conducted face-to-face or via online/video call. All interviews were audio-recorded and transcribed. Data about companies' background were also collected, including the sector of activity, date of foundation, number of employees, client focus (B2B, B2C or both) and, when available, funding, annual result, and revenue. The average revenue of the interviewed start-ups lay between €0.4-0.5mn at the date of the interview, the average team size was 6 FTE (ranging from one FTE to 25 FTE; incl. freelancer hours) and more than a quarter of all interviewed CSUs had already obtained more than €1mn in funding (total average ~€0.25mn).[9]

2.3.2. Data analysis

To answer the research questions, the authors systematically analysed the data from all three sources using a content analysis (Krippendorff, 2013; see Figure 2). First, all extracts which referred to the business models of CSUs were collected and stored in a coding software. Next, a coding framework (further explained in Section 2.2) was developed to enable the authors to convert qualitative information into numeric data (Bourque, 2004). To do so, both deductive categorisation, which uses higher-level, existing categories from the literature (e.g.,

[9] The final dataset was established in February/March 2019; founders' interviews were conducted between September 2017 and October 2018. Not all interviewees disclosed data on revenue (16 responses), employees (26 responses), and funding (24 responses)

Urbinati et al.'s (2017) distinction between upstream and downstream activities or Kirchherr et al.'s (2017) 4R-framework), and inductive categorisation, which groups lower-level codes (e.g., specific CBM innovations and strategies developed by CSUs) into higher level codes, were employed to develop the coding categories (Hsieh, Shannon, 2005). Coding categories had to be mutually exclusive and collectively exhaustive.

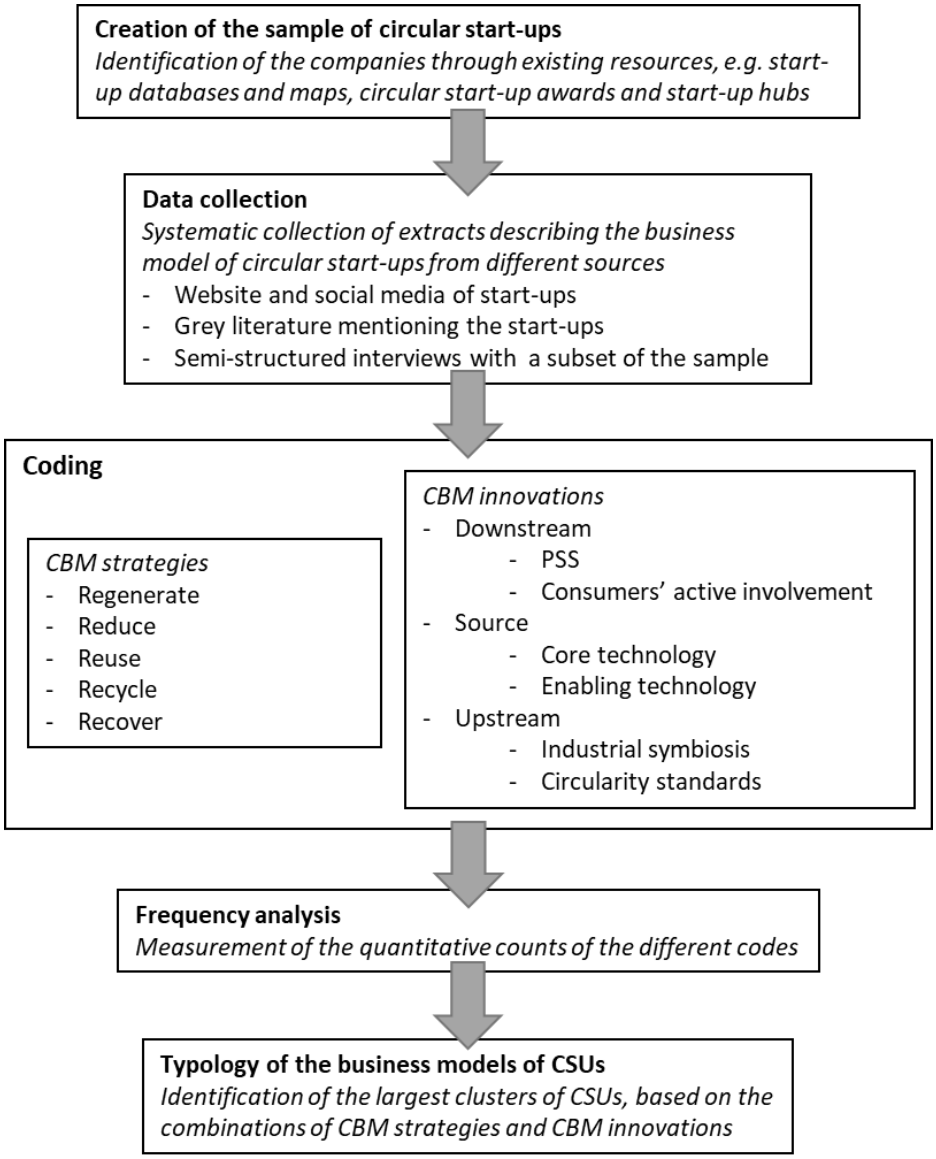
The information about the business model of CSUs was then carefully examined and manually coded according to this coding framework, following an initial set of coding rules. For example, a start-up substituting product components with more sustainable materials was coded as the CBM strategy 'Reduce', while a company using external residual resource streams was coded into the innovation category 'Industrial symbiosis'. To ensure the validity and reliability of the research design, the coding exercise was first completed by two authors separately (alternating halves in-depth/high-level) to then discuss the results with each other. In case of diverging coding results, the coding rules were reconsidered, possibly leading to their modification – a good practice to enhance reliability in manual coding (e.g., Hruschka et al., 2004; Neuendorf, 2016).

In practice, the R-strategies often are applied conjointly. A product made of multiple components frequently requires the combination of several Rs (Reike et al., 2018), or a business model may simultaneously embrace various CBM strategies. Therefore, the coding procedure allowed for a dominant R-strategy and multiple secondary R-strategies. For instance, a start-up can adopt 'Reduce' as a dominant strategy by developing a less resource-intensive material and, at the same time, encourage the reuse of its products. The decision regarding the dominant R-strategy was made on a qualitative basis (i.e., what is considered the key value driver of the business model) and was complemented with the inputs from the founders of the respective CSUs. Similarly, the coding procedure allowed for a multiplicity of circular innovations to depict the practical (hybrid) realities of the business models. For instance, a start-up could adopt a product design that facilitates reparability (innovation in the core technology), while organising part of its activities as a PSS. There was no dominant innovation type per start-up determined due to lack of insight and missing scientific context.

Since some of the innovation types fall in the same innovation categories as per the framework presented in Table 3, the absolute number of different innovation types is bigger than the number of innovation categories developed by the CSUs.

As a next step, a frequency analysis was performed to measure the quantitative counts of the different codes. This enabled the authors to assess the relative significance of the CBM strategies and innovations developed by CSUs. In addition, CBM strategies of CSUs could be compared to strategies that corporate actors adopt by pulling in the data from a previous study that followed a similar methodology scrutinising 46 large corporations' CBM innovation types (Stewart, Niero, 2018). Finally, the authors also analysed the relationship between CBM strategies and innovations by looking at the type of CBM innovations per CBM strategy category. Based on these analyses, the authors could identify the five most relevant combinations of CBM innovations and strategies in the dataset. These five combinations provided the basis for developing a typology of business models of CSUs, which unambiguously classifies more than 90% of CSUs in the dataset.

Figure 2. Methodological procedure followed in Chapter 2.



Source: constructed by authors.

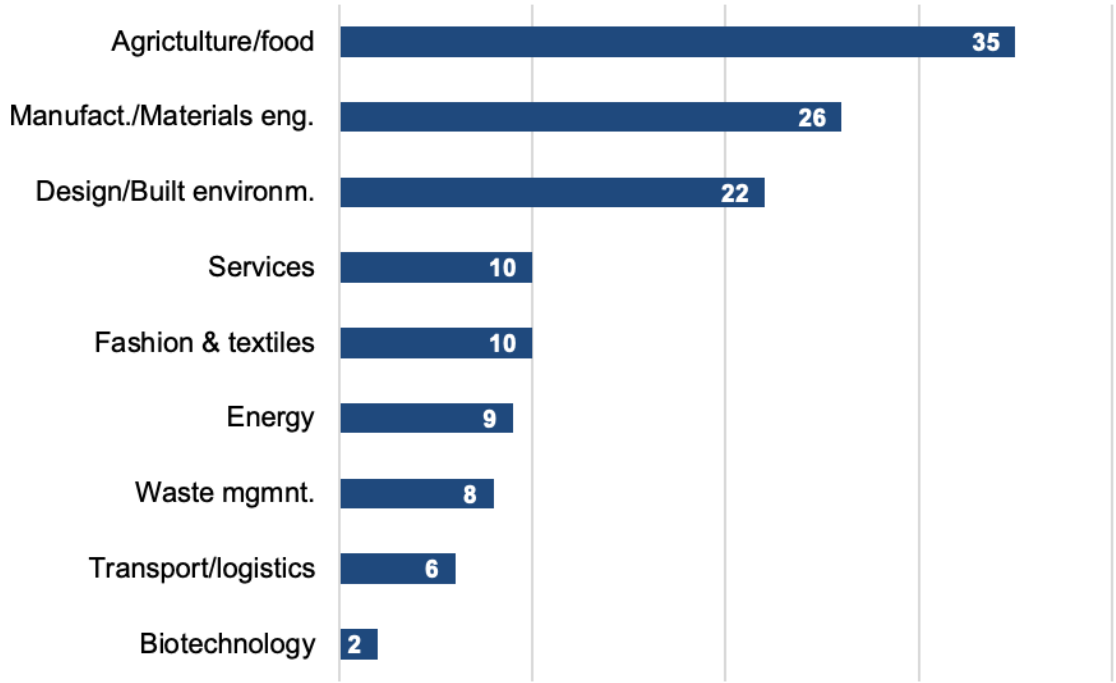
2.4. Results and discussion

2.4.1. Sector and market overview

The most dominant sector within the dataset is agriculture/food (27%). Other sectors strongly represented in the hubs are manufacturing/materials engineering and built environment/design (see Figure 3). The emphasis on food is not surprising from a market perspective, since inefficiency in food-supply chains is pressing and evident, especially in developed countries (Buzby, Hyman, 2012; Ribeiro et al. 2018; Thi et al., 2014). Furthermore, large food sector corporations do not tackle waste management resource-efficiently, mostly due to rigid food-grading systems and lack of actor coordination (European Commission,

2016; Hyde et al., 2001; Martin-Rios et al., 2018; Stewart, Niero, 2018). In total, 46% of CSUs examined deploy business models in the biological cycle, while only 7% of corporates, that are active in only one of the cycles, do (75% of CSUs are in the biological cycle if sectors are matched with reference study which focuses on corporates in FMCG; Stewart, Niero, 2018). Indeed, multiple value models, in which sequential cash flows are generated from waste in biological cycles, are predominantly adopted by start-ups. Big companies seem to fail to integrate these ways of value capture (Bocken, 2017).

Figure 3. Sector overview in # of CSUs (n = 128)



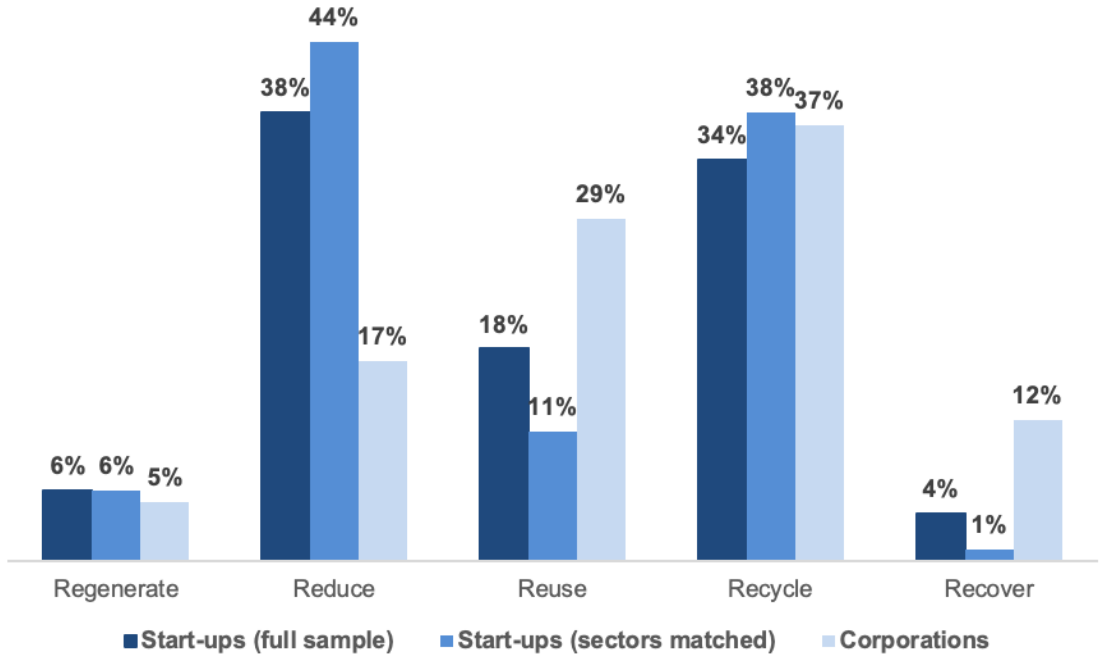
2.4.2. CBM strategies and innovations

The findings on CBM strategies show that CSUs tend to adopt higher ranked CBM strategies than incumbents and large corporations (Regenerate, Reduce; see Figure 4). The multinational companies scrutinised in the reference study (mostly incumbents) were only included when listed in the EMF's CE100 directory (Stewart, Niero, 2018) and can therefore be considered frontrunners in implementing CE. Previous research suggests that, although CE is increasingly integrated into the corporate sustainability agenda, the focus is drawn on end-of-life management while the adoption of business models incorporating higher levels of circularity is less prevalent (Bocken, 2017; Stewart, Niero, 2018). Out of the higher-ranked

CBM strategies, incumbents are more strongly represented only in the ‘Reuse’ concept. This can be explained by two facts: first, reverse logistics, which would allow for a second use cycle of a technical product, are complex and costly (Neely, 2008; Ramanathan, 2011; Ravi et al., 2005); larger companies tend to have better resources to set up an adequate take-back management (Veleva, Bodkin, 2018). Secondly, the technological cycle is dominant among incumbents innovating in CE (Stewart, Niero, 2018) and ‘Reuse’ is the CBM strategy that mostly covers tech-related business models; goods in the biological cycle are rather of single-use nature, at least for the same or similar purpose of use[10]. In terms of incumbents’ activity in ‘Regenerate’, Stewart and Niero (2018) give indications on corporation’ approaches through including the strategy ‘Design for Regenerative Systems’ (Moreno et al., 2016) in their analysis (see Figure 4; see footnote 12 for details calculation approach).

[10] An exclusion to this might be catalytic goods like cooling water, i.e. “materials that are necessary to speed up chemical reactions without being used up in the process” (Stahel, 2010, p. 21). They are mostly relevant in the chemical industry, in which none of the CSUs in the data sample operates

Figure 4. CBM strategies: CSUs vs incumbents[11,12]



Note: Share (in %) of all R-strategies pursued

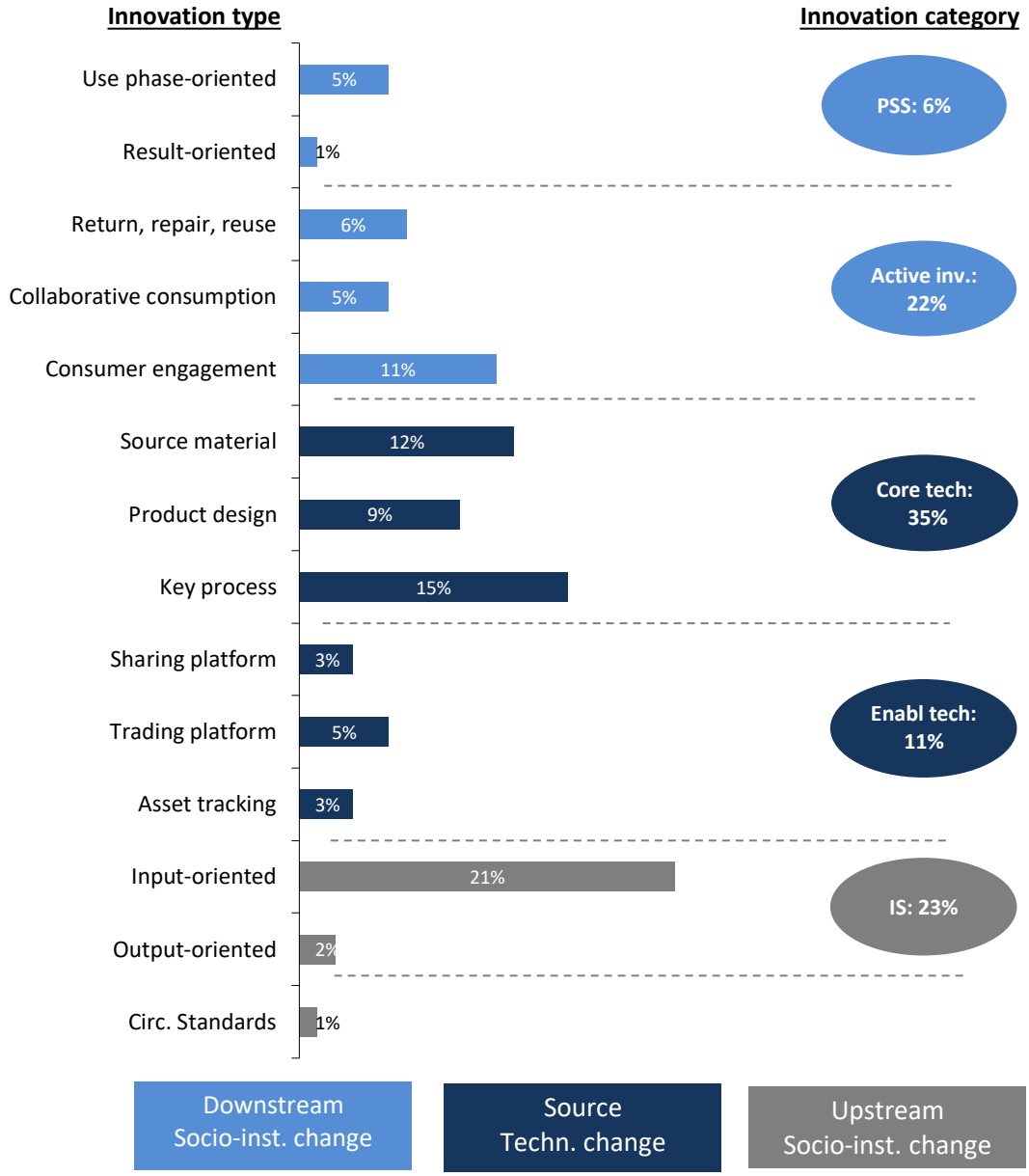
The innovations that the start-ups realise are including their socio-institutional environment (see Figure 5). Two-thirds of the start-ups that innovate in the core technology combine this with innovation types that build on other system actors than only themselves. Thus, CSUs act in alignment with the theoretical view that new technology must build up the required socio-institutional embedding and have to be diffused in society to be successful (Geels, 2005; Boons, Luedeke-Freund, 2013; Hekkert et al., 2007), despite the higher complexity of driving factors of socio-institutional change compared to technological change (Fuenfschilling, Truffer, 2013). CSUs address this primarily by actively involving customers (~40% of CSUs) and working with inter-organisational waste streams (~50% of CSUs). The high share of customer involvement activities partly contradicts Boons and Luedeke-Freund's

[11] Evaluation based on analysis of multiple (dominant and secondary) R-strategies pursued per organisation (avg. corporates: 2.64; avg. start-ups: 1.46). CSU's circularity strategies were coded (see 3.) The data for corporate circularity strategies was proportionally scaled from the base of all organisations analysed to the base of all strategies identified due to different sample size and organisation sizes; only concretely mentioned circular activities were counted; the original coding in the reference study did not include *Regenerate*; to adjust for this and following the abovementioned logic, R-related activities in company reports studied that relate to 'Design for Regenerative Systems' are included in the graph as the *Regenerate* strategy by corporates (5.3%; deducted from *Reduce* strategy since this is the only strategy whose coding keywords contained the term "design" in the original study's 4R mapping). Source: Stewart, Niero, 2018

[12] 'Start-ups (sectors matched)' include only CSUs from sectors Food/beverages, Packaging, Fashion, Consumer/Household goods (53 CSUs) to allow for better comparability with Stewart & Niero's (2018) data set

(2013) findings on the successful marketing of sustainable innovations, since it can be argued that Collaborative Consumption or Return and Repair includes a partly or full shift of the focal organisation's socio-ecological burdens to its customers. However, it sheds light on the central question posed by Hall et al. (2010) on how start-ups and entrepreneurs will influence a societal transformation towards sustainability – amongst other factors, by changing established value appropriation and allocation logics of other actors. Combined with the close ties of the CSUs with societal actors, (core) technological innovation is driving more than half of the start-ups. Core-technology innovations, the most represented innovation category, range from nickel-iron batteries, to fungus-based construction materials, or bubble barriers to filter plastic from rivers. Lastly, it can be observed that CSUs do not necessarily formally engage with suppliers in circular supply chain management (circularity standards), which is considered pivotal for the marketing of sustainable innovations (Boons, Lüdeke-Freund, 2013; Seuring, Müller, 2008).

Figure 5. Circular business model innovation types. % of all innovation types (2,2 per CSU, 285 in total)



Multiple innovation types per start-up considered; on average, 2.22 circular innovation types per CSU

2.4.3. Towards a typology of circular start-ups

The typology of CSUs is based on the various innovation categories and on the dominant R-strategy per venture (see Figure 6). By identifying the biggest clusters in the dataset structural insight into the approaches taken to develop CBMs is created. Based on this analysis and derived from the data gathered, a typology of CSUs that contrast five main archetypes was established. The following presentation and discussion of results is structured

along these five typologies (Table 5). In case one CSU fell into several innovation categories, the R-strategy was used as the decisive criterion to decide on the archetype.

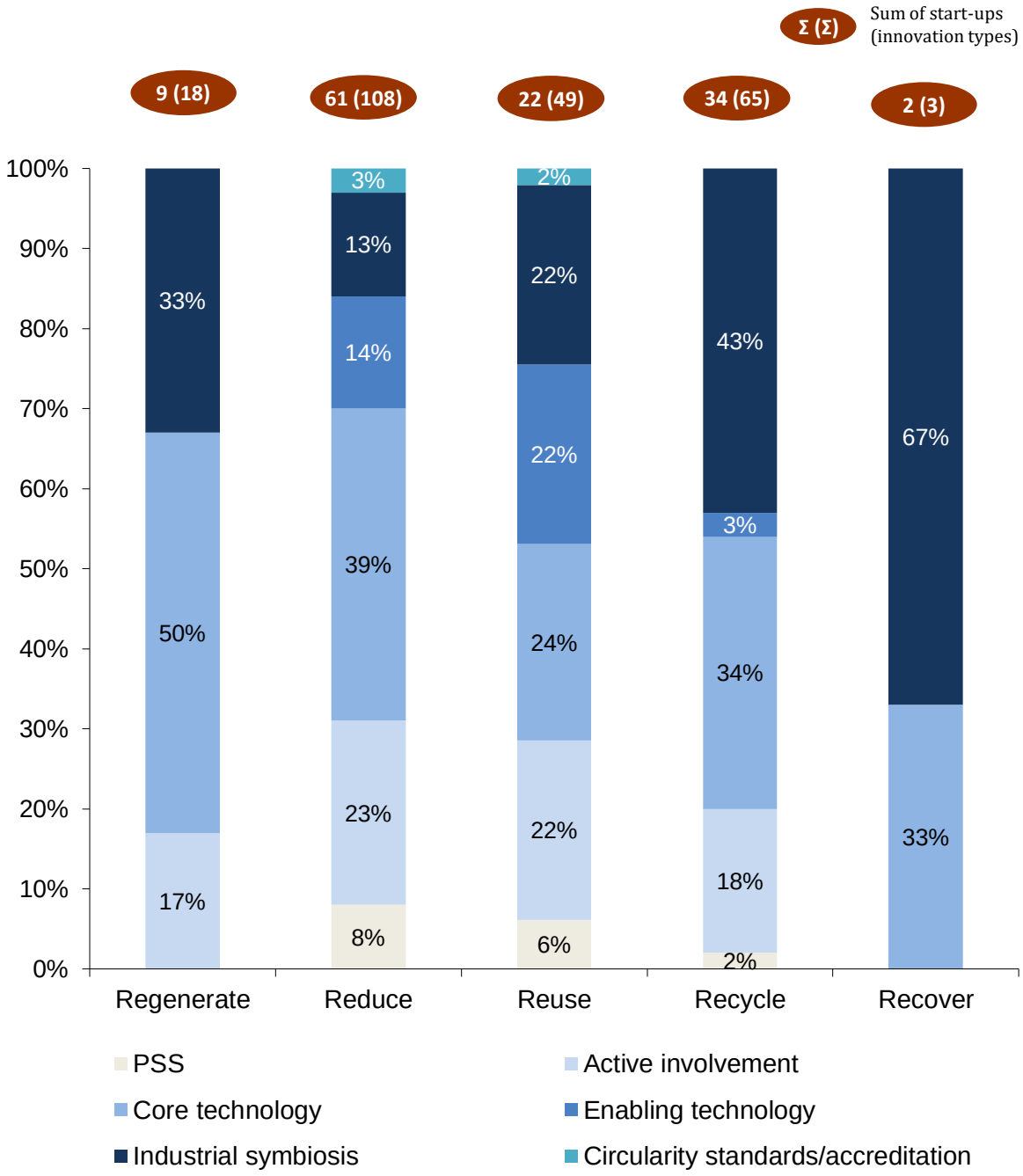
Table 5. Categorisation criteria and definition for CSU typologies

CSU archetype	**R-strategy**	**Innovation category**	**Definition**	**Share of data sample** (n=128)
Design-based	***Reduce***	***Core technology***	Aiming to increase usage efficiency, avoid scarce inputs, and mitigate residuals, design-based CSUs adopt circular innovations mostly in the pre-market phase through material engineering, product design, and production process innovations.	**36%**
Waste-based	***Recycle, Recover***	Industrial symbiosis	Waste-based CSUs seek to extract value from unexploited external residual resource streams (e.g., recycled plastic, CO_2, surplus food) - often with innovative process solutions.	**27%**
Platform-based	Various	***Enabling technology***	Platform-based CSUs pursue business models built around B2B, B2C or C2C marketplaces for (excess) resources. Thus, they facilitate trading or sharing of products, knowledge, infrastructure, and services.	**19%**
Service-based	Various	***PSS***	Service-based CSUs embed products in a service-system without customer ownership of the physical good. They aim for higher and more controllable usage efficiency.	**9%**
Nature-based	***Regenerate***	Various	Nature-based CSUs operate nature-based systemic solutions to deliver services (or products) with the objectives to lower input of non-renewable natural capital and increase investment in renewable natural processes.	**6%**
Other	Reduce, Reuse, Recycle	Various	For instance, circular city tours or CSUs that apply several CBM strategies and innovation types.	**3%**

Note: mutually exclusive archetypes, dominant criterion for archetype stated in **Italics**

Based on the typology outlined in Table 5, there is a marginal number of seven cases of CSUs that would fit to more than one cluster. For these, the authors applied a qualitative assessment based on the type of innovation pursued and the key elements of the business model. For instance, there are two CSUs that operate PSSs and innovate in core technology, i.e., substituting a component of their product with reusable source material or designing for reuse. These are still in the cluster of service-based start-ups since the core-technology innovation is a means to an end for them. Only four start-ups did not fit the typology presented in Table 5 (e.g., circular city tours) and are not included in any of the archetype clusters.

Figure 6. Innovation categories of circular start-ups per R-cluster. % of total innovation categories in respective R-strategy cluster (n = 243)



Note: Analysis based on the dominant R-strategy only and multiple innovation types per start-up

2.4.3.1. Design-based start-ups

This cluster of start-ups includes business models combining the R-strategy 'Reduce' with innovations in core technology and is the biggest group within the sample (37%). The high share of design-based start-ups can be explained by the high circular ambition of CSU founders, and thus the dominance of the 'Reduce' strategy, as well as the correlation of

‘Reduce’ and the most dominant innovation types (core technology). More than two-thirds of start-ups (42 of 61) with a dominant ‘Reduce’ strategy innovate in core technology. This echoes the dominant scientific view connecting ‘Reduce’ predominantly with innovation in source material and product design and, therefore, mostly with activities during the pre-market phases of product lifecycles (Jayal et al., 2010; Lieder, Rashid, 2016; Reike et al. 2018; Sihvonen, Ritola, 2015; Worrell, Reuter, 2014). This CSU cluster includes companies striving for minimisation of non-renewable resource use (e.g., fungus roots as construction material), process efficiency (e.g., low-cost infrastructure biomass growing), or innovators in product design (e.g., electricity-independent medical refrigerators).

Despite the common focus on the pre-market phase, the findings also suggest that design-based start-ups could be relevant micro-level innovators regarding integrating upstream-related – and, especially, downstream-related – activities in CBMs. More than half of the start-ups in this cluster complement their core technology innovations with innovations in active customer involvement or industrial symbiosis. Amsterdam-based Kartent is one example of such a start-up. Kartent designed a festival tent made entirely from cardboard. This product design innovation is embedded in a business model that requires customers to change consumption patterns (ordering a tent for a festival, returning after usage) and utilise existing supply chains to create value from the waste streams (used tents processed into boxes for logistics industry, trash bins, or festival gadgets). Literature suggests that it is a key challenge for corporations to include customers in their circular endeavors and create awareness among them (Kirchherr et al. 2017; Young et al., 2018). This however, is considered critical for the development of CBMs and an eventual transition to a CE (Hazen et al., 2017; Linder, Williander, 2017; Veleva, Bodkin, 2018), whereby CSUs could be relevant drivers of stronger consumer involvement and pioneers in successfully applying business models that build on it.

2.4.3.2.Waste-based start-ups

Waste-based start-ups are the second largest group (27%) of organisations in the dataset. They pursue the lower-ranked R-strategies ‘Recycle’ and ‘Recover’ as their dominant

circularity approach and commonly innovate in IS (>95% of all Recycle and Recover start-ups). IS is a commonly known concept (Chertow, 2000) and is increasingly considered a tool for the implementation of CE (Baldassarre et al., 2019; Bocken et al., 2014; Domenech et al., 2019; Forum for the Future, 2016; Mortensen, Kørnøv, 2019; Prosman et al., 2017). Recycled materials mostly stem from post-producer waste streams or post-consumer products and are called secondary materials since they often lose their fit to the original use case and can be re-applied anywhere (Worrell, Reuter, 2014; Graedel et al., 2011; Jawahir et al., 2006; King et al., 2006). Start-ups in this category include organisations that turn recycled plastic into wall tiles or community-based organisations, such as recyclers of surplus food.

Only one-fifth (20%) of the start-ups that use the ‘Recycle’ / ‘Recover’ strategies and innovate in IS are primarily in the waste-management sector. The sectoral focus of the start-ups is on agriculture/food (43%), and manufacturing/materials engineering (32%), whereby recycling/recovering seems to be rather a means to an end than an end in itself. More than two-thirds of companies in this cluster combine IS with core-technology innovations in source material or key processes. While key process innovations in ‘Recycling’ can involve relatively simple approaches such growing mushrooms from coffee waste, there are also more breakthrough process innovations included, such as turning CO2 and sunlight into organic compounds or creating a leather-like material from leftover fruits. An example for a source-material innovation is Rotterdam-based Refil, which develops fully recycled 3D-printing filaments made from car dashboards and old PET bottles. The CSUs that are active in 3D-printing produce a waste stream-based filament or offer it through local community recycling systems (e.g., of waste plastic). These types of offerings correspond with Despeisse et al.’s (2017) findings and represent two of the three focus categories of activities combining 3-D printing and CE (the third being the use of 3-D printing for repair or remanufacturing).

The development of supply chain networks is often initiated by private sector actors due to a lack of legislative clarity about by-products and waste streams. Across Europe, there are a significant number of self-organising industry networks striving for circularity through IS (Domenech et al., 2019). In the expert interviews, founders in this cluster stated that they tend

to face regulatory problems, as in some markets, like Germany, resources that have been declared as waste cannot be reused but must be disposed of, or require licenses allowing for further processing ('Waste-material sourcing requires specific licenses, and the tax on it is too high, in my opinion', Interviewee A). Therefore, the CSUs using waste as resources tend to establish informal networks to disrupt established supply chains, as, for instance, half of the Berlin participants of the expert interviews stated when asked for major external challenges ('[…] [the source material] is officially a waste product, so there are regulatory barriers regarding working with this material. Here, we rely on our entrepreneurial spirit and just go ahead without having regulatory clarity', Interviewee B; '[We are facing a] lack of regulation in terms of declaration of waste material and how to handle it', Interviewee C).

2.4.3.3. Platform-based start-ups

This archetype of start-up has, at its core, business models built around market-making for excess resources mainly from the construction, fashion or home-appliances sector. The dominant R-strategies represented here are 'Reduce' and 'Reuse'. The fact that platform-based business models are the third-largest category (20%) in the overall sample of CSUs can be explained by the general low-labor intensity and thus low entry barriers, as well as the recent diffusion of peer-to-peer platforms as key enablers of the sharing and circular economy (Ellen MacArthur Foundation, 2015; Ritter, Schanz, 2019). Sharing platforms are the dominant innovation type among start-ups pursuing a 'Reduce' strategy within the group of platform-based CSUs (7 out of 11 Reduce start-ups). Taking a closer look at the forms of value creation on the platforms, Van Dijck et al. (2018), Potting et al. (2017) and Konietzko et al. (2019) seem to be confirmed in their views that (online) platform business models are rather facilitators of economic transactions (trading, sharing) than bases for co-creation – i.e., sharing knowledge or debating/learning together. Only three of the 26 start-ups in this cluster focus on co-creation (e.g., Materiom, an open-source database for regenerative materials), while more than 90% of platform-based business models enable sharing or trading.

In the context of platforms and their roles in a CE, Konietzko et al. (2019) mention the value of usage data – e.g., to inform maintenance or repair needs of products. Additionally,

the Ellen Macarthur Foundation et al. (2019) discuss the example of a trading platform for secondary resources with a focus on pricing algorithms and forecasting. Four of the 26 platform-based start-ups have a distinct focus on this kind of value creation via asset tracking. While one of the CSUs in this cluster develops a platform solution that helps organisations and their networks transitioning towards circularity through business intelligence and artificial intelligence (AI), the others use technology to track resources and product components. Berlin-based Design for Circularity developed a radio-frequency identification (RFID) label on clothes that grants consumers and sorting companies access to a member-based platform that contains information on the inherent materials as well as on the type of recycler to which the product should go to at end of life. Another example of advanced technology used for asset tracking is Excess Materials Exchange, which uses blockchain technology to facilitate the exchange of excess materials among companies. All four CSUs make the data accessible via a multi-user platform, and three of them define their offerings as platforms themselves. Due to this practical evidence, and also since literature connects asset tracking with platforms in CE (Konietzko et al. 2019), this type of innovation is clustered as platform-based.

2.4.3.4. Service-based start-ups

Service-based CSUs operate PSSs in order to better control and increase usage efficiency of their continuously owned products. Interestingly, only one PSS-oriented company in the entire dataset runs a CBM where ownership is transferred to the customer (Fairphone). This indicates that CSUs tend to focus on need-fulfilment systems rather than selling the maximum possible number of products (Tukker, 2015). PSSs financially incentivise the companies to invest in the durability and reuse of products and materials (Baines et al., 2007; Mont et al., 2006; Williams, 2007). Following this focus on more intensive product use, the main R-strategy pursued by this type of start-ups is ‘Reduce’. The driving innovation of developing a PSS is mostly combined with active involvement of consumers through returning or repairing products (10 out of 12 CSUs, e.g., a returnable packaging service for drinks) or collaborative consumption (4 out of 12 CSUs, e.g., rented construction spaces and machinery). Involving consumers in reverse supply-chain activities (return, repair, reuse) is

considered a promising avenue towards a wider diffusion of CE through PSS business models since it can address the barrier of increased capital requirements of a reverse logistics network and break down cognitive barriers to CE adoption among consumers (Wastling et al., 2018). Product recovery activities are currently underdeveloped in the CE/PSS domain, and early customer involvement is considered critical in PSS solution design (Kühl et al., 2018; Luiten et al., 2001; Manzini et al., 2001). One-third of start-ups in this category are vertically integrated and also innovate in product design to develop products that better support their PSS (e.g., modular phones, modular and biodegradable diapers, reusable batteries).

Despite many authors considering PSSs as a key driver of circularity in business models and they belong to the most cited practical application methods of the latter (Antikainen et al., 2017; Bocken 2017; Kühl et al., 2018; Lieder, Rashid, 2016; Stahel, 2010; Tukker, 2015; Yang, Evans, 2019) – only 9% of start-ups pursue this innovation category of moving from customer ownership to performance- and service-based revenue models. The most significant reason for this is that the application of typically asset-heavy PSS business models is often more problematic for small- and medium-sized businesses (SMEs) than large corporates due to lack of (financial) resources and lack of formalised planning (Augusto de Jesus Pacheco et al., 2019; Besch, 2004; Neely, 2008). In general, especially performance-based PSS are considered very difficult to implement due to the difficulty of establishing indicators and requirement of continuous feedback loops with customers (Pereira Pesoa, Jauregui Becker, 2017). Furthermore, the biological cycle is dominant among the CSUs, and PSSs are strongly associated with manufacturing companies in the technical cycle (Augusto de Jesus Pacheco et al., 2019; Copani, Behnam, 2018; Neely, 2008; Yang, Evans, 2019) – 11 out of 12 service-based start-ups operate in the technical cycle, which supports the literature perspective.

2.4.3.5.Nature-based start-ups

The distinctive features of companies in this archetype are that they pursue the highest-ranked category ‘Regenerate’ and thus not only try to avoid any environmental harm, but also seek to maintain and increase the delivery of (products and) services based on natural ecosystems and nature-based solutions (Maes, Jacobs, 2017). Six percent of all start-ups fall

into this category of imitating biological cycles or systems. The only sectors represented are agriculture/food and built environment/design. Examples of such start-ups include Berlin-based ‘aquaponic’ start-ups, synergising fish farming and plant growing in a symbiotic, self-supporting environment without the usage of soil (Campanhola, Pandey, 2019; Kyaw, Ng, 2017). Further representatives of this category are start-ups working on building-integrated plant cultivation and green roofs or London-based Entocycle, which produces protein by feeding food waste to protein-rich, vertically farmed insects which can be used to nurture livestock or fertilise industrial crop production.

Maes, Jacobs (2017, p. 123) argue that the usage of nature-based ecosystem services always leads to “decreased input of non-renewable natural capital and increased investment in renewable natural processes”. This combination of decreased resource usage and adaptation of natural processes corresponds with the results of the data gathering, since all nature-based start-ups combine the dominant ‘Regenerate’ strategy with ‘Reduce’, and innovation in core processes is the dominant innovation type. Those start-ups that work on building-integrated solutions utilise residual streams from the buildings they plan to redesign, which explains the high share of IS. It is noteworthy that almost all of the CSUs in this cluster focus on urban systems. Nature-based solutions are considered to have the potential to generate major socio-economic benefits addressing the challenges of urbanisation. (European Commission, 2018; Frantzeskaki, 2019; Lafortezza, Sanesi, 2019; Maes, Jacobs, 2017; Vujcic et al., 2017). The low uptake of nature-based solutions thus far (in general and among CSUs) is due to missing definition and impact assessment of the concept itself (Canitez, 2019; Kabisch et al. 2016; Krauze, Wagner, 2019), and to lack of awareness among and support from city authorities and their respective urban-development plans (Faivre et al. 2017; Lohr et al., 2004, Kirkpatrick et al., 2013; Kronenberg, 2015).

2.5. Conclusion

This research aimed to conceptualise and create a typology for **circular start-ups (CSUs)** to explore these innovative organisations that often holistically apply CE principles in their work. Based on the data gathered and the frameworks applied, a typology for CSU

business models could be introduced that encompasses more than 90% of all 128 CSUs scrutinised in the data sample. The major clusters in this typology are

- **design-based CSUs**, adopting circular innovations mostly in the pre-market phase through material innovation, product design or process innovations,
- **waste-based CSUs**, seeking to extract value from unexploited external waste streams,
- **platform-based CSUs**, pursuing sharing/trading business models built around B2B, B2C or C2C marketplaces,
- **service-based CSUs**, embedding products in service-systems to increase usage efficiency, and
- **nature-based CSUs**, increasing the delivery of (products and) services based on nature-based systemic solutions.

The developed typology contributes to the literature on entrepreneurship, sustainability and on sustainable (business model) innovation by better positioning circular start-ups against related concepts, such as sustainable and environmental start-ups, and by examining the actual circular solutions deployed by circular entrepreneurs. Thus, it strengthens the link between the above-mentioned bodies of research. The analysis shows that the R-frameworks which are the most commonly used frameworks to operationalise CE in literature and practice need to be expanded by the additional category ‘Regenerate’. The introduction of the concept of nature-based solutions in the conceptual realm of CE strategies is one of the key theoretical contributions of this paper. Additionally, despite being the most common conceptualisation, the R-frameworks are still a relatively abstract and rigid concept in the light of business models transformation towards CE. The common scientific perspective that the combination of multiple strategies, methods and approaches is necessary for a shift towards a CE (Bocken et al., 2016) is further driven, elucidated and nuanced in this research. The authors developed a CBM framework that goes beyond existing concepts in terms of the ‘how-to’ of CE through

the simultaneous mapping of CBM strategies and innovation types, thus allowing for – and introducing – CBM archetypes that are defined based on unique and distinct compositions of CBM strategies and innovation types. This research adds to existing frameworks in the field of CBM innovation and enables a more detailed and structured perspective on the key actors for circular innovation along by adding the 'Source' category to existing CBM innovation frameworks (Urbinati et al., 2017).

The novel empirical contributions of this article include the observation that CE strategies that start-ups pursue tend to be of higher hierarchical (i.e., impact) levels than the ones pursued by large, established corporations. Cumulatively, CSUs compare higher in the strategies 'Regenerate' (6%[13] vs 5%) and 'Reduce' (44%[15] vs 17%). Additionally, CSUs operate more dominantly in the biological cycle than CE-oriented corporations (75%[15] vs 7%). PSS business models – even though highly valued by many scholars as CE enablers – are only represented to a relatively small extent among CSUs. This is caused by financial constraints faced by CSUs that apply this asset-heavy innovation type, as well as the mismatch of the rather technically related PSSs and the primarily bio-based CSU business models.

This conceptualisation of CSUs will help to understand possible pathways and necessary conditions for the further spreading of the concept of CE, and thus of sustainable development in practice (and theory). Corporations and start-ups that strive to become more circular can derive structured transition paths towards CBMs (e.g., guidance on dominant innovation types applied when pursuing a Reduce strategy; full overview in Figure 6). The results shown can serve as inspiration for circular entrepreneurs in their incubation phase when looking for promising, low-invest business model adaptations for circularity. For instance, the lack of coordinated action for the management of residual resource streams is an indicator for circular founders to invest in their network and social capital early on to create a competitive advantage (see Paunescu et al., 2014; Peng et al., 2018). Policy-makers benefit

[13] Only those CSUs of the dataset are considered that operate in the same sectors as in Stewart & Niero's (2018) reference study, i.e. Food/beverages, Packaging, Fashion and Consumer/Household goods (56 CSUs)

from a further definition and differentiation of practical concepts in circularity/sustainability. For instance, the current high-level perspective on the implementation of nature-based solutions – taken, e.g., by the EU (European Commission, 2015) – could be substantiated with a better understanding of the underlying practical application methods. Additionally, the empirical and conceptual character of this research allow for a better channelling of efforts on policy intervention since the presented typology of CSUs enables a targeted addressing of relevant stakeholders and their respective needs.

This research is one of the first of its kind in elucidating business models that are developed by 'grassroots' circular entrepreneurs. However, the lack of understanding of the actual sustainability performance of these very business models is a limitation related to it. Hypotheses regarding the hierarchy and effectivity of circularity strategies and business models are not substantially backed with representative and comparable metrics. Furthermore, since approximately two thirds of CSUs were not analysed based on direct interviews but outside-in (30 CSUs were interviewed, 98 were analysed outside-in), there is a risk that not every circularity-related activity has been captured during the data gathering. This would require a deeper analysis of each start-up or a direct contact with the respective organisations. However, the authors consider that the publicly available information from and about the scrutinised companies contains all the major activities on CE since CE is formulated as a distinct business focus of almost all of them.

Further research on this topic could consider a comparative analysis of the different geographical areas covered in this study. There were indications (e.g., dominant sectors, CBM strategies pursued) that the different municipal/governmental policies and business ecosystems in the areas analysed led to distinct regional characteristics among the CSUs. A deeper qualitative analysis of the underlying causes and respective market/legislative setups is necessary to gain structured insight into these regional differences – which could also be compared to regions that are not mentioned in this study. This allows for a more effective intervention management and for cross-fertilisation through the sharing of learnings from different contexts. The prevalent outside-in analysis and selected founder interviews used for

this research would therefore need to be enriched, e.g., with interviews with policy-makers or CE experts from the same regions or founders from other regions). Additionally, an extension of the data sample (e.g., including business models and innovation types of CE-oriented corporations) would help to better understand the start-ups' roles in transitions towards CE. Furthermore, it is not clearly defined and structurally assessed which barriers and success factors impact the diffusion of CSU business models. Further research on this could inform policy-makers or investors on where to focus their efforts to further drive CE.

The authors are excited about the opportunity to analyse CSUs and their respective CBMS and hope to trigger further scientific work on this relevant topic with this research.

3

Motivation and Identity of ‘Grassroots’ Circular Entrepreneurs[14]

[14] This chapter has been published in the Special Issue “Towards a Circular Disruption” in the journal Business Strategy and the Environment as

Henry, M., Hoogenstrijd, T., Kirchherr, J. (2022). Motivations and Identities of “Grassroots” Circular Entrepreneurs: An Initial Exploration. Business Strategy and the Environment, Towards a Circular Disruption (Special Issue Article). https://doi.org/10.1002/bse.3097.

The chapter is a version of an earlier manuscript (no word-for-word overlaps) which was published as a book chapter in Circular Economy: Challenges and Opportunities for Ethical and Sustainable Business as

Henry, M., Hoogenstrijd, T., Kirchherr, J. (2021). The rise of the circular entrepreneur - An altruistic spirit and the pursuit of mass-market expansion. In Kopnina, H., & Poldner, K. (Eds.). Circular Economy: Challenges and Opportunities for Ethical and Sustainable Business (1st ed., Chapter 6). Routledge. https://doi.org/10.4324/9780367816650.

3.1. Introduction

The relevance of the circular economy (CE) for creating a sustainable future in which economic growth can be decoupled from excessive resource depletion is much discussed – and contested – in recent sustainable development literature (Hobson, 2021; Morseletto, 2020; Parrique et al., 2019; Tseng et al., 2020; Ward et al., 2017). The private sector and circular business models (CBMs) are identified as crucial elements in a large-scale CE transition (Kirchherr et al. 2017; Lüdeke-Freund et al., 2018; Urbinati et al., 2017). Many private organisations - as well as public authorities – pursue strategies to implement and disseminate circularity (EMF, 2019; Nelles et al., 2016). Yet, progress towards a wide-scale application of CE among corporate players, and in the global economic systems, fails to materialise. Large, established corporations – while critically relevant for a CE transformation - tend to innovate incrementally and thereby reinforce existing structures that support a dominant linear, take-make-dispose system (Bidmon, Knab, 2018; Circle Economy, 2020; Kristensen and Mosgaard, 2020; Masi et al., 2018; Schot, Steinmueller, 2018). Faster, more disruptive circular innovation (i.e., the accelerated release and reorganisation of elements from the old paradigm that are complemented with new, innovative solutions and subsequently consolidated into a new paradigm) is required to upend this lacking progress across sectors and regions and counteract the emerging crisis that is caused by the linear economy. As such, business actors of socio-technical systems need to ignite and catalyse systemic change by strategically deploying circular innovations and creating a fit with customers and wider institutional contexts (cf. Carvalho et al., 2017; Bauwens et al., 2021).

Circular entrepreneurship and circular innovation may be such catalysts for circular disruption (Cullen and De Angelis, 2020; Bauwens et al. 2021). Bottom-up innovation and learning as well as serendipity are considered critically relevant factors for disruptive systemic transition processes. Therefore, the accelerated emergence of circular ventures can become a key pillar for a CE transition (Bauwens et al., 2021; Gibb, 1996; Mazzucato, 2018). Furthermore, start-ups have structural advantages over incumbents in holistically implementing practices that support the disruptive, systemic shift that CE requires. In general,

circular start-ups (CSU) are more independent in their decision-making and can develop strategies to valorise circular practices from scratch (Bergset and Fichter, 2015; Rizos et al., 2016). Apart from business models and innovation types – which have been studied extensively in the context of CE (cf. Geissdoerfer et al. 2020; Nußholz, 2017; Pieroni et al., 2019; Santa-Maria et al., 2021) – we identify the founders' motivation and entrepreneurial identity as key determinant for the creation and growth paths of circular entrepreneurial venture (Basco et al., 2019; Staniewski and Awruk, 2019).

While types of sustainable entrepreneurs and the hybrid tensions they face in their entrepreneurial journey are much discussed in academic literature (Douglas and Prentice, 2019; Germak and Robinson, 2014; Hall et al., 2010; Schick et al., 2002; Schlange, 2006; Walley and Taylor, 2002), little insight exists into the motivation and identity of entrepreneurs who chose to build their venture based on circular principles (Cullen and de Angelis, 2020). Even if potentially related, circular entrepreneurs conceptually differ from sustainable entrepreneurs because they apply a common 'how' (i.e., circular principles) in their business models in addition to the relatively vague 'what' that is common among sustainable entrepreneurs (i.e., environmentally or socially beneficial outcomes). This level of alignment on the 'how' is unprecedented and makes grassroots circular entrepreneurs one of the few distinct groups in the context of sustainable entrepreneurship research which – overall – is still emergent, fragmented and lacks typological delineation (Gast et al., 2017; Schaltegger, Wagner, 2011). Additionally, due to the systemic character of CE innovation, founders of circular start-ups (CSUs) tend to build or navigate highly uncertain, complex and radically new business environments (e.g., in terms of value co-creation, reverse logistics, waste/by-product declarations; Konietzko et al., 2020; Fischer et al., 2021; Schaltegger, Wagner, 2011). The scope of this research does not include circular entrepreneurship within existing organisations but has a distinct focus on independent founders of CSUs. The above provokes the questions: why do individuals chose to build entrepreneurial ventures based on CE strategies even if the expected systemic challenges are high? What drives them towards this distinct approach

within the vast landscape of sustainable innovation? And, how do they position themselves and their ventures in relation to the market and its actors?

This paper aims to systematically analyse the motives and entrepreneurial identities of this new “breed” of circular founders in an empirical study and thereby contribute to the literature body of entrepreneurial motivation as well as emerging circular entrepreneurship literature. Understanding the motivations of circular entrepreneurs can help to create an environment in which innovative circular ventures can flourish and is pivotal to promote the bottom-up entrepreneurial development of the CE (Ostrom, 2010, 2012; Steinz et al., 2015). We argue that sustainable entrepreneurship literature is a relevant base to study circular entrepreneurship, but is too vague to conceptualise the particularities, intricacies and the variables that foster circular entrepreneurship. The study of the personality and entrepreneurial identity of CSU founders may contribute to a better understanding of the emergence of circular entrepreneurship as well as the multi-faceted processes that underlie bottom-up developments in a CE transition. Following Gartner’s (1995) framework for new venture creation, the element of the *individual* as well as the element of the *process* are in focus of this study while the other two elements of *organisation* and *environment* are scrutinised in chapters 1 and 3. Therefore, the research questions we want to answer in this article is:

- What are the motivations of circular start-up founders to launch their venture?
- What are circular start-up founders’ entrepreneurial identities?

The remainder of this chapter is structured as follows: a literature review on entrepreneurial motivation and the conceptual framework underpinning this investigation are presented in section 3.2, the methodology is presented in section 3.3, and the results of the empirical analysis are shown and discussed in section 3.4. Concluding remarks about the theoretical contribution of this work and implications for policy and management are provided in section 3.5.

3.2. Literature analysis

3.2.1. Motivation and identity of sustainability-oriented entrepreneurs

While there is scholarly consensus that the person(ality) of the founder is one of the most decisive components – especially in the early stages – of the entrepreneurial process, the definitions and components that scholars ascribe to personality vary. Typically, personality is associated with constructs of motivation, skills and knowledge, demographic indicators and identity (Donnellon et al., 2014; Isaak, 2002; Gast et al., 2017; Kirkwood and Walton, 2010; Mischel, 2004; Murnieks et al., 2019; Stephan et al., 2017). This analysis primarily builds on the two constructs of motivation and identity. Motivational factors are considered decisive for an individuals' initiation and continuation of a business and for her/his entrepreneurial behaviour (Barba-Sánchez, Atienza-Sahuquillo, 2017; Kusa et al., 2021; Stevenson, Jarillo, 1990). Complementary to motivation, entrepreneurial identity a key concept when investigating why and how individuals engage in (sustainability-oriented) entrepreneurship. Particularly, when entering difficult business environments such as CE, entrepreneurs' identities and respective spill-over on their ventures' missions and goals have been found to be the reason for the founders' perseverance (York et al., 2016; Murnieks et al., 2019; Weber et al., 2008). Insights into motives and identity during venture creation and early growth are relevant for this study in particular because we scrutinise a relatively new type of sustainability-oriented ventures for which little evidence on entrepreneurial motivation during maturity and exit phases exist (in contrast to e.g., sharing economy start-ups; cf. Henry et al., 2021).

In general, entrepreneurial motivation in small- and medium-sized companies is characterised by attitudes of risk-taking, innovativeness and proactiveness (Persutti, Odorici, 2019; Semrau et al., 2016; Shane, Venkataraman, 2000). In addition, sustainable entrepreneurs are characterised by the goal to transform a sector or market towards an increased environmental and/or social state through the exploitation of economic opportunities (Hockerts and Wüstenhagen, 2010). They assess their gains in economic and non-economic benefits and thus deviate from the economic value definition of traditional, commercial

entrepreneurship (Jayaratne et al., 2019; Sarango-Lalalngui et al., 2018). Sustainable entrepreneurship is treated in various research domains and is still a growing concept (Sarango-Lalalngui et al., 2018). Accordingly, the definition and interpretation of types of sustainable entrepreneurs and their motivations is diluted and "lacking definitional consensus" (Gast, et al., 2017). For instance, socially- and environmentally driven entrepreneurial motivation are often treated in close junction to each other, or even interchangeably (Kuckertz, Wagner, 2010; York et al., 2016). This partly results from similar ('hybrid') tensions that all sustainable entrepreneurs are confronted with when managing conflicts between economic, social and environmental value creation (Battilana and Dorado, 2010; Davies, Chambers, 2018; York et al., 2016).

3.2.2. Circular entrepreneurship

We define circular entrepreneurship as an independent and innovative entrepreneurial activity that is operationalised in circular business models (CBM). CBMs are defined as circular operations on the micro-level that aim at closing material loops or increasing resource efficiency (narrowing of loops) or longevity (slowing of loops; Bocken, 2016). The business strategies that typically are applied to achieve this are called the R-strategies and address the regeneration of natural ecosystems, refusal or reduction of virgin material usage, reuse of products, recycling or recovery of resources (Henry et al., 2020; Kristensen and Mosgaard, 2020). Thus, CSUs' approaches towards sustainable value creation are more narrowly defined than sustainable start-ups' approaches (Cullen, De Angelis, 2020). As the R-strategies are not mutually exclusive, a more dynamic perspective on CSUs' business models is required to comprehensively grasp their business activities. Henry et al. (2020) identified five business model types through an analysis of 128 CSUs: design-based (e.g., modular phones), waste-based (e.g., avoidance of food disposal), platform-based (e.g., online tool sharing), service-based (e.g., energy as a service) or regenerative/nature-based business models (e.g., urban agriculture). However, analyses of CE business models and CE entrepreneurship barely provide empirical evidence for the underlying motives and values that are represented by the founders of CSUs (Reddy, 2020).

Start-ups can drive circular innovations either directly by scaling or indirectly by spearheading larger systemic shifts as innovators and role models (Almeida, Kogut, 1997; Smith, Raven, 2012). Even though CSUs face challenges of regulatory entry barriers or lack of capital, many believe that circular entrepreneurship is a highly relevant driver for the diffusion of sustainable development and CE in the private sector (Geissdoerfer et al., 2020; Närvänen et al., 2021). Sustainability transitions literature emphasises the relevance of niche players as “seeds” of larger systems transformations. However, the scaling of niche actors is difficult because - by definition - niche innovations deviate significantly from existing regimes and their adoption relies on non-niche factors such as regulatory frameworks, consumer practices/demand and appropriate infrastructure (Geels, 2002; 2011; Stiles, 2020). Scholars propose that explicit, collective efforts are required to allow a more strategic management of niches and purposeful steering of broader transitions (Kemp et al., 2007; Schot and Geels, 2008). Sustainability transition theories such as the approaches of technical innovation systems and mission-oriented innovation systems suggest that alignment of motivations and directionality across actors is necessary to enable the scaling of circular innovation (Hekkert et al., 2007; Hekkert et al., 2020). We argue that a better understanding of the motivation and identity of founders of CSUs (or CSU entrepreneurs) is relevant in this context so that educational, public, and private institutions can purposefully intervene and systematically promote circular entrepreneurship (e.g., publicly provided entrepreneurial trainings, collaboration models in circular supply chains, funding/investment schemes; Douglas et al., 2021; Henry et al., 2020; Närvänen et al., 2021).

Particularly for incumbent companies, the holistic, innovative and disruptive character of CE requires a significant shift in companies’ core business and breaks with existing practices and designs (Stahel, 2016). While there are examples of successful implementation of circular business model innovations by large corporations (e.g., reverse logistics, product lifetime extension), established companies largely struggle to effectively implement disruptive CE practices in their business models at accelerated pace (Franco, 2017; Stewart, Niero, 2018). Scholars scrutinising corporates’ CE practices identified the lack of systemic/supply

chain perspective, a linear organisational culture, green washing, paucity of adequate evaluation measures and risk aversion to implement radical change as key barriers (Franco, 2017; Kirchherr et al., 2018a; Kopnina, 2019; Lieder, Rashid, 2016; Ritzen, Sandström, 2017). Incumbents are committed through past investments and existing supplier relationships and thus operate relatively inflexible business models that rather allow for incremental innovation. At the same time, such behaviour among incumbents reinforces existing, linear structures and heightens systemic barriers for new market entrants – such as CSUs (Chesbrough, 2010).

The existing knowledge about CE and CE innovation implies that CSU founders have distinct personal characteristics. Most prominently, circular entrepreneurs apply common principles and practices of circularity (circular or R-strategies such as reduce, regenerate, reuse) in their business models and seek for monetary valorisation (for-profit; Battilana and Dorado, 2010; Downing, 2005; Henry et al., 2020; Reike et al., 2018). Unlike sustainable entrepreneurs in general, circular entrepreneurs share the challenges of radical innovations in the sustainability space as they have a strong tendency to deliberately accept complex environments for their business models which is virtually bound up with CE's systemic and multiple-societal character (Carvalho et al., 2017; Hekkert et al., 2020; Konietzko, 2020; Momente, 2020; Schaltegger, 2016). The concept of CE has been criticised to mostly overlook social aspects (Hobson, Lynch, 2016) which – in contrast – are prominent in the overall sustainable entrepreneurship discourse (Teran-Yepez et al., 2020). By scrutinising circular entrepreneurs' pro-social behaviour as well as consideration of their social impact, learnings can be drawn that allow for a stronger integration of societal impact and CE innovation.

3.2.3. Base for theoretical framework

We want to conceptualise the archetype of a 'grassroots' circular entrepreneur based on a theoretical framework that draws from several scholarly contributions in the fields of sustainable entrepreneurial motivation and entrepreneurial identity (see Table 6; Murnieks et al., 2019; Sarango-Lalalngui et al., 2018; Teran-Yepez et al., 2020). Therefore, an extensive literature review was conducted to identify recurring themes and build a theoretical embedding

for the findings of this study. One of the reasons for this approach is the emerging, and partly diluted, literature body on social and sustainable entrepreneurial motivation which aggravates comparability and discussion of implications (Douglas and Prentice, 2019). Overall, we identified two dimensions as most relevant recurring themes in the context of motivation and identity in the entrepreneurial process (Fauchart, Gruber, 2011; Cesinger et al., 2021; Kraus et al., 2013; Stephan et al., 2017; York et al., 2016): *personal motivation of entering (circular) entrepreneurship*, as well as the *entrepreneurial identity*.

The motivation of an entrepreneur is a key driver to start a business and has significant influence on the entrepreneurial ventures' performance and success (Rauch and Frese, 2007; Ribeiro-Soraino, 2017). It is mostly expressed in five to seven dimensions that are related to personality traits such as need for achievement, autonomy, altruism, passion, recognition, income security/profit. In general, these traits can be divided into self-transcending (e.g., altruism) or self-enhancing (e.g., profit) factors (Barba-Sánchez et al., 2012; Stephan et al., 2017; Thelken and de Jong, 2020). Understanding the factors that shape an individual's entrepreneurial motivation such as socioeconomic characteristics, perception of barriers to entrepreneurship as well as (business) aspirations can bring to light significant insights that are required to foresee and shape development paths of entrepreneurship (Hessels et al., 2008; Shane et al., 2003; van der Zwan et al., 2016). Literature on sustainable entrepreneurs typically ascribes high levels of altruism, need for autonomy and self-realisation as well as profit as the dominant motivating factors (see Table 6; Gast et al., 2017; Kirkwood, Walton, 2010; Stephan et al., 2017). We distinguish between *social* and *biospheric altruism* and *profit/income security* to better understand circular entrepreneurs' perspective and prioritisation of the dimensions of the triple bottom line. Biospheric value orientation is forerunner of pro-environmental behaviour that addresses non-human species (Stern and Dietz, 1994; Stern et al., 1999) while social altruism typically leads to the contribution to other persons' wellbeing (Swami et al., 2009).

While the motivational factors typically evolve gradually and slowly over time, the concept of entrepreneurial identity is more variable and dynamic (Kašperová and Kitching, 2014; Murnieks et al., 2014). Scholars agree that multiple identities can be represented by one entrepreneur simultaneously – even if they are seemingly contradictory – and that they evolve together with a venture's development path. The commonly used entrepreneurial identity typologies developed by Cardon et al. (2009; inventor, developer, founder) are most meaningful for this research since they are outcome-oriented and rather independent of the type of sustainability entrepreneur (Ekinci et al., 2020; Mathias, Williams, 2014).[15] In general, the entrepreneurial identity links less to personal, and more to managerial and contextual factors such as the entrepreneurial vision and the entrepreneur's interaction with her business environment (i.e. the chosen frame of reference; see Table 6; Cesinger et al., 2021; Donnellon et al., 2014; Gartner, 1990; Jones, Spicer, 2005; Kyrö, 2001; Morris et al., 2016). Building on this – and following York et al.'s (2016) and Cesinger et al.'s (2021) approach of linking entrepreneurial identity with goals and business environment interactions – this study structures the analysis of the *entrepreneurial identity* along the elements of entrepreneurial vision and network interactions. Thus, we study first, how founders of CE ventures prioritise their objectives and formulate their vision, and second, how they manage tensions that result from their vision and network actor interactions. Numerous types of sustainable entrepreneurs with various characteristics are identified in literature (e.g., bioneer, ecopreneur, environmental entrepreneur) and accordingly, the identities that are ascribed to them vary significantly and can barely be generalised (Beveridge, Guy, 2005; Gast et al., 2017; Linnanen, 2002; Schaltegger, 2016; Schaltegger, Wagner, 2011).

The entrepreneurial vision is outcome-oriented and contributes to the entrepreneurial identity because it is formalised based on the entrepreneurial context, objectives, and the strategic direction (Block et al., 2015; Ghalwash et al., 2017; Morris et al., 2016). In addition,

[15] Fauchart and Gruber's (2011) typology of entrepreneurial identities is commonly used in this context but differentiates based on commercial (Darwinian), community (Communitarian) or societal (missionary) interests. Therefore, it is more interdependent with the type of sustainability-oriented entrepreneur (e.g., social entrepreneur <-> Communitarian entrepreneurial identity (Stephan, Drencheva, 2017)) and expected to deliver less objective additional insights.

the business network interactions are relevant because the entrepreneurial identity is typically subjectively defined through comparison and self-evaluation against chosen frames of reference (e.g., community, society, competitors; Fauchart, Gruber, 2011; Fischer et al., 2021; Navis, Glynn, 2011; Rigg and O'Dwyer, 2012). Apart from distinct societal groups, the other two dimensions of the triple bottom line, i.e., economy/market and environment are viewed as part of the external business network of a circular founder (Fassin, 2009; Slaper, Hall, 2011). In this, the study builds on theories from Starik (1995) and Carroll (1993) who promote a stronger inclusion of social and environmental ethics in network and stakeholder management theory. We argue that this is particularly relevant in the context of CE because contemporary CE practices are criticised for neglecting environmental and social ethics (Henry et al., 2021; Washington, Maloney, 2020). Furthermore, circular business model innovations have a particularly strong interrelation with their socio-environmental systems (Henry et al., 2020; Musters et al., 1998).

Table 6: Core references for theoretical framework

Authors	Year	Title	Definition of 2nd order coding dimension	Dominant themes in motivation and identity of sustainable entrepreneurs
Cesinger et al.	2021	The ebb and flow of identity: How sustainable entrepreneurs deal with their hybridity	Entrepreneurial identity	Business interactions and frame of reference as parts of entrepreneurial identity Entrepreneurial vision as core element of entrepreneurial identity
Donnellon et al.	2014	Constructing entrepreneurial identity in entrepreneurship education	Entrepreneurial identity	Stakeholder interaction as an integral part of entrepreneurial identity Storytelling/vision and strategic positioning as important parts of entrepreneurial identity construction
Gast et al.	2017	Doing business in a green way: A systematic review of the ecological sustainability entrepreneurship literature and future research directions	Entrepreneurial motivation Entrepreneurial identity	Autonomy, role modelling, biospheric altruism (and personal value) as core motivational factors Monetary objectives, social impact, environmental impact and inspiring consumers as part of the vision and goals
Kirkwood, Walton	2010	What motivates ecopreneurs to start businesses?	Entrepreneurial motivation	Biospheric altruism (“green values”), income security/profit, and self-realisation as core motivational factors
Kraus et al.	2013	Social entrepreneurship: An exploratory citation analysis	Entrepreneurial motivation Entrepreneurial identity	Entrepreneurial motivation and vision as key dimensions of sustainable entrepreneurship
Schaltegger, Wagner	2011	Sustainable entrepreneurship and sustainability: categories and interactions	Entrepreneurial motivation Entrepreneurial identity	Biospheric/social altruism and profit as core motivational factors Monetary objectives, social impact, and environmental impact as part of the vision and goals Core vision to expand in order to fix market inefficiency
Stephan et al.	2017	The person in social entrepreneurship: A systematic review of research on the social entrepreneurial personality	Entrepreneurial motivation Entrepreneurial identity	Autonomy/self-realisation, social altruism, achievement, and profit as core motivational factors Stakeholder & business environment interaction as an integral part of entrepreneurial identity Strategic vision and objectives as sub-concepts of entrepreneurial identity
York et al.	2016	Exploring Environmental Entrepreneurship: Identity Coupling, Venture Goals, and Stakeholder Incentives	Entrepreneurial identity	Entrepreneurial identity (incl. positioning vis-à-vis business environment) as core concept that drives environmental entrepreneurship Ecological and commercial objectives (or combination of both) as dominant themes

3.3. Research design

3.3.1. Sample selection and regional scope

This research has a distinct focus on entrepreneurs that are independent and that build CSUs from scratch. CSUs are new (max. 5 years), legally independent and active organisations that embed creative and innovative solutions based on circular principles in a circular business model (Henry et al., 2020). The interviewees were identified via the authors' existing networks in CE innovation and incubation, via publicly available information such as member lists of circular innovation hubs, via accelerators or awards, and through snowball sampling. The 57 CSUs that are included in this study are located in the areas of Berlin, London, Melbourne, Sydney, Amsterdam or Rotterdam (see Table 7). The start-ups were sampled in these areas to ensure sufficient sample size (i.e., increase of regional scope to increase the sample size) and because the respective municipalities or state governments promote circular economy and are among the world's most reputed start-up hubs (Campos, 2020; NSW Government, 2019; Victoria State Government, 2019; European Startup Initiative, 2017; Startup Blink, 2019). More than half of the founders (31 out of 57) have an educational background in engineering and design (see Figure 7) which confirms recent studies that connect CE innovation with these disciplines (Daae et al., 2018; Kirchherr, van Santen, 2019). Notably, the rise of circular founders in the above-mentioned regions relativises the scholarly view that socio-economic and regional contexts shape the emerging entrepreneurial types (Downing, 2005; Gibbs, 2009). However, the homogeneity of the chosen regions (i.e., Western world) must be recognised wherefore we propose future studies in which the regional scope is widened, e.g., to South America or Africa. The interviews took place between October 2017 and May 2020.

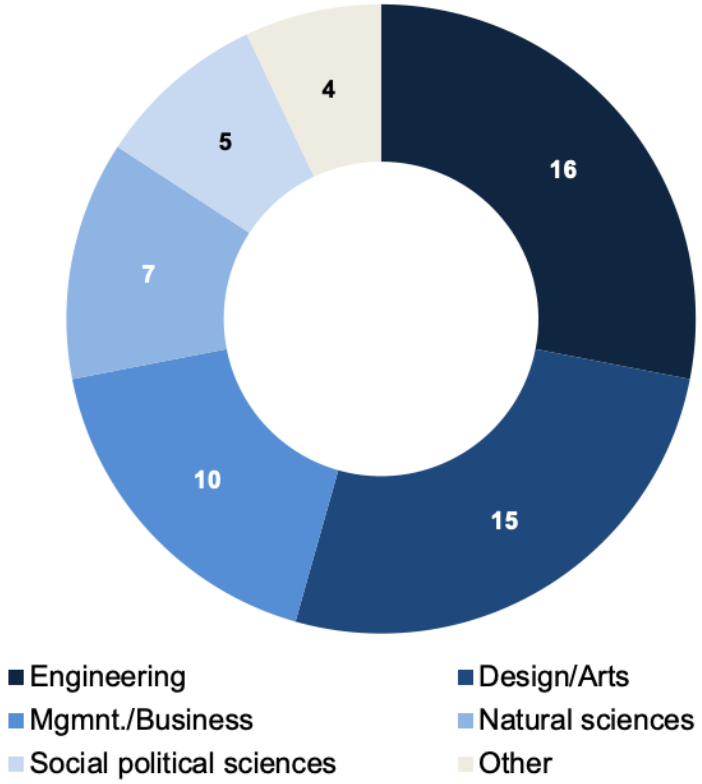
Table 7. Regional overview, sector and respondents' role of interview sample

#	City	Sector	Role
E1	Berlin	Fashion/textiles	Co-Founder
E2	Berlin	Agriculture/Food	COO (founding team)
E3	Berlin	(Bio-)technology	Founder
E4	Berlin	Fashion	Co-Founder
E5	Berlin	Services	Founder
E6	Berlin	Services	Co-Founder
E7	Berlin	Fashion/textiles	Co-Founder
E8	Berlin	Agriculture/Food	Founder
E9	Berlin	Tourism	Founder
E10	Berlin	Manufacturing/materials eng	Founder
E11	Berlin	Waste management	COO (founding team)
E12	Berlin	Fashion/textiles	Co-Founder
E13	Berlin	Agriculture/Food	Business Development
E14	Berlin	(Bio-)technology	Founder
E15	Berlin	Manufacturing/materials eng	Founder
E16	Berlin	(Bio-)technology	Founder
E17	Berlin	Agriculture/Food	COO (founding team)
E18	Berlin	Services	Founder
E19	Amsterdam/Rotterdam	Agriculture/Food	Founder
E20	Amsterdam/Rotterdam	Built environm/design	Co-Founder
E21	Amsterdam/Rotterdam	Manufacturing/materials eng	Founder
E22	Amsterdam/Rotterdam	Fashion/textiles	Founder
E23	Amsterdam/Rotterdam	Agriculture/Food	Co-Owner
E24	Amsterdam/Rotterdam	Built environm/design	Founder
E25	Amsterdam/Rotterdam	Fashion/textiles	Founder
E26	Amsterdam/Rotterdam	Fashion/textiles	Founder
E27	Amsterdam/Rotterdam	Built environm/design	Co-Founder
E28	Amsterdam/Rotterdam	Fashion/textiles	Founder
E29	Amsterdam/Rotterdam	Manufacturing/materials eng	Founder
E30	Amsterdam/Rotterdam	Transport/logistics	Founder
E31	Amsterdam/Rotterdam	Agriculture/Food	Founder

Table 7. Regional overview, sector and respondents' role of interview sample (cont'd)

#	City	Sector	Role
E32	Amsterdam/Rotterdam	Manufacturing/materials eng	Founder
E33	Amsterdam/Rotterdam	Built environm/design	Founder
E34	Amsterdam/Rotterdam	Fashion/textiles	Founder
E35	Amsterdam/Rotterdam	Transport/logistics	Founder
E36	Amsterdam/Rotterdam	Agriculture/Food	Co-Founder
E37	Amsterdam/Rotterdam	Agriculture/Food	Founder
E38	Other	Waste management	Founder
E39	London	Energy	Co-Founder
E40	London	Energy	Co-Founder
E41	London	Manufacturing/materials eng	Co-Founder
E42	London	Energy	Co-Founder
E43	London	Agriculture/Food	Co-Founder
E44	London	Transport/logistics	Founder and CEO
E45	London	Services	Founder and CEO
E46	London	Fashion/textiles	Co-Founder
E47	London	Manufacturing/materials eng	COO (founding team)
E48	London	Built environm/design	Founder
E49	Sydney/Melbourne	Agriculture/Food	Founder
E50	Sydney/Melbourne	Agriculture/Food	Founder
E51	Sydney/Melbourne	(Bio-)technology	Founder
E52	Sydney/Melbourne	Waste management	Founder
E53	Sydney/Melbourne	Fashion/textiles	Co-Founder
E54	Sydney/Melbourne	Fashion/textiles	Co-Founder
E55	Sydney/Melbourne	Manufacturing/materials eng	Co-Founder
E56	Sydney/Melbourne	Waste management	Founder
E57	Sydney/Melbourne	Manufacturing/materials eng	Co-Founders

Figure 7. Educational background of 'grassroots' circular entrepreneurs



3.3.2. Data analysis and coding

Deductive and abductive methods were combined for the data analysis. To analyse the motives, ambitions and decision factors that shape the entrepreneurial journey of grassroots circular entrepreneurs, semi-structured interviews were conducted with the founders (following the same interview guide in all of the interviews; see interview guide in Appendix 1). Most questions were open-ended and centred around the experiences along the entire entrepreneurial process as well as perspectives on the future (Kvale, 1983). All interviews lasted between 50 and 80 minutes, were conducted face to face or via video conference, and follow-up questions were tailored to individual answers. The interviews were recorded and transcribed. At the same time, an interview database was compiled to allow for analysis and coding. Since CE entrepreneurs' motivations and identity have not yet been scholarly scrutinised, this research dominantly applies conventional content analysis, which is most applicable when there is limited theory available on an existing phenomenon (Hsieh, Shannon, 2005). The answers were read by two authors and each coded half of the dataset

independently. Afterwards, they coded the respective other half of the dataset, discussed diverging outcomes and adjusted the coding framework. Thus, the first version of the 1st order coding dimensions was mostly developed inductively (see Tables 8 and 9). Theoretical saturation was reached when the evaluation and coding of the interviews did not lead to novel insights or changes to the 1st order code. This was the case after 40 interviews had been documented and evaluated.

To advance the structure of the content analysis, recurring themes from relevant scholarly writings in the field of social and sustainable entrepreneurship were subsequently used to refine and bundle the 1st order codes. In that, literature reviews and work from highly cited authors were scanned for themes that were identified with the inductive coding approach during the first phase of the data analysis. The analysis became more deductive (or directed) because the interview data was complemented with available theory to support the contextualisation of the observed phenomena and to strengthen the analytical framework (Alvesson and Kärremann, 2007; van Maanen et al., 2007; York et al., 2016). The 1st order coding categories were thus linked to the larger theoretical context of entrepreneurial motivation and identity (Gioia et al., 2012). Relevant literature that dealt with these two concepts was the base for the 2nd order codes. The 1st order codes were structured and grouped under the 2nd order codes *personal motivation of entering circular entrepreneurship* (entrepreneurial motivation), *entrepreneurial vision* and *business environment interactions* (entrepreneurial identity; see Section 3.2.3). So, the reasons for individuals to be driven towards circular entrepreneurship are subsumed under *entrepreneurial motivation*, while the objectives, frame of reference and (market) positioning of individuals as circular founders are categorised as *entrepreneurial identity*.

Table 8. Analytical framework and definition of coding dimensions for circular entrepreneurs' motivation

2nd order code	1st order code	Definition/description	Exemplary quote
Entrepreneurial motivation (drivers towards circular entrepreneurship)	Social altruism	Motivation to enhance the wellbeing of others	*"I myself, I'd like to do something good for people […]. The motivation for me [is] having an impact in the life of the people"* – E3
	Biospheric altruism	Motivation based on a pro-environmental attitude addressing non-human species	*"I […] learned a lot about how much waste is emerging at each level of the fashion industry and I thought I cannot work in any other direction anymore. I had to […] create products that save resources" – E1* *"I am motivated because […] the interest of ecology was just becoming more and more relevant and prevalent to me" – E52*
	Self-realisation / autonomy	Motivation to attain flexibility in professional decision-making and find meaning in the workplace	*"I have a certain idea of entrepreneurship, or the way things need to be designed or handled […]. And that I wasn't able to do in my previous company*" – E29 "*I wanted to do something I can identify myself [with]*" – E8
	Role modeling / education	Motivation to pioneer a circularity-based (business) innovation in order to set positive examples and educate others	*"We want to present an idea of a futuristic plan […] but we rather want to be advocates of an idea"* - E10 *"We want to be an example for this, how this can work, and I think as soon as we make it work you can also adapt this for any other industries"* - E5

Table 8. Analytical framework and definition of coding dimensions for circular entrepreneurs' motivation (continued)

2nd order code	1st order code	Definition/description	Exemplary quote
Entrepreneurial motivation (drivers towards circular entrepreneurship)	Profit	Motivation to maximise financial returns out of personal interests	*"Well, I think to make enough money to invest in other small businesses, become essentially a private investor" – E48* *"Ultimately, we'd like to create a successful return for ourselves and our investors" – E40*
	Achievement / challenge	Experience of gratification through personal growth and/or mastering a major challenge (i.e., circular entrepreneurship)	"*And I like to go out of my comfort zone and do things that have not been done before. And if somebody tells me 'Oh, this is not possible', I think 'ah, nice!'*" – E21 "*I see it as a good way to develop these skills [research and design]. To use them. So, it's developing myself.*" – E35

Table 9. Analytical framework and definition of coding dimensions for circular entrepreneurs' identity

2nd order code	1st order code	Definition/description	Exemplary quote
Entrepreneurial identity (vision/ objectives and business environment interactions)	Expansion	Fix system inefficiencies by (openly) expanding the own business model	*"[…] starting to package that business model up in a way that it can be replicated in a new city, so that we can expand by replication or have people essentially copy what we've done in Sydney in other places."* – E49 *"I want to grow this business so that create a dent in the amount of virgin material that is being used"* – E11 *"We want to establish our business case and model in every big city in the world"* – E31
	Inspire/ teach circular consumption	Influence consumers or markets by raising awareness and role modelling circular mindsets/practices	"*We want to create this awareness in our customers' mindsets"* – E6 *"We want to trigger a transfer thinking from our products to other products our customers use. Save resources through lack of consume"* – E18
	Social impact	Striving for social equity along the supply chain, impact on social structures or (marginal) societal groups	"*Well, we want to have a measurable effect on the social structures […] and take care of people, paying a fair share to the farmers […] and have a factory where people are safe."* – E29 *"So, the premise is to get it out to schools, and to homes, and communities, making it very accessible to all."* – E52 "*I would really love to do my business in Africa somewhere. And see how can impact also on a social scale*" – E29

Table 9. Analytical framework and definition of coding dimensions for circular entrepreneurs' identity (continued)

2nd order code	1st order code	Definition/description	Exemplary quote
Entrepreneurial identity (vision/ objectives and business environment interactions)	Environm. impact	Achieve positive impact on the environment by preserving resources and through more efficient processes	"O*ur vision is just clear and simple, we want to preserve water and energy"* – E16 "*I want to make real impact on waste and waste streams, and impact on yeasting new resources from Mother Earth."* – E33 "W*ell, we want to have a measurable effect on the air pollution. We want to see on the counter how many million trees we have saved." – E21*
	Enable circular supply chains	Fixing of system inefficiencies through enhanced knowledge sharing and platform-based solutions	"*We want to have a platform solution. A big marketplace where people can offer and send coffee themselves and we provide the payment solution and supply chain tracking."* – E2 "*We want to make the market more transparent and give producers of material the opportunity to be more flexible on the side of buying their raw materials. So that they can adapt it to their production and don't buy unnecessary stock."* – E22 *"But our vision is to be part of a more sustainable future and more awareness also among the industry, because it's very easy for them at the moment to say, 'Oh, yeah, we have a cleaner machine in our factory' without completely rethinking the whole product"* – E35

3.4. Results

3.4.1. Personal motivation: Drivers towards circular entrepreneurship

The motivation for founders of CSUs to start a circular venture is related to three factors: self-realisation, social altruism and biospheric altruism. Self-realisation is one of the dominant themes (36/57 mentions). The evidence from the founder interviews supports the idea that principles of CE and circular innovation are not compatible with historically grown, linear market structures. Large corporations' and established organisations' approaches towards sustainable development are not in line with the aspirational maxims of CSU entrepreneurs which is why many of them left their corporate jobs ("I was primarily too creative for the slow speed [in the corporate environment]." – E29; "I see that I cannot change companies, which are already listed, so I have to create something by myself" – E4; "So we didn't want to end up at Philips or some other large company designing the next coffee machine, but we really thought that something more fundamentally had to change" – E20; "I quit my former corporate job 7 years ago since I wanted to get involved more in sustainability and in sustainable companies which I could not do in a large company" – E31; "I could have kept doing what everyone else does in the corporate industry, say 'we were supposed to become circular, we were supposed to become sustainable, but at the end kept doing the same stuff every day. So, I decided to leave." – E56). Circular founders considered entrepreneurship as an opportunity where they can practise business according to their holistic idea of circularity. This is not only reflected in a relatively high number of circular innovation types in CSUs' business models (Henry et al., 2020) but also in systemic and relational factors such as collaboration with – or empowerment of – business partners (see Section 3.4.2.2)

Circular entrepreneurs' personal value system encompasses social, economic and environmental value creation while non-economic factors are the most important motivational drivers. Most interviewees (37/57) mentioned biospheric altruism as motivation

and social altruism was mentioned by 19 o respondents. (“we wanted to create something for and with those refugees and […] with the high-quality material that would otherwise be thrown away” – E12; “we also got to know about this waste product […] and then came up with the business idea. We improved something for the farmers in the country of origin and made use of the waste product” – E17; “I do really want to make money because I know that's the way we can build an environmentally and socially sustainable business” – E34; “But as we progressed into creating a real business, we really cared about climate change and the disproportionate effect it's having on people as well as the environment. And we believe that business is a real lever in addressing the problem” – E49). Particularly, the systematic inclusion of social value is considered a critical step for entrepreneurship to contribute to sustainable development. A structured approach to social value creation is often underrepresented among existing entrepreneurial types, and in CE in general (Hobson, Lynch, 2016; Merli et al., 2018; Schaltegger, Wagner, 2011). A reason for the prioritisation of environmental over social value might be that circular founders barely mention relatedness (i.e., the desire for companionship; Sheldon, 2002; Gagne, Deci, 2005) or some form of obligation towards their own community as an underlying motivation for their entrepreneurial endeavours. These are common threads among social entrepreneurs, particularly in the Global South (Jayaratne et al., 2019; Ruskin et al., 2016; Saebi et al., 2018). So, grassroots circular entrepreneurs in the Western World are not primarily driven by concrete experience as part of their respective societal groups but rather want to contribute to more equitable business practice and value chains even if they are not directly affected in their day-to-day lives. It requires additional studies in varying systemic and regional contexts to find out whether this hypothesis is generally applicable to circular entrepreneurship.

In contrast to some types of sustainable entrepreneurs such as ecopreneurs (Schaltegger, 2016), CSU entrepreneurs do not primarily seek unmet consumer demand. They are driven by a desire to contribute to systems efficiency and tackling major challenges, particularly in terms of environmental value and resource usage (“I learned a lot about how much waste is emerging at each level of the industry and I thought I cannot work

in any other direction than circular economy anymore" – E1; "Climate change is something that we must put our whole effort and energy into solving and, and so to me, I'm motivated by that premise" – E50 "I started thinking; what type of waste do we waste a lot, and do we not bring back into our economic system as a resource" – E32; "the waste problem was the big driver" – E55). We observe that only a few circular founders are driven by market-oriented motives in the ideation and launch phase of their start-ups. Accordingly, less than five individuals in the interview sample were personally driven towards circular entrepreneurship by the desire to grow or scale a business and achieve economic success ("My motivation is not to build a fast-growing company, and to sell it to another company, or exit" – E16; "I don't want to cash out quickly" – E24; "We're not really in it for the profit" – E49). We discuss potential underlying reasoning and implications in the next chapter because – even though not particularly relevant as a personal motivator – growth and market orientation constitute a relevant component in circular entrepreneurs' entrepreneurial identity.

3.4.2. Entrepreneurial identity

We scrutinise CSU founders' entrepreneurial identity along the two 'structuring' elements of entrepreneurial vision and objectives as well as business network interactions ('frame of reference'). These are the two core elements that shape and develop entrepreneurial identity (cf. Gast, 2017; Fauchart, Gruber, 2011). The analysis of vision and objectives sheds light into the prioritisation of goals of born circular entrepreneurs. This is a critically relevant theme in this context due to sustainable entrepreneurs' general challenge of balancing partially incompatible goals (Philips, 2013). The business network interactions are considered key elements in developing an entrepreneurial identity. Therefore, we analyse how CSU founders self-evaluate and compare to chosen frames of reference and how they interact with their business environment to manage the tensions that might result from conflicting objectives (Cesinger et al., 2021).

3.4.2.1. Entrepreneurial vision and objectives

In this section we scrutinise circular entrepreneurs' entrepreneurial vision and how it defines the business objectives and strategy. In contrast to the initial motivators to become an entrepreneur, circular entrepreneurs' vision is built on the idea of their ventures being influential drivers of circular practices through direct (growth) or indirect (inspiration/education) impact. The respondents have strong aspirations to expand and fundamentally "change" systems which was mentioned by E27, E30, E41, E50; however, only two founders particularly mentioned the goal to "disrupt" systems (E44, E45). Therefore, it remains ambiguous – and may be contested – whether the specific notion of disruption as defined earlier in this chapter ('accelerated systemic change process') is fully embraced by circular entrepreneurs. Still, the aspirations for growth and systems change imply strongly outward-oriented visions of circular ventures and are in line with the scholarly view of CE requiring systemic shifts. As such, CSU entrepreneurs connect their growth ambitions with the fixing of (mostly environmental) system inefficiencies ("the overall game is to change the whole industry to be less wasteful, and more sustainable" – E48). Accordingly, the prevalent visions identified are related to expansion (40/57) and striving for environmental impact (27/57). Apart from those, circular entrepreneurs' vision is to inspire/educate circular consumption (23/57) and enable more circularity in value chains (25/57).

Only 4 founders mentioned the further improvement of their technical innovation as their visions – and only 6 stated profits. Grassroots circular entrepreneurs are therefore rather altruistic in their vision formulation with a focus on environmental value creation. However, they respect economic factors such as market share and revenue as relevant indicators of their success and growing impact ("for me, it's all about big impact. And profit creation; and actually, the two are really linked" – E48). Social value plays a rather insignificant role in circular founders' vision even though it is part of their personal motives. Social value creation should probably receive more attention and structured embedding in circular business models, e.g., by establishing social key performance indicators (KPIs; see section 3.4.2.2). CSU entrepreneurs pursue visions that include a synergetic relation of

environmental (sustainable) and economic objectives. This balanced outlook is rare in existing perspectives on sustainable entrepreneurship where economic goals are in principle deprioritised (Thelken and de Jong, 2020). Still, we can observe a disconnect between circular entrepreneurs' vision and success indicators as social and environmental KPIs are partly gathered but economic KPIs are dominant. Reasons for this are the for-profit nature of circular start-ups which often requires them to report financial indicators to investors, loan providers or public authorities. Furthermore, the non-financial reporting landscape is still very fragmented and only slowly converging (e.g., CDP, 2020) wherefore it is too ambiguous for CSU entrepreneurs to invest their – oftentimes – scarce capacity on data collection and processing ("non-financial KPI measurement is very time consuming" – E2; "we do not have the capacity to track non-financial KPIs since we have to prioritise our limited capacities. We tried to measure and track this in the past but it is very difficult due to our complex supplier network" – E3; "Currently, we don't have the capacity to quantify the social and environmental impact" – E23). If so, CSU entrepreneurs roughly calculate non-financial KPIs to use them in their customer communication and marketing rather than formal reporting ("You have to relate your product back to those discussions in the context of sustainable development that people understand" – E34; "[our environmental impact] should translate into a loyalty program through gamification" – E16; "We try to establish a rolling indicator for this which we could also publish on our homepage" – E18).

We found that 'grassroots' circular entrepreneurs' orientation towards the market increases over time. When they were asked to assess the importance of scalability during the ideation and launch phase of their company, and compare it to the current situation a significant shift becomes apparent. Thus, 15 out of 57 founders considered scalability to be highly relevant in the launch phase, while this number more than doubled to 38 out of 57 at the date of the interview. Complementarily, 27 out of 57 interviewees did not consider scalability as a relevant factor in their launch phase while this number shrank to 2 out of 57 at the date of the interview. This development can partly be explained by the fact that problems that CSU entrepreneurs are trying to tackle with their business models become

increasingly pressing over time. Furthermore, growing relevance of scaling can be impelled by exposure to, and exchange with, peers, training programs, mentoring and incubator programs.

The dynamic nature of the concept of entrepreneurial identity can be drawn in to interpret these observations. Circular founders enter entrepreneurship with an inventive identity but build up a growth vision and developer identity over time (Cardon et al., 2009; Ekinci et al., 2020). As indicated above, this is reflected in the aspirational visions of CSU entrepreneurs which have a strong systemic character and go beyond the growth of their own ventures ("my vision is that we will no longer be a necessity because we've already reduced everything we can. So, in the end, I'm destroying my own business model. But that's fine, because then I'll have achieved what I want, which is the general reduction of food waste." – E37; "We want to establish our business case and model in every big city in the world through an open-source approach" – E31). This hints at the advanced position that grassroots circular entrepreneurs have when dealing with mission drift, i.e., the domination of economic values over social and environmental value when implementing and marketing sustainable innovation.

We explain the initially low growth orientation of CSU entrepreneurs with the fact that the majority (42/57) of circular founders are first-time entrepreneurs and with their relatively low personal economic motivation (see section 3.4.1). Furthermore, less than 10 interviewees had an educational background in management or entrepreneurship. Particularly, interviewees with an engineering or design background recognise this dissonance in their own educational path. They mentioned the lack of entrepreneurial knowledge as a major obstacle in their early-stage phases ("I think the biggest hurdle for us [was that] we were spun out of the university. We were two engineering PhD students that had no business knowledge or business sense at all" – E51). Typically, entrepreneurial experience and relevant education correlate with high growth ambitions of ventures (Mayer-Haug et al., 2013; Peng et al., 2020; Politis, Gabirellson, 2005). In this context, we highlight

CSU entrepreneurs as role models because they combine design and engineering backgrounds with entrepreneurial intentions. These positive examples are pivotal to overcome the negative effects of subjective norms (i.e., beliefs about social reference groups' attitudes toward a behaviour) on entrepreneurial orientation in higher design and engineering education, and to better integrate (circular) entrepreneurialism in respective university curricula (Kopnina et al., 2019; Middleton, Donellon, 2014).

3.4.2.2. Frame of reference and business environment interaction

We conceptualise the core external business network ofs grassroots circular entrepreneur – or sustainability-oriented entrepreneurs in general – as a combination of consumers, suppliers and the dimensions of the triple bottom line, i.e., economy, society, environment (Fassin, 2009; Starik, 1995; Stead, Stead, 2000). The recognition of, and interaction with these actors in their business environment are an important part in shaping the entrepreneurial identity (Cesinger et al., 2021; Donnellon et al., 2014). Circular founders barely formalise social value creation, but still strongly involve consumers in their business activities. The consumer-first philosophy manifests in downstream-oriented circular innovation types such as return, reuse or sharing, and collaborative practices (Henry et al., 2020). These types of circular business model innovations have the potential to drive socio-institutional change (institutional norms and cognition, e.g., increased agency, changing value perception) and address barriers to regime adoption of circular innovations. Grassroots circular entrepreneurs distinctly focus on proximity to consumers and aim to be approachable for customers to empower wider systems change (cf. Närvänen et al., 2020; "There are many really cool start-ups around Europe trying to come up with new ideas and new ways of doing things. This will bring about a lot of change in the system because it is not like a government that is [driving it] but this transition is made very sympathetically. People like those different approaches and sympathise with these companies [...]" – E8).

This positioning becomes more evident when examining circular entrepreneurs' stakeholder focus and self-evaluation against their chosen frames of reference. Thus, they prioritise environmental value and consumption systems (i.e., consumers and product end-of-life) over suppliers, incremental profit and social equity. Only 5 founders out of the entire dataset did not state consumption systems or environmental conservation as first or second priority when asked to build a hierarchy among those dimensions (see Appendix 1). As outlined above, founders of CSUs try to inspire consumers to change norms and increase awareness for circular practices beyond the purchase and usage of a product. This explains the strong consumer-centric nature of circular entrepreneurs' vision ("we want to show to consumers that we can actually have a society that uses and reuses products, especially plastic, in a much more sustainable way, especially through technology" – E45). A sole consumer focus and neglection of human beings in a social context is commonly critiqued as being too narrow a perspective to make behavioural predictions. This narrow view may contribute to a neglect of ethical aspects such as ownership, data security or confidentiality (Calisto-Friant, 2020; Henry et al., 2021; Hobson, 2019). Given circular entrepreneurs' high level of motivation from social altruism (see section 3.4.1) we propose to stronger include, and proactively manage, issues such as fair access, co-creation, attribution of societal value, and information transparency in circular business models (e.g., through platformization, data transparency and governance; Konietzko, 2020). A more systematic approach towards social embeddedness and value creation of circular innovation could help to remedy the common critiques of CE and lift the disruptive potential of circular innovation.

CSU entrepreneurs position their start-ups as complementary. As such, they try to create benefits within existing inefficient (linear) systems and do not disrupt systems per se. Almost two thirds of the respondents stated that they consider their company's interaction with other players in their markets to be complementary rather than disruptive (30%) or competitive (10%). Reasons for this are a generally open and collaborative mindset (E11: "we want to collaborate with everybody"; E31: "[…] we believe in sharing being the new competition we also collaborate across sectors"; "I think that replication by open sourcing, it's

like a much faster way of scaling. […] we're very happy for others to adopt what we've started" – E49; "we want to grow through franchise, open source or any other solution. In essence, we want to show how it can be done and then propagate" – E41), a self-understanding of a dependency on the output of the existing system ("We are rather filling a gap" – E17; "So in the end, I'm destroying my own business model in the long run." - E37), and – simply – a void in competition ("When we started there was no competition" - E18). Therefore, circular entrepreneurship might hold undiscovered potential which can be stronger leveraged either through more aggressive and targeted external growth strategies of CSUs, or through collaborations with established market actors to enable value co-creation in circular systems and leverage circular entrepreneurs' open-innovation approach and collaborative mindset (cf. Bertassini et al., 2021; Hopkinson et al., 2020; Ranta et al., 2018, 2020). This philosophy of sharing and collaboration can be considered part of a disruptive shift in itself as Bauwens et al. (2021) ascribe new forms of collaboration (e.g., experimentation between incumbents and start-ups) as part of the release phase in a circular disruption.

3.5. Conclusion and discussion

This study set out to build an understanding of the motivations and identities of grassroots circular entrepreneurs. The findings of this research contribute to the scholarly work on entrepreneurial motivation and sustainable entrepreneurship by using empirical data which suggests the emergence of a new category of sustainability-focused entrepreneurs. The key characteristic of CSU entrepreneurs is that they apply a common 'how-to' of circular strategies to advance sustainability. This common attribute – combined with some generic characteristics of start-ups – makes CSU entrepreneurs a clearly distinct entrepreneurial archetype and serves as a base and robust frame for further scientific and empirical investigation (Santini, 2017). Grassroots circular entrepreneurs are motivated to enter entrepreneurship by social and biospheric altruism and by the opportunity to work according to their personal, holistic principles of circularity. We found that these motives are only partly reflected in their entrepreneurial vision and interaction with the business environment. While

environmental impact is prioritised as part of their vision and self-evaluation, societal value creation – including notions of circular justice (Kirchherr, 2021) – is widely neglected even though it is a cornerstone of circular entrepreneurs' personal value system.

CSU entrepreneurs are mostly engineers and designers by training and they are mostly first-time entrepreneurs. The little experience and lack of managerial education may be reasons for a relatively low scaling ambition at the beginning of their entrepreneurial journey – which is thus at odds with the concept of circular disruption. However, over time and due to exposure to incubators, mentors and peers as well as increasing encouragement and attention from other societal actors, CSU entrepreneurs embrace the market and growth potential of their ventures, as opposed to many types of sustainable and social entrepreneurs that have been studied. CSU entrepreneurs wish to scale their business to extend the inherent environmental impact that they ascribe to their business models. They assess their impact based on economic proxies such as profit; therefore, they take on a market-directed perspective, a shift that is expressed by the fact that growth and expansion constitute the most frequently recurring theme in circular entrepreneurs' vision – a vision that largely connects with the notion of 'circular disruption'. As such, they aim to synergistically combine sustainable and economic value creation in their business models (i.e., being altruistic and benefiting themselves). Notably, the timely component of circular disruption is not adopted by grassroots circular entrepreneurs (i.e., they barely address speed of change). It is worthwhile to further explore the underlying reasons for what could be interpreted as lack of urgency for the complexity of the challenge.

CSU entrepreneurs seek to set examples and inspire their direct value chain partners. They consider themselves as role models who can encourage more circular mindsets and norms among suppliers and consumers. Founders of CSUs do not consider themselves competitive or disruptive which is in line with their strong emphasis on rather collaborative approaches towards other market actors. CSU entrepreneurs realise that the complex problems that arise from a circular transition can only be solved collectively and

collaboratively. Accordingly, CSU entrepreneurs are willing to share (knowledge, resources) even with competitors when it comes to the dissemination of their business models or value creation logics. Thus, they do not necessarily seek unmet demands and market gaps, but rather aim to enable circular resource and material flows through collaboration and open-source scaling.

3.6. Practical and theoretical implications of the study

A better understanding of the motivations and identities behind grassroots circular entrepreneurship can be relevant for policymakers with transformative agendas who aim to nurture CSUs initiation and growth; or for corporates who try to progress by establishing, learning from, and partnering with innovative circular ventures (Mishra et al., 2019; Veleva, Bodkin, 2018). Such a deep understanding could help to avoid information asymmetries and inequality in access or distribution of gains and created value from circular innovation. Following this new approach of collaboration that is aspired by circular entrepreneurs, new mechanisms for value creation, appropriation and allocation within economic systems are required. This can be solved with technology such as blockchain and tokenization (Narayan, Tidström, 2020) as well as governance and policy intervention as examples in the sharing economy have shown (Frenken, 2017; Henry et al., 2021).

Founders of CSUs show little ambition to achieve growth or profit as a core and stand-alone purpose of their activities. However, these characteristics of founders are considered major drivers for innovative ventures to achieve mass-market impact and multi-regional scale. Whether such ‘self-enhancing’ traits can be identified among CSU entrepreneurs in other regions, contexts or circumstances than the ones scrutinised in this study has implications on their relevance in sustainable future scenarios and on the level and kind of attention their innovations deserve in the present (Chesbrough, 2010; Shane et al., 2003; Smith et al., 2014). Will the above-mentioned collaborative approaches suffice or will there be CSUs who eventually disrupt industries driven by endogenous factors? In addition to such development paths where CSUs have direct impact, a detailed analysis of

the interplay of egoistic and (socially or biospheric) altruistic motives might unveil more pathways towards the promotion of circular entrepreneurship in environmental education and training (Singh et al., 2019; Sun and Lo, 2012).

It could be critical to unleash the transformative force of circular innovation to stronger include ethical and social goals in circular business models in practice (Schulz et al., 2019). In this context, research is required to create knowledge on how to structurally and representatively include the social dimension in sustainable or circular innovation (Schröder et al., 2020). To foster grassroots development of circular entrepreneurship, engineering and design education could put a stronger emphasis on entrepreneurial and managerial courses that target entrepreneurial profiles (Maresch et al., 2015). This could further push the transformative force of circular and sustainability-oriented entrepreneurship.

3.7. Limitations and future research

This chapter is limited by its lack of structured and in-depth analysis of temporal effects, which would require longitudinal studies instead of cross-sectional analyses. We partially addressed the factor of time by adding probing questions to the interview guide to gather insight into different stages along entrepreneurial journeys and by examining key steps in entrepreneurial process such as opportunity recognition of CSU founders. Still, future studies could build on this research by contextualising the findings and assessing the dimensions of the underlying analytical framework as well as the interdependencies over time. Furthermore, as the CSU hubs included in this study are all located in developed countries and regional start-up hubs, the contextual factors that are examined in the analysis are not exhaustive. Therefore, we propose for research to investigate CSUs in rural locations and in areas where circularity receives varying levels of institutional support. In particular, we encourage the analysis of circular entrepreneurship in the Global South, where context-specific interventions can create “leapfrogging” opportunities for sustainability (Geng, Doberstein, 2008; Preston, Lehne, 2017; Spence et al., 2011).

Acknowledgements

I want to thank Prof Rob Raven and the Monash Institute for Sustainable Development of Monash University in Melbourne, Australia, for introducing me to the circular economy community in Australia, guiding me in progressing with my research, and supporting the data collection for this research.

4

Building Innovation Systems in the Circular Economy - The Perspective of Circular Start-Ups[16]

[16] This chapter is submitted as *Henry, M., Raven, R., Kirchherr, J., Hekkert, M. (under review). Building Innovation Systems in the Circular Economy - The Perspective of Circular Start-Ups. Under review.*

4.1. Introduction

The circular economy (CE) is a much discussed and contested concept in scientific literature and business practice related to sustainable development. CE has its roots in the mid 20th century where it evolved from literary fields of industrial ecology and ecological economics (Boulding, 1966; Persson, 2015; Henry et al., 2021). The core idea of CE is to implement resource loops in economic systems so that environmental impacts (emissions, energy leakage) are minimised and the value of resources is maintained for as long as possible (Merli et al., 2018; Murray et al., 2017). The increasing literature body on CE provides a wide array of classifications and descriptions such as business model typologies (Henry et al., 2020; Geissdoerfer et al. 2018; Nußholz, 2017; Pieroni et al., 2019; Santa-Maria et al., 2021), implementation approaches (Fischer, Pascucci, 2017; Heyes et al., 2018; Lieder, Rashid, 2016) and concept definitions (Kirchherr et al. 2017; Reike et al, 2018) but large-scale, real-world implementation of CE – including quantification of value creation and capture – are barely tested (Hopkinson et al., 2020; Babbit et al., 2018).

In practice, CE is often critiqued for a lack of definitional consensus, inharmonious assessment criteria (e.g., for product environmental footprints), little outcome orientation and ‘greenwashing’ – the latter particularly among large corporations (Kopnina 2019; Henry et al., 2020; Subramanian et al., 2012). However, systems mobilisation based on coordinated and targeted action of various interdependent actors is needed to enable systemic CE transformations. The desired outcome of CE (i.e., resources that are embedded in loops to allow for maximum utilisation) is a wide-spread principle, however the approaches of how to collectively move towards circular business practices are ambiguous (Fischer et al., 2021). This could eventually derail a circularity – and even sustainability – transformation because actors may collectively not behave resource-efficiently due to lack of coordination as well as multiple definitions and strategic orientations. Thus, undesirable outcomes in terms of value extraction may be created, and actors may restrain from investing. Therefore, CE needs to be considered and established as an institutional field. For this, regulatory frameworks and behavioural norms require commoditization on a systemic level.

We apply the concept of mission-oriented innovation systems (MIS) to examine the complex dynamics that are the cause and the result of the CE mission formulation and wider transformation processes. Mission-oriented innovation is gaining increasing attention as an accelerator of sustainability transitions because it better reflects the complexity of underlying change processes than existing concepts (Mazzucato, 2018; Hekkert et al., 2020). However, a better understanding is required of how MISs are functioning. In existing literature, most work is done at the level of the MIS in its entirety, i.e., the focus lies on MIS structure, mission arenas and respective systems functions (Jorgensen, 2012; Wesseling, Meijherhof's, 2021). The few scientific publications that address actual problem-solution spaces in the context of MIS find that clear missions may lead to a combination of various solution pathways (Hekkert et al., 2020). The insider (agency) perspective of how to manage and govern and operationalise these various pathways has not gained much attention. In this study we focus on CE missions, CE innovation systems, and bottom-up circular innovation dynamics. Concretely, we will elaborate the roles that circular start-ups (CSUs) play in building up circular innovation systems.

Due to the lack of systemic guardrails, circular business models (CBMs) currently function as "islands of rules" (Fischer et al., p. 122, 2021) through which intended circularity impact is achieved based on technical innovation, systemic alignment of stakeholders and common circular missions. CSUs are a distinct group of CE-oriented private sector players that build and implement CBMs from scratch. They are increasingly established in the start-up – and wider economic – landscape (Henry et al., 2020; Närvänen et al., 2021). By pursuing strategies that create an adequate socio-institutional embedding for their circular innovations and managing the systemic challenges of CE (Henry et al., 2021), CSUs reveal insight into systemic interventions - beyond only novelty creation - that are needed for a CE transformation. Thus, they may open up new visions about the future, create legitimacy and form new knowledge to influence regulatory, cultural and normative associations in their respective institutional environments (Henry et al., 2020; Kopnina, Poldner, 2021; Närvänen et al., 2021). Following Gartner's (1995) framework for new venture creation, the element of

the *environment* is in focus of this study while the other three elements of *organisation*, *individual*, and *process* are scrutinised in the previous chapters. This study defines a common CE mission of CSUs within wider socio-political environments that follow circular missions and examines the external strategies that CSUs pursue to implement the mission and foster circular business practices. Thereby, we explore the dynamics that are required for circular innovation systems to unfold. This chapter follows the research question:

- What are circular start-ups' roles in building innovation systems in the circular economy?

To conceptualise CSUs' approaches to building circular innovation systems, this article draws from transitions, innovation systems, and CE literature. The chapter uses a data sample that is based on interviews with founders of 40 CSUs from Europe and Australia. The research body on innovation systems literature can be enriched based on empirical cases of innovative private sector players and their roles in systems building and diffusion of cultural-cognitive norms when advancing the common mission of CE. The outcome of this study could be useful for the governance and strategic management of the various directionalities in which CE is currently developing. Furthermore, inadequacies and limitations for CE-oriented innovation in existing norms and regulation, policy, and network governance may evince. CE value chains and circular innovation systems are currently in a 'formative' stage wherefore this research can be relevant to establish the structures and manage the system scope for a successful 'growth' stage (Hekkert et al., 2020; Smith, Raven, 2012).

The remainder of this article is set up as follows. Section 4.2 provides a literature review of the most relevant concepts and introduces an underlying theoretical framework for this research. Section 4.3 describes the research design and methodology. Section 4.4 presents the results of this research and discusses them in light of the theoretical context of sustainability transitions, innovation systems and institutional work. Last, section 4.5 summarises the findings and lays out the main contributions of this chapter while also discussing its limitations and proposing potential future studies that could build on this work.

4.2. Literature review

4.2.1. Innovation systems and system dynamics

The concept of mission-oriented innovations originated in the context of transition literature and ‘transformative’, mission-oriented innovation policy (MIP). MIP builds on transformational government intervention with the aim to co-shape innovation systems so that complex societal challenges can be addressed. This type of public intervention builds on far-reaching objectives, portfolios of innovative solutions and aligned strategies to address co-defined societal missions (Braams et al., 2021; Hekkert et al., 2020; Kattel, Mazzucato, 2018). Out of the three dimensions of MIP which are strategic orientation, policy-coordination and policy implementation, this study mostly addresses the former and the latter. Strategic orientation includes features such as legitimation; policy implementation includes reflexivity and business innovation features which are also discussed in this work (Larrue, 2021). In general, MIP is legitimised by the lack of strategic policy responses to drive transformational, systemic changes that are needed in order to address complex, long-term challenges (“wicked problems”) such as climate change, poverty or resource depletion (cf. Boon, Elder, 2018; Kattel, Mazzucato, 2018). These challenges require fundamental transformation processes that are prone to a much more complex set of transformational failures on a systemic level than incidental innovations on organisational level (Weber, Rohracher, 2012). However, the MIP is also criticised as it positions the state as an actor in areas where knowledge is often missing, where accountability is not clearly assigned, and where a meaningful assessment of failure and success is hardly possible (Larsson, 2022).

CE transformation is considered such a fundamental process but while the barriers to a CE have been scrutinised (cf. Kirchherr et al., 2018; Ritzen et al., 2017), little is known about the regulatory and normative configurations as well as interventions by private and public actors that contribute to desired transformational outcomes on a systemic level (Borrás, Edler, 2020; Braams et al., 2021; Weber, Rohracher, 2012). In the context of CE, examples of such desired outcomes are the development of reverse logistics, servitisation/product-service systems, measurement of environmental gains from waste

management, implementation of polluter-pay-principles or design-for-X approaches. More generally, CE strives for a maximisation of utilisation and a minimisation of waste over resources' entire lifecycle. Entrepreneurship that leverages these mechanisms to create system-wide value require the involvement of broader ecosystems rather than the limited perspective on an organisation's direct interactions (Geissdoerfer et al., 2020; Kanda et al., 2021). In fact, we argue that closer ties between innovative bottom-up solutions and top-down dynamics can address some of the key issues of mission-oriented innovation and MIP – particularly in the areas of knowledge creation and actor accountability.

The dominant frameworks to conceptualise innovation systems and systemic transitions – technological innovation systems (TIS) and multi-level perspective (MLP) – are mostly applied to scrutinise one focal technological innovation (e.g., electric vehicles or biogas plants; Hekkert et al, 2007; Geels, 2002). However, the concept of CE refers to systems of actors and institutions that need to coordinate a variety of technological and non-technological innovations under common principles (Henry et al., 2021; Konietzko et al, 2020). To conceptually grasp this complexity, we refer to literature on MIS and conceptualise large-scale CE transformations as such (Hekkert et al., 2020). Thus, we propose that strong missions based on shared problem recognition and vision (e.g., well-defined objectives including sector breakdowns) are a promising tool to mitigate misalignment among relevant actors and enable transformative CE innovation (Mazzucato, 2016; Meijer et al., 2006). In fact, large-scale CE transformation is increasingly expressed in such missions by public and private actors (e.g., a 100% circular Dutch economy by 2050, double resource productivity and zero avoidable waste in the UK by 2050). Plans to develop and diffuse CE build on portfolios of technological innovation projects across varying regions and sectors such as agriculture/food, electronic goods, utilities and transport (Defra, 2020; Dutch Ministry of Infrastructure and the Environment and the Ministry of Economic Affairs, 2017; European Commission, 2021).

The above already indicates that the uncoordinated investment in and promotion of innovations across sectors is not sufficient to address complex, long-term challenges but

better insight into directions of change based on shared future visions is required (Weber, Rohracher, 2012). Even if public agendas start endorsing, subsidising, and regulating certain principles or concepts related to CE innovation, established actors in the private sector tend to engage similarly in according practices so that truly transformative processes are barely traceable and not reflexive (Weber, Rohracher, 2012; Wesseling, Meijerhof, 2021). Furthermore, as long as there exists little knowledge about directions of change, strong state intervention will always result in a (relatively unstructured) crowding out of market actors that followed alternative paths (Larsson, 2022). We argue that practical evidence should be consulted to not only advance bottom-up dynamics but also to improve the process of CE mission formulation and systems building in top-down agendas (Schlaile et al., 2017). However, as evidence from established system actors may barely yield any insight for transformative change (Chesbrough, 2010; Schot, Steinmueller, 2018), innovative entrepreneurial activities deserve closer examination in this context because they are key sources of novelty, legitimation and variety (Bickerstaff & Walker, 2005; Loorbach, 2010; Smith & Stirling, 2007). So, this study scrutinises CSUs' roles as contributors to innovation systems with a CE mission. We define these systems as 'networks of agents and sets of institutions that contribute to the development and diffusion of innovative solutions with the aim to define, pursue and complete large-scale/systemic CE transformations (cf. Hekkert et al., 2020).

4.2.2. Circular start-ups' role in innovation systems

Business model innovation is considered a key pillar for both a transformation towards CE and mission-oriented innovation (Mazzucato, 2018a; Pieroni et al., 2019; Santa-Maria et al., 2021). Mission-oriented innovation (incl. mission formulation) as well as CE transformation processes on a systemic level need to be nurtured by bottom-up developments that allow for serendipity and learning from failure and experimentation (e.g., because roles and responsibilities of relevant actors in MISs are often not sufficiently elucidated; Bauwens et al., 2021; Hekkert et al., 2020; Rodrik, 2004; Sabel, 2012). Circular business models (CBMs) tend to address market demand as well as wider societal needs

and can therefore be understood as strategic tools that market actors valorise by creating the required systemic acceptance and demand for circular solutions (Bidmon, Knab, 2018; Nailer et al., 2019; Sorbacka, Nenonen, 2015; Zucchella, Previtali, 2019). This implies that value creation in CBMs has a reciprocal character because a variety of market actors must adopt circular innovations in a co-creative approach to realise the full economic, social and environmental value potential (Bertassini et al., 2021; Fischer et al., 2021; Merli et al., 2018; Moreau et al., 2017; Park, 2020). However, there is a lack of insight into bottom-up interventions of individual agents that could steer the co-creation of public value based on common CE missions and coordinated practices (Aminoff, Pihlajamaa, 2020; cf. Henry et al., 2021; Ranta et al., 2020).

CSUs are considered pioneers that establish circular practices and thereby create a value proposition and institutional legitimacy for CBMs from scratch. In systems functions terminology, entrepreneurial activity would be captured under the function “entrepreneurial experimentation” (Hekkert et al., 2007) but we argue that this perspective is too myopic. CSUs “are continuously disrupting established assumptions and norms and create new, better institutions” (Närvänen et al., 2021, p. 10). Even technology-focused CSUs (e.g., modular design, bio-based source materials) tend to combine their core solutions with innovation types that involve normative and cogntive changes in their value chain (upstream/downstream, e.g., customer behaviour) and wider institutional contexts (Henry et al., 2020; cf. Lawrence, Suddaby, 2006; Zvolska et al., 2019). CSUs hold others and themselves accountable to a high circular doctrine and look for complementarities rather than competition which is a key characteristic for protagonists in evolving MISs (Hekkert et al., 2020; Henry et al., 2021b). CSUs combine a common ‘how-to’ and system-transcending technological variety in their business models which are based on CE or R-strategies such as reduce, reuse and regenerate (cf. Henry et al., 2020; Henry et al., 2021b). Thereby, they constitute a rare instance which allows us to “zoom in” but still partly capture the overall broadening sustainability transformation landscape and multi-system interactions (Köhler et al., 2019; Rosenbloom et al., 2021). Through the implementation of novel, disruptive

business models, entrepreneurs may provide legitimation for broader similarly oriented transformational interventions (Braams et al., 2021; Daimer et al., 2021; Weber, Rohracher, 2012). This study analyses the approaches and strategies that 40 CSUs apply in this context to shed light into the strategic management of technological variety and complex dynamics in circular MISs.

4.2.3. Theoretical framework

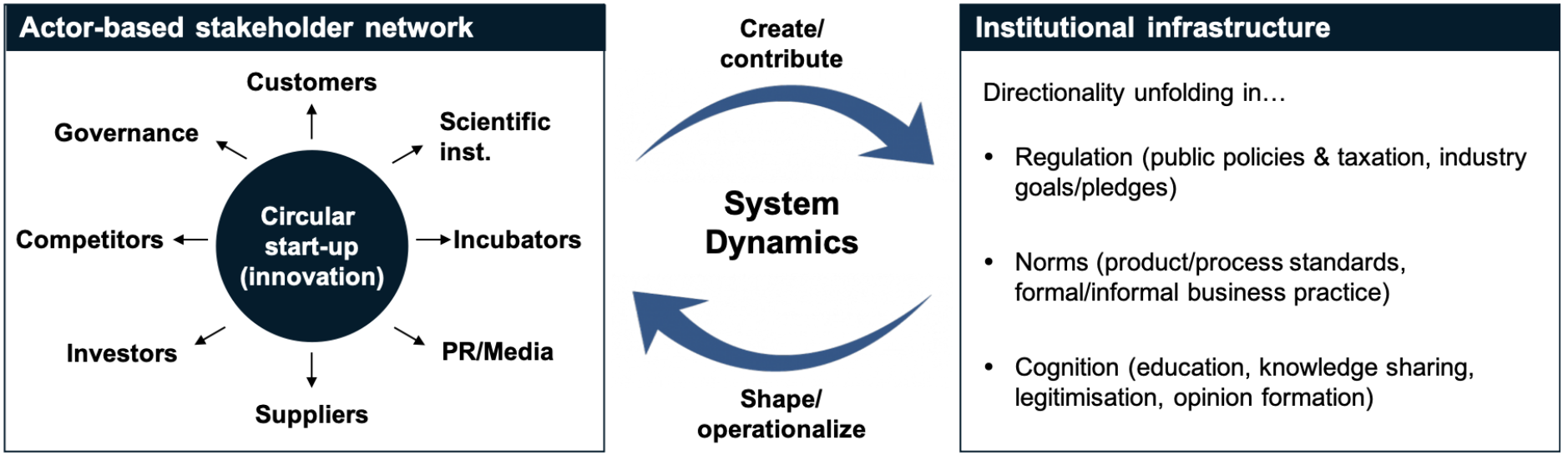
Next to literature on innovation systems and mission-oriented innovation, the analysis of stakeholder interactions and the role of CSUs in shaping their socio-technical environment will be informed by institutions literature (see Figure 8). Including institutions literature will allow this analysis to better account for the change processes and adoption mechanisms that are triggered by CSUs' stakeholder interactions and are associated with circular and sustainable transitions (Beunen, Patterson, 2019; Geels, 2004). Institutional theory builds on three pillars – or elements (Raven et al., 2017) – that contain the rules that actors must adhere to in order to create legitimacy for their business models: regulations (legal framework), norms, and cognition (values, meaning; Scott, 2008).

Following Raven et al. (2017), this study will not provide a full review of this complex conceptualisation but rather use it to systematically explore how CSUs navigate these elements as they build their business models and define and implement their external strategies (Ranta et al., 2018).[17] Thereby, this research addresses the need for an actor-based view when studying CE transformation and governance in MISs as it is suggested by deep transitions and transition governance research – the latter referring to it as an inside perspective that is oriented towards co-constituting the innovation system (versus an outside perspective of objectifying the innovation system; Kern et al., 2020; Smith, Stirling, 2007). Particularly, qualitative insight into day-to-day practices of CSUs as a clearly defined group of ‘system builders’ and their influence on and conveyance of regulation, ideas, values and

[17] Zvolska et al. (2019) and Närvänen et al. (2021) provide comprehensive frameworks to grasp the types of institutional works conducted by urban sharing organisations and circular food start-ups

beliefs in interaction with other network actors are considered a promising base for further research and a stronger diffusion of CE innovation (Henry et al., 2020; Lawrence, Leca, Zilber, 2013; Schot, Kanger, 2018; van der Vleuten, 2019). Therefore, we argue that socio-economic systems which are formed or connected based on CSUs' business activities can be considered minimum viable circular innovation systems in which relevant institutional elements that enable circular systemic innovation are shaped, tested and proven and can inform wider mission-oriented governance (cf. Konietzko et al., 2020: Mazzucatto, 2018a).

Figure 8. Theoretical framework – Minimum viable circular innovation system



4.3. Research Design

4.3.1. Sample selection and regional scope

This study is based on a qualitative research approach. 40 CSU case studies were scrutinised in-depth through founder interviews. This approach was chosen as it allows for theory building and knowledge development for relatively new phenomena within the context they occur in during the critically-important early stages (Eisenhardt, Gräbner, 2007; Yadav, 2010, 2018). CSUs are defined as new (max. 5 years), legally fully independent and active organisations that operate a for-profit circular business model (Henry et al., 2020). The regional scope of this research spans metropolitan areas in the Western world as the ventures that are included are from the Randstad Metropolitan region, London, Berlin, Sydney and Melbourne (see Table 10; cf. Luo et al., 2020). The locations were chosen because they are among the world's top start-up hubs (Campos, 2020; European Startup Initiative, 2017; Startup Blink, 2019) and the respective municipal governments established CE policies in recent years (Henry et al., 2020; NSW Government, 2019; Victoria State Government, 2019). Thus, a concentration of CE-oriented organisations, respective institutional infrastructure and CE missions could be expected. The interviews for this research were conducted between October 2017 and May 2020.[18]

Table 10. Regional overview, sector and respondents' role

	Country	Sector	Role
1	Netherlands	Manufacturing/materials eng.	Founder and CTO
2	Netherlands	Waste management	Founder and CEO
3	Germany	Fashion/textiles	Founder and CMO
4	Other	Services	Founder and CEO
5	Netherlands	Agriculture/Food	Founder and CEO

[18] All interviews with Europe-based CSUs were conducted in 2017 and 2018. Only the interviews with Australia-based founders were conducted in 2020. CE experienced an upswing and appeared on municipal policy agendas in Berlin, Amsterdam and London already in 2017/2018 while this upswing happened in 2019/2020 in Australia (see sources mentioned above). Due to the parallels in the respective regulatory development, little systematic bias is expected to result from this timely difference in data collection periods

Table 10. Regional overview, sector and respondents' role (continued)

	Country	Sector	Role
6	Germany	Fashion/textiles	Co-Founder and CEO
7	Netherlands	Agriculture/Food	Founder and CEO
8	Netherlands	Agriculture/Food	Co-Founder and CEO
9	Netherlands	Fashion/textiles	Founder and CEO
10	UK	Built environm/design	Co-Founder and CEO
11	Netherlands	Services	Co-Founder and Creative Director
12	Germany	Services	Co-Founder and CEO
13	Germany	Fashion/textiles	Co-Founder and CEO
14	Netherlands	Fashion/textiles	Founder and CEO
15	Germany	Agriculture/Food	Founder and CEO
16	Germany	Waste management	Founder and CEO
17	Germany	Fashion/textiles	Co-Founder and CEO
18	Germany	Waste management	COO
19	UK	Agriculture/food	Co-Founder and CEO
20	UK	Energy	Co-Founder and CEO
21	UK	Services	Founder and CEO
22	UK	Built environm/design	COO
23	Germany	Agriculture/Food	COO
24	Germany	Agriculture/Food	Founder and CEO
25	Germany	Agriculture/Food	COO
26	Netherlands	Agriculture/Food	Co-Owner and CCO
27	Netherlands	Services	Founder and CEO
28	Germany	(Bio-)technology	Business Development
29	Germany	Fashion/textiles	Founder and CEO
30	Germany	Services	Founder and CEO

Table 10. Regional overview, sector and respondents' role (continued)

	Country	Sector	Role
31	Australia	Services	Founder
32	Australia	Manufacturing/materials eng.	Founder
33	Australia	(Bio-)technology	Founder
34	Australia	Fashion/textiles	Founder
35	Australia	Waste management	Co-Founder
36	Australia	Agriculture/food	Co-Founder
37	Australia	Waste management	Co-Founder
38	Australia	Manufacturing/materials eng.	Founder
39	Australia	Services	Co-Founders
40	Australia	Agriculture/Food	Founder

4.3.2. Data analysis and coding

Most questions of the semi-structured founder interviews were open-ended and focused on the experiences along the interviewees' entrepreneurial process with a focus on the recent past and status quo (Kvale, 1983). All interviews lasted between 45 and 80 minutes and were conducted face-to-face or via video conference. Follow up questions were tailored to each participant's answers. The interviews were recorded and transcribed verbatim. Simultaneously, a database was compiled based on the transcribed interviews to allow for analysis and operationalisation of key concepts. This process resulted in the typology of roles that entrepreneurs and CSUs assume in building circular MISs (sections 4.4.1 to 4.4.4). Theoretical satisfaction was reached when the analysis of the interviews did not lead to any novel insights. This was the case after ~40 interviews had been documented and evaluated.

Dominant themes from transitions literature, innovation system literature and theory on institutional work were used to guide the search, further structure and deepen the analysis, and to provide sensitising concepts for the analysis (e.g., empowering of customers as reduction of resistance to change; Blumer, 1954). Literature review articles, recent

publications and work from highly cited authors were screened for the themes that were identified during initial (bottom-up) coding of the interviews. The approach took on a deductive character because the analysis of the interview data was amended with existing theory to explain and build on the observed phenomena (Alvesson and Kärremann, 2007). Thus, the inductively identified operationalisation of the key concepts were embedded in the theoretical context of innovation systems and institutional literature (Gioia et al., 2012).

4.4. Results and Discussion: Circular start-ups' roles in circular MISs

The 40 interviewed founders indicated the relevance of their innovation system for their success at 8.2 on a scale from one to ten ("[*The innovation system*] *is highly relevant for us to achieve this mind shift on a big scale wherefore we require an active ecosystem*" - E4). In relation to their respective markets and wider systemic environment, CSUs consider themselves as complementary, creating benefits within existing (linear) systems and not disrupting them per se. Two thirds of the respondents stated that they consider their company's interaction with other players in their markets as complementary rather than disruptive (~30%) or competitive (~10%). This is due to a generally open and collaborative organisational mindset ("*we want to collaborate with everybody*"; "*we believe in sharing being the new competition we also collaborate across sectors*"; "*In* [*our market*] *[…] we collaborate a lot. Only the very big players actually compete fiercely"* – E8*; "collaboration and mutual support* [in the CE community] *instead of competitiveness" – E30*), a dependency on the regime inefficiencies (e.g., when using excess/waste materials as input; "*We are rather filling a gap*" - E25), or simply a void in competition due to the novelty of the offering ("*When we started there was no competition*" – E12).

The above finding emphasises the radical, systemic and co-creative character of CE innovation but does not answer how CSUs contribute to a transformation towards circular systems and CE at large. To shed light on the latter, we first inventory the problems and solutions that constitute the foundation of CSUs' common mission before scrutinising the roles that CSUs play in building innovation systems. We establish and reflect on the missions across

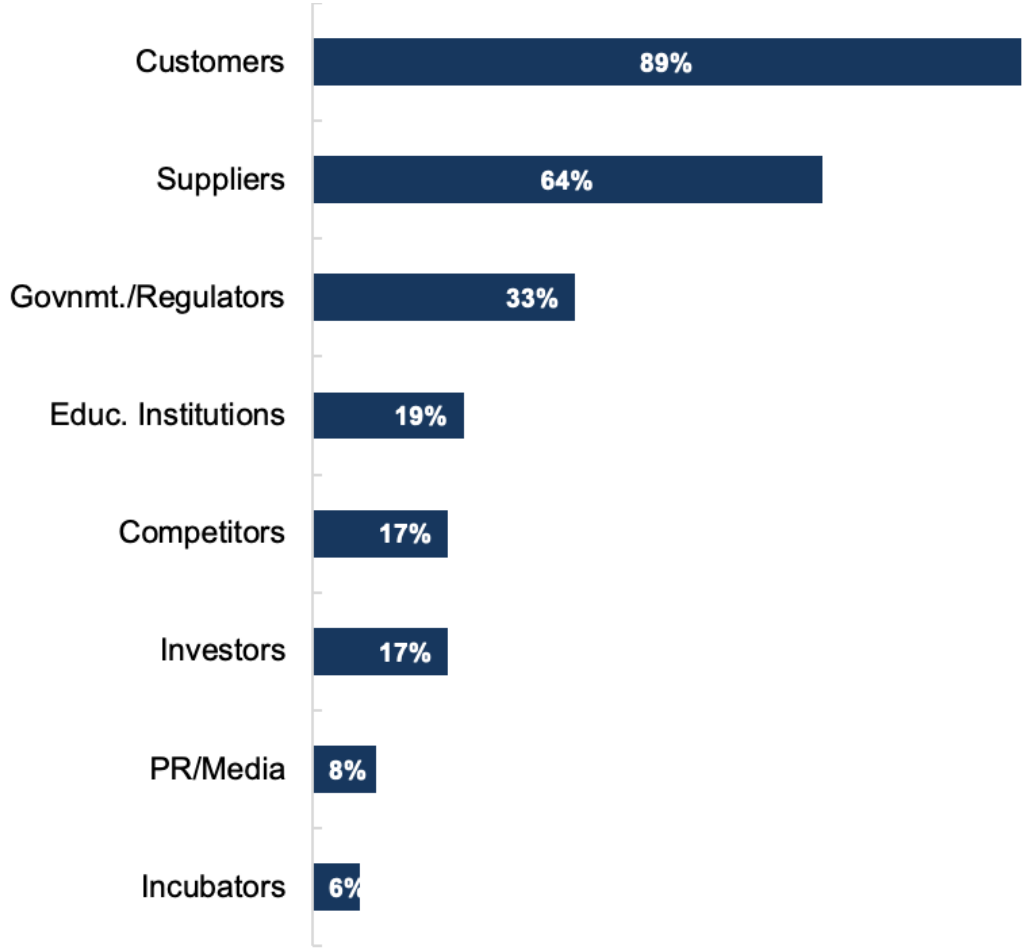
the entire sample (i.e., for metropolitan areas in the Western hemisphere) to manage complexity in the context of this relatively recent phenomenon, and to ensure that the mission is largely unbiased – it neither discriminates against nor favors any particular solutions or sectors (cf. Azar, Sandén, 2011; Sandén, Hillman, 2011). We critically reflect on CSU business model specificities on the backdrop of the identified roles of CSUs.

The most common themes in CSUs' mission formulation are related to the large-scale societal problem of an *anthropogenic environmental degradation* ("problem directionality"; Wesseling, Meijerhof, 2021, p. 6) where problem facets include increasing anthropogenic emissions, excessive waste and high resource inefficiencies in industrial systems, over-consumption (incl. lack of product lifecycle perspectives), lack of customer awareness and unequal value appropriation to marginalised groups within and across global supply chains. The solutions that CSUs generally relate to the mission mostly refer to the *closing of resource loops* which was proposed by CSUs from all sectors that are represented in the sample (cf. Bocken et al., 2016). The necessary conditions (i.e., the regulative, normative, cognitive institutions) are defined by CSUs as changes in the value perception of businesses and customers, redefinition or eradication of waste/landfill, conservation of (limited) resources and biodiversity, re-imagination of source materials and supply chains as well as mobilisation/inclusion of various levels of society ("solution-directionality"; Wesseling, Meijerhof, 2021, p. 6). While almost no CSU includes time-bound temporality in its mission (which is a key characteristic of mission-oriented innovation; Frenken, 2017; Hekkert et al., 2020; Mazzucato, 2018b) a few CSUs connect the finality of the mission to the phase-out of an environmentally harmful resource, process or product ("*Our big dream is to erase all plastic bags*" - E57; "*we are always guided by keeping textiles out of landfill and not compromise on that.*" – E54; "*My vision is that there won't be any food waste anymore even if that means that my own business models will be destroyed*" – E37).

Based on the interviews and data analysis that are outlined in Section 4.3, the most relevant players for CSUs in building circular innovation systems could be identified: customers/consumers, suppliers (incl. direct supply chain partners), regulators/governance

and scientific institutions (see Figure 9). CSUs' strategies to influence technology development, behaviour and institutions to achieve a systemic shift towards a common mission is scrutinised in the next sections. We categorise the systemic roles that CSUs take on into 4 archetypes: reinforcers, conveners, pioneers and champions (see Table 11).

Figure 9. Most relevant innovation system actors for CSUs (% of CSU founders mentioned)



Multiple answers possible, n = 40

Table 11. Typology of CSU roles in building circular innovation systems

CSU role	Role description	Institutional elements	Example activities & strategies
Reinforcer	Public consensus building and customer empowerment	Cognitive, socio-cultural, values, beliefs	− Free, public education (e.g., workshops, events) − Digital exchange and tracking platforms for increased end-user agency − Storytelling
Convener	Reconfiguration of supply chains and fundamental changes in production processes and delivery models	Normative, evaluative, governance	− Value co-creation based on strategic deliberation − Standards and contracts development/provision for circular systems − Open innovation − Advanced technology for supply-demand matching and tracking
Pioneer	Legitimation and normative justification of transformative, cross-sectoral policy	Regulation/ policy, governance	Inspiring, challenging and (partly) breaching of regulatory standards to “fill supply chain gaps” and increase market efficiency through informal networks, e.g. ○ Upcycling of industrial/agricultural waste ○ Bio-/waste-based innovations in material and product design ○ Re-routing of idle/excess resource flows
Champion (Mentor)	Role-modelling of circular entrepreneurship	Socio-cultural, normative (subjective)	− Public-private collaborations with universities to exchange expert insight, advance own topical agendas and attract/inspire talent

4.4.1. Reinforcers: Behavioural Change and Customer Empowerment

As outlined above, CSUs are relevant 'bottom-up' drivers of mission-oriented innovation that complement a top-down approach (e.g., by political leadership) to create system-wide transformation (cf. Henry et al., 2021a; Mazzucato, 2018a).

The interview data suggest that this particularly applies to the engagement of civil society. Many founders of CSUs consider changes in social norms and beliefs as the most important external drivers for their success ("*I think we've really leveraged that trend of increasing demand for corporate circular practices*" – E36; "*people talk a lot about circular economy and want to reduce their footprint which is in our favour*" – E18). This confirms a recent study that found out that more than 60% of global consumers find it 'very important' that the companies they buy from adopt circular principles (ING, 2020). Particularly, because CSUs have higher circular ambitions and apply more impactful practices than large corporates (Henry et al., 2020), they raise the bar for other market players because they holistically include circular practices in successful, for-profit businesses that offer competitive products ("*big corporations are too slow and there will be increasing opportunity for people like us*" – E38). Many CSUs in the sample go beyond only differentiating from the linear economy to promote socio-cultural change (cf. Winans et al., 2017). To engage with customers and to build up acceptance and consensus in larger society, Reinforcers offer free workshops, free case libraries, free events/meetups and free educational materials next to their core products (e.g., Berlin-based Dycle, Rotterdam-based Rotterzwam; "*When we worked in our research facilities and pilot facilities, we did a lot of videos, show and tell, to bring it alive. We invited people to the research facilities to see what we do. We built deep relations, people trust us*" – E34; "*People need to smell and see it. They want to see the facts, no pollution, no smell, no odors*." – E35).

In a recent study on CSU's business model innovations, it was shown that most CSUs apply forms of circular innovation that require customers to engage and change consumption patterns (Henry et al., 2020). However, the study provided no insight into the extent and the quality that underlie these types of engagements and how deeply they are rooted in the CSUs' external strategies. The results of this chapter indicate that it is among CSUs' ambition to directly and indirectly change their normative and cognitive institutional environments and influence customer behaviour (Beunen, Patterson, 2019). It was found that CSUs purposefully engage with customers to empower them and convey a mindset that is open towards circular practices (Zvolska et al., 2019; "[*We*] *want to inspire people to rethink the usage of their waste […]. We want to trigger a transfer thinking from our products to other products our customers use*" – E3; "*We focus mainly on people who are not interested because the ones that already are will find us anyways"* – E7; "*We want to take this "annoying" part out of living according to circular principles and show that it is not a trade-off but fun and rewarding*"- E30). Berlin-based start-up mundraub, for instance, created a platform-based business model that includes a route planner to discover edible landscapes. This enables customers to track and freely access natural resources in their direct vicinity. Thereby, they decrease consumers' perceived risk of differentiating from the typical consumption pattern of grocery shopping and give them agency by routinising the yielding of publicly available, idle resources as substitutes (*"Everyone living in a city should be able to [access local, idle resources] once a year to understand the neighbourhood and be less focused on products and the market*" – E15; Fuentes, Sörum 2019; Hobson, 2015). Other typical examples are CSUs' business models that embed products in a service-based revenue models, enable asset traceability, facilitate peer-to-peer sharing or offer return-/repair models (cf. Vargo et al., 2015).

4.4.2. Conveners: Changing Normative Associations through New Forms of Collaboration

Next to a lack of financial resources – which is a "chronic" problem for any start-up, and for CSUs in particular (Geissdoefer et al., 2018; Veleva, 2021) – supply chain complexity and lack of supply chain readiness for circular business models were mentioned by CSUs as the

biggest challenges to growth (""*Supply chain* [*is a major barrier to scalability since*] *the market is made for a product in a linear model*" – E20; "*companies do not have the attitude to value secondary resource streams*" – E4). CSUs' business models often include multiple, radical innovations that lead to a combination of traditional resource flows and value creation logics and thereby change established normative associations. In that, CSUs' dominant innovations do not only require a deep understanding of supply chain partners' value-in-use (e.g., when creating value through replacement of source materials) but also radical changes in delivery models where the focus moves towards need fulfilment (e.g., service- or platform-based business models; Henry et al., 2020; Ranta et al., 2020; Thakker and Bakshi, 2021). These challenges materialise upstream of the CSUs due to required changes in product/process design, little coherence in circularity standards and in-transparent supply chain connections (Henry et al., 2020; cf. Park, 2020); and downstream of the CSUs due to the lack of intellectual and technological infrastructure that supports reverse/secondary logistics and take-back schemes. CSUs actively engage in creating and partly governing the technical and cultural foundations that are required for a functioning circular innovation system where established supply chains and business practices are newly connected and appropriated value is newly allocated (Tseng et al., 2020; *"We try to actively promote the ecosystem and not only partake in something existing. We work with the* [scientific institutions] *and 15-16 other companies to find ways on how to develop ecosystems*" – E4 *"None of the relationships already existed, so we worked on connecting the dots"* – E19*; "We started talking to other startups that we know that could be useful for other ones. Because this also creates network and trust. […] We don't just jump in and offer our services, but we can recommend things to check out"* – E32).

CSUs strive for an according readjustment and balancing of collaboration and competition within and across value networks to address interconnected, systemic issues through open-source and co-creative business approaches, and by holding business partners accountable to a high circularity doctrine. These approaches root in novel forms of collaboration and value co-creation that deviate from traditional 'siloed' cost-benefit analysis in the private sector (D'Antone et al., 2017; Henry et al., 2021; Ranta et al., 2020). Corresponding

strategies such as collaborative innovation and open innovation are proposed by recent literature as highly relevant for the diffusion of CE (Brown et al., 2021; Jesus, Jugend, 2021). Concrete measures by CSUs that could be observed to advance their systemic environments towards more circularity are

- the definition of joint circular value propositions and strategic deliberation ("*We try to 'cross-pollinate' and to connect people from different supply chains that benefit afterwards"* – E31; "*So in terms of connecting the ecosystem of farmers, to waste remediation, to doing something with the waste product to help the environment... I guess we did build that*." – E33; "*We analysed the workstreams of [public and private] supply and what the mutual costs and environmental benefits of doing business with each of those streams were*" – E34; cf. Larson, Sandholm, 2004)
- alignment through provision of standards and contractual cornerstones (*"Basically, we helped our suppliers to establish standards"* – E12; "*We have put the right agreements, contracts and commercial terms in place with our distribution partners around how we expect the relationship to unfold and what they can and cannot do*" – E38)
- and open innovation ("W*e are also in close interaction with our competitors or other platform solutions like sharing economy platforms"* – E4*; "Expansion is about spawning so that everybody does it without the founder being in charge. So, we like open source and knowledge-sharing across value chains." – E18*).

Following, circular, reciprocal value propositions that are mutually determined by relevant system actors could help to establish a fair value share (despite relatively low IP protection) in the case of joint value creation and appropriation between naturally competing parties (Aminoff et al., 2017; Dagnino, 2002; Ritala, Tidström, 2014). Recent literature proposed (open source) platforms and blockchain technology as relevant vehicles to mitigate the tensions that arise from these new forms of collaboration in circular systems while maintaining transparency, security, confidentiality and trust between organisations or individuals (Konietzko et al., 2020; Kouhizadeh et al., 2022; Narayan, Tidström, 2020; Zhang

et al., 2021). Increasingly, NGOs, alliances and industry associations are proposed to act as brokers and intermediaries who define network and data governance rules, value allocation logics and host the network infrastructure (Abbott et al., 2017; cf. Cramer, 2020). CSUs such as twig and GreenCircle act as intermediaries or brokers to enable forms of supply chain collaboration (re-use of idle resources) based on a technological solution and supply-demand matching. However, due to the lack of existing (secondary/reverse logistics) infrastructure they often need to develop the necessary infrastructure networks from scratch (circular.berlin, 2021; NewsDesk, 2021). Software-based CSUs like Circulor offer traceability-as-a-service models that increase supply chain transparency and thereby narrow resource loops in global supply chains (Sitra, 2020). Other CSUs approach this complexity partly through relationship marketing (Morgan, Hunt, 1994) and over-investing in personal relationships – particularly with their direct suppliers ("*everything is based on interpersonal relations and people working with people rather than sending out marketing materials"* – E19*; "I had to knock on doors and get laughed at*" – E14*)*. Recent findings emphasise the relevance of supply chain relationship management in building CE capability (i.e., the implementation of interrelated practices that support closed-loop systems) – particularly from the perspective of small- and medium-sized companies (Centobelli et al., 2021; Zeng et al., 2017).

4.4.3. Pioneers: Pushing Boundaries and Legitimising Transformative Policy

This study emphasises the roles of CSUs in MIP because their interaction within MISs reveals inadequacies and limitations for circular innovation not only in societal and business interactions but also in governance and regulation. CSUs consider governmental bodies as the third most relevant stakeholder (see Figure 9), and regulatory interventions as one of the most important institutional elements. At the same time, our data showed that regulatory barriers are perceived as one of the major obstacles to growth for CSUs.

Particularly, those CSUs that work with residual resource streams face regulatory challenges due to required licences for waste material handling (*"Waste material sourcing requires specific licences and the tax on it is too high in my opinion."* - E14*; "we deal with*

material streams which are officially categorised as waste and therefore we need special permits to handle them; the old rules are killing innovations […] and are not suited for the new solutions" – E11; "There is a lack of regulation in terms of declaration of waste material and how to handle it" – E18). All CSUs that work with residual resource streams mentioned this barrier – independently of the sectors they operate in and varying regulatory environments. Most CSUs are required to accept a level of ambiguity in their own implementation of relevant regulatory frameworks. Therefore, compliance of their own business models is oftentimes not assured which may aggravate the required process of a targeted phase-out and redefinition of norms and beliefs that were established in a linear economy (e.g., the desire for ownership of new goods and resistance against purchasing of pre-owned goods or by-products; "*we rely on our entrepreneurial spirit and just go ahead without having regulatory clarity*" *- E5; "[Even though I only work with material that others threw away] I am taxed in the luxury item department, like Louis Vuitton bags, which I do not consider fair" – E14; "At the end of day governments are slow and they always are"* – E38). CSUs contribute to the establishment of new norms and to the disruption of assumptions and beliefs (cf. Lawrence, Suddaby, 2006) and thereby help circular practices to gain institutional legitimacy among buyers and other relevant stakeholders.

Policymakers could steer systems towards circularity based on insights on directionality and respective legitimation from CSUs that receive increasing societal support ("*There are many start-ups around Europe trying to come up with new ideas and new ways of doing things. This will bring about a lot of change in the system because […] this transition is made very sympathetically. People like those different approaches and sympathise with these companies"* – E8). Legitimation and knowledge building for public authorities' transitions tasks are urgently required due to a current absence of normative arguments that support transformative government intervention – apart from the established complex market failure argumentation – but rather increasing criticism of states that "crowd out" private sector activity with ambitious policies of which significant consequences are not known (Braams et al., 2021; Larsson, 2022; Mazzucato, O'Donovan, 2016; Weber, Rohracher, 2012; Raven, Walrave, 2020).

So far, individual or collective extended producer responsibility and recycling schemes that are supposed to increase circularity miss their purpose of driving upstream design changes or better resource recovery downstream (e.g., in the European Union; Atasu, 2018; Kunz et al., 2018; Maitre-Ekern, 2021; Morseletto, 2020). Systemic technological variety could be guided more strategically through dedicated cross-sector incentives/subsidies (e.g., collective extended producer responsibility, R&D investments; cf. Janssen, 2021), product standards (e.g., minimum recycling/bio-material rates) or revised waste treatment laws (e.g., input/output rates) that are inspired by proven (or failed) CSU innovations in the recycling process (Charopy, consumer goods; Bygen, chemicals company), in product design (Kees, fashion label) or in platform technology (Rethink Resource, B2B platform for residuals; "*We had to make a lot of stuff ourselves and find a lot of things that are not necessarily affiliated with our market. We looked at existing models and put the things to place in a different manner*" – E20). The evidence of CSU business models could help avoiding lengthy, politically laden processes but justify normativity in integrated, transformational mission-oriented policy mixes by forming higher levels of structuration, encouraging collaboration and thereby "picking the willing" (cf. Bidmon, Knab, 2018; Hekkert et al., 2020; Mazzucato, 2018a, p. 805; Weber, Rohracher, 2012).

4.4.4. Champions: Role Modelling Circular Entrepreneurship and Encouraging Talent

The relation to scientific institutions was repeatedly mentioned as relevant for the CSUs' success. Various CSUs originated in university research projects (e.g., Australia-based Bygen, UK-based Areopower). Also, the diffusion of knowledge on circular innovations is considered critical: most of the collaborations include workshops for schools and universities. A few CSUs also leverage these to establish more structural private-public collaborations with scientific institutions to advance their topical agendas and attract talent ("*We organised hackathons and invited students and universities to build [our production machines] together*" – E12; "W*e offer skills training through relationships with universities and technical experts […]; these are also sources of members"* – E10; "W*e also want to drive [knowledge and*

inspiration sharing] through giving workshops or speeches at universities" – E6). These latter forms of collaboration between scientific institutions and CSUs can be the foundation for systemic impact and direct benefits for CSUs. Particularly, in the field of design and engineering training and education – the dominant backgrounds among circular entrepreneurs (Henry et al., 2021b). Examples of CSU founders who successfully combine design and engineering backgrounds with entrepreneurial intentions can help counteract the negative effects of subjective norms on students' entrepreneurial orientation (Maresh et al., 2015; Sun, Lo, 2012). Thereby, CSUs do not only contribute to the strengthening of the circular entrepreneurship community in their respective innovation systems but also to the access to and availability of talent for their own ventures.

4.5. Conclusions and future research

This study set out with the objective to analyse the roles that grassroots entrepreneurship plays in building circular MISs and qualify the institutional dynamics that unfold accordingly. Based on the insights gained from CSUs, we aimed to delineate implications for the formation of MISs with a CE mission. Customers, suppliers, regulators, and educational institutions could be identified as the most relevant stakeholders for CSUs. CSUs' stakeholder interactions are purposeful – rather than unintended consequences of business activities – and driven by CSUs' strong circular missions and ambition levels as well as the partial lack of institutional support. We identified four overarching roles that CSUs adopt. We classify them as reinforcers, conveners, pioneers and champions. Most of CSUs' system interactions are based on close collaboration and have direct implications for their stakeholders, for instance for suppliers (co-creation of value, new normative associations and joint standard setting) or customers (empowerment and agency in consumption choices). Other systemic interactions of CSUs have indirect implications – particularly for policymakers because CSUs' push regulatory boundaries as their activities reveal insufficiencies in existing policy (e.g., waste treatment laws) and opportunities for more directionality and normativity in transformative regulation (e.g., EPR); and, because CSUs do not have the capacities to effectively lobby for policy change themselves.

This study offers theoretical contributions to the scientific field of CE and to literature on mission-oriented innovation. It is one of the first studies to scrutinise the agency perspective in MISs based on empirical evidence. The testing of distinct, functioning business models that deal with the systemic challenges posed by CE, contributes to the scientific perspective departing from abundant classifications and descriptions of the phenomenon towards the study of the solution space, i.e., desirable systemic configurations. Instead of analysing systemic interactions based on siloed solution/technology types this study takes on a mission-generic actor-based view and provides more holistic insight into the stakeholders and activities that are relevant for circular innovations to spread. We call the respective stakeholder networks that form around CSUs' business models 'minimum viable' circular innovation system. Thereby, this study takes a step towards closing the research gap on the connection of CE, business models and transition literature, adds to the agency and governance perspective in mission-oriented innovation, and helps understanding the role of bottom-up innovations in circular/sustainability transitions (Bidmon, Knab, 2018; Boons et al. 2013; Loorbach, 2010; Schaltegger et al., 2016). Future studies on circular MISs could build on these insights to further the knowledge on adequate system configurations for MISs in specific sectors (e.g., which actors to exclude/include from a policy or value co-creation perspective). Furthermore, this study provides theoretical insight into roles and institutions in MISs that are required for an adequate socio-technical 'embedding' of circular economy innovations. Therefore, we identify various examples of how systemic acceptance can be achieved through institutional work, mobilisation of supply chains and new forms of collaboration.

We also propose CSUs as important stakeholders for practitioners and thereby contribute to the mutual exchange between CSUs and other systems actors. Policymakers can leverage the evidence that CSUs provide to legitimise transformative CE policy agendas and accordingly stimulate and co-shape innovation systems that take circular principles into consideration. Business collaborators can create competitive advantage when adapting to the forms of collaboration that are demonstrated by CSUs and thereby creating societal or systemic value based on circular innovation. This could mean to develop the technical and

contractual infrastructure that allows joint value creation and fair value allocation or build on CSUs' supply chain mobilisation activities to actively shape future resource flows in alignment with corporate strategies.

A major limitation to this study stems from the novelty of the concept of MIS (in the context of CE) and the limited empirical and analytical work that has been conducted to study MISs. The research approach, interpretation of results and conceptual findings are therefore susceptible to changes – particularly as the concept of MIS develops and matures over time. Still, it was laid out in this work why this phenomenon deserves further scholarly attention - particularly in the context of CE. Furthermore, the study took a rather generic approach in terms of mission formulation which may overlook some of the intricacies around systems building that occur in specific clusters of solutions or regions. Literature on mission-oriented innovation includes the aspect of phase-out or ex-novation as a critical element of a transformational process. However, it is barely scrutinised in this study because CSUs – even though proponents of transformative systems change - provided little targeted insight into the means by which technology phase-outs could be triggered and organised (which is probably due to their relatively low scale and collaborative/complementary organisational mindset).

Future research on this topic could focus on the identification of gaps between various actors' framing of CE mission's problems and solutions to allow for necessary translation and alignment between actors. Additionally, the development of problems and solutions in relation to each other could be scrutinised with longitudinal studies. This would allow for a better understanding of the temporality of CE missions and can serve as input into reflexive governance processes in MISs. As indicated in the limitations above, future studies could take contextual factors more into consideration (e.g., analyse/compare regional/sectoral specificities). Last, we propose to combine the increasing insight and data from (sectoral) material flow analyses and large-scale CO2 tracking with the findings from this study. Such analyses can serve as a base for dedicated governance interventions, prioritisation of sectors and definition of cross-sector responsibilities.

5

The Battle of the Buzzwords: A Comparative Review of the Circular Economy and the Sharing Economy Concepts[19]

[19] This chapter was published in the journal Environmental Innovation and Societal Transitions as *Henry, M., Schraven, D., Bocken, N., Frenken, K., Hekkert, M., Kirchherr, J. (2021). The battle of the buzzwords: A comparative review of the circular economy and the sharing economy concepts, Vol. 38, pp. 1-21. https://doi.org/10.1016/j.eist.2020.10.008.*

5.1. Introduction

The discourse around the concepts of circular economy (CE) and sharing economy (SE) has grown significantly among businesses and policy makers (Geissdoerfer et al., 2017; Mont et al., 2020; Morozov, 2018; Rushe, 2019).[20] However, concepts in rapidly growing fields tend to diffuse in their meaning: a process that both CE and SE have undergone (Belk, 2014a; de Vries and Petersen, 2009; Kirchherr et al., 2017). This diffusion can be problematic because SE and CE are expected to play significant roles in future sustainability paradigms. In principle, both are linked to the concept of 'strong sustainability' (Peace, Turner, 1989) because CE and SE preserve natural resources for humanity's and the planet's sakes, rather than substitute resources through human capital (Ayres et al., 1998; Blomsma, Tennant, 2020). However, both concepts have been criticised for deviating from the idea of sustainability due to exaggerated neoclassical and neoliberal interpretations (Martin, 2016; Martins, 2016; Murillo et al., 2017).

Despite their similarities, CE and SE have rarely been examined jointly in scholarly discourse.[21] Schwanholz and Leipold (2020) recently found that digital SE platforms relate to CE, but that SE platforms do not reflect this relation in their objectives or business models. In addition, Jabbour et al. (2020) presented the first peer-reviewed article that "unexpected[ly] unveil[ed]" (p. 10) a potentially synergetic relationship between SE and CE. Thus, these concepts seem to slowly converge over time, but there is a lack of systematic reviews and structured analyses of potential connections between SE and CE.

The changing definitions of both concepts may also impede their usage. For instance, CE conceptualisations range from a focus on end-of-life practices such as

[20] During the total of 2012 to 2016, 281 articles containing the term "sharing economy" in their title, abstract or keywords could be found in Scopus. This number was surpassed on a respective annual basis in the years 2017 and 2018, where 377 and 525 articles could be found. Regarding CE, even higher growth numbers can be observed. The Scopus search – synonymously conducted for CE – lead to the following results: 829 articles in 2012-2016, 713 in 2017 and 1,181 in 2018.

[21] Peer-reviewed CE review articles such as Geisendorf and Pietrulla (2018) or Lahti et al. (2018) incidentally conceptualise sharing as a type of CE practice but do not mention the term "sharing economy". Similarly, peer-reviewed SE review articles such as Katrini (2018), Mont (2020) and Netter et al. (2019) do not mention the term 'circular economy' or discuss circular concepts. Homrich et al. (2018) state SE can help companies to move towards CE without outlining concrete propositions or examples.

recycling (Allwood, 2014) to a focus on reuse and preventive measures such as reduction of resource inputs (Reike et al., 2018). Furthermore, CE is regularly affiliated with various other terms such as *performance economy* and *cradle-to-cradle* (Braungart et al., 2007; Merli et al., 2018; Stahel, 2008). Meanwhile, definitions of SE include Belk's (2014b) restrictive definition which specifies that SE entails temporary access to under-utilised (*idle*) goods[22] for no fees or compensation, and Plewnia and Guenther's (2018) broad definition, which postulates that SE involves the activities or platforms that facilitate sharing among at least two market players.

CE is often criticised for lacking a social perspective, and scientific work that addresses consumption in the context of CE is scarce (Ferrasso et al., 2020; Schröder et al., 2020). In turn, SE has a strong consumer perspective, and SE's social impact has become increasingly discussed in scholarly work (Mont et al., 2020). However, business models and their interactions with socio-technical and organisational systems are barely scrutinised in SE literature (Andreassen et al., 2018; Grinevich, Huber, 2015). This thematic gap can be potentially compensated by building on CE literature's strong business model focus and systemic perspective when the relation between SE and CE is analysed more structurally (Camacho-Otero, 2018; Konietzko et al., 2020). So, a comparative study helps to advance the respective concepts' knowledge base and holds the potential for fruitful dialogues between CE and SE scholars to improve future policies and business actions.

The aim of this chapter is to comprehensively explore such conceptual links. Accordingly, the research questions addressed in this paper are as follows:

- What are the links between the concepts of CE and SE in scholarly literature?
- How can the literary fields of CE and SE enrich each other?

[22] The temporary lending of human capital (i.e. services such as transport or cooking) does not fall under sharing economy and is instead referred to as the 'gig economy' (Frenken and Schor, 2017)

This study is to be understood as a conceptual contribution to the bodies of CE/SE literature. A comparative bibliometric analysis was carried out and complemented by a qualitative analysis of conceptual links.

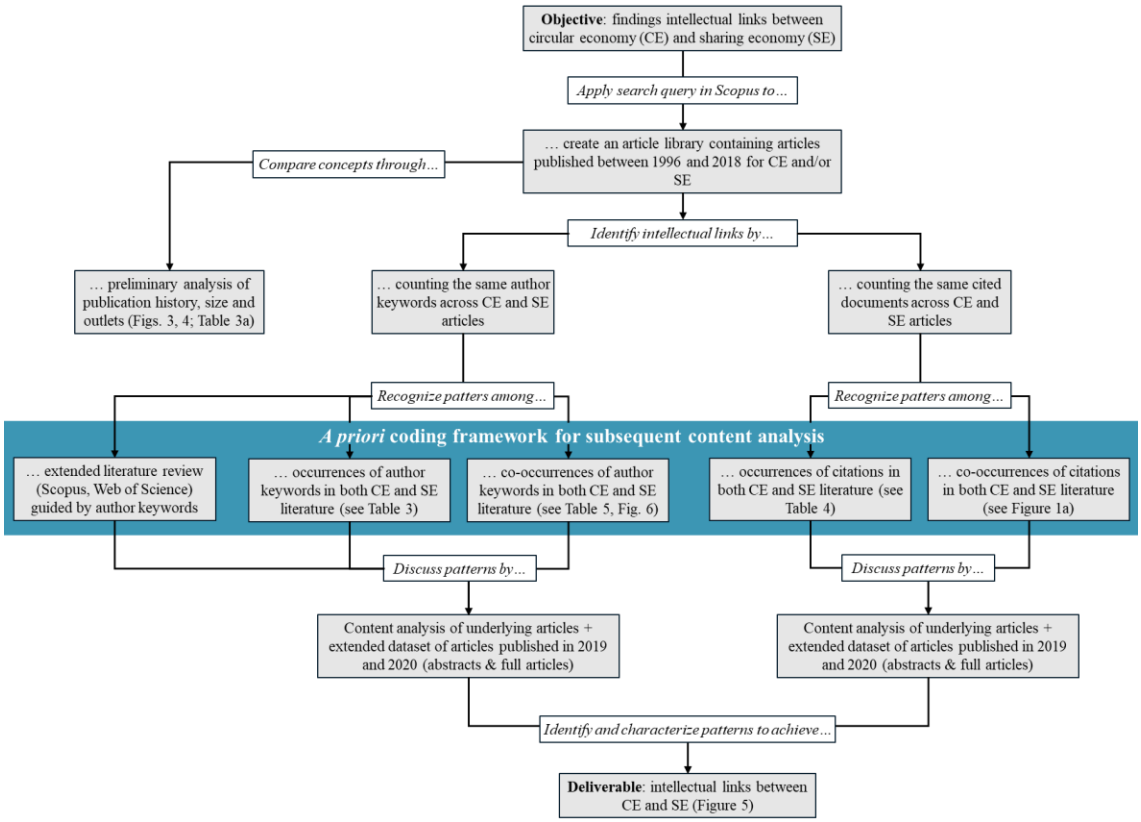
Overall, it was found that the CE and SE have been largely isolated from each other. However, this study's analysis reveals that CE and SE scholars can benefit from learning about each concept's disciplinary origins and recent development, and from the concepts' common links to sustainability, business models, sustainable consumption and governance literature.

The remainder of this chapter is organised as follows. Section 5.2 outlines the methodological approach of the bibliometric and content analyses. The disciplinary foundations of SE and CE are outlined in Section 5.3. Section 5.4 presents the concepts' characteristics through a preliminary analysis of the bibliometric results. Section 5.5 presents SE's and CE's joint growth over time and recent approximations of the concepts. Section 5.6 discusses the identified literary overlaps of the two fields in the form of an extended literature review based on the bibliometric analysis, and a qualitative comparison. Finally, the study's findings are concluded and synthesised in Section 5.7.

5.2. Methods

Scholars have argued that quantitative and qualitative methods produce particularly rigorous and insightful reviews (Brewerton and Millward, 2001; Seuring et al., 2005). Therefore, a bibliometric analysis and a content analysis were combined for this work. An *a priori* coding framework was derived from the bibliometrics to inform and guide the content analysis. Titles, keywords, abstracts and the content of identified scholarly writings were scrutinised. This study's research approach is summarised in Figure 10 and explained in this section.

Figure 10. Research approach in Chapter 5



Number of articles per stage (i.e., count of articles considered in analyses) in Figure 15; partly, also article abstracts where searched because 763 articles in the article library did not include author keywords; the extended dataset for content analysis included articles published before September 2020; Source: Constructed by authors.

Bibliometrics is a powerful tool when analysing data that have been demarcated by ill-defined concepts, such as CE and SE. Bibliometric analysis also allows for an objective (quantitative) perspective on a subject matter (Albort-Morant, Ribeiro-Soriano, 2016) based on an empirical and systematic examination of the full body of relevant scholarly writing. This approach has been successfully employed in a variety of fields, ranging from computer-aided diagnostics (Takahashi, Kajikawa, 2017) to social entrepreneurship (Rey-Martí et al., 2016) and sustainable development (Hassan et al., 2014).

The strength of an analysis depends on the comprehensiveness of the underlying database. Of the two large academic databases – Web of Science and Scopus – Scopus was selected for this study given its larger coverage.[23] Every article that contains the phrase

[23] Scopus includes a stable publication record of journals since 1996, and – in contrast to Web of Science – in Scopus publications are not lost if the outlet misses an ISI indexation for a year (Schraven et al., 2015).

'circular economy' OR 'sharing economy', OR both, in its title, abstract or keywords[24] was considered for the bibliometric analysis. A total of 4,422 writings published between 1996 and 2018 were retrieved from Scopus via the OR-operator. The bibliometric information was downloaded, placed in an academic library and cleaned for analysis and coding. This exercise was conducted by two of this paper's authors independently, and compiled results were cross-checked to ensure objectivity.

One of this study's approaches was to measure keywords' (co-) occurrences to determine indications of intellectual links between CE and SE. This approach is generally deemed to be useful because keywords concisely express the conceptual frame that authors draw for their work (de Jong et al., 2015). By counting the number of CE articles and SE articles, conclusions can be drawn about the degree of association per author keyword.[25] Given the scarcity of joint CE-SE analyses, occurrences of keywords in articles that contained both terms (direct links; column CE ∩ SE in Table 13) as well as keywords which frequently occurred in the separate literature bodies are taken into consideration (indirect links/co-occurrences; see Figure 16). Co-occurring keywords indicate themes that are relevant in both fields. To ensure their significance, co-occurring keywords were only taken into consideration if they appeared in at least 15% of the compiled writings per field (see Table 13).

Additionally, Scopus is particularly exhaustive regarding conference proceedings (Strotmann and Zhao, 2010; Tetè et al., 2014), which is relevant for fast-moving fields like CE and SE, as conference proceedings have shorter timespans from submission to publication than other outlets. Therefore, journal articles are not the one type of dominant outlet for relevant scientific knowledge (Lisée et al., 2008; Powell, 2016; Raan et al., 2007). Additionally, it can be noted that Scopus also includes some non-scholarly literature, e. g. The Economist. It is of relevance to include non-scholarly literature in this comparative review since this literature is said to significantly shape both the scholarly CE and SE discourse (Ghisellini et al., 2016; Kirchherr et al., 2017; Oh and Moon, 2016).

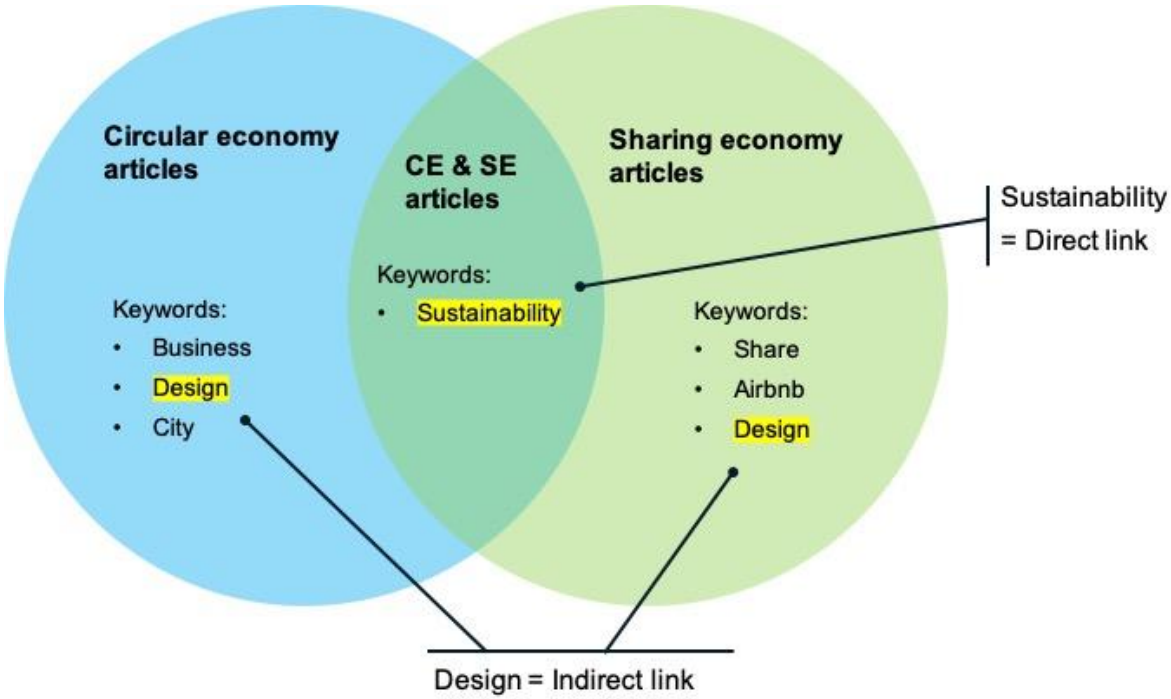
[24] Search queries with different operators executed in online database Scopus:

- (TITLE-ABS-KEY ("circular economy") AND TITLE-ABS-KEY ("sharing economy")) AND PUBYEAR > 1995 AND PUBYEAR < 2019
- (TITLE-ABS-KEY ("circular economy") OR TITLE-ABS-KEY ("sharing economy")) AND PUBYEAR > 1995 AND PUBYEAR < 2019

[25] *Keywords plus* or *Index keywords* – search filters automated by scientific databases based on algorithms scanning e.g., an article's references' titles (Garfield, 1990; Gil-Leiva et al., 2007; Turney, 2000) – were not included in the research. They do not necessarily represent how authors intentionally relate their study conceptually but are rather a latent/unobserved ('algorithm-guided') variable in this context. An unrestricted inclusion bears the risk of overstating existing links between the agendas of SE and CE research since un-/conscious links cannot be differentiated. The neglection of I*ndex keywords* and *Keywords plus* was remedied by the analysis of the most (cross-) cited articles of SE and CE papers (see Appendix 6 and Appendix 9).

This study also measures scientific and non-scientific citations' (co-) occurrences. The citations that appeared most frequently within the retrieved articles were counted to determine the direct links between influential publications and CE and SE literature (see Table 14). Like the keyword analysis, citations that co-occur in articles which solely discuss CE or SE are studied to guide the coding process and content analysis.

Figure 11. Direct and indirect keyword links (schematic diagram; exemplary keywords)



Source: Constructed by authors

The counting of keywords and citations has been deemed to be a superficial method of analysis (Melkers, 2013; Russell, Rousseau, 2016). Qualitative analysis can remedy this notion (Wallin, 2005); therefore, a content analysis was conducted for this study. A qualitative content analysis can identify thematic patterns within texts and allows for a more subjective interpretation than quantitative bibliometrics do. The thematic patterns presented in Section 5.6 emerged from the keywords and corresponding articles that this study examined (Hsieh, Shannon, 2005; Seuring et al., 2005). The coding framework (see Figure 15) was guided by the salient terms from the initial keyword and citation analyses. This type of analysis can be referred to as *a priori* coding (Haney, 1998; Saldana, 2009; Stuckey, 2015) because the set of codes was not drawn from a text or transcript (emergent coding) but was created through a bibliometric analysis.

The compiled article library allowed for filtering and keyword searches within titles, abstracts and two article keyword fields as well as searches within any combination of those four parameters (see Table 12). For instance, a thematic cluster around SE and CE business models could be established through the identified keywords ‘business model(s)’, ‘design’, ‘innovation’ and ‘product-service systems’, which were all present in both literature bodies and were used by authors in connotation with business models (see Section 5.6.2).

Table 12. Exemplary filter results in SE/CE library of 4,422 scientific articles

Title	Abstract	Author key-words	Author key-words	Article count	#SE articles	#CE articles
-	‘platform’	‘Airbnb’	-	58	58	0
-	‘business model-’	‘design’	-	28	10	18
‘empiric-’				49	23	26
		‘sustain ab-‘	‘soci-‘	32	10	21
‘china’ or ‘chinese’				290	18	272

Note: analysed time period 1996-2018

To further the content analysis, full articles were reviewed to identify if they could serve as evidence for underlying notable bibliometric patterns. These patterns were then qualitatively assessed to determine whether they were caused by shared conceptual foundations. The articles were identified by filtering the article library for relevant terms that built direct and indirect links (see Section 5.4 and 5.5 for links; see Figure 15 for thematic grouping). The resulting set of 1,191 articles was truncated further based on the authors’ qualitative assessments and objective prioritisation criteria.

The first criterion was articles’ currency to ensure that recent growth and potential approximation of CE and SE literature were not overlooked (articles published after 2015 were preferred). The number of citations of an article served as the second selection criterion so that the analysis represented dominant lines of thinking in both fields (articles

with more than 20 citations were preferred). Article type was the third criterion; specifically, peer-reviewed articles were prioritised over conference proceedings.

Following the criteria's application, a subset of 134 articles was created that built the foundation for the content analysis. Another 48 articles were added, which were published between January 2019 and September 2020 and were identified through a manual literature review by applying the same *a priori* coding scheme (see Figure 15 for a detailed article count and full coding scheme). In addition, the most relevant references from the citation analysis were examined for their relation to the identified literary themes and were included in the analysis where applicable.

5.3. Disciplinary foundations

The concept of CE has been popularised by organisations, such as the Ellen MacArthur Foundation, but the term's origins lie deeper in recent history (Blomsma, Brennan, 2017; Bocken et al., 2017a). The creation of CE is attributed to Boulding and his flagship publication *Spaceship Earth* (1966; Persson, 2015), which also spawned ecological economics and industrial ecology. Industrial ecology was the first scholarly field to examine the possible circulation of resources with the aim of increasing efficiency (Blomsma, Brennan, 2017; Lifset, 1997; Lifset, Graedel, 2002). Ayres' (1994), Frosch and Gallopolous's (1989), and Pearce and Turner's (1989) work initiated the *development period* of CE that led to the widespread use of the term (Bocken et al., 2017a; Martins, 2016). The CE model has been proposed to foster sustainability through alternative engineering solutions for products, services, business models and socio-economic systems (Konietzko, 2020; Molina-Moreno et al. 2017). However, the social and environmental benefits, definitional consensus, operationalizability and measurability of a CE are still challenged (Perella, 2014a; Geissdoerfer et al, 2017).

Recently, scholars have wished for today's neoclassical, linear interpretations of ecological economics and industrial ecology to return to their more classical circular origins (e.g., Commoner, 1971). This means that capital aggregation should not be valued

irrespectively of its source, and economic value should not be determined based on consumer preferences alone. Scholars and practitioners in ecological economics and industrial ecology should aim to better understand and value the natural roots of economic activity because only then ecological capital can be sustainably maintained for future generations (Liu, 2012; Martins, 2016; Melgar-Melgar, Hall, 2020).

To understand the roots of economic and societal activity, techniques such as life-cycle assessment (LCA) and material flow analysis (MFA) come to the fore. Both methods of analysis assess the environmental impacts of each stage of a product, process or service (LCA) or the biophysical processes in a system (MFA; Birat, 2015; Brunner, Rechberger, 2003; Pincetl, 2012; Zhang et al., 2013). The article library contains 188 articles that include the terms ‘LCA’ or ‘life-cycle-assessment’ (113 results) and ‘MFA’ or ‘material flow analysis’ (75 results) in their abstracts; these articles are all affiliated with CE. Accordingly, the working definition of CE that this study used is as follows: the creation of resource loops in a defined (economic) system according to the system’s underlying biophysical roots to minimise waste and pollution or maximise resource utilisation.

SE was coined as a concept recently and popularised through publications by Botsman and Rogers (2010) and Belk (2014). The disciplinary roots of SE, however, lie in anthropology and sociology (Polanyi, 1957), as well as in the economic theory of two-sided platforms and network externalities (McGee, Sammut-Bonnici, 2015; Rochet, Tirole, 2003). Early writings of human sharing concluded that sharing is related to a basic principle in various research disciplines such as anthropology or behavioural economics: reciprocity (Shaheen et al., 1999; Stack, 1974). Reciprocity can be understood as the calculated non-market exchange of goods or services (‘give and take’) between humans in which one’s prestation creates an obligation for the other based on trust (Hann, 2006; Parry, 1986). This fundamental theory was shaped and projected into modern society by Mauss (1954) and Malinowski (1922).

Building on this theory, Polanyi (1957) determined four modes of allocation: household, reciprocity, redistribution and market exchange. Household members often co-own goods; reciprocity takes place in personal networks (e.g., friends); redistributive schemes involve a centralised body (e.g., a municipality) that manages an asset and governs the asset's use; and market exchange concerns market participants who rent out their underutilised goods, or parts of their goods, to strangers.

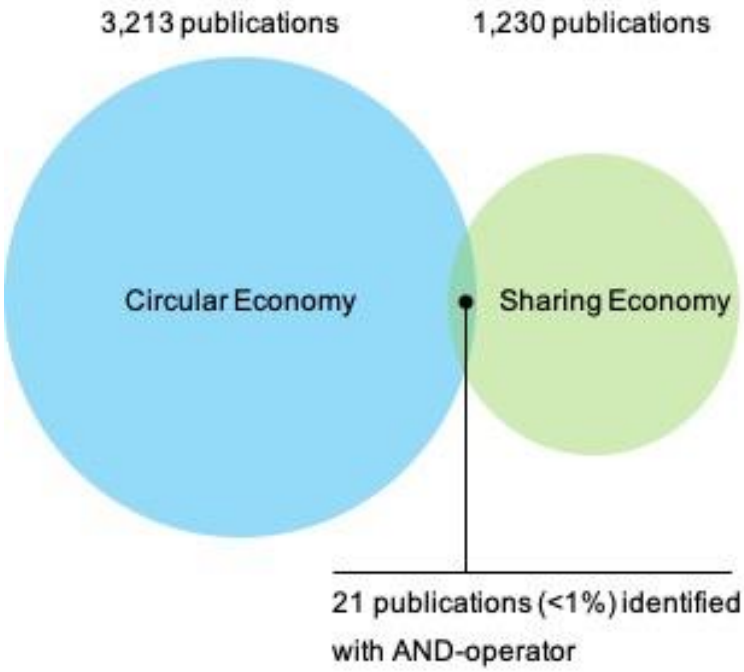
Market exchange has become an exemplar of SE in recent years through the advent of online marketplaces and platforms, as well as the increasing positive network externalities social actors could harness (Iasevoli et al., 2018). Large-scale peer-to-peer sharing activities' high transaction costs and levels of uncertainty can now be mitigated through digital and information technologies, such as rating systems and real-time data exchange (Codagnone, Martens, 2016; Lit et al., 2018). This indicates a tendency for SE conceptualisations to focus on the consumer-side of the value chain (cf. Acquier et al., 2017; Netter et al., 2019). The concept of a SE is used in various research domains in the context of platform transactions such as trust, regulation, computer science, blockchain and reputation systems (e.g., Avital et al., 2014; Ert et al., 2016; Schor, Fitzmaurice, 2014). SE appears in connotation or is used interchangeably with terms such as collaborative consumption and peer economy (Camacho-Otero et al., 2018; Mont et al., 2020; Pazaitis et al., 2017). Yet, some scholarly voices (e.g., Belk, 2014a) emphasise the distinction between collaborative consumption and sharing because sharing does not necessarily involve fees or other compensation. For the purpose of this research, SE is understood as a redistribution scheme and, primarily, a market exchange mediated by (digital) platforms to enable temporary access to under-utilised (*idle*) resources (see Curtis, Mont, 2020; Frenken and Schor, 2017; acc. to Polanyi, 1957).

5.4. Bibliometric results

The retrieved set of 4,422 articles were broken down into individual bodies of knowledge concerning CE, SE, and their overlap. The Venn diagram in Figure 12 shows that

the body of CE literature is almost three times the size of SE literature. This is probably because the term CE was coined 20 years before that of SE. As already outlined, the direct scientific overlap (AND-operator in Scopus search query) accounted for less than 1% of the dataset.

Figure 12. Literature bodies of CE and SE concepts 1996-2018



Including data from 2019 results in the same relative spread (5215 for CE, 1949 for SE, 23 overlap articles); Source: Constructed by authors

The 21 identified papers that mentioned both SE and CE (see Appendix 9) were all published after 2014. Because SE was established in recent years (Arcidiacono, Pais, 2018) the convergence of the two fields could only be expected to occur thereafter. Furthermore, Blomsma and Brennan (2017) argue that, after 2013, CE scholars began to increasingly relate CE to other concepts. Only one of the 21 overlap articles contained substantive links between CE and SE.[26] Therefore, the bibliometric analysis evinces the lack of dedicated systematic research on the links and relationship between SE and CE.

[26] Sposato et al. (2017) scrutinised how sharing business models can contribute to the circularity of product-service life cycles, and they suggested that a hierarchy exists between the two concepts. However, this study is a singular piece of evidence in which the authors took a relatively unstructured approach to illuminate the SE/CE relationship (<100-word description of methodological approach, <10 scientific references)

The notion that SE and CE literature rarely directly overlap solidifies when examining dominant keywords (see Table 13) and citations (see Table 14). 16 out of the 20 most common keywords in the article library show a clear association with one of the two concepts. ‘Collaborative consumption’ is the only keyword that shows a noteworthy direct link between SE and CE literature (>5%). Terms that show more balanced applications in the respective literature bodies were ‘sustainability’, ’business model(s)’ and ’innovation’. This chapter elaborates on these keywords in Section 6. ‘Innovation’ is no separately scrutinised but considered a transversal term given its inconsistent occurrences. The term is thematised around sustainability (e.g., social innovation) and business models (e.g., business model innovation) in the discourse of this chapter.[27]

Table 13. Most common keywords in both CE and SE literature

Rank	Author keyword	Keyword count in articles of the domain:			
		CE ∪ SE	CE	SE	CE ∩ SE
1	Circular economy	1580	1563 (99%)	0 (0%)	17 (1%)

[27] Both terms ‘business model innovation’ and ‘social innovation’ are the 2nd and 3rd most appearing author keywords containing the term ‘innovation’ with 15 and 19 appearances accordingly

2	Sharing economy	644	0 (0%)	629 (98%)	15 (2%)
3	Sustainability	268	227 (85%)	40 (15%)	1 (1%)
4	Recycling	179	178 (99%)	1 (1%)	0 (0%)
5	Sustainable development	136	129 (95%)	6 (4%)	1 (1%)
6	Airbnb	126	0 (0%)	126 (100%)	0 (0%)
7	Collaborative consumption (CC)	102	3 (3%)	94 (92%)	5 (5%)
8	Industrial ecology	93	91 (98%)	1 (1%)	1 (1%)
9	Waste management	81	81 (100%)	0 (0%)	0 (0%)
10	Industrial symbiosis	78	78 (100%)	0 (0%)	0 (0%)
11	Life cycle assessment	74	72 (97%)	2 (3%)	0 (0%)
12	Resource efficiency	68	67 (99%)	0 (0%)	1 (1%)
	Business model(s)	68	45 (66%)	23 (34%)	0 (0%)
13	China	66	66 (100%)	0 (0%)	0 (0%)
14	Remanufacturing	55	54 (98%)	0 (0%)	1 (2%)
15	Waste	49	49 (100%)	0 (0%)	0 (0%)
16	Reuse	47	47 (100%)	0 (0%)	0 (0%)
17	Innovation	40	23 (58%)	17 (42%)	0 (0%)
18	Reverse logistics	39	39 (100%)	0 (0%)	0 (0%)
19	Biogas (production)	39	36 (100%)	0 (0%)	0 (0%)
20	Sharing	37	0 (0%)	37 (100%)	0 (0%)

Note: ∪ = or, ∩ = and

None of the top 10 cited publications seems to be equally relevant for both the SE and CE fields. More than 90% of the citations are made by articles from either SE or CE literature (see Table 14). Only one paper out of the top 50 cited publications (see Appendix 6 for full list) showed a noteworthy deviation from this trend: Tukker's (2004) analysis of product-service-systems. The articles that most frequently and equally cross-cite the top 50

cited references also belong to the group of 21 articles that include both terms SE and CE (AND-operator) – examples are Barbu et al. (2018) and Camacho-Otero et al. (2018).

Table 14. Most common citations in SE/CE article library (based on OR-operator in Scopus search query, see appendix for full overview)

Rank	Reference	Reference Count			
		CE ∪ SE	CE	SE	CE ∩ SE
1	Ellen MacArthur Foundation, 2015a. Towards A Circular Economy: Business Rationale For An Accelerated Transition	366	354 (97%)	4 (1%)	8
2	European Commission, 2015. Closing the Loop. An EU Action Plan for the Circular Economy	299	296 (99%)	0 (0%)	3
3	Belk, R., 2014. You are what you can access sharing and collaborative consumption. Journal of Business Research, Vol. 67, Issue 8, pp. 1595-1600	261	9 (3%)	249 (95%)	3
4	Botsman, R., Rogers, R, 2010. What's Mine Is Yours: The Rise of Collaborative Consumption. HarperCollins, New York, United States	249	13 (5%)	230 (92%)	6
5	Ghisellini, P., Cialani, C., Ulgiati, A., 2016. A review on circular economy – The expected transition to a balanced interplay of environmental and economic systems. Journal of Cleaner Production, Vol. 114, pp. 11-32	241	236 (98%)	0 (0%)	5
6	Hamari, J., Sjöklint, M., Ukkonen, A., 2015. The sharing economy: why people participate in collaborative consumption. Journal of the Association for Information Science and Technology	220	3 (1%)	216 (98%)	1
7	Bardhi, F., Eckhardt, G.M., 2012. Access-based consumption the case of car sharing. Journal of Consumer Research, Vol. 39, Vol. 4, pp. 881-898	197	9 (5%)	187 (95%)	1
8	McDonough, W., Braungart, M., 2002. Cradle to Cradle: Remakig the Way we Make Things	160	155 (97%)	2 (1%)	3
9	Lieder, M., Rashid, A., 2016. Towards a circular economy implementation: A comprehensive review in context of the manufacturing industry. Journal of Cleaner Production, Volume 115, pp. 36-51.	155	153 (99%)	0 (0%)	2
10	EC Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on Waste and Repealing certain directives. Official Journal of European Communities, 312, pp. 3-30	153	153 (100%)	0 (0%)	0

Note: ∪ = or, ∩ = and

5.5. Joint growth and recent approximation

SE and CE are considered ‘new’ types of economies that have the potential to overhaul the dominant mass production systems and business practices with more resource-efficient alternatives (Dos Santos et al., 2017; Easterling, 2018; Todeschini et al., 2017). Thus, CE may eliminate waste from global supply chains without hampering economic growth (see Yap, 2005), while SE can fundamentally reduce the amount of consumer goods in circulation and urban land space required (Frenken, 2017; Lan et al., 2017).

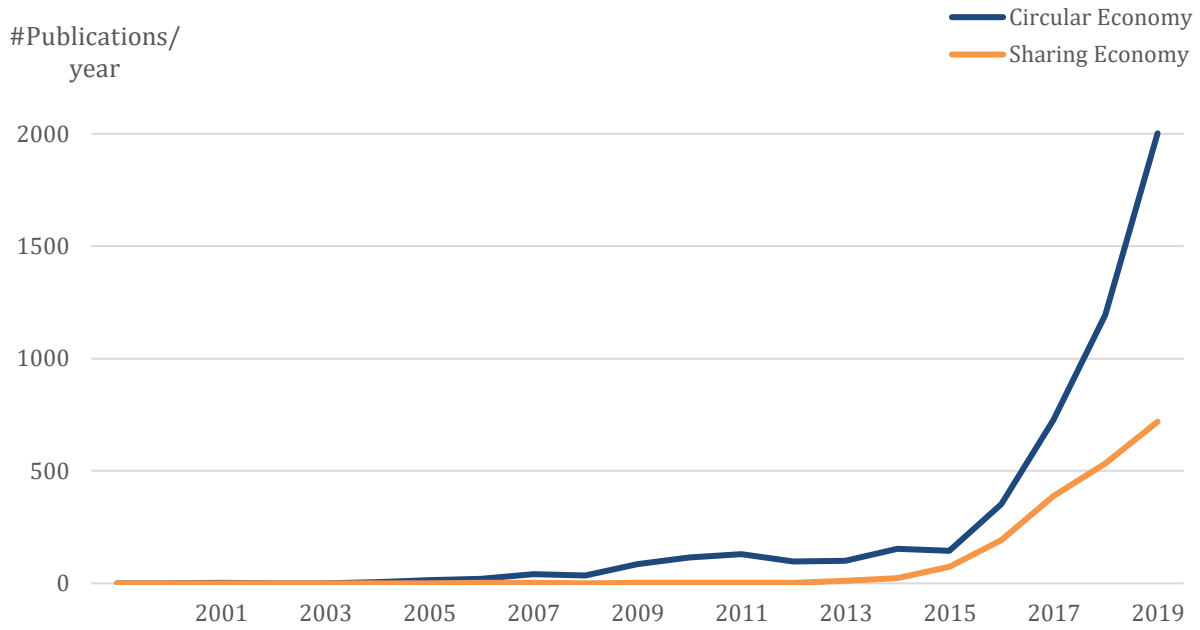
The concepts of CE and SE both received increased attention because of the 2008 financial crisis. After 2008, governments and businesses were searching for models to revive economic growth (Coca-Stefaniak, Carroll, 2015; Habibi et al., 2017). CE emerged as a suitable concept to sustainably transition the capitalist dominated economic model which had caused the crisis (Cave, 2015; Easterling, 2018; Kok et al., 2013; Pratt, 2014; Richardson, 2015). Most recently, CE literature grew significantly due to a publication by the Ellen MacArthur Foundation in 2012 (Lieder, Rashid, 2016; Murray et al., 2017; see Figure 13). SE literature experienced its major growth in publications around 2012 as well, but this growth was driven by collaborative consumption, peer-to-peer platforms, blockchain and online marketplaces (e.g., Andersson et al., 2013; Sarkar et al., 2013).

These historical events indicate a more systematic and scholar-driven perspective for CE in which thought and knowledge are conceptual and emphasised over experience. SE’s growth in scholarly work is instead driven by experience that leads to the creation of knowledge.[28] CE’s more conceptual footprint is substantiated by its related dominant keywords (e.g., ‘industrial ecology’ and ‘industrial symbiosis’) and the visionary and advisory character of its most cited publications (EMF 2013, 2015; EMF, McKinsey & Co., 2014; European Commission (EC), 2008, 2015). These examples may be the reason why CE underwent a mission drift and why the implementation of circular concepts no longer

[28] 309 articles in the dataset contain the terms ‘Uber’ or ‘Airbnb’ in their abstract and ‘Airbnb’ is among the top 10 overall keywords (see Table 13). All three are renowned examples of successful sharing economy ventures.

conforms to CE's theoretical origins. The growing number and scale of empirical cases in SE research – though they lack systemic quality – (Boons, Bocken, 2018) and CE's systemic character indicate that scholars of these two fields may be able to learn from each other.

Figure 13. CE and SE publications per year 2000-2019



Source: Constructed by authors

The beginning of the convergence of CE and SE literature can be observed in the review of identified indirect links and recent scholarly work (Jabbour et al., 2020; Schwanholz, Leipold, 2020). Apart from the terms 'collaborative consumption', 'business model(s)' and 'sustainability', 'governance' was also identified as a relevant indirect thematic pattern. Even though it did not appear in the 20 most common keywords, 'governance' and related terms such as 'regulation' and 'smart city', are noteworthy due to their equal appearances in both SE and CE literature (see Table 15). Furthermore, the emerging themes of 'consumer behavio(u)r' and 'sustainable consumption' were subsumed under 'collaborative consumption' (see Section 5.6.3). Regarding sustainable consumption, this study's analysis applied the definition of collaborative consumption, which includes business-to-business collaboration (i.e., monetising idle capacity of existing assets and residual resources; Botsman, 2013). Therefore, this study discusses industrial symbiosis – though

often considered a production-based approach –in the context of sustainable (industrial) consumption (see Section 5.6.3).

Similar to the theme of 'innovation', concepts such as 'supply chain (management)' and 'design' are considered transversal or sub-themes. Thus, 'design' mostly appears and is discussed as a sub-theme of business models, and 'supply chain (management)' is discussed in the context of disciplinary foundations, business models and sustainable consumption.

Table 15. Indirect links - Top 10 author keywords with balanced (>15%) appearances across CE and SE literature[29]

Rank	Author keyword	Keyword count in CE/SE-related articles				Section
		CE ∪ SE	CE	SE	CE ∩ SE	
1	Sustainability	268	227 (85%)	39 (15%)	2 (1%)	6.1
2	Business model(s)	68	45 (66%)	23 (34%)	0 (0%)	6.2
3	Innovation	40	23 (58%)	17 (43%)	0 (0%)	6.1, 6.2, 6.3
4	Supply chain (management)	35	28 (80%)	7 (20%)	0 (0%)	3., 6.2, 6.3
5	Consumer behavio(u)r	22	14 (64%)	7 (32%)	1 (5%)	6.3
6	Sustainable consumption	19	12 (63%)	5 (26%)	2 (11%)	6.3
	Design	19	11 (58%)	8 (42%)	0 (0%)	6.2
7	Smart city	18	4 (22%)	14 (78%)	0 (0%)	6.4
8	Regulation	17	5 (29%)	12 (71%)	0 (0%)	6.4
9	Case study*	17	12 (71%)	5 (29%)	0 (0%)	-
10	Education*	16	12 (75%)	4 (25%)	0 (0%)	-
	Literature review*	16	10 (63%)	5 (31%)	1 (6%)	-
	Governance	16	7 (44%)	9 (56%)	0 (0%)	6.4

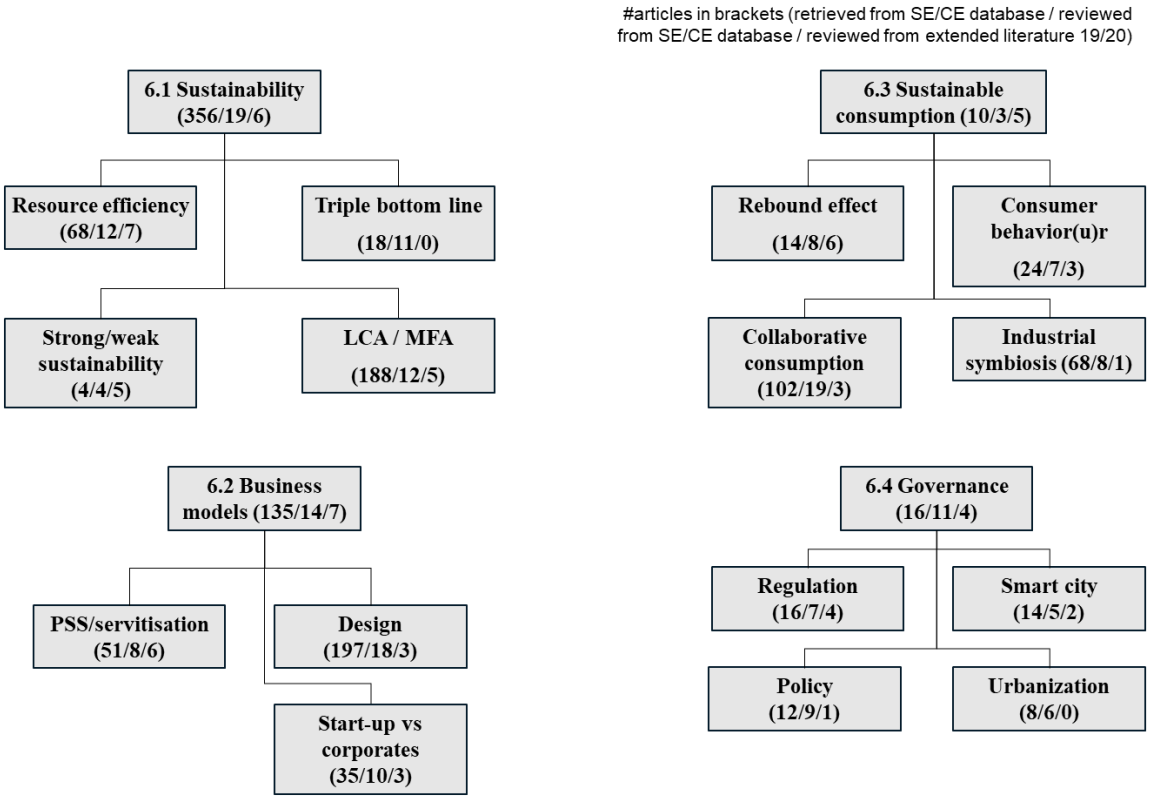
*The content analysis evinced that the author keywords emerged with a balanced appearance in CE and SE literature due to their generic/methodological character. Literature review articles were extensively included in this work to discuss results and findings (e.g., Ferrasso et al., 2020; Ghiselini, 2016; Mont et al., 2020)

[29] Only those author keywords included whose counts are composed of at least 15% from SE- and CE-related articles respectively

5.6. Conceptual links in literature

Based on the insights presented in Tables 13, 14 and 15, the following conceptual links between SE and CE were identified: sustainability, business models, sustainable consumption and governance. These are discussed in light of the dominant (sub-)themes per topic which were directly derived from the bibliometric analysis that dictated the coding framework (Figure 15).

Figure 15. SE/CE coding framework and article count



Note: Including double counts when articles included several of the dominant author keywords in one coding group. Therefore, the number of reviewed articles is not 272 as the numbers in the figure indicate, but 182.

5.6.1. Sustainability

In addition to the thematic pattern that emerged from the keyword analysis, the list of dominant outlets indicated that sustainability is a core theme in SE and CE literature. The largest share of publications (more than 30%) can be found in outlets that distinctly focus on sustainability,[30] such as the *Journal of Cleaner Production, Resources Conservation and*

[30] CE outlets show an additional focus only on engineering and special issues covering a breadth of CE-related topics (Esposito et al., 2018). SE is dealt with in various fields besides sustainable development such as computer science, hospitality management and business literature outlets. It should be noted that the most

Recycling and *Sustainability (Switzerland)* (Multidisciplinary Digital Publishing Institute, 2019; Schober et al, 2018). CE scholars use the term 'sustainability' disproportionally more than SE scholars (see Tables 13 and 16). While some authors believe that SE contributes to sustainable growth (Bonciu and Bâlgăr, 2016), other recent scholarly works contest this theory (Acquier, 2017; Martin, 2016; Schor, 2014, 2017; Yeomans, 2015). Evidence from the bibliometric analysis supports this contention, namely, the imbalance in occurrences of the keyword 'resource efficiency'. Only CE authors in the dataset use 'resource efficiency' (see Table 13) even though democratically organised sharing practices can directly contribute to increased resource efficiency (cf. Guo, 2018b; Martin and Shaheen, 2010). A stronger focus on efficiency gains in SE discourse may help to realise more of the concept's sustainability potential.

Table 16. Focus on triple bottom line dimensions of CE and SE – article abstract analysis

Literature body	'environmental + sustainab-'	'economic + sustainab-'	'social/societal + sustainab-'	Total
SE	20% (38)	42% (76)	38% (73)	**175**
CE	41% (603)	40% (593)	20% (299)	**1474**

Note: Combination of the respective terms 'environmental', 'economic' and 'social/societal' and the prefix 'sustainab-' in article abstracts.

SE literature also deals intensively with social themes (see Table 16; Pouri, Hilti, 2018). This finding indicates that a gap between theory and practice exists in SE literature because SE is criticised for its lack of social perspective in practice. Various scholars have observed factors that possibly reproduce existing social bias and hamper equitable access such as income, education, age, digital affection and race (Cheng, Foley, 2018; Cherry, Pidgeon, 2018; Edelman et al., 2017; Hsiao et al., 2018; Li et al., 2018; Schor, 2014). Furthermore, scale economies and network externalities, combined with the high costs of switching, can lead to platform provider monopolies as well as information and power imbalances (Calor, Rosenblat, 2017; Ritter, Schanz, 2019, Theurl et al., 2015). CE research

chosen outlets can only provide a preliminary indication on the thematic orientation of the concepts, especially since the article library also contains conference proceedings (Meho, 2019). See Appendix 8 for full list of top outlets per field

deals more intensively with economic and environmental topics than societal ones (Cazzaniga, Detomati, 2017; Merli et al., 2018). Various authors have claimed that CE neglects the social dimension (Moreau et al., 2017; Schulz et al., 2019). CE's blind spot for the social dimension can potentially be addressed through leveraging the existing research on SE's societal implications and the hierarchy between CE and SE.

From an institutionalist point of view, one can argue that the exact economic, social and environmental impacts of SE are contingent on accompanying regulatory and ownership structures that are operationalised in a political-economic model (Curtis, Mont, 2020; Frenken, 2017). If, for instance, most SE platforms use market logic, sharing may increase overall rents through economic utilisation models for owners of scarce goods and (unregulated) expansion of commercial platforms. However, it would contribute little to social cohesion or environmental conservation as transactions would increasingly become impersonal and economic surplus would not necessarily be invested in more eco-friendly alternatives (Ottelin et al., 2017). However, economic outcomes could be more equal if platforms earnings become subject to progressive taxation by governments (redistribution logic) or become owned by their users in a democratic, cooperative form (also see Gorenflo, 2015; Theurl et al., 2015). Benefits from social cohesion and efficient resource use could be substantial (Frenken, 2017; cf. Frenken et al., 2020).

Both the CE and SE models risk not exploiting their full sustainable potential by abandoning the disciplinary origins and strong sustainability paradigms they were originally reputed for. Contemporary CE practices have been criticised for commoditising nature, neglecting environmental ethics and favoring an application of weak sustainability (Turner, 1993; Washington, Maloney, 2020). Institutionalised sharing practices have been criticised for dissociating from their roots in reciprocity and adopting a strongly market-oriented character during the late 20th century (Light et al., 2015; Martin et al., 2015; Pais et al., 2015; Washington, 2017). However, these shifts could be remedied by leveraging a stronger intellectual exchange between the disciplines. By building on SE's knowledge base in

economic anthropology and value creation in two-sided markets, nature's interests could hypothetically be safeguarded by creating stronger human obligations when exploiting nature (e.g., carbon offsetting, carbon insetting, i.e., offsetting & reducing direct supply chain emissions). A common ground for SE and CE to further converge could be Polanyi's (1944) substantive interpretation of economy, in which humans interact with natural resources rather than 'economise' them. Thus, utility maximisation is a potential, but not an imperative outcome. Substantivism combined with 'biospheric reciprocity' requires a better understanding of the biophysical roots of economic and social activity as well as reflexive capacities of the socio-economic system.

For instance, envisaged changes in downstream activities (e.g., logistics, consumption) of a sustainable food system must be evaluated also based on their respective effects on the system's underlying natural resources. The allocation of resulting environmental expenses could be applied according to a 'polluter-pay principle' (Ruiz-Rosa et al., 2020) and facilitated through life-cycle assessments (for impact tracking and evaluation) and digital platforms (for data confidentiality, market transparency, and feedback loops). Accordingly, necessary regenerative agricultural measures that address, for instance, soil carbon, water quality and (soil) biodiversity (i.e., nature's interests; Schreefel et al., 2020) could be implemented to strengthen the overall system's resilience while costs and benefits are allocated fairly and transparently across relevant system actors. Similarly, the sharing approaches that the fields of (design) anthropology and social innovation propose[31] could be adjusted based on information gathered in life-cycle assessments and material flow analyses to maximise resource utilisation and minimise leakage (e.g., in rental business models).

Kjaer et al. (2018) evaluated sharing-based business models' environmental performances by performing a life-cycle assessment. Similarly, Amatuni et al. (2020) examined the environmental impacts of car sharing by adopting a life-cycle perspective.

[31] E.g., Pink et al.'s (2020) study on autonomous/shared driving, Pais et al.'s (2015) analysis of economic and social relations in SE or Lan et al.'s (2017) study of consumers' willingness to co-create value through sharing

Thus, the ‘obligations’ that an economic system’s production and material disposal have for nature could be examined, measured and accordingly reflected in certain areas, such as revenue models or pricing. This ethical inclusive and data-driven perspective could enrich both SE and CE practices and could prevent these models continue the neoclassical economic paths they are criticised for. A full overview of potential areas of discussion between CE and SE scholars based on the terms’ disciplinary foundations and conceptual links can be found in Table 17.

5.6.2. Business models

The existing relations between SE and CE in business model literature were established by scientists who consider the private sector to be highly relevant to these economic models and who consider business models to be vehicles that drive SE and CE (Lüdeke-Freund et al., 2018; Lewandowski, 2016; van Renswoude, 2016; Rosa et al., 2019). Circular and sharing business models enable companies to improve the sustainability of their business practices within and beyond organisational boundaries while also creating a competitive advantage (Antikainen et al., 2018; Lieder, Rashid, 2016). However, scholars have also observed that research on SE and CE business models requires structuring and focus (Bocken et al. 2017a; Lobbers et al., 2017). This encumbers CE’s and SE’s practical application and gives the discourse an innovative and explorative character (Bianchini et al., 2018; Cohen, Kietzmann, 2014; Muñoz, Cohen, 2018).

CE scholars tend to consider sharing models to be use-oriented subsets of circular practices (Hobson, Lynch, 2016; Lacy, Rutqvist, 2016; Ranta, Saari, 2020). ‘Product-service system(s)’ and ‘servitis(z)ation’ are prevalent themes in this context (Kopnina, 2019; Mont, 2002; Tukker, 2015). They are considered to be major drivers of the diffusion of CE and SE practices (Lehmacher, 2016; McLaren, Agyeman, 2015). Product-service systems enable access to company-owned assets and facilitate the provision of privately owned assets (Piscicelli et al., 2015). These types of systems primarily refer to the downstream activities of a business model, such as the revenue model, while upstream interventions (e.g., to

increase product maintainability) can be observed in some isolated cases, too (Urbinati et al., 2017). The reason why scholars tend to view sharing models as a subset of circular practices is that CE literature equally addresses downstream activities and upstream interventions (Bocken et al., 2016; Ferrasso et al., 2020). However, literature that acknowledges upstream and business-to-business sharing practices is scarce (Choi et al., 2014; Sterev et al., 2018). Upstream activities in this context tend to be related to more path-breaking innovations that often involve proprietary value creation processes (e.g., product design), while changes in access and revenue models are often easier to implement for established companies (cf. Henry et al., 2020). Consequently, both fields could benefit from systematically implementing sharing practices or servitization in circular business ecosystems (Jabbour et al., 2020; Kanda et al., 2018). The SE literature that was found in this study rarely addressed any relation with CE; therefore, SE scholars have neglected SE's circular and sustainable potential (see Table 17).

Scholars of CE and SE consider design interventions to be necessary to enable business models (Amasawa et al., 2018; Belk, 2017; Daae et al., 2018; Fleischmann, 2018; Moreno et al., 2016).[32] CE literature could benefit from SE's enhanced knowledge of service design and digital architecture, which are both considered key instruments in delivering service-based business models (Bettoni et al., 2018). Hence, optimal engagement, supply-demand matching and use of blockchain technology could be used for intervention (Fischer, 2018; Guo et al., 2018a; Han et al., 2018; Kouhizadeh et al., 2020, 2022; Wu et al., 2018). In turn, SE could benefit from CE scholar's knowledge about upstream design interventions, such as process and product design, eco-design and Design-for-X (DfX, e.g., design for reusability, design for remanufacturing, design for longevity) approaches (Bakker et al., 2014; Sassanelli et al., 2020). For example, Jabbour et al. (2020) provided one of the first pieces of evidence that show how information technologies (e.g., Internet of Things, sensors,

[32] ''Design', 'Eco(-)design' and 'product design' are all among the top 20 author keywords in the co-occurrence analysis (see Figure 15). While 'design' is equally treated in both literature bodies (58% CE, 42% SE), 'product design', 'eco-design' or 'DfX' show a unanimous affiliation with CE and 'service design' is only mentioned in SE articles

big data) can be leveraged in the product design process to unlock the full sharing potential along the value chain (see De Sousa Jabbour et al., 2018). This mutual exchange is a promising path towards systematically integrating product-service systems and sharing and circular business model concepts.

SE literature focuses on the role of newer firms and entrepreneurs (Chasin et al. 2018a, b; Hasan et al., 2016) rather than long standing corporations (Bocken et al., 2017b; Parker et al., 2015). CE research, however, examines both newer companies' and longstanding corporations' activities – with emphasis on the latter (Bocken et al., 2017a; McIntyre, Ortiz, 2015). Yet, only a modest number of studies exist that address small- and medium-sized circular companies and their disruptive potential (Stewart, Niero, 2018; Singh et al., 2018).[33] CE has a longer history than SE, and cases such as Uber and Airbnb might partially explain SE literature's increased attention on start-ups. Nevertheless, SE is generally considered to atomise business transactions and offer chances for emerging businesses that disrupt incumbents (Easterling, 2018; Liang et al., 2018; Sundararajan, 2016). This implies that CE scholars can scrutinise more start-ups and small- and medium-sized enterprises while SE scholars can examine incumbents' and corporations' approaches.

5.6.3. Sustainable consumption

Considerations of potential rebound effects are generally absent from SE discourse, but are more prominent in that of CE.[34] Overall, less than 1% of the articles in the dataset discuss rebound effects; therefore, this study finds that this area is underdeveloped for both concepts. For SE literature, the scientific evaluation of a potential 'sharing economy rebound' seems to be a relevant and valuable addition to the academic discourse especially when considering SE's strong footprint in consumer behaviour research (Cheng, 2016; Roos,

[33] SMEs are examined only in a few small studies (<10 N, regionally limited cases; e.g., Bocken et al., 2018; Fischer, Pascucci, 2017; first large-N study by Henry et al., 2020). Bibliometrically, 14 out of the 16 articles from the SE library that feature the term 'incumbent' in their abstract mention it in the context of new market entrants' disruptive impact on incumbents and industries (e.g., Crittenden et al., 2017; Santoso et al., 2018); while only 4 of the 8 articles out of the CE library containing the term 'start-up' in their abstract even deal with the organisational form (e.g., De Angelis, 2018).

[34] The rebound effect describes a phenomenon where an incidental increase in resource productivity does not lead to a reduced, but rather increased resource usage – and thus extraction and production – in the wider system. It is prominent in the sustainable consumption discourse as an improvement in one area of consumer behaviour might result in direct or indirect negative impacts elsewhere (Junnila et al., 2018; Zink, Geyer, 2017)

Hahn, 2017). Schor (2014, 2017) and Pouri and Hilti (2018) mention potential downsides of sharing platforms related to new economic activities. These downsides include increased travel due to home sharing, decreased use of public transport due to ride sharing and micro mobility, and 'total commercialisation', i.e., the transformation of interpersonal transactions (e.g., neighbours helping one another) into digital markets facilitated by perfect pricing and information mechanisms. These problems exemplify the ethics of SE and the criticism regarding its neoliberal interpretations (Theurl et al., 2015). For example, Warmington-Lundström and Laurenti (2019) were some of the first who empirically scrutinised the sharing rebound effect of peer-to-peer boat sharing and concluded that particularly lessees are affected by rebound effects' negative consequences through increased personal use and increased air travel (also see Briceno et al., 2005).

The scientific community has emphasised the relevance of unintended environmental effects driven by consumer behaviour. The need for preventive policies and lifestyle interventions is increasingly acknowledged (Skjelvik et al., 2017; Zink, Geyer, 2017). CE and SE bodies of literature identify semantics as an aspect that is relevant to this discussion. Only one CE article was found in the library that deals with semantics from a user perspective,[35] while SE seems to have a stronger scholarly footing in this subject (Banning, 2016; Baralla, et al., 2017; von Hoffen et al., 2015; Liao et al., 2017). Given the concepts' historic development, one could argue that CE scholars need to make up leeway because – even though CE has an inspiring character (Perella, 2014b) – SE is arguably the more palpable concept for consumers. It is also noteworthy, that the broad use of the term SE has led to a dilution of its meaning, and has spawned alternate titles, such as 'pseudo-sharing' or 'share-washing' (Belk, 2014b; Curtis, Lehner, 2019; Pink et al., 2020).

Scholars agree that a successful prevention of rebound effects can only be achieved through disruptive, rather than incremental innovations and a coordinated interplay of production and consumption (e.g., Laurenti et al., 2016; Widmer et al., 2018). This holistic

[35] The only study in the library underlying this research is Bovea et al.'s (2018) study on labeling of circular products

perspective is even more important when considering that measures which are taken in carbon-intensive activities tend to result in relatively smaller rebound effects (Chitnis et al., 2013). Therefore, these measures should be identified and prioritised in an economic system, for instance, through life-cycle assessments (Finnveden et al., 2009; Table 17).

The keyword co-occurrence analysis indicated that ‘collaborative consumption’ is a theme that connects CE and SE literature (see Figure 16). ‘Collaborative consumption’ is defined as an approach that is applied at the levels of business-to-consumer, consumer-to-consumer and business-to-business transactions and outperforms traditional services especially when applied in the digital domain (Botsman, 2013; Gutiérrez et al., 2017; Park, Armstrong, 2017). SE scholars tend to employ the term ‘collaborative consumption’ to emphasise that SE enables collaboration among consumers (Barbu et al., 2018; Švecová, Veber, 2017). CE scholars use the term to emphasise that a CE requires increased collaboration in supply chains to organise circular consumption in complementary configurations (Aminoff et al., 2016; Herczeg et al., 2018; Junnila et al., 2018).

In this context, industrial symbiosis is often referenced. This study proposes that scholars re-evaluate the strong link between industrial symbiosis and production-based approaches. Industrial symbiosis entails sustainable business-to-business consumption practices in which infrastructures and residual resources are consumed collaboratively. Therefore, organisational approaches, internal policies and structures that promote industrial symbiosis among employees (e.g., in procurement and operations) could be contrasted with, or even informed by, studies of sharing behaviour and market exchange (Denning, 2015). Both SE and CE studies include collaborative consumption to economically valorise idle resources (or ‘waste’ in CE terms) and thereby increase environmental gains (Belk, 2014; Botsman, 2013). The major obstacles that are preventing a wide assimilation of industrial symbiosis are a lack of (primary-based) information and a lack of independent facilitator support for regulation and governance (Lombardi, 2017). Digital platforms, the dominant vehicle of modern SE, might present a promising solution for increased upstream supply chain collaboration and (information and resource) sharing to drive circular innovation (see

Fraccascia and Yazan, 2018; Li et al., 2019; Kosmo, 2019). Furthermore, SE scholar's knowledge of blockchain technology can be leveraged by CE researchers to bridge information asymmetries and avoid complex regulatory frameworks in circular systems (e.g., Romero's [2019] concept of Green Virtual Enterprises, or when sharing product-specific impact data through global supply chains). SE researchers could also elaborate more on organisational sharing behaviour to achieve more efficient inter-organisational resource usage.

5.6.4. Governance

CE research tends to exhibit a top-down character because it is influenced by governmental and policy interventions. Three of the most common citations in CE literature have a distinct focus on policy. These references, Yuan et al. (2006), European Commission (2008) and European Commission (2015), reinforce the claim that the European Commission and China are aspiring forces behind a CE transformation (also see Nelles et al., 2016; People's Republic of China, 2008). In fact, the initial increase in CE literature before 2012 began in 2005 and was considerably influenced by China's Circular Economy initiative (Lowe, 2005; Yap, 2005). Thus, almost 60% of all CE publications that were published between 2005 and 2011 contain the terms 'China' or 'Chinese' in their title, abstract or keywords.

It is worth noting that neither SE nor CE scholars seem to focus on developing or emerging countries (2 % of the dataset), but they do have a clear tendency to examine developed countries (20% of the dataset; Kirchherr, van Santen, 2019).[36] An increased focus on emerging countries could become particularly promising when the economic scale shifts towards the Global South, where context-specific interventions can foster development and 'leapfrogging' opportunities for sustainability (Geng, Doberstein, 2008; Preston, Lehne, 2017).

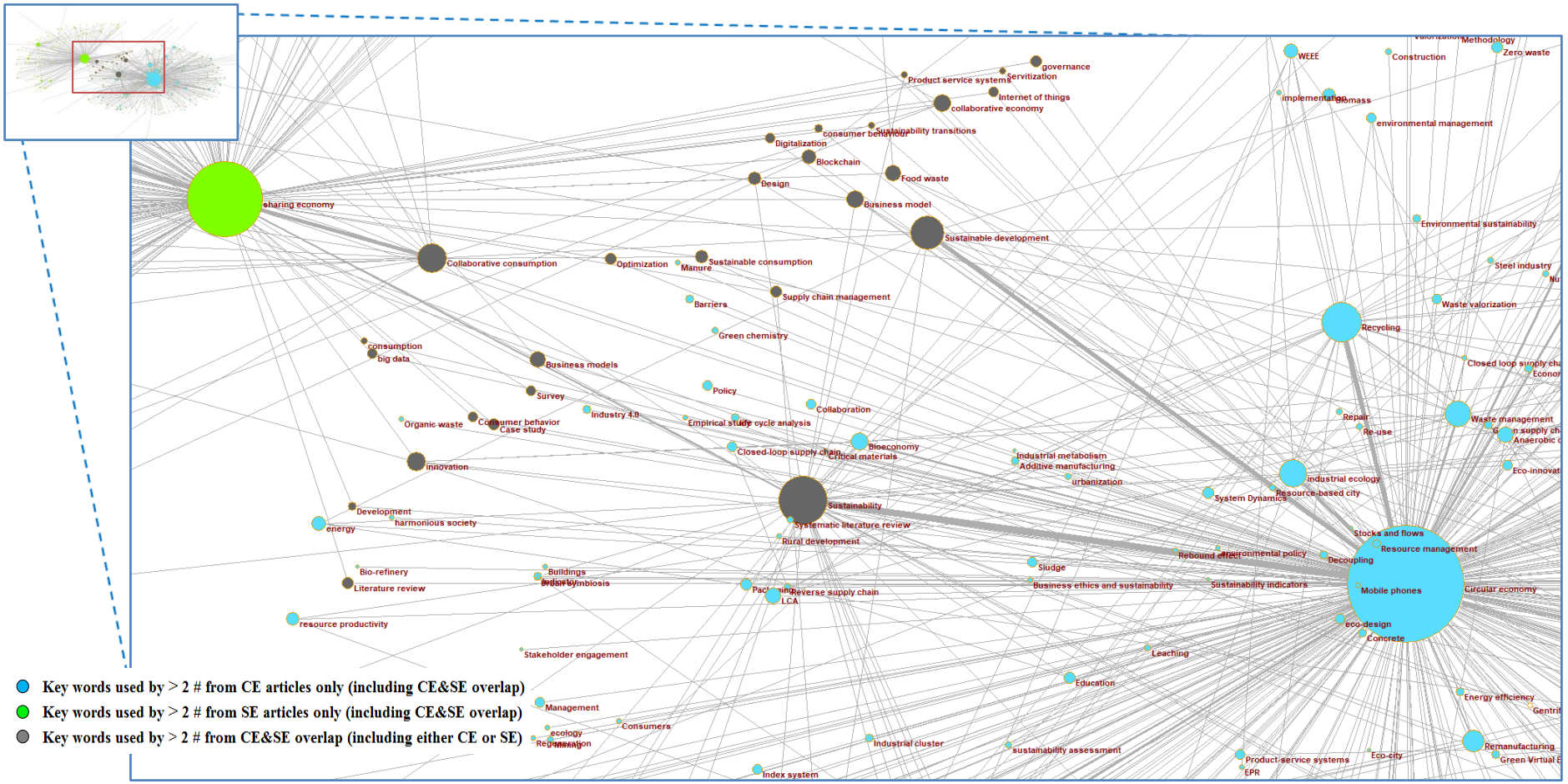
[36] Abstracts of all articles in the dataset were searched for the terms "developing country/-ies" and all 81 country names in the World Bank's low and lower-middle income clusters (World Bank Group, 2020). Abstracts of all articles in the dataset were searched for the following countries' names: China, France, Germany, USA, UK, Italy, Spain (all in World Bank's higher-middle or high income cluster; World Bank Group, 2020)

As mentioned above, SE publications mainly focus on peer-to-peer interactions, which causes SE to be viewed as being bottom-up rather than top-down. Scholars agree that targeted policy interventions are highly relevant for supporting the efficient establishment of SE practices (Følstad et al., 2018; Richards, Hamilton, 2018). However, in contrast to CE, SE has received less direct support from policymakers due to safety or market regulations (Dupuis, 2018; Pfeffer-Gillett, 2016; Prendeville, et al., 2018). Chen et al. (2018) and Crommerlin et al. (2018) argue that short-term rental laws might slow down the development of the peer-to-peer home-sharing market and that city officials have tightened their SE regulations rather than loosened them. This phenomenon can be connected to an atomised view on individual sharing platforms rather than a holistic, systemic perspective on SE (Boons and Bocken, 2018).

Finally, urban environments were identified as a theme that builds common ground between both concepts.[37] Urban areas are considered to be a highly relevant unit of analysis as they are hubs for sharing practices, and circular transitions (Cohen, Muñoz, 2016; Geissinger et al., 2018; Wang et al., 2018). The dominant threads that were identified regarding urban sharing practices show that sharing practices equally relate to themes such as evolving information and communication technology (Dudás et al., 2017), sharing in distinct business sectors (Tedjasaputra, Sari, 2016; Wang, Nicolau, 2017), and smart city development (Gadecki, J., 2018; Pick, 2017). In fact, despite policymakers' partially critical reactions to SE ventures, sharing activities have often been included in the growing number of municipal smart city agendas (Almirall, E., 2016; Capdevilla, Zarlenga, 2015; Hsu, 2018; Zvolska et al., 2018). Similarly, the concept of CE plays a role in scientific work that focuses on smart cities and urban sustainability transitions, in which implementation of circular models is considered to be a defining criterion (Fang et al., 2017; Petit-Boix, 2018; Koop, van Leeuwen, 2017).

[37] 471 articles in the article library contain the words 'urban', 'city' or 'cities' in their abstract (303x CE, 165x SE, 3x BOTH) and more than 100 articles' keywords contain the term 'urban'. In total 113 articles with 'urban' in their keywords were found (71x CE, 40x SE, 2x BOTH).

Figure 16. Co-occurrences of keywords from articles retrieved with the OR-operator in the Scopus search query[38]



[38] The figure is simplified by removing links with only one connection, thus only showing keywords connected by at least two articles.

Table 17. Proposed reciprocal enrichments of SE and CE literature fields

Thematic links	Sharing economy literature	Circular economy
Disciplinary origins	Strengthen SE's conceptual muscle' to develop a systemic vision and aspiration for viable large-scale sharing practices	Balance conceptual CE knowledge with knowledge based on real-life experience to foster a coherent understanding and avoid mission drift
Sustainability	Mutual elevation towards a strong sustainability narrative: build on SE's principles of reciprocity and ICT technology as well as CE's insights from life-cycle assessments and material flow analyses to systematically include and adequately reflect ('polluter-pay principle') a context-specific obligation towards nature in sustainable systems	
	Better embed sharing practices in existing CE discourse on environmental impact (e.g., resource efficiency)	Strengthen research on societal impact of CE benefiting from existing SE knowledge
Business models	Expand research on the circular and sustainable potential of SE business models	Build on SE's platform and service design capabilities to facilitate supply-demand matching in circular systems
	Extend upstream perspective to allow for effective use of sharing practices throughout business ecosystems	Scrutinise small- and medium-sized companies' and start-ups' CE strategies to comprehensively illuminate CE's disruptive potential
	Focus on corporates' inter- and intra-organisational approaches towards SE	
Sustainable consumption	Focus on a potential 'sharing economy rebound' drawing learnings from work on CE rebound	Leverage SE's understanding of platform architecture to facilitate information exchange and governance of industrial symbiosis
	Increase attention to organisational perspectives on shared consumption to increase resource utilisation	Build on the knowledge of semantics of SE to create an incisive and palpable CE narrative
	Achieve more balanced development of sustainable solutions taking rebound effects in production and consumption into consideration	

Table 17. Proposed reciprocal enrichments of SE and CE literature fields (continued)

Thematic links	Sharing economy literature	Circular economy
Governance	Take top-down perspective to enable better informed and more efficient collaboration and sharing practices among incumbent and corporate players	Develop a better understanding of bottom-up diffusion of CE practices and small-scale intervention as driving force behind CE
	Create a more differentiated view of the (partly) complex sharing systems to allow for adequate and informed regulatory intervention	
	Strengthen perspective on the Global South, especially considering a regional growth of the economic scale to create opportunities for 'leapfrogging' towards sustainable development	

5.7. Conclusion

This chapter analyses the literary development and conceptual links between the literature concerning the sharing economy (SE) and circular economy (CE) to contribute to a productive exchange between the scholars of these two fields. Both fields have been presented as normative solutions for sustainable development, but diffused in their meaning due to neoclassical interpretations and a steep growth in (grey) literature. One of this study's major findings is that scientific literature only incidentally places the concepts of SE and CE in direct relation to each other, despite the conceptual links that exist between the two models. Future business and policy decisions will benefit from a better understanding of the relations between these two concepts. Thus, this paper presents the first holistic approach to linking these concepts and provides a structured narrative for them.

Unlike the *Game of Thrones* episode '*Battle of the Bastards'* which inspired the title of this chapter, the 'battle' between SE and CE literature has not resulted in the demise of one of the "parties" involved. In fact, this study's analyses reveal high compatibility and ample room for ideas to meet. Examples for mutual enrichment in this context could be improved regulation and better perspectives on sharing in complex value chains. Furthermore, facilitated information exchange and governance in circular systems could leverage SE scholar's understanding of information and communication technologies and the internet of things.

Both concepts share a history as proposed responses to the 2008 economic crisis. After 2008, literature concerning both SE and CE experienced a boom: the increase in CE literature was driven by the Ellen MacArthur Foundation's flagship publications and developed countries' national policies such as China and the EU. The increase in SE literature was influenced by the rise of digitally-enabled peer-to-peer interaction (in the Western world). This study's bibliometric analysis exposed the most prevalent overlapping themes between CE and SE literature: sustainability, business models, sustainable consumption and governance. However, from a sole literary and bibliometric perspective,

little evidence was found to suggest that these relationships are sought for or have been structurally scrutinised yet.

Another key finding of this study is that most scholars who analyse SE and CE business models conjointly, unanimously consider SE to be a subset of CE. They often portray SE business models as one out of several possible applications of CE. This perspective is shared by scholars who solely examine CE, but it is not found within SE research in which the relation or hierarchy of SE and CE business models is not addressed. This finding indicates that there is space for SE research to explore its circular potential, which may add opportunities for the implementation of sharing business models, or even business ecosystems. Concrete pathways towards achieving this outcome could be presented in the context of product design or platform- and service-based business models. SE literature's focus on small- and medium-sized enterprises and entrepreneurs and CE literature's inclination to focus on incumbents imply that both fields should expand their respective organisational perspectives. In addition, the potential rebound effects of circular or sharing interventions are mentioned by scholars from both fields but are more carefully examined by CE publications.

Researchers agree that SE and CE can be significant drivers of sustainable development, however the view on both should be further nuanced. Despite this belief in on SE and CE, scholars approach sustainability differently in reference to the respective concepts. Beyond the economic dimension of sustainable development that is shared by both concepts, CE literature places a stronger focus on environmental issues while SE literature rather deals with societal implications. The respective emphases are probably related to the concepts' disciplinary origins, as CE is rooted in the fields of industrial ecology and environmental economics while SE is rooted in anthropology, economic sociology and computer science. Potentially, the combination of SE's advanced discourse surrounding reciprocity and computer science, and the biophysical roots of economic and social activity that the CE discourse builds upon, could lead to a new form of natural ethics. The environmental burden caused by exploitive resource extraction could be evaluated and

assessed by means of CE techniques. Building on this assessment, the costs of necessary mitigation measures to safeguard nature's interests could be identified and reciprocally allocated to relevant parties in the dependent system (e.g., through insetting, targeted offsetting, or the reflection of costs for regenerative measures in price calculations). Required levels of data security and confidentiality could be maintained through the application of digital platforms or blockchain. Thus, the exploitation of nature would cause a measurable obligation for its beneficiaries throughout a socio-economic system.

This study's analysis revealed room for mutual exchanges between SE and CE scholars, particularly regarding the general direction from which the concepts are approached. CE has a stronger systemic character, while scientists, public authorities and practitioners focus on factual incidents rather than aspirational visions for SE. Thus, CE is thought to be top-down while SE is thought to be bottom-up. In fact, there is significant evidence that shows public interference has hindered the spread of sharing practices and business models, particularly in urban areas. This is partly caused by SE not being viewed from a systemic perspective. In general, cities have been identified as potential targets for SE and CE because both models play a role in urban development, such as smart cities, urban sustainability and increased information and communication technology use.

One of this study's limitations lies in the subjective character of the content analysis as it may trigger disagreements. This shortcoming was addressed by the addition of the bibliometric analysis's findings to guide the analysis and to quantitatively evaluate the arguments that were made based on content analysis. Thus, a more objective and balanced argument could be provided. Furthermore, the choice of a specific combination of keywords used in the bibliometric analysis (e.g., the exclusion of the terms 'sharing' or 'circular') bears the risk of missing some relevant works. To remedy this limitation, some of the 'bibliometrically' excluded terms were used in the content analysis of recent literature.

Not all the publications gathered through the Scopus search query contained keywords, abstracts or journal information. Therefore, the analyses presented in this chapter

vary marginally regarding the article components that were analysed. This variation depended on the most comprehensive data that could be found to help answering the questions at hand. Finally, the constantly growing nature of the CE and SE literature fields allowed only for articles that were published before the end of 2018 to be included in the bibliometric analysis. To mitigate this limitation and capture most recent developments in CE and SE literature, this study's content analysis also included articles that were published between 2019 and September 2020.

With this article, the authors of this research seek to initiate a more involved and fruitful debate between the scientific and practical fields of SE and CE. Therefore, this study identifies and highlights the areas which hold the most potential for mutual benefit between CE and SE scholars, as well as points of contention. This contributes to an improved application of CE and SE on the path towards socially and environmentally sustainable economies.

6

General Conclusion and Discussion

6.1. How do circular start-ups contribute to the transformation towards a circular economy?

An increasing number of start-ups build their business models on CE principles while the dominant players in our economic system struggle with a transition of their existing practices towards more circular resource flows and value creation. The fact that start-ups develop circular business models suggests that CE innovation resonates with sustainability-oriented entrepreneurs. It requires further practical and theoretical progress in CE innovation to fundamentally establish the economic, social and environmental value creation potential that is – often exuberantly – ascribed to it. However, there is a void in scientific literature on CE implementation among start-ups and the group of innovative, entrepreneurial ventures that implement CE principles into processes that are related to value creation and value capture of their business models. An exploration of start-ups in the circular economy may reveal novel insights to inform the discourse regarding the dynamics that drive CE innovation in theory and practice. Therefore, the overarching research question at the core this thesis is

> How do circular start-ups contribute to the transformation towards a circular economy?

Before elaborating on the main research question, I present the results of the four studies that constitute the main body of this thesis. I also describe how the findings of the individual studies relate to, and reinforce one another. I further discuss novel theoretical perspectives that are revealed by this research and delineate practical implications. This thesis closes with limitations of the research project, an outline of analytical paths that were not taken and potential avenues for future exploration.

6.1.1. A typology of circular start-ups

In the first study we empirically analysed the business models of 128 circular start-ups (CSUs) in Europe. This study finds that CSUs' business models can be categorised in five archetypes. Hence, the research focuses on CSUs' direct contributions to more

circularity in business practice; while the findings also indicate relevant indirect contributions. CSU business models were classified based on the dominant circularity strategies, and on the circular innovation types that they apply. The findings of this study are the focal point for the remainder of this thesis. We introduce the concept of CSUs and thereby lay the groundwork for further analysis.

The prevalent CSU archetypes are design-based, waste-based, platform-based, service-based, and regenerative/nature-based business models (see Table 18). Design-based start-ups (e.g., modular phones, bio-based construction materials) mostly innovate in source materials and product design as they aim to reduce (or prevent) excessive usage of scarce materials in production and usage. This reflects the relatively high circular ambition of CSU founders that Chapter 3 elaborates further on. Most design-based CSUs combine their focal innovations with elements of consumer involvement and awareness and thereby address a critical aspect of balancing downstream and upstream focus to enable wider CE transitions. Waste-based CSUs (e.g., food waste upcycling) work with post-producer or post-consumer residual resource streams and generate value from these. They are mostly active in the agricultural and construction/materials engineering sectors. They tend to operate in partly informal business and supply networks due to the oftentimes ambiguous regulatory landscape in context of the usage of secondary materials. Platform-based (e.g., online tool sharing, supply-demand matching for industrial residuals) CSUs are mostly facilitators of economic transactions (trading, sharing) while only a small subset serve as bases for value co-creation – i.e., sharing knowledge or debating/learning together across organisational boundaries. These start-ups often build on ICT - in some cases even advanced technology like artificial intelligence, RFID and blockchain - as well as concepts of sharing or collaborative consumption to scale their business models. Service-based CSUs' business models (e.g., batteries/energy-as-a-service, furniture-as-a-service) focus on need-fulfillment systems rather than selling the maximum possible number of products. Thereby, they break with existing management practice and aim to

control and increase usage efficiency of products. They are often ascribed to the performance economy, a concept that is frequently connotated with CE (Stahel, 2010). Nature-based CSUs (e.g., building-integrated agriculture) aim for ‘decreased input of non-renewable natural capital and increased investment in renewable natural processes’ (Maes, Jacobs, 2017). Here, biological cycles are leveraged to find sustainable solutions, such as the recycling of food waste for insect-based protein production which can serve as natural fertiliser or livestock feed.

Table 18. Circular start-up typology from Chapter 2

CSU archetype	**Dominant R-strategy**	**Dominant innovation type**	**Definition**	**Share of data sample** (n = 128)
Design-based	Reduce	Core technol.	CSUs that adopt circular innovations mostly in the pre-market phase through source material minimisation, product design or increases in production process efficiency.	**36%**
Waste-based	Recycle, Recover	Industrial symbiosis	CSUs that seek to extract value from external waste streams (e.g., recycled plastic, CO_2 emissions, surplus food) by applying innovative process solutions.	**27%**
Platform-based	Various	Enabling technol.	CSUs that pursue business models built around B2B, B2C or C2C marketplaces for (idle/excess) resources. Thus, they facilitate trading or sharing of products, knowledge, infrastructure or services.	**19%**
Service-based	Various	Product-service-system	CSUs that embed products in a service-system without customer ownership of the physical good and aim for higher, and better controllable usage efficiency.	**9%**
Nature-based	Regenerate	Various	CSUs that operate nature-based systemic solutions to deliver services (or products) with the objective to lower input of non-renewable natural capital and increase investment in renewable natural processes.	**6%**
Other	Various	Various	CSUs that operate natural urban air filters, circular city tours or circular design/consulting agencies	**3%**

Based on the findings of this study CSUs can be positioned against related concepts in literature such as sustainable or social start-ups which allows for deeper

investigation and cross-fertilisation. Additionally – based on empirical insight – the study introduces nature-based solutions to the conceptual realm of CE innovation and expands the commonly used R-framework by the strategy ‘Regenerate’. The common critique to existing CE conceptualisations of a missing focus on implementation and applicability (Bocken et al., 2018; Konietzko, 2020) was addressed in this chapter because it unites existing theoretical concepts to comprehensively depict real-world cases of circular business models. The findings also show that CSUs pursue CE strategies that are more impactful than corporates’ strategies. When compared to a reference study that analysed corporations’ CE strategies, it was shown that more than 50% of the CSU sample apply more impactful Regenerate and Reduce strategies while only 23% of the corporations' approaches build on these strategies. Potential reasons for this are presented in Chapter 2. This insight provides relevant input for answering the overarching research questions as it emphasises CSUs’ relevance as potential direct contributors in transformative change processes towards CE.

Chapter 2 identifies five archetypes of CSUs and - in view of the main research question - comprehensively classifies the business models that CSUs deploy to contribute to a CE transformation. This is an important finding because it shows that in fact, start-ups consider it worthwhile to pursue circular strategies and to build up businesses that are entirely based on principles of CE. Sustainability transition literature emphasises the relevance of niche players and independent entrepreneurial activity for system-wide change processes. In light of this, it is promising that the concept of CE appeals to founders because bottom-up dynamics that are largely aligned on core principles of entrepreneurial activity may allow for a more purposeful systems governance and strategic management of sustainable transformation processes. However, some questions remain unanswered by Chapter 2: to what extent will CSUs be able to fulfil the promise about their sustainability potential? And, to what extent must CSUs shape innovation systems and build a socio-technical embedding for their solutions? Chapter 3 addresses the former question by analysing CSU founders’ motivation, ambition and entrepreneurial identities; Chapter 4

addresses the latter question by examining CSUs' roles and system building activities more in depth.

6.1.2. Motivations and identities of circular start-up founders

Once able to conceptually grasp the concept of CSUs, it is important to create an understanding for their origin and their positioning towards other market actors and wider sustainability transformation processes. To shed light into this, Chapter 3 analyses CSUs' founders' motivation and entrepreneurial identity. The entrepreneurial motivation and identity are considered decisive factors in the entrepreneurial process – particularly, regarding start-ups' origins, performance, frame of reference, strategic positioning, and development path (Gartner, 1990; Hessels et al., 2008; Kyrö, 2001; Rauch and Frese, 2007; Ribeiro-Soraino, 2017). Chapter 3 takes a qualitative approach and is based on interviews with 57 CSU founders combined with a literature review in the fields of sustainable and social entrepreneurship (Gioia et al., 2012). The inclusion of existing concepts in sustainable entrepreneurship allowed for an intellectual discourse with the wider academic field when introducing the archetype of the 'born' circular entrepreneur as a new category of sustainability-oriented entrepreneur – which is a main contribution of this study. Due to the inclusion of CSU founders from various regions and various sectors, we conclude that the observations on CSU founders' motivation and identity are largely independent from contextual factors - as long as the ventures are located in urban areas in the Western world. It remains to be seen whether the observations also apply to circular entrepreneurs in the Global South, in rural areas or markets with lower purchasing power.

It was shown that grassroots circular entrepreneurs have proprietary characteristics of which the most distinct one is that they apply a common 'how-to' of circularity strategies in their efforts to advance sustainable development. CSU entrepreneurs are extremely driven to find effective and profitable solutions to environmental problems that they identify as occurring from systemic inefficiencies. It is worthwhile to explore further why most CSUs are

founded as for-profit entities, especially because this chapter shows that monetary drivers are largely irrelevant in grassroots CE entrepreneurs' motivational configuration. They aim to apply business models that - per design - 'cure' the above-mentioned inefficiencies through circular strategies, e.g., creating value from end-of-use resources, substituting scarce virgin materials or facilitating access to idle resources. Many founders leave their jobs in large corporate organisations to start circular ventures from scratch. Within corporate structures, they feel incapable of realising the speed and magnitude of change that is in line with their high circular ambition and ambition for self-realisation in circular entrepreneurship. Following, CSUs are being founded with the goal to demonstrate the extent to which businesses and business models can live up to principles of CE while being economically viable. Over time, CSU founders' focus even shifts towards the scalability of their business. On the one hand, this may indicate that the scaling of CSUs is still immature and bears the potential of including scalability in earliest ideation phases. On the other hand, this underlines CSUs' roles as 'lighthouses' in the CE transformation because they create a different quality of accountability and raise the bar for other private sector actors who continuously innovate incrementally towards CE while largely still operating in linear business structures.

The findings from the previous chapter were complemented and further sustained because Chapter 3 shows that apart from applying high-impact circularity strategies, the founders of CSUs also strive for systemic transformation towards CE. In their entrepreneurial visions, circular entrepreneurs even prioritise systemic changes over their own start-ups' success or lasting existence. This is a critical finding in relation to the research question as CSUs create a new quality of dialogue in for-profit entrepreneurship where the mantra of everlasting growth is contested based on the premise of value creation for wider society and a systemic perspective. Such a self-transcending attitude became evident in the interview data from waste-based CSUs, for instance. Several founders accept the fact that their own solutions contribute to the limitation – or even full demise – of their addressable market (e.g., artificial intelligence solutions and nudging to reduce food waste). Despite the motivation to

contribute to disruptive systemic shifts, it was found that founders of CSUs consider their businesses as complementary in their interaction with stakeholders and their markets. Thus, they emphasise collaborative approaches and co-creation of collective value rather than a "survival of the fittest".

The findings reveal another common factor among circular entrepreneurs: their dominant educational background in design and engineering. This partly explains the high share of design-based CSUs as outlined in Chapter 2 but also provokes questions whether the variety of expertise and managerial background in circular entrepreneurship are sufficient for a far-reaching diffusion of CSUs and their practices. For instance, platform-based business models in the digital realm are typically more prone for scaling than dominant CSU archetypes that rely on physical resource flows (e.g., design-based, waste-based). However, digital platform models require a higher expertise in ICT (internet and communications technology, e.g., supply-demand matching, blockchain) which is not necessarily a common background among circular entrepreneurs. So, this chapter builds on the argument from Chapter 2 and suggests that it is worthwhile to explore how CSUs can better integrate learnings from ICT domains and in what way a deeper expertise in these fields can be leveraged to increase the presence of platform- and service-based business models in circular innovation.

This study found that circular entrepreneurs' value systems build on a synergetic relationship of economic and environmental value while environmental value is the dominant factor and economic value rather a 'means to an end'. A neglection of the creation of social equity was registered in circular entrepreneurs' vision and positioning even though they were often personally motivated by social altruism to start their ventures (next to biospheric altruism and self-realisation, and opposed to financial motives). The reason for, and consequences of this discrepancy remains ambiguous and should be the object of further scientific studies.

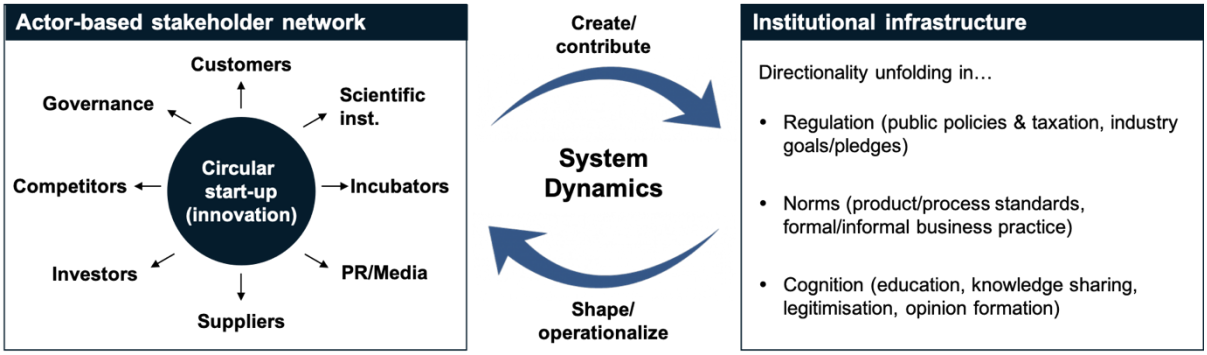
Chapter 3 complements the findings of Chapter 2. While Chapter 2 showed us the business models through which CSUs contribute to a CE transformation, Chapter 3 adds more qualitative aspects to the findings as it illuminates the ambitions and intentions with which these business models are developed and deployed. Chapter 3 provides evidence that founders of CSUs prioritise elements of a systemic CE transformation over business interests if they face a trade-off between the two. This implies a stronger resistance to the growth paradigm of market capitalism and neoliberal trends when it comes to the implementation of circular principles in business practice. The above-mentioned systemic perspective combined with founders' altruistic attitudes, drive and high circularity ambition indicate that CSUs are important ambassadors and role models of CE. Such a strong value orientation is needed so that the concept will not traverse another 'mission drift' with economic value becoming dominant over social and environmental value. In fact, the little personal economic motivation of CSU entrepreneurs and their focus on a synergetic combination of ecological and economic value hint at 'born' circular entrepreneurs being in a good position to manage the so called 'hybrid tensions' that organisations are exposed to in such value conflicts (Battilana, Dorado, 2010; Ebrahim et al., 2014; Hai, Draft, 2016).

6.1.3. System building activities of circular start-ups

Chapter 4 is rooted in empirical insight based on 40 CSU founder interviews which was combined with literature on sustainability transitions, innovation systems and innovation systems. This approach was chosen to provide a more normative and directive interpretation of the findings of this thesis as a base for relevant systemic interventions and directionality that underlie systemic CE transformations. Chapters 2, 3 as well as existing start-up literature show that CSUs are young phenomena that deservedly receive increasing attention but still operate on a relatively small scale (Närvänen et al., 2021; cf. Zvolska et al., 2019). This – combined with the lack of unanimously accepted metrics to measure circularity – are the central reasons why CSUs' direct impact on systems is still very hard to measure quantitatively. Therefore, this study took a qualitative approach and focused on the system

building activities that CSUs pursue in order to provide an answer to the overarching research question. The approach to position CSUs as actors in wider innovation system was chosen becasue because CE transcends existing concepts in innovation and transitions theory due to its multiple-technological and system-transcending character (the focus lies on a variety of social and technical solutions instead of one focal innovation such as biogas or EVs). Thus, we define the common circular mission of CSUs and conceptualise the innovation systems that build around CSUs' business models as 'minimum viable' circular innovation systems in which the systemic configurations that underlie circular innovations are tested and proven (see Figure 17). We propose a framework that defines the roles beyond novelty creation that CSUs adopt in such circular innovation systems. This can inform agendas of private institutions and policymakers to manage the multiple directionalities that CE is currently associated with more strategically (subsumed under strong missions) and legitimise transformative measures to further advance a CE transition.

Figure 17. Theoretical framework from Chapter 4 – 'Minimum viable' circular innovation systems



Chapter 4 shows that CSUs take purposeful action in relation to their ecosystems to create legitimacy for circular business models - and networks. This study advances the findings from Chapter 2 as it shows that the high share of CBM innovations that include CSUs' socio-technical environment is based on purposeful systems building activity of CSUs. Furthermore, this chapter reveals that the high ambition for systems change among circular entrepreneurs that was identified in Chapter 3 translates into systems building activities from CSUs. The findings show that CSUs take on different roles to advance their circular mission: reinforcers, conveners, pioneers and champions.

Chapter 4 offers several responses to the overarching research question by connecting CE research to sustainability transitions literature and depicting the roles that CSUs adopt to contribute to CE missions. As such, we identify CSUs as reinforcers who establish agency and empower individuals to become increasingly conscious about their consumption behaviour. Not only consumers, but also upstream actors are partly guided by CSUs as they act as conveners. Here, CSUs reconfigure material flows in supply chains and initiate fundamental changes in production processes and delivery models. Furthermore, we identify pioneers who explicate insufficiencies and opportunities in regulatory frameworks and thereby legitimise more normativity in transformative policymaking. Chapter 4 also suggests CSUs as mentors who establish CE innovation in exchange and collaboration with educational institutions. The role of entrepreneurship as a contributor to novelty creation in sustainability transitions is established. However, the various roles beyond novelty creation that start-ups can take on to drive sustainability transformation processes might reveal insights that allow a more strategic management of complex innovation systems.

Combining the findings with results from Chapter 3, we observe among CSUs a seemingly unprecedented awareness of the necessity to counteract a dominant regime through new forms of collaboration and coordination within across systems. Arguably, this was one of the elements that the CE narrative was missing in the past decades where the focus lay on end-of-life management (waste management, recycling) rather than pro-actively changing systemic structures from within through direct (Chapter 2) and indirect measures.

Chapter 4 shows that CSUs demonstrate this mindset and orientation and thereby lay out pathways to disrupt historically grown, common business practice to drive CE innovation. Chapter 4 is congruent with Chapter 2 because it confirms the finding that a high number of CSUs' business model innovations require the mobilisation of their respective socio-technical environment beyond entities that they directly interact with and beyond a sole economic perspective. At the same time, Chapter 4 also complements and advances the previous findings by demonstrating that CSUs' systemic interactions are not only unintended consequences of their business activities but are based on concrete strategies to actively shape innovation systems and direct other actors towards a common CE mission.

6.1.4. Learnings from the sharing economy to advance bottom-up CE innovation

After establishing CSUs as distinct artefacts in scientific literature and providing insight into their potential contributions and roles in relation to a CE transformation, the last chapter 'zooms out' and takes a purely theoretical perspective on the phenomenon. This is to strengthen the scientific context and build ties to other sustainability-related research bodies as well as to serve as foundation for further analysis and discussion.

The previous chapters have shown that CSUs apply concepts that are core conceptual pillars in an adjacent literary concept - the sharing economy (SE). As such, (two-sided) platforms, service-based business models, collaborative consumption and open innovation are disciplines and themes that not only play an important role in CSUs' business models and system building activities but are also extensively discussed by scholars in the context of SE. However, CE research does not include purposeful analyses of the role of SE in relation to CE and provides little structured insight as to how the two concepts connect in theory and practice (Andersson et al., 2013; Bettoni, et al., 2018; cf. Gruber, Henkel, 2006; Frenken, 2017; Jabbour et al., 2020; Mont et al., 2020; 2002; Schwanholz et al., 2020). Therefore, the concept of the sharing economy (SE) was drawn in and we conducted the first comprehensive bibliometric analysis and comparative review of more that 4,000

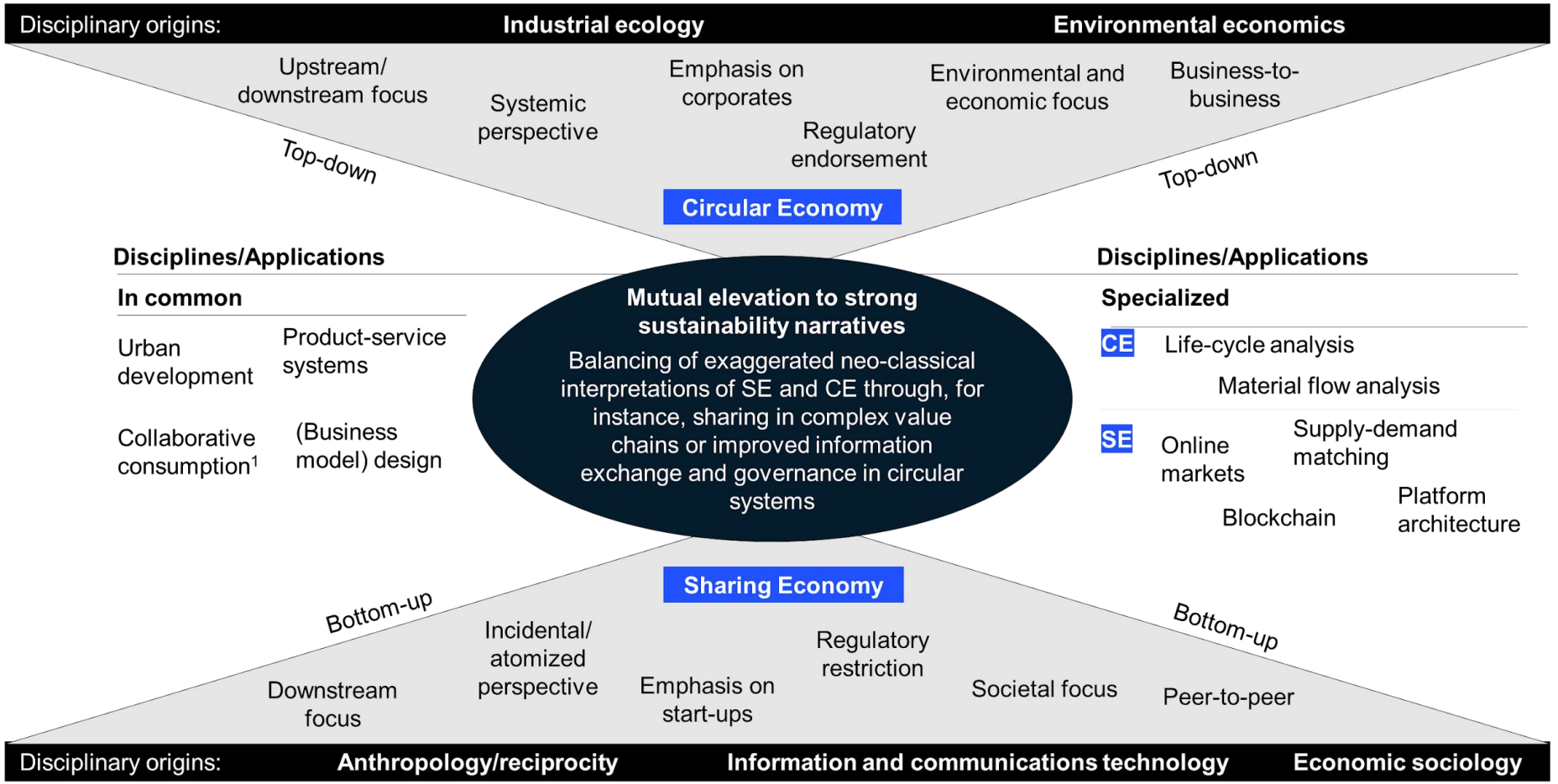
scientific publications in the CE and SE literary bodies. This study not only scrutinises examples of SE start-ups that scaled and disrupted industries as reference cases for CSUs (platform- and service-based business models can be relevant vehicles for both concepts; Kanda et al., 2018; Jabbour et al., 2020), but also provides a theoretical contribution by establishing SE as a subset of CE.

The findings of Chapter 5 resulted in a framework of conceptual links between SE and CE and proposed reciprocal enrichments between the respective academic fields. Major links were identified in the scholarly fields of sustainability, business models, sustainable consumption, and governance. Furthermore, a comparative analysis of the concepts' disciplinary origins yielded in potential areas for cross-fertilisation, e.g., to strengthen the social dimension in the CE innovation discourse through inclusion of insights and narratives from SE which has a strong footing in sociology and anthropology. As for SE innovation, the study shows that literature is largely missing a systemic and conceptual view and was evidently guided by the emergence of start-ups like Uber and Airbnb. We identified that the lack of a systemic perspective (e.g., only downstream focus) and immature socio-technical embedding (e.g., lack of progressive taxation) were key reasons for innovative SE business models to traverse a 'mission drift' and not reach their full sustainability potential. The findings of Chapter 5 allow for a more structured inclusion of a bottom-up perspective into CE discourse to balance prevalent top-down dynamics. In Chapter 5, CSUs are objectified rather than subjectified and the enabling conditions for their emergence and spreading are elucidated based on learnings from SE innovation.

The findings of Chapter 5 firstly show that - conceptually - also SE start-ups and business models are part of CE and can therefore directly contribute to a CE transformation through their business models (cf. Chapter 2). However, the circularity potential of these start-ups is not yet elucidated because there exists too little insight into the founder motivations and ambitions of SE start-ups, and the conceptual relation of CE and SE is still not exhaustively studied. Regarding the overarching research question, we firstly argue that SE start-ups can contribute to a CE transformation through a more conscious and strategic

management of their circular potential and circular value creation. Secondly, we find that CSUs - and other advocates of CE innovation - could contribute to a CE transformation by stronger leveraging insight and learnings from the field of SE. Particularly, applications of blockchain and supply-demand matching technology, insights into platform architecture and the adoption of a more atomised view on business and societal transactions may nourish CSUs' growth and impact. Chapter 5 proposes to deepen the understanding of collaboration/coopetition and shared value creation as key enablers for a wider diffusion of CE. Accordingly, the analysis built on the disciplinary roots of SE in computer science and particularly platforms (architecture) to propose pathways to advance "new ways of working" that could be leveraged by CSUs. Furthermore, the study shows that core practices of CSUs such as industrial symbiosis require information exchange and governance in complex systems which can be facilitated based on the insights from SE's scientific domain of digital platforms.

Figure 18. Graphical abstract of Chapter 5



6.2. Overarching findings

6.2.1. Answering the research question

Tying together the approaches and findings from the four studies that were outlined above, we come back to the main research question: How do circular start-ups contribute to the transformation towards a circular economy? While instances where CSUs influence industrial systems, societies, or institutions at large are still scarce, the findings of this research show that it is indeed possible for CSUs to play a considerable role in the CE transformation. This thesis lays out various arguments and pathways for this.

CSUs contribute to larger CE transformations as role models that drive bottom-up dynamics and have a variety of direct and indirect impacts on the change process. The direct contributions mostly relate to CSUs' business models, their contributions to the CE mission definition as well as their shaping of a new form of ethics in for-profit business. While it remains to be seen to what extent these will change entire industries or have significant, measurable impact, a promising increase in the number and size of CSUs as well as collaborations between CSUs and incumbents happened in recent years. This thesis shows that CSUs build 'minimum viable' circular innovation systems and thereby create premises for testing and proving of desirable system configurations as breeding ground for CE innovation. In terms of indirect contributions, the emphasis lies on the new ways of working and value creation (e.g., open innovation, value co-creation, servitization, strategic deliberation) that CSUs postulate, standardise and even govern. Corresponding changes can be considered disruptive to common business practice and value creation logics in the linear regime, and they can have spillover effects on other systems actors - not least due to the inclusive character of CSUs' applied innovation types.

From a theoretical perspective, the findings of this thesis build the base for a stronger bond between CE innovation and sustainability transition research. We find that 'grassroots' CE entrepreneurship purposefully contributes to sustainable transformation processes. Furthermore, 'grassroots' circular entrepreneurs – or CSU founders - and business models

are defined, and pathways are suggested as to how their potential role as relevant vehicles for bottom-up CE innovation can be enhanced. Thereby, the research opens up novel theoretical perspectives on CE both on an incidental (i.e., business model/supply chain) as well as systemic and conceptual level. This responds to calls in the literature that CE is missing an anchoring in existing scientific work and is rather an approach to production and consumption than a theory (Corvellec, 2021; Inigo, Blok, 2019; Korhonen et al., 2018).

6.2.2. CSUs challenge the linear regime and contribute to systemic innovation towards CE

Given the high relevance of the private sector in the CE transformation and the increasing establishment of CSUs in global markets, CSUs are highly promising vehicles that have a direct impact in driving the required systemic shift. The analyses identify CSUs and circular entrepreneurs as distinct groups of actors in the sustainable entrepreneurship space. This thesis evinces that CSUs pursue CBM strategies that are more impactful and more ambitious than the ones pursued by large corporations. The focus of CSU business models lies on design, end-of-life/waste management, and platforms to increase resource usage efficiency and value extraction along the resource lifecycle and minimise leakage; service-based and regenerative business models complete the typology of CSU business model archetypes. Circular entrepreneurs are motivated by social and environmental altruism and aim to change wider systems directly or indirectly with their ventures. Thus, the findings address the question *if* start-ups have the general capacity to contribute to a CE transformation. The insights presented in this study allow us to confirm this. The proposed CSU business model typology allows for more strategic choices and profound discourse in the implementation and study of CBM innovation. The findings widen sustainability transformations and innovation systems research by adding an exhaustive framework of archetypes (i.e., research objects) whose activities are distinct but overall transverse to the dominant technology-specific perspectives in sustainability transformations research (cf. Rosenbloom et al., 2021).

The analysis of CSUs' business models revealed that most of their innovations influence their socio-economic environment so they contribute to systems building and mobilisation as an inherent component of their business model design. More conscious choices in CSUs' external strategies and systems building approaches will be discussed next. During the course of this PhD project, empirical evidence for the flourishing of CSUs increased: while only a few CSU 'seedlings' were growing at the start of the project 2017, we now can interact with and learn from a large variety of well-funded and innovative organisations that are entirely built on principles of CE. There are recent examples of circular scale-ups such as UK-based Twig or German Lendis who acquired $35mn, respectively $80mn, in their Series A funding rounds. Still, many CSUs also seem to 'inherit' some of the shortcomings that CE is often critiqued for in terms of a larger contribution to sustainable development: the lack of a strong social vision and respective structural embedding in their business approach. It should be noted that the findings cover phenomena in the Western world as the regional focus of this work lay here. Future research to widen and deepen the level of insight is highly encouraged, e.g., by a comparative analysis between the Global North and South.

CSUs develop and apply their business models following a common vision and CE mission (counteracting *anthropogenic environmental degradation* by *closing resource loops* and *fixing system inefficiencies*). For 'grassroots' circular entrepreneurs, the relevance of this mission and the corresponding systemic changes lead to a high ambition for disruptive change while they approach this change process rather collaboratively and through open innovation as they position themselves complementary to their business ecosystems. CSU entrepreneurs even prioritise the overarching mission over their own ventures and the lasting success - or even survival - of their business. In that, founders of CSUs do not prioritise economic value but consider economically driven interactions as mechanisms ('means to an end') for the creation of environmental and wider societal value. This conscious neglection of the economic dimension has not been observed so far in the space of for-profit businesses as it breaks with economic actors' siloed perspective and the paradigm of infinite growth

which - arguably - led to increasing anthropogenic natural deprivation over the past decades. This thesis reveals that circular entrepreneurs' value system is structured in a way that can 'counteract' some downsides of neoliberal business practice which was one of the major barriers to a large-scale diffusion of CE in the 20th century. Despite these positive signs, it is too soon to draw conclusions on whether this unprecedented attitude of CSU founders will lead to disruptive changes in business practice and distinct development path of their ventures (e.g., financing, valuation, brand positioning, growth).

This thesis also studies CSUs' other - more indirect - contributions to the CE transformation beyond potential spill-overs of their approaches to open innovation and business growth. As such, their direct contributions to the complex process of mission definition come to the fore because the contributions are based on CSUs' common picture of the necessary conditions that require and drive the change processes (i.e., eradication of landfill, resource and biodiversity conservation, re-imagination of delivery models and supply chains, changes in value perceptions). This does not only lead to a high ambition regarding CSUs' own business models - as stated above - but also to a higher level of accountability for other actors that work directly with CSUs or are being compared to CSUs by customers or public authorities. Through their strong orientation towards solutions and 'fixes' for system inefficiencies, CSUs demonstrate the extent to which circular strategies can be considered as a financially viable option in business model design, supply chain management and innovation. Furthermore, CSUs contribute to learning processes and dynamic feedback loops in systemic innovation processes which are considered highly relevant in dominant theories of sustainable transformations literature (e.g., multi-level perspective, mission-oriented innovation, technological innovation systems; Geels, 2002; Hekkert et al., 2021; Rodrik, 2004). So, through CSUs' experimentation and 'trial and error' approach (also referred to as serendipity; Mazzucato, 2018a) systemic innovation processes can be nurtured and innovation dynamics can be enhanced.

This research shows that CSUs not only build 'minimum-viable' circular innovation systems (proactively as part of their external strategy and not *en passant* as part of their

business model innovation types) but also take on relevant roles beyond only novelty creation. Thus, we observe that CSUs actively pursue strategies to form and advance the CE mission of innovation systems. The roles that CSUs adopt focus on the mobilisation of value chains, consumer empowerment, legitimation of transformative policy and the championing of circular entrepreneurship. This thesis proposes mechanisms and tools that relate CE innovation to the literary fields of distributed network technology, platforms and ICT, multi-actor value allocation and open innovation. On the backdrop of strategic deliberation, CSUs provide resources, governance and formal contracts that allow circular value creation by a convention of 3rd parties (e.g., supply-demand matching to allow industrial symbiosis, rent-as-a-service business models). CSUs closely collaborate with and mobilise their direct and indirect supply chain partners to formally establish new ways of value creation and CE standards for services, products, and processes.

This study proposes the above-mentioned strategies of CSUs as framing to allow for a more strategic management of the jumble of directionalities that CE innovation is commonly critiqued for. Furthermore, it is suggested that even if grassroots sustainable business models scale, adequate systemic embeddings need to be created so that the sustainability potential and the ‘strong’ sustainability characteristics of CE innovation do not get lost. Therefore, themes such as the regulatory embedding, social inclusion and enabling technologies require more attention and alignment among a variety of actors to enable bottom-up CE innovation. These mechanisms can be leveraged to increase social and regulatory acceptance for circular innovations and thereby avoid push-back. The thematic variety of the mechanisms imply the high coordinative systemic effort and alignment requirements across institutional elements that are needed to further enable the emergence and growth of CSUs' and circular innovations.

Recent literature emphasises the relevance of a systems perspective in the context of CE but similarly describes the field as nascent and understudied (cf. Kanda et al., 2021). By scrutinising CSUs’ system building activities and roles in transformation processes, we connect the comparatively vague CE literature to the more solid and strongly anchored

sustainability transitions literature. Furthermore, this research is one of the few scientific works that connects the concept of CE to mission-oriented innovation. It thereby improves the theoretical substance of the concept of CE. This provides the foundation for a promising theoretical perspective on CE innovation as the complex, cross-system and transformative character of CE can be holistically reflected in scholarly analysis. As for MIP literature, particularly the strategic orientation is enhanced as this study proposes a novel definition of CE missions by pulling in distinct entrepreneurial activity, suggests a framing for directionalities that could inform and guide MIP related to CE; and brings forward legitimation of transformative policy with potentially higher chances of adoption.

6.3. Practical contributions – recommendations for policymakers, business and consumers

After having discussed the studies of this PhD project individually and conjunctly to provide answers to the main research question, this section takes on a practical perspective as it elaborates on the findings' contributions to the CE innovation practice. This study proposes new ways of working that are required to allow for circular innovation to flourish. Practitioners should invest into co-creative approaches, open innovation and network governance mechanisms (contractual and technological) to be able to grasp and allocate the added value that circular practices entail. Also, policymakers should turn towards CSUs when looking to increase normativity in regulative measures and seeking legitimation for transformative policy.

Practically, this study shows that CE innovation still lacks a perspective on – and respective structured inclusion of - the social dimension. A structural embedding of societal dimensions is largely absent from the business models and entrepreneurial vision of grassroots CE entrepreneurship. Rather, they tend to focus on environmental and economic value creation. This is surprising as it stands in contrast with circular entrepreneurs' motivation that builds on social value creation and social altruism. The lack of social perspective is a common critique to the concept of CE but had not yet been examined in a

bottom-up/entrepreneurial context. While the reasons for this are not elaborated on in this thesis, the finding stresses the prevalence of a structural weakness of CE that may inhibit the concept's overall sustainability potential. We can still observe instances of social value focus among CSUs. Some occur in the hiring policies where CSUs only hire from socially marginalised groups (refugees, handicapped people, people on state support) while others pursue strategies that are fully based on strong community engagement on a small-scale. However, these incidents were mostly due to the high social ambition of CSU founders and described as a burden in day-to-day work (regulatory processes, licenses, language barriers etc.). We emphasise the relevance of tools and metrics that allow for a better integration of the social dimension in circular business models and according regulatory support (e.g., tax exemptions, facilitated hiring processes) for socially inclusive business models.

This research shows that – in business practice – co-creative approaches need to be strengthened and practitioners need to invest in creating the formal and technological base for system-spanning circular innovation. This includes contractual frameworks, technological enablers such as blockchain technology or digital asset tracking and the – more complex – redefinition of material flows and value propositions. I propose SE technologies and tools as potential starting points when exploring coordinative interventions to foster circularity in economic systems. For instance, blockchain and distributed ledger technology can be applied to maintain data confidentiality while increasing transparency and trust in value chains so that product-specific environmental information can be tracked across organisational borders. This would allow for interventions in delivery models that better reflect the upstream resource availability or extraction technology (e.g., pricing, conscious scarcity). The WBCSD's Pathfinder initiative or start-ups like Circulor and topl are practical examples for this (WBCSD, 2021; World Bank Group, 2020); Kim et al. (2020) or Bauman (2018) provides deeper insight into the underlying theory and systems design to improve measurement, reporting and verification of sustainability data. The function of intermediaries and brokers that govern circular systems is emphasised by the findings of this study (cf. Cramer, 2020). Such roles can be taken on by private or public sector actors – or a

combination of both. Furthermore, practitioners that want to transform their business models and supply chains towards more circular practices can use the findings of this study and either collaborate with specific types of CSUs or take on pioneering roles themselves, e.g., by providing directionality or building circular innovation systems.

The findings of this study can directly contribute to policymaking related to CE. Policies on CE innovation should be more directive and transformative. Based on the results of this research such policies can be legitimised by the novel phenomenon of CSUs who drive bottom-up CE innovation. Such forms of legitimation are rare when it comes to transformative innovation policy due to the rather passive role of governments in the past (“overseers" rather than “shapers”). Various policy interventions are proposed that can be delineated from or supported by CSU activity in the context of extended producer responsibility, waste management or cross-sectoral emission goals. If policymakers want to initiate such mechanisms, they should be subsumed under strong circular missions that are founded on clearly defined elements and constitute the underlying problems on the one hand and – through the consultation of CSUs – concrete solutions on the other hand.

6.4. Reflections and future research

When expounding the contributions of this research, we should at the same time reflect on the limitations of the chosen approaches and propose avenues for future research. This is what the upcoming section deals with.

First, this study has a clear geographical scope – particularly in terms of the empirical data that was gathered. This was a deliberate choice which was partly due to the novelty of the concept at the beginning of this PhD project. Therefore, I had to focus on those areas where a high density of CSUs could be expected. The combination of innovation hubs, funding opportunity, start-up friendly regulation and sustainability/consumer trends served as selection criteria for the regional scope. This led to a sample of CSUs that are from Western metropolitan regions. Past studies have shown that there are structural differences between, for instance, Nigeria and Germany in terms of founder motivations and business models

(Tiba, 2020). Therefore, the focus on the Western World limits the generalizability of the findings. The lack of empirical insight from Asia or Africa could be partly mitigated by using existing literature that analyses related phenomena in those regions such as eco-industrial parks in China, sustainable and circular entrepreneurship in Africa, and community-managed, informal resource circularity in India. Further research should validate which part of the findings apply in other regions and environments (e.g., Global South, rural areas, low-investment regions) and which parts require adjustment. Furthermore, the problems in "westernised environmental discourses" and CE narratives such as the large neglection of "socio-spatial work practices" and the "lack of recognition of informal expertise" can be mitigated when drawing on successful cases of grassroots involvement in CE (Anantharaman, 2021; Calisto Friant et al., 2020; Corvellec, 2021).

The depth of analysis could be strengthened if future research explores approaches to scaling, funding or collaboration that are specific to a CSU type this study defines. The cross-sample perspective throughout this research was chosen due to the novelty of the concept and to provide an overarching theoretical framing of CSUs in sustainability transitions literature. However, a more in-depth analysis could provide relevant insights for specific types of private actor interaction (e.g., product-service systems, approaches to upstream innovation, system building in waste management). Adopting a more specific perspective and elucidating the solutions to CE innovation more in-depth is therefore a promising avenue of research as it could help private and public sector actors to adopt their strategies.

Third, the analysis mostly focuses on a specific point in time in the start-ups' development trajectory. Some longitudinal perspectives were adopted in the survey (i.e. retrospective questions about the ideation stage or forward-looking questions about scaling or investment) but an analysis that takes different maturity levels of CSUs into consideration might reveal insight that goes beyond the results of this study. As such, different types of founders or business models may face similar challenges or benefit from similar drivers along different phases in the start-up development process. Insights from the study of

various phases in the founding process can help to advance the nurturing of CSUs and also provide guidance for the strategic venture process of CSU founders. Additionally, longitudinal studies across a diverse sample of CSUs such as it was the empirical base for this study may provide insight into the direct impact of CSUs on socio-economic systems (i.e., their scaling and growth) as well as success factors for the perseverance or demise of some types of CSUs. Particularly, for a novel concept such as circular entrepreneurship these insights can be very valuable to avoid a diluted view on the concept and contribute to the *guidance of the search* as well as reflexive processes in sustainability transformations. Last, the connection between the findings on circular entrepreneurship and CBMs that this study presents and management science thinking and theory should be strengthened to leverage the emergence of CE as an economic strategy and better embed CE into organisational narratives.

I purposefully decided to not scrutinise favourable system environments for CSUs in this study to maintain the focus on the actual solutions (i.e. what are CSUs' activities) and not deviate into a more passive discussion of CSUs (i.e. what are CSUs' needs). Still, insight into the systemic reception of CSUs and bottom-up innovation is an important research avenue as it could also provide more generalizable results that apply to circular innovation at large. For this, system actors in circular innovation systems that (want to) interact with CSUs could be consulted (e.g., corporate management, regulators, citizens) and their perspectives could be compared with what CSUs perceive as systemic enablers and barriers. Such factors are not at the core focus of this work but could be similarly critical to the thriving of CSUs and circular innovation as the presented business model archetypes, founder personalities and system building strategies.

Bibliography

A

Abbott, K.W., Levi-Faur, D., Snidal, D. (2017). Introducing regulatory intermediaries. Annals of the American Academy of Political and Social Science, Volume 670, Issue 1, pp. 6-13. https://doi.org/10.1177%2F0002716217695519

Accenture (2014). Circular Advantage: Innovative Business Models and Technologies to Create Value in a World without Limits to Growth, http://tinyurl.com/p4s5a2f

Acquier, A. (2017). Is the sharing economy living up to its sustainability promise? Eur. Econ. Soc. Comm. http://www.eesc.europa.eu/en/news-media/presentations/sharing-economy-living-its-sustainability-promise

Acquier, A., Daudigios, T., Pinkse, J. (2017). Promises and paradoxes of the sharing economy: an organizing framework. Technol. Forecast. Soc. Change, Volume 125, pp. 1-10

Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D., Overy, P. (2016). Sustainability-oriented Innovation: A Systematic Review. International Journal of Management Reviews, Volume 18, Pages 180–205. https://doi.org/10.1111/ijmr.12068

Albort-Morant, G., Ribeiro-Soriano, D. (2016). A bibliometric analysis of international impact of business incubators. Journal of Business Research, Volume 69, Issue 5, pp. 1775-1779. https://10.1016/j.jbusres.2015.10.054

Allwood, J. (2014). Squaring the Circular Economy: The Role of Recycling within a Hierarchy of Material Management Strategies. Handbook of Recycling: State-of-the-Art for Practitioners, Analysts, and Scientists. pp. 445–477

Almeida, P., Kogut, B. (1997). The exploration of technological diversity and geographic localisation in innovation: start-up firms in the semiconductor industry. Small Business Economics, Volume 9, pp. 21-31

Almirall, E., Wareham, J., Ratti, C., Conesa, P., Bria, F., Gaviria, A., Edmondson, A. (2016). Smart Cities at the crossroads: New tensions in city transformation. California Management Review, Volume 59, Issue 1, pp. 141-152

Alvesson, M., Kärreman, D. (2007). Constructing mystery: Empirical matters in theory development. Academy of Management Review, Volume 32, pp. 1265–1281.

Amasawa, E., Suzuki, Y., Moon, D., Nakatani, J., Sugiyama, H., Hirao, M. (2018). Designing interventions for behavioural shifts toward product sharing: The case of laundry activities in Japan. Sustainability (Switzerland), Volume 10, Issue 8, art. no. 2687. https://10.3390/su10082687

Amatuni, L., Ottelin, J., Steubing, B., Mogollón, J. (2020). Does car sharing reduce greenhouse gas emissions? Assessing the modal shift and lifetime shift rebound effects from a life cycle perspective. Journal of Cleaner Production, Vol. 266. https://doi.org/10.1016/j.jclepro.2020.121869

Aminoff, A., Valkokari, K., Kettunen, O. (2016). Mapping multidimensional value(s) for co-creation networks in a circular economy. IFIP Advances in Information and Communication Technology, 480, pp. 629-638

Aminoff A., Valkokari K., Antikainen M., Kettunen O. (2017). Exploring Disruptive Business Model Innovation for the Circular Economy. Campana G., Howlett R., Setchi R., Cimatti B. (eds). Sustainable Design and Manufacturing 2017. SDM 2017. Smart Innovation, Systems and Technologies, vol 68. Springer, Cham. https://doi.org/10.1007/978-3-319-57078-5_50

Aminoff, A., Pihlajamaa, M. (2020). Business experimentation for a circular economy - Learning in the front end of innovation. Journal of Cleaner Production, Vol 275. https://doi.org/10.1016/j.jclepro.2020.124051

Amsterdam Smart City (2017). Circular City. https://amsterdamsmartcity.com/themes/circular-city. Last accessed on 14/05/2019.

Anantharaman, M. (2021) Reclaiming the Circular Economy: Informal Work and Grassroots Power. The Oxford Handbook of Comparative Environmental Economics

Andersson, M., Hjalmarsson, A., Avital, M. (2013) Peer-to-peer service sharing platforms: driving share and share alike on a mass-scale. International Conference on Information Systems: Reshaping Society Through Information Systems Design, 4, pp. 2964-2978. http://aisel.aisnet.org/cgi/viewcontent.cgi?article=1195&context=icis2013

Andreassen T.W., Lervik L., Olsen, H., Snyder D., Riel A. C. R. V., Sweeney J., Vaerenbergh Arcidiacono Y. V., Pais, I. (2018). Individual rewarding and social outcomes in the collaborative economy. Bruglieri M. (eds.) Multidisciplinary Design of Sharing Services. Research for Development, pp. 81-93. Springer, Cham. http://dx.doi.org/10.1007/978-3-319-78099-3_6

Anpo, M., Fukuda, H., Endo, M. (2019). Plant Factory Using Artificial Light. Published by Elsevier. ISBN: 978-0-12-813973-8

Antikainen, M., & Valkokari, K. (2016). A Framework for Sustainable Circular Business Model Innovation. Technology Innovation Management Review, 6(7): 5-12. http://doi.org/10.22215/timreview/1000

Antikainen, M., Aminoff, A., Paloheimo, H., Kettunen, O. (2017). Designing CBM experimentation - Case study. ISPIM Innovation Forum, (March), 1–14. https://doi.org/10.1016/j.surfcoat.2008.06.124

Antikainen, M., Uusitaloa, T., Kivikytö-Reponen, P. (2018). Digitalisation as an Enabler of Circular Economy. Proceedings of 10th CIRP Conference on Industrial Product-Service Systems, IPS2 2018, 29-31 May 2018, Linköping, Sweden. https://10.1016/j.procir.2018.04.027

Asgari, A., Asgari, R. (2021). How circular economy transforms business models in a transition towards circular ecosystem: the barriers and incentives in Sustainable Production and Consumption, Vol. 28, Issue 5. https://10.1016/j.spc.2021.06.020

Atasu, A. (2018). Operation perspectives on extended producer responsibility. Journal of Industrial Ecology, Vol 1, p. 7

Augusto de Jesus Pacheco, D. et al. (2019). Overcoming barriers towards Sustainable PSSs in Small and Medium-sized enterprises: State of the art and a novel Decision Matrix. Journal of Cleaner Production, Volume 222, Pages 903-921. https://www.sciencedirect.com/science/article/pii/S0959652619301714

Avital, M., Andersson, M., Nickerson, J., Sundararajan, A., Van Alstyne, M., Verhoeven, D. (2014). The collaborative economy: a disruptive innovation or much ado about nothing? Proc. 35th Int. Conf. Inf. Syst. ICIS 2014 1–7

Ayres, R. U. (1994). Industrial metabolism; theory and policy. B. R. Allenby and D. J. Richards (eds), The Greening of Industrial Ecosystems, National Academy Press, Washington, DC, 23–37.

Ayres, R., van den Bergh, J., Gowdy, J. (1998). Viewpoint: Weak versus Strong Sustainability. Research Papers in Economics

Azar, C., Sanden, B. (2021). The elusive quest for technology-neutral policies. Environmental Innovation and Societal Transitions, Vol. 1, Issue 1, pp. 135-139. https://doi.org/10.1016/j.eist.2011.03.003

B

Babbitt, C., Gaustad, G., Fisher, A., Chen, W.-Q., Liu, G. (2018). Closing the loop on circular economy research: From theory to practice and back again. Resources, Conservation and Recycling, Volume 135, Pages 1-2, https://doi.org/10.1016/j.resconrec.2018.04.012.

Baines, T. S., Lightfoot, H. W., Evans, S., Neely, A., Greenough, R., Peppard, J., Roy, R., Shehab, E., Braganza, A., Tiwari, A., Alcock, J. R., Angus, J. P., Bastl, M., Cousens, A., Irving, P., Johnson, M., Kingston, J., Lockett, H., Martinez, V., Michele, P., Tranfield, D., Walton, I.M., Wilson, H. (2007). State-of-the-art in PSSs. Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture, Vol. 221, Pages 1543-1552. https://doi.org/10.1243%2F09544054JEM858

Baldassarre, B., Schepers, M., Bocken, N., Cuppen, E., Korevaar, G, Calabretta, G. (2019). Industrial symbiosis: towards a design process for eco-industrial clusters by integrating Circular Economy and Industrial Ecology perspectives. Journal of Cleaner Production, Volume 216, Pages 446-460. https://doi.org/10.1016/j.jclepro.2019.01.091

Barba-Sánchez, V., Atienza-Sahuquillo, C. (2017). Entrepreneurial motivation and self-employment: evidence from expectancy theory. International Entrepreneurship and Management Journal, 13 (4), pp. 1097-1115

Baron, K. (2020). Carté DIEM: The Circular Economy Bank Ramping Up Resales For Generation Flux. https://www.forbes.com/sites/katiebaron/2020/10/06/cart-diem-the-circular-economy-bank-ramping-up-resales-for-generation-flux/?sh=3e8eb2988ffd

Basco, R., Hernandez-Perlines, F., Rodríguez-Garcia, M. (2019). The effect of entrepreneurial orientation on firm performance: A multigroup analysis comparing China, Mexico, and Spain. Journal of Business Research, In Press

Bassi, A. M., Bianchi, M., Guzzetti, M., Pallaske, G., Tapia, C. (2021). Improving the understanding of circular economy potential at territorial level using systems thinking. Sustainable Production and Consumption, Vol 27, pp. 128-140. https://doi.org/10.1016/j.spc.2020.10.028

Battilana, J., Dorado, S. (2010). Building sustainable hybrid organisations: The case of commercial microfinance organisations. The Academy of Management Journal, Vol 53 , Issue 6, 1419-1440

Baumann, T. (2018). Blockchain for Planetary Stewardship - Using the Disruptive Force of Distributed Ledger Technology to Fight Climate Disruption, Blockchain Research Institute. https://transparency-partnership.net/system/files/document/Baumann_Blockchain%20for%20Planetary%20Stewardship%20Framework_Blockchain%20Research%20Institute.pdf

Bauwens, T., Blomsma, F., Weissbrod, I., Kirchherr, J. (2021). The ‘need for speed’: towards Circular Disruption - what it is, how to make it happen and how to know it’s happening. Business Strategy and the Environment, Special Issue Article. https://doi.org/10.1002/bse.3106

Beattie, V., Smith, S. J. (2013). Value creation and business models: Refocusing the intellectual capital debate. The British Accounting Review, Volume 45, Pages 243–254. https://doi.org/10.1016/j.bar.2013.06.001

Belz, F. M., Binder, J. K. (2017). Sustainable Entrepreneurship: A Convergent Process Model. Business Strategy and the Environment, Volume 26, Pages 1–17. https://doi.org/10.1002/bse.1887

Bergset, L. (2017). Green start-up finance – where do particular challenges lie? International Journal of Environmental Behaviour & Resources, Volume 24, Pages 451–575. https://doi.org/10.1108/IJEBR-11-2015-0260

Bergset, L., Fichter, K. (2015). Green start-ups – a new typology for sustainable entrepreneurship and innovation research. Journal of Innovation Management Voume 3, Pages 118–144. https://doi.org/10.24840/2183-0606_003.003_0009

Berlin Business Location Center (2017). Kreislaufwirtschaft in Berlin. https://www.businesslocationcenter.de/imperia/md/blc/broschueren/content/kreislaufwirtschaft_de.pdf

Bernon, M., Tjahjono, B., Ripanti E. F. (2017). Aligning retail reverse logistics practice with circular economy values: an exploratory framework. Production, Planning and Control, Volume 29, Issue 6, Pages 483-497. https://doi.org/10.1080/09537287.2018.1449266

Bertassini, A.C., Zanon, L.G., Azarias, J.G., Gerolamo, M.C., Ometto, A.R. (2021). Circular Business Ecosystem Innovation: A guide for mapping stakeholders, capturing values, and finding new opportunities. Sustainable Production and Consumption, Volume 27, Pages 436-448, https://doi.org/10.1016/j.spc.2020.12.004.

Besch, K. (2004). PSSs for office furniture: barriers and opportunities on the European market. Journal of Cleaner Production, Volume 13, Pages 1083-1094

Beunen, R., & Patterson, J.J. (2019). Analysing institutional change in environmental governance: exploring the concept of 'institutional work'. Journal of Environmental Planning and Management, 62:1, 12-29, https://doi.org/10.1080/09640568.2016.1257423

Beveridge R., Guy, S. (2005). The rise of the eco-preneur and the messy world of environmental innovation. Local Environment - The International Journal of Justice and Sustainability, Volume 10, Issue 6, pp. 665-676tuden. https://doi.org/10.1080/13549830500321972

Bianchini, A., Pellegrini, M., Rossi, J., Saccani, C. (2018). A new productive model of circular economy enhanced by digital transformation in the Fourth Industrial Revolution - An integrated framework and real case studies. Proceedings of the Summer School Francesco Turco, pp. 221-227.

Bickerstaff, K., Walker, G. (2005). Shared visions, unholy alliances: Power, governance and deliberative processes in local transport planning. Urban Stud. 42, 2123–2144. https://doi.org/10.1080/00420980500332098

Bidmon, C.M, Knab, S.F. (2018). The three roles of business models in societal transitions: New linkages between business model and transition research. Journal of Cleaner Production, Volume 178, Pages 903-916, https://doi.org/10.1016/j.jclepro.2017.12.198.

Blewitt, J. (2017). Understanding Sustainable Development (3rd edition). Routledge. ISBN: 9781138205956

Block, J. H., Kohn, K., Miller, D., & Ullrich, K. (2015). Necessity entrepreneurship and competitive strategy. Small Business Economics, Vol 44, Issue 1, 37–54. https://doi.org/10.1007/s11187-014-9589-x

Blomsma, F. and Brennan, G. (2017). The Emergence of Circular Economy: A New Framing Around Prolonging Resource Productivity. Journal of Industrial Ecology, 21: 603-614. https://doi.org/10.1111/jiec.12603

Blumer, H. (1954). What is Wrong with Social Theory? American Sociological Review Vol. 19, No. 1, pp. 3-10, Published By: American Sociological Association. https://doi.org/10.2307/2088165

Bocken et al. (2014). A literature and practice review to develop sustainable business model archetypes. Journal of Cleaner Production, Volume 65, Pages 42-56

Bocken, et al. (2017). The circular economy - exploring the introduction of the concept AmongS&P 500 Firms. J. Ind. Ecol., Vol 21, Issue 3, pp. 487-490.

Bocken, N., 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, Vol 33, Issue 5, 308-320. https://doi.org/10.1080/21681015.2016.1172124

Bocken, N., Miller, K., Evans, S. (2015). Assessing the environmental impact of new Circular business models. The proceedings of the First International Conference on “New Business Models”, pp. 17-18

Bocken, N.M.P., Schuit, C.S.C., Kraaijenhagen, C. (2018). Experimenting with a circular business model: Lessons from eight cases. Environmental Innovation and Societal Transitions, Vol 28, pp. 79-95. https://doi.org/10.1016/j.eist.2018.02.001

Boon, W., Edler, J. (2018). Demand, challenges, and innovation. Making sense of new trends in innovation policy. Science and Public Policy, Volume 45, Issue 4, Pages 435–447, https://doi.org/10.1093/scipol/scy014

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, Volume 45, Pages 9-19

Boons, F., Montalvo, C., Quist, J., Wagner, M. (2013). Sustainable innovation, business models and economic performance: an overview. Journal of Cleaner Production, Volume 45, Pages 1-8, https://doi.org/10.1016/j.jclepro.2012.08.013.

Borrás, S., Edler, J. (2020). The roles of the state in the governance of sociotechnical systems' transformation. Res. Policy, 49, pp. 1-9

Borzaga, C., Defourny, J. (2001). The Emergence of Social Enterprise. Routledge, London & New York

Boulding, K.E. (1966). The Economics of the Coming Spaceship Earth. In H. Jarrett (ed.). Environmental Quality in a Growing Economy, pp. 3-14. Baltimore, MD: Resources for the Future/Johns Hopkins University Press.

Bourque, E., Dudek, G. (2004). Procedural Texture Matching and Transformation. Computer Graphics Forum, Eurographics, Volume 23, Issue 3. http://cim.mcgill.ca/mrl/pubs/ericb/eg2004.pdf

Braams, R., Wesseling, J., Meijer, A., Hekkert, M. (2021). Legitimizing transformative government: Aligning essential government tasks from transition literature with normative arguments about legitimacy from Public Administration traditions. Environmental Innovation and Societal Transitions, Vol. 39, pp. 191-205. https://doi.org/10.1016/j.eist.2021.04.004

Brennan, D., Tennant, M., Blomsma, F. (2015). Business and production solutions - Closing loops and the circular economy. Kopnina, H., Blewitt, J. (Eds.), Sustainability: Key Issues. Routledge, London, United Kingdom

Brown, P., Von Daniels, C., Bocken, N., Balkenende, A. (2021). A process model for collaboration in circular oriented innovation. Journal of Cleaner Production, Vol. 286. https://doi.org/10.1016/j.jclepro.2020.125499

Brush, C. G., Vanderwerf, P. A. (1992). A comparison of methods and sources for obtaining estimates of new venture performance. Journal of Business Venturing, Volume 7, Pages 157–170. https://doi.org/10.1016/0883-9026(92)90010-O

Bryman, A. (2015). Social research methods, 5th Revise. ed. Athenaeum Uitgeverij.

Burdett, H., Fenko, A., Gawel, A., Havermans, L., van Dijk, M. (2021). Circular Trailblazers: Scale-Ups Leading the Way Towards a More Circular Economy. https://www3.weforum.org/docs/WEF_Circular_Trailblazers_report_2020.pdf

Butcher, M. (2021). Cash-and-send fintech startup Diem raises $5.5M seed led by Fasanara Capital. https://techcrunch.com/2021/03/17/credit-and-collect-fintech-start-up-diem-raises-5-5m-seed-led-by-fasanara-capital/

Buzby, J. C., Hyman, J. (2012). Total and per capita value of food loss in the United States. Food Policy, Volume 37, Issue 5, Pages 561-570. https://www.sciencedirect.com/science/article/pii/S0956053X18304562#b0045

C

Calisto-Friant, M., Vermeulen, W., Salomone, R. (2020). A typology of circular economy discourses: Navigating the diverse visions of a contested paradigm. Resources, Conservation and Recycling, Vol. 161. https://doi.org/10.1016/j.resconrec.2020.104917

Campanhola, C., Pandey, S. (2019). Sustainable Food and Agriculture – An Integrated Approach. Academic Press. ISBN: 978-0-12-812134-4. https://doi.org/10.1016/C2016-0-01212-3

Campos, J. (2020). Beyond Silicon Valley: Six Startup Hubs Around the World. https://www.inacademy.eu/blog/six-startup-hubs-around-the-world/

Canitez, F. (2019). Pathways to sustainable urban mobility in developing megacities: A socio-technical transition perspective. Technological Forecasting and Social Change, Volume 141, Pages 319-329. https://www.sciencedirect.com/science/article/pii/S0040162518309880

Cardon, M.S., Wincent, J., Singh, J., Drnovsek, M. (2009). The nature and experience of entrepreneurial passion. Academy of Management Review, Volume 34 Issue 3, pp. 511-532

Carroll, Archie B. (1993) Business and Society: Ethics and Stakeholder Management, 2nd Ed. Cincinnati, OH: South-Westem Publishing Co.

Carter, C. R., Ellram, L. M. (1998). Reverse Logistics -- A Review of the Literature and Framework for Future Investigation. Journal of Business Logistics, Volume 19, Issue 1, Pages 85-102

Carvalho, A.D.P., et al. (2017). The role and contributions of sociological institutional theory to the socio-technical approach to innovation theory. RAI Rev. Adm. Inov.14 (3), 250-259. https://doi.org/10.1016/j.rai.2017.02.001

Carvalho, C.A.P., Vieira, M.M.F., Lopes, F.D. (1999). Contribuições da perspectiva institucional para análise das organizações in Anais do Encontro Nacional da Associação

Nacional de Pós-Graduação e Pesquisa em Administração, Foz do Iguaçu, PR, Brasil. http://www.anpad.org.br/admin/pdf/enanpad1999-org-26.pdf

Castellani, V., Sala, S., Mirabella, N. (2015). Beyond the throwaway society: A life cycle-based assessment of the environmental benefit of reuse. Integrated Environmental Assessment and Management, Volume 11, 373–382. Availanble online at: https://doi.org/10.1002/ieam.1614

Cave, A. (2015). What Will Come First: The Sharing Or Circular Economy? Forbes Online. https://www.forbes.com/sites/andrewcave/2015/03/29/what-will-come-first-the-sharing-or-circular-economy/#4cfee4e26721

CDP, (2020). Statement of Intent to Work Together Towards Comprehensive Corporate Reporting. https://29kjwb3armds2g3gi4lq2sx1-wpengine.netdna-ssl.com/wp-content/uploads/Statement-of-Intent-to-Work-Together-Towards-Comprehensive-Corporate-Reporting.pdf

Centobelli, P., Cerchione, R., Chiaroni, D., Del Vecchio, P., Urbinati, A. (2020). Designing business models in circular economy: A systematic literature review and research agenda. Business Strategy and the Environment. Vol, Issue 4, pp. 1734-1749. https://doi.org/10.1002/bse.2466

Cesinger, B., Vallaster, C., Müller, J. (2021). The ebb and flow of identity: How sustainable entrepreneurs deal with their hybridity. European Management Journal, In-Press. https://doi.org/10.1016/j.emj.2021.04.003

Chaplin, (2021). The John Lewis Partnership launches The Circular Future Fund: The Million Pound Challenge. https://www.circularonline.co.uk/news/the-john-lewis-partnership-launches-the-circular-future-fund-the-million-pound-challenge%E2%80%AF/

Charmaz, K. (2006). Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis. Thousand Oaks, CA: Sage.

Cheng, M., Foley, C. (2018). The sharing economy and digital discrimination: the case of Airbnb. Int. J. Hosp. Manag. 70, 95–98. https://doi.org/10.1016/j.ijhm.2017.11.002

Cherry, C.E., Pidgeon, N.F. (2018). Is sharing the solution? Exploring public acceptability of the sharing economy. J. Clean. Prod. 195, 939–948. https://doi.org/10.1016/j.jclepro.2018.05.278

Chertow, M.R. (2000). Industrial symbiosis: literature and taxonomy. Annual Review of Energy and the Environment, Volume 25, Issue 1, Pages 313-337. https://doi.org/10.1146/annurev.energy.25.1.313

Chertow, M.R. (2004). Industrial Symbiosis, Editor(s): Cutler J. Cleveland, Encyclopedia of Energy. Elsevier. Pages 407-415. https://doi.org/10.1016/B0-12-176480-X/00557-X.

Chesbrough, H. (2010). Business Model Innovation: Opportunities and Barriers. Long Range Planning, Vol., 43, Issue 2-3, pp. 354-363. https://doi.org/10.1016/j.lrp.2009.07.010

Choi, D.Y., Gray, E.R. (2008). The venture development processes of “sustainable” entrepreneurs. Management Research News, Volume 31, Pages 558–569. https://doi.org/10.1108/01409170810892127

Christensen, C. (1997). The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail. Boston, Mass: Harvard Business School Press

Circle Economy (2018). The Circularity Gap Report: An analysis of the circular state of the global economy.
https://docs.wixstatic.com/ugd/ad6e59_ba1e4d16c64f44fa94fbd8708eae8e34.pdf

Circle Economy, (2020). The Circularity Gap Report - When circularity goes from bad to worse: The power of countries to change the game.
https://pacecircular.org/sites/default/files/2020-01/Circularity%20Gap%20Report%202020.pdf

Circle Economy, (2021). The circularity gap report. https://www.circularity-gap.world/2021

circular.berlin, (2021). GreenCircle: eine neue Plattform für den zirkulären Konsum in Berlin. https://circular.berlin/greencircle-eine-neue-plattform-fur-den-zirkularen-konsum-in-berlin/

Coca-Stefaniak, A., Carroll, S. 2015. Traditional or Experiential Places? Exploring Research Needs and Practitioner Challenges in the Management of Town Centres Beyond the Economic Crisis

Cohen, B., Winn, M. I. (2007). Market imperfections, opportunity and sustainable entrepreneurship. Journal of Business Venturing, Volume 22, Issue 1, pp. 29–49. https://doi.org/10.1016/j.jbusvent.2004.12.001

Colombelli, A., Quatraro, F. (2017). Green start-ups and local knowledge spillovers from clean and dirty technologies. Small Business Economics. https://doi.org/10.1007/s11187-017-9934-y

Copani, G., Behnam, S. (2018). Remanufacturing with upgrade PSS for new sustainable business models. CIRP Journal of Manufacturing Science and Technology, 2018, ISSN 1755-5817, https://doi.org/10.1016/j.cirpj.2018.10.005

Corvellec, H., Stowell, A., Johannson, N. (2021). Critiques of the circular economy. Journal of Industrial Ecology, Vol. 26 (2). https://doi.org/10.1111/jiec.13187

Cramer, J. (2020). Implementing the circular economy in the Amsterdam Metropolitan Area: The interplay between market actors mediated by transition brokers. Business Strategy and the Environment, Vol. 29, Issue 6, pp. 2857-2870. https://doi.org/10.1002/bse.2548

Creswell, J. (2002). Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research. Upper Saddle River, NJ: Pearson Education

Cullen, U. A., De Angelis, R. (2020). Circular entrepreneurship: A business model perspective. Resources, Conservation and Recycling, In Press.
https://doi.org/10.1016/j.resconrec.2020.105300

Curtis, S.K., Mont, O. (2020). Sharing economy business models for sustainability. J. Clean. Prod. 266. https://doi.org/10.1016/j.jclepro.2020.121519

D

D'Antone, S., Canning, L., Frankling-Johnson, E., Spencer, R. (2017). Concerned innovation: The ebb and flow between market and society in Industrial Marketing Management, Vol. 64, pp. 66-78. https://doi.org/10.1016/j.indmarman.2017.02.006

Dantus, M., High, K. (1999). Evaluation of waste minimisation alternatives under uncertainty: a multiobjective optimisation approach. Computers & Chemical Engineering, Volume 23, Issue 10, pp. 1493-1508. https://doi.org/10.1016/S0098-1354(99)00307-5.

Daae, J., Chamberlin, L., Boks, C. (2018). Dimensions of Behaviour Change in the context of Designing for a Circular Economy. Design Journal, Volume 21, Issue 4, pp. 521-541. 10.1080/14606925.2018.1468003

Dagnino, G. 2007. Preface: Coopetition Strategy—Toward a New Kind of Inter-Firm Dynamics? International Studies of Management & Organisation, 37(2), 3-10. http://www.jstor.org/stable/40397694

Daimer, S., Hufnagl, H., Warnke, P. (2012). Challenge-oriented policy-making and innovation systems theory: reconsidering systemic instruments. K. Koschatzky (Ed.), Innovation System Revisited: Experiences from 40 Years of Fraunhofer ISI Research, Fraunhofer Verlag, Stuttgart, Germany, pp. 217-234

Davies, C., Lafortezza, R. (2019). Transitional path to the adoption of nature-based solutions. Land Use Policy, Volume 80, Pages 406-409. https://doi.org/10.1016/j.landusepol.2018.09.020

Davies, I. A., & Chambers, L. (2018). Integrating hybridity and business model theory in sustainable entrepreneurship. Journal of Cleaner Production, Volume 177, pp. 378–386. https://doi.org/10.1016/j.jclepro.2017.12.196

De Angelis, R., Howard, M., Miemczyk, J. (2018). Supply chain management and the circular economy: towards the circular supply chain. Production Planning and Control, Volume 29, Issue 6, pp. 425-437 https://doi.org/10.1080/09537287.2018.1449244

De los Rios, I. C., Charnley, F. J. S. (2017). Skills and capabilities for a sustainable and circular economy: The changing role of design. Journal of Cleaner Production, Multinational Enterprises' strategic dynamics and climate change: drivers, barriers and impacts of necessary organisational change, Volume 160, Pages 109–122. https://doi.org/10.1016/j.jclepro.2016.10.130

Dean, T. J., McMullen, J. S. (2007). Toward a theory of sustainable entrepreneurship: Reducing environmental degradation through entrepreneurial action. Journal of Business Venturing, Volume 22, Pages 50–76. https://doi.org/10.1016/j.jbusvent.2005.09.003

Defourny, J., Nyssens, M. (2010). Conceptions of Social Enterprise and Social Entrepreneurship in Europe and the United States: Convergences and Divergences. Journal of Social Entrepreneurship, Volume 1, Pages 32–53. https://doi.org/10.1080/19420670903442053

DEFRA, (2020). Circular Economy Package policy statement. Policy Paper. https://www.gov.uk/government/publications/circular-economy-package-policy-statement/circular-economy-package-policy-statement

Despeisse, M. et al. (2017). Unlocking value for a circular economy through 3D printing: A research agenda. Technological Forecasting and Social Change, Volume 115, Pages 75-84. https://doi.org/10.1016/j.techfore.2016.09.021

Deutz, P. (2020). Circular Economy. Editor(s): Audrey Kobayashi. International Encyclopedia of Human Geography (Second Edition), Elsevier. Pp 193-201. https://doi.org/10.1016/B978-0-08-102295-5.10630-4.

Diaz Lopez, F., Bastein, T., Tukker, A. (2019). Business Model Innovation for Resource-efficiency, Circularity and Cleaner Production: What 143 Cases Tell Us. Ecological Economics, Volume 155, Pages 20-35.

Doherty, B., Haugh, H., Lyon, F. (2014). Social Enterprises as Hybrid Organisations: A Review and Research Agenda. International Journal of Management Reviews, Volume 16, Pages 417–436. https://doi.org/10.1111/ijmr.12028

Domenech, T. et al. (2019). Mapping IS Development in Europe_ typologies of networks, characteristics, performance and contribution to the Circular Economy. Resources, Conservation and Recycling, Volume 141, Pages 76-98. https://doi.org/10.1016/j.resconrec.2018.09.016

Donnellon, A., Ollila, S., Williams Middleton, K. (2014). Constructing entrepreneurial identity in entrepreneurship education. The International Journal of Management Education, Volume 12, Issue 3, pp. 490–499. https://doi.org/10.1016/j.ijme.2014.05.004

Douglas, E., Prentice, C. (2019). Innovation and profit motivations for social entrepreneurship: A fuzzy-set analysis. Journal of Business Research, Volume 99, pp. 69-79. https://doi.org/10.1016/j.jbusres.2019.02.031

Douglas, E., Shepherd, D., Venugopal, V. (2021). A multi-motivational general model of entrepreneurial intention. Journal of Business Venturing, Vol. 36, Issue 4. https://doi.org/10.1016/j.jbusvent.2021.106107

Downing, S. (2005). The Social Construction of Entrepreneurship: Narrative and Dramatic Processes in the Co-production of Organisations and Identities. Entrepreneurship Theory and Practice, Volume 29, Issue 2, pp. 185- 204

E

Easterling, K. (2018). Many. ARQ, 2018, Volume 98, pp. 26-31. https://scielo.conicyt.cl/pdf/arq/n98/en_0717-6996-arq-98-00026.pdf

Ebrahim, A., Battilana, J., Mair, J. (2014). The governance of social enterprises: Mission drift and accountability challenges in hybrid organisations. Research in Organisational Behaviour, Volume 34, pp. 81-100. https://doi.org/10.1016/j.riob.2014.09.001

Eisenhardt, K., Gräbner, M. (2007). Theory Building from Cases: Opportunities and Challenges. The Academy of Management Journal, Vol. 50, No. 1, pp. 25-32. http://www.jstor.org/stable/20159839

Ekinci, Y., Gordon-Wilson, S., Slade, A. (2020). An exploration of entrepreneurs' identities and business growth. Business Horizons, In Press. https://doi.org/10.1016/j.bushor.2020.02.003

EMF (2013). Towards the CE: Economic and Business Rationale for an Accelerated Transition. http://tinyurl.com/pv7q7l4

EMF (2015). Growth within: A circular economy vision for a competitive Europe. https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_Growth-Within_July15.pdf

EMF et al. (2019). Artificial Intelligence and the Circular Economy – AI as a tool to accelerate the Transition. https://www.ellenmacarthurfoundation.org/assets/downloads/Artificial-intelligence-and-the-circular-economy.pdf

European Commission (2008). Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on Waste and Repealing Certain Directives. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0098&from=EN.

European Commission (2015). Towards an EU research and innovation policy agenda for nature-based solutions and re-naturing cities. Final Report of the Horizon 2020 expert group on “Nature-Based Solutions and Re-Naturing Cities.” European Commission, Brussels, Belgium

European Commission (2016). Closing the loop—An EU action plan for the CE. Brussels: European Commission. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614

European Commission (2018). Horizon 2020 - Work Programme 2018-2020 - 12. Climate action, environment, resource efficiency and raw materials. http://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-climate_en.pdf

European Commission, (2020). Climate action, environment, resource efficiency and raw materials. https://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-climate_en.pdf.

European Commission, (2021). First circular economy action plan. https://ec.europa.eu/environment/topics/circular-economy/first-circular-economy-action-plan_en#ecl-inpage-937

European Commission, (2021). SirPlus: the supermarket that rescues unwanted food - rescuing as a new way of buying, https://circulareconomy.europa.eu/platform/en/good-practices/sirplus-supermarket-rescues-unwanted-food-rescuing-new-way-buying

European Startup Initiative, (2017). Startup heatmap Europe. https://www.startupheatmap.eu/analytics.

F

Faivre, N., Fritz, M., Freitas, T., de Boissezon, B., Vandewoestijne, S. (2017). Nature-Based Solutions in the EU: Innovating with nature to address social, economic and environmental

challenges. Environmental Research, Volume 159, Pages 509-518. https://doi.org/10.1016/j.envres.2017.08.032

Farooque, M., Zhang, A., Huisingh, D. (2019). Circular supply chain management: A definition and structured literature review. Journal of Cleaner Production, Volume 228, Pages 882-900. https://doi.org/10.1016/j.jclepro.2019.04.303

Fassin, Y. (2009). The Stakeholder Model Refined. Journal of Business Ethics, Volume 84, pp. 113-135. 10.1007/s10551-008-9677-4

Fauchart, E., Gruber, M. (2011). Darwinians, Communitarians, and Missionaries: The Role of Founder Identity in Entrepreneurship. Academy of Management Journal, 54 (5), 935–957. https://doi.org/10.5465/amj.2009.0211

Fischer, A., Pascucci, S. (2017). Institutional incentives in circular economy transition: The case of material use in the Dutch textile industry. Journal of Cleaner Production, Vo. 155, pp. 17–23. https://doi.org/10.1016/j.jclepro.2016.12.038

Fischer, A., Pasucci, S., Dolfsma, W. (2021). Understanding the role of institutional intermediaries in the emergence of the circular economy. Circular Economy. Challenges and Opportunities for Ethical and Sustainable Business, Routledge, 1st Edt. https://doi.org/10.4324/9780367816650

Fisher, G. (2012). Effectuation, causation, and bricolage: A behavioural comparison of emerging theories in entrepreneurship research. Entrep. Theory Pract. 36, 1019–1051. https://doi.org/10.1111/j.1540-6520.2012.00537.x

Forum for the Future (2016). The Circular Economy Business Model Toolkit: a Toolkit that Helps Businesses Transition from the Linear to the Circular Economy. https://www.forumforthefuture.org/project/circular-economy-business-model-toolkit/overview

Foss, N., Saebi, T. (2016). Fifteen Years of Research on Business Model Innovation: How Far Have We Come, and Where Should We Go? Journal of Management, Volume 43, Issue 1. https://doi.org/10.1177%2F0149206316675927

Franco, M.A. (2017). Circular economy at the micro level: A dynamic view of incumbents' struggles and challenges in the textile industry. Journal of Cleaner Production, Volume 168, Pages 833–845. https://doi.org/10.1016/j.jclepro.2017.09.056

Frantzeskaki, N. (2019). Seven lessons for planning nature-based solutions in cities in Environmental Science and Policy, Volume 93, Pages 101-111

Frenken, K. (2017). A Complexity-Theoretic Perspective on Innovation Policy. Complexity, Gov. Networks 0, 35–47. https://doi.org/http://dx.doi.org/10.20377/cgn-41

Frenken, K. (2017). Political economies and environmental futures for the sharing economy. Philos. Trans. A Math. Phys. Eng. Sci. 375, 20160367 https://doi.org/10.1098/rsta.2016.0367

Frishammar, J., & Parida, V. (2019). Circular Business Model Transformation: A Roadmap for Incumbent Firms. California Management Review, 61(2), 5–29. https://doi.org/10.1177/0008125618811926

Frishammar, J., Parida, V. (2019). Circular Business Model Transformation: A Roadmap for Incumbent Firms in California Management Review, Volume 61, Pages 5–29. https://doi.org/10.1177/0008125618811926

Fuenfschilling, L., Truffer, B. (2013). The structuration of socio-technical regimes – Conceptual foundations from institutional theory in Research Policy, Volume 43, Issue 4, Pages 772–791.

Fuentes, C., Sörum, N. (2019). Agencing ethical consumers: smartphone apps and the socio-material reconfiguration of everyday life, Consumption Markets & Culture, Vol. 22, Issue 2, pp. 131-156, https://doi.org/10.1080/10253866.2018.1456428

G

Gagne, M., Deci, E. L. (2005). Self-determination theory and work motivation. Journal of Organisational Behaviour, 26 (4), 331-362, https://doi.org/10.1002/job.322

Galvão, GDA., de Nadae, J., Honorato Clemente, D., Chinen, G., Monteiro de Carvalho, M. (2018). Circular Economy: Overview of Barriers, Procedia CIRP, Vol 73, pp. 79-85. https://doi.org/10.1016/j.procir.2018.04.011

Gartner, W. (1985). A Conceptual Framework for Describing the Phenomenon of New Venture Creation in The Academy of Management Review, 10 (4), pp. 696-706. https://doi.org/10.2307/258039

Gartner, W. (1990). What we are talking about when we are talking about entrepreneurship? In Journal of Business Venturing, Volume 5, pp. 15-28

Gast, J., Gundolf, K., Cesinger, B. (2017). Doing business in a green way: A systematic review of the ecological sustainability entrepreneurship literature and future research directions. Journal of Cleaner Production, Volume, Issue 147, pp. 44–56. https://doi.org/10.1016/j.jclepro.2017.01.065

Gebhart, M, Spieske, A., Birkel, H. (2022). The future of the circular economy and its effect on supply chain dependencies: Empirical evidence from a Delphi study in Transportation Research Part E Logistics and Transportation Review, Vol 157, Issue 4. http://dx.doi.org/10.1016/j.tre.2021.102570

Geels, (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study in Res. Policy, 31 (8), pp. 1257-1274, https://doi.org/10.1016/S0048-7333(02)00062-8

Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems. Insights about dynamics and change from sociology and institutional theory. Research Policy, 33, 897–920. https://doi.org/10.1016/j.respol.2004.01.015

Geels, F.W. (2005). Technological Transitions and System Innovations; A Co-evolutionary and Socio-Technical Analysis. Edward Elgar, Cheltenham

Geels, F. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms in Environmental Innovation and Societal Transitions, Vol 1 (1). https://doi.org/10.1016/j.eist.2011.02.002

Geels, F.W., Hekkert, M.P., Jacobsson, S. (2008). The dynamics of sustainable innovation journeys, Technol. Anal. Strat. Manag., 20 (5), pp. 521-536. https://doi.org/10.1080/09537320802292982

Geissdoerfer, M., Morioka, S., Monteiro de Carvalho, M., Evans, S. (2018). Business models and supply chains for the circular economy. Journal of Cleaner Production, Volume 190, Pages 712-721, https://doi.org/10.1016/j.jclepro.2018.04.159.

Geissdoerfer, M., Pieroni, M. P.P., Pigosso, D. C.A., Soufani, K. (2020). Circular business models: A review. Journal of Cleaner Production, Vol 277, 123741. https://doi.org/10.1016/j.jclepro.2020.123741

Geissdoerfer, M., Savaget, P., Bocken, N.M.P., Hultink, E.J. (2017). The Circular Economy – A new sustainability paradigm? Jourrnal of Cleaner Production, Volume 143, Pages 757–768. https://doi.org/10.1016/j.jclepro.2016.12.048

Geissdoerfer, M., Vladimirova, D., Evans, S. (2018). Sustainable business model innovation: A review. Journal of Cleaner Production, Volume 198, Pages 401–416. https://doi.org/10.1016/j.jclepro.2018.06.240

Gemeente Rotterdam (2016). Roadmap Circular Economy Rotterdam. http://www.rotterdamclimateinitiative.nl/documents/2016/roadmap-circular-economy.pdf

Geng, Y., Doberstein, B. (2008). Developing the circular economy in China: Challenges and opportunities for achieving 'leapfrog development' in International Journal of Sustainable Development and World Ecology, 15 (3), pp. 231-239.

Geng, Y., Zhu, Q., Doberstein, B., Fujita, T. (2009). Implementing China's circular economy concept at the regional level: A review of progress in Dalian, China, Waste Management, Vol 29, Issue 2, pp. 996-1002. https://doi.org/10.1016/j.wasman.2008.06.036

Germak, Andrew J., Robinson, Jeffrey A. (2014). Exploring the Motivation of Nascent Social Entrepreneurs. Journal of Social Entrepreneurship, Vol 5, Issue 1, pp. 5-21, 10.1080/19420676.2013.820781

Ghalwash, S., Tolba, A., Ismail, A. (2017). What Motivates Social Entrepreneurs to Start Social Ventures ? An Exploratory Study in the Context of a Developing Economy in Social Enterprise Journal. Emerald Publishing Limited, Volume 13, Issue 3, pp. 268–298. 10.1108/SEJ-05-2016-0014

Ghisellini, P., Cialani, C., Ulgiati, S. (2016). A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems. J. Clean. Prod. 114, 11–32. 10.1016/j.jclepro.2015.09.007

Gibb, A. (1996). Entrepreneurship and Small Business Management: Can We Afford to Neglect Them in the Twenty-first Century Business School? British Journal of Management, Vol. 4 (7). https://doi.org/10.1111/j.1467-8551.1996.tb00121.x

Gibbs, D. (2009). Sustainability Entrepreneurs, Ecopreneurs and the Development of a Sustainable Economy. Greener Management International, Issue 55, pp. 63-78

Gilissen, H., van Rijswick, H., Schueler, B. (2009). Environmental Policy in The Netherlands. Confronting Social and Environmental Sustainability with Economic Pressure: Balancing Trade-offs by Policy Dismantling or Expansion? (CONSENSUS)

Gioia, D. A., Corley, K. G., Hamilton, A. L. (2012). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology in Organisational Research Methods, Volume 16, pp. 15–31

Graedel, T. E., Allwood, J., Birat, J. P., Buchert, M., Hagelüken, C., Reck, B. K., et al. (2011). What do we know about metal recycling rates? Journal of Industrial Ecology, Volume 15, Issue 3, Pages 355–366

Grafström, J., Aasma, S. (2021). Breaking circular economy barriers. Journal of Cleaner Production, Vol 292, 126002. https://doi.org/10.1016/j.jclepro.2021.126002

Gruber, M., Henkel, J. (2006). New ventures based on open innovation - an empirical analysis of start-up firms in embedded Linux. International Journal of Technology Management, Vol. 33, No. 4, pp. 256-372.

Guzzo, D., Rodrigues, V. P., Mascarenhas, J. (2021). A systems representation of the Circular Economy: Transition scenarios in the electrical and electronic equipment (EEE). industry, Technological Forecasting and Social Change, Vol 163, 120414. https://doi.org/10.1016/j.techfore.2020.120414.

H

Haas, W., Kausmann, F., Wiedenhofer, D, Heinz, M. (2015). How Circular is the Global Economy?: An Assessment of Material Flows, Waste Production, and Recycling in the European Union and the World in 2005. Journal of Industrial Ecology, Volume 19, Issue 5, pp 765-777. https://doi.org/10.1111/jiec.12244

Habibi, M.R., Davidson, A., Laroche, M. (2017). What managers should know about the sharing economy. Bus. Horiz., 60 (2017), pp. 113-121. 10.1016/j.bushor.2016.09.007

Hai, S. and R. L. Daft, (2016). When missions collide: Lessons from hybrid organisations for sustaining a strong social mission. Organisational Dynamics 45(4): 283-290. http://dx.doi.org/10.1016/j.orgdyn.2016.10.003

Hall, J. K., Daneke, G. A., Lenox, M. J. (2010). Sustainable development and entrepreneurship: Past contributions and future directions. Journal of Business Venturing, Volume 25, Issue 5, pp. 439–448. https://doi.org/10.1016/j.jbusvent.2010.01.002

Hautier, Y., Zhang, P., Loreau, M. et al. (2020). General destabilizing effects of eutrophication on grassland productivity at multiple spatial scales. Nat Commun 11, 5375. https://doi.org/10.1038/s41467-020-19252-4

Hautier. Y., Tilman D., Isbell, F., Seabloom, E. W., Borer, E. T., Reich, P. B. (2015). Anthropogenic environmental changes affect ecosystem stability via biodiversity. Science, Vol. 348, no. 6232, pp. 336-340. https://doi.org/10.1126/science.aaa1788

Hazen, B. T., Mollenkopf, D. A., Wang, Y. (2017). Remanufacturing for the circular economy: An examination of consumer switching behaviour. Business Strategy and the Environment, Volume 26, Issue 4, Pages 451–464.

Hekkert, M.P., Janssen, M.J., Wesseling, J.H., Negro, S.O. (2020). Mission-oriented innovation systems, Environmental Innovation and Societal Transitions, Vol 34, pp. 76-79. https://doi.org/10.1016/j.eist.2019.11.011

Hekkert, M.P., Suurs, R.A.A., Negro, S.O., Kuhlmann, S., RSmits, E.H.M. (2007). Functions of innovation systems: A new approach for analysing technological change, Technological Forecasting and Social Change, Volume 74, Issue 4, Pages 413-432, https://doi.org/10.1016/j.techfore.2006.03.002.

Henderson, R., & Clark, K. (1990). Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms. Administrative Science Quarterly, 35 (1), 9-30. https://doi.org/10.2307/2393549

Henderson, R., Clark, K, (1990). Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms in Administrative Science, Volume 35, Issue 1, Pages 9-30. https://www.jstor.org/stable/2393549

Henkel, (2019). Henkel invests into specialist circular economy fund. https://www.henkel.com/resource/blob/899994/52affd5d16a51450f72a4126a1a4ab7b/data/2019-01-08-press-release-henkel-invests-into-specialist-circular-economy-fund.pdf

Henry, M., Bauwens, T., Kirchherr, J., Hekkert, M. (2020). A Typology of Circular Start-ups: Analysis of 128 Circular Business Models. Journal of Cleaner Production, Vol. 245. https://doi.org/10.1016/j.jclepro.2019.118528

Henry, M., Schraven, D., Bocken, K., Frenken, K., Hekkert, M., Kirchherr, J., (2021a). The battle of the buzzwords: A comparative review of the circular economy and the sharing economy concepts in Environmental Innovation and Societal Transitions, Vol. 38., pp. 1-21. https://doi.org/10.1016/j.eist.2020.10.008

Henry, M., Hoogenstrijd, T., Kirchherr, J., (2021b). The rise of the circular entrepreneur: An altruistic spirit and the pursuit of mass-market expansion in Circular Economy, Routledge, Edt. by Kopnina, H., Poldner, K., pp. 127-148

Hessels, J., Van Gelderen, M., Thurik, R. (2008). Entrepreneurial aspirations, motivations, and their drivers in Small Business Economics, Volume 31, Issue 3, pp. 323–339. https://doi.org/10.1007/s11187-008-9134-x

Heyes, G., Sharmina, M., Mendoza, J. M. F., Gallego Schmid, A. (2018). Developing and implementing circular economy business models in service-oriented technology companies. Journal of Cleaner Production, Volume 177, Pages 621-632. 10.1016/j.jclepro.2017.12.168

Hill, C. W. L., Rothaermel, F. T. (2003). The Performance of Incumbent Firms in the Face of Radical Technological Innovation in Academy of Management Review, Volume 28, Issue 2, Pages 258-274. https://doi.org/10.5465/amr.2003.9416161

Hobson, K. 2021. The limits of the loops: critical environmental politics and the Circular Economy. Environmental Politics 30(1-2), pp. 161-179. 10.1080/09644016.2020.1816052

Hobson, K. (2015). Closing the loop or squaring the circle? Locating generative spaces for the circular economy in Progress in Human Geography, Vol. 40, Issue 1., pp. 88-104. https://doi.org/10.1177%2F0309132514566342

Hobson, K. (2020). 'Small stories of closing loops': social circularity and the everyday circular economy. Climatic Change Vol 163, pp. 99–116. https://doi.org/10.1007/s10584-019-02480-z

Hobson, K., Lynch, N. (2016). Diversifying and de-growing the circular economy: Radical social transformation in a resource-scarce world, Futures, Vol 82, pp. 15-25. https://doi.org/10.1016/j.futures.2016.05.012

Hockerts, K., Wüstenhagen, R. (2010). Greening Goliaths versus emerging Davids — Theorizing about the role of incumbents and new entrants in sustainable entrepreneurship. Journal of Business Venturing, Sustainable Development and Entrepreneurship Volume 25, Pages 481–492. https://doi.org/10.1016/j.jbusvent.2009.07.005

Hofnaegels, K. (2016). Das Tropicana-Kollektiv in smart magazine. https://de.smart-magazine.com/bluecity010-rotterdam/

Hopkinson, P., De Angelis, R., Zils, M. (2020). Systemic building blocks for creating and capturing value from circular economy. Resources, Conservation and Recycling, Vol. 155. https://doi.org/10.1016/j.resconrec.2019.104672

Hruschka, D. J., Schwartz, D., St. John, D. C., Picone-Decaro, E., Jenkins, R. A., Carey, J. W. (2004). Reliability in Coding Open-Ended Data: Lessons Learned from HIV Behavioural Research in Field Methods, Volume 16, Pages 307–331. https://doi.org/10.1177/1525822X04266540

Hsieh, H.-F., Shannon, S.E. (2005). Three Approaches to Qualitative Content Analysis in Qualitative Health Research, Volume 15, Pages 1277–1288. https://doi.org/10.1177/1049732305276687

Hyde, K., Smith, A., Smith, M., Henningsson, S. (2001). The challenge of waste minimisation in the food and drink industry: a demonstration project in East Anglia, UK. Journal of Cleaner Production, Volume 9, Pages 57-64. https://doi.org/10.1016/S0959-6526(00)00050-0

I

ING, (2020). Learning from consumers: How shifting demands are shaping companies' circular economy transition. https://www.ingwb.com/media/3076131/ing-circular-economy-survey-2020-learning-from-consumers.pdf

Inigo, E. A., Blok, V. (2019). Strengthening the socio-ethical foundations of the circular economy: Lessons from responsible research and innovation. Journal of Cleaner Production, 233, 280–291. https://doi.org/10.1016/j.jclepro.2019.06.053

Isaak, R. (2002). The Making of the Ecopreneur in Greener Management International, Vol. 38, Environmental Entrepreneurship, pp. 81-91

J

Jabbour, C.J.C., Camargo Fiorini, P., Wong, C., Jugend, D., Lopes de Sousa Jabbour, A.B., Seles, B.M.R, Pinheiro, M.A.P., Ribeiro da Silva, H.M. (2020). First-mover firms in the transition towards the sharing economy in metallic natural resource-intensive industries: implications for the circular economy and emerging industry 4.0 technologies. Resour. Policy, Vol. 66, 10.1016/j.resourpol.2020.101596

Jannsen, M. (2021). Legitimation and effects of mission-oriented innovation policies: A spillover perspective. Conference Paper. Hacienda Publica Espanola

Jawahir, I. S., Dillon, O. W., Rouch, K. E., Joshi, K. J., Jaafar, I. H. (2006). Total life-Cycle considerations in product design for sustainability: a framework for comprehensive evaluation, At 10th International Research/Expert Conference Trends in the Development of Machinery and Associated Technology, University of Kentucky, Pages 11–15

Jawahir, I. S., Rouch, K. E., Dillon, O. W., Holloway Jr., L., Hall, A. (2007). Design for sustainability (DFS): new challenges in developing and implementing a curriculum for next generation design and manufacturing engineers in International Journal of Engineering Education, Volume 23, Issue 6, Pages 1053-1064

Jayal, A. D., Badurdeen, F., Dillon, O. W., Jawahir, I. S. (2010). Sustainable manufacturing: modeling and optimisation challenges at the product, process and system levels in CIRP Journal of Manufacturing, Science and Technology, Volume 2, Issue 3, Pages 144–152. http://dx.doi.org/10.1016/j.cirpj.2010.03.006

Jayaratne, M., Sullivan M. G., D'Souza, C. (2019). Sustainability Entrepreneurship: From Consumer Concern Towards Entrepreneurial Commitment in Sustainability Vol 11, Issue 24. https://doi.org/10.3390/su11247076

Jesus, G., Jugend, D. (2021). How can open innovation contribute to circular economy adoption? Insights from a literature review in European Journal of Innovation Management, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/EJIM-01-2021-0022

Jiang, W., Chai, H. Shao, J., Feng, T. (2018). Green entrepreneurial orientation for enhancingfirm performance: Adynamic capability perspective. Journal of Cleaner Production, Volume 198, Pages 1311-1323. https://doi.org/10.1016/j.jclepro.2018.07.104

Johnson, M.W. (2010). Seizing the white space. Business model innovation for growth and renewal. Harvard Business School Press, Boston, MA.

Jones, C., Spicer, A. (2005). The sublime object of entrepreneurship in Organisation, Vol. 12, Issue 2, pp. 223-246

Jørgensen, U. (2012). Mapping and navigating transitions - The multi-level perspective compared with arenas of development. Res. Policy 41, 996–1010. https://doi.org/10.1016/j.respol.2012.03.001

Jun, F.W., Hui, M.L. (2006). The development of the circular economy in China, Aquatic Ecosystem Health and Management, 9 (1), pp. 99-103. https://doi.org/10.1080/14634980500536162

Junnila, S., Ottelin, J., Leinikka, L. (2018). Influence of reduced ownership on the environmental benefits of the circular economy in Sustainability (Switzerland), Volume 10, Issue 11, art. no. 4077. https://doi.org/10.3390/su10114077

K

Kabisch et al. (2016). Nature-based solutions to climate change mitigation and adaptation in urban areas: perspectives on indicators, knowledge gaps, barriers, and opportunities for action. Ecology and Society, Volume 21, Issue 2, pp 39. https://doi.org/10.5751/ES-08373-210239

Kanda, W., Geissdoerfer, M., Hjelm, O. (2021). From circular business models to circular business ecosystems. Business Strategy and the Environment, Vol. 30, Issue 6, pp. 2814-2829. https://doi.org/10.1002/bse.2895

Kašperová, E., Kitching, J. (2014). Embodying entrepreneurial identity. International Journal of Entrepreneurial Behaviour & Research, Volume 20, Issue 5, pp. 438–452. https://doi.org/10.1108/ijebr-07-2013-0108

Kattel, R., Mazzucato, M. (2018). Mission-oriented innovation policy and dynamic capabilities in the public sector, Ind. Corp. Chang., 27 (5), pp. 787-801, 10.1093/icc/dty032

Kemp, R., Schot, J., Hoogma, R. (2007). Regime shifts to sustainability through processes of niche formation: The approach of strategic niche management in Technology Analysis & Strategic Management, Vol 10 (2), pp. 175-198.

Kern, F., Sharp, H., Hachmann, S. (2020). Governing the second deep transition towards a circular economy: How rules emerge, align and diffuse, Environmental Innovation and Societal Transitions, Volume 37, Pages 171-186, https://doi.org/10.1016/j.eist.2020.08.008

Keskin, D., Diehl, J.C., Molenaar, N. (2013). Innovation process of new ventures driven by sustainability. Journal of Cleaner Production, Sustainable Innovation and Business Models, Volume 45, Pages 50–60. https://doi.org/10.1016/j.jclepro.2012.05.012

Kiernan, L. (2020). TENACIOUS VENTURES MAKES FIRST INVESTMENT, CO-LEADS $8M SERIES A FOR GOTERRA. https://www.globalaginvesting.com/tenacious-ventures-makes-first-investment-co-leads-8m-series-goterra/

Kim, H., Baumann, T., Laskowski, M. (2020). Towards Ontology and Blockchain Based Measurement, Reporting, and Verification For Climate Action. http://dx.doi.org/10.2139/ssrn.3717389

King, A. M., Burgess, S. C., Ijomah, W., Mcmahon, C. A. (2006). Reducing waste: repair, recondition, remanufacture or recycle? in Sustainable Development, Volume 14, Pages 257–267. https://doi.org/10.1002/sd.271

Kirchherr, J., Reike, D., Hekkert, M. (2017). Conceptualizing the Circular Economy: An Analysis of 114 Definitions. Resources, Conservation and Recycling, 127, pp. 221-232, https://doi.org/10.1016/j.resconrec.2017.09.005

Kirchherr, J., Piscicelli, L., Bour, R., Kostense-Smit, E., Muller, J., Huibrechtse-Truijens, A., Hekkert, M., (2018). Barriers to the Circular Economy: Evidence from the European Union (EU). Ecological Economics, Volume 150, pp. 264-272. https://doi.org/10.1016/j.ecolecon.2018.04.028

Kirchherr, J., van Santen, R., (2019). Research on the Circular Economy: A Critique of the Field. Resources, Conservation and Recycling, Volume 151. https://doi.org/10.1016/j.resconrec.2019.104480

Kirchherr, J. (2021). Towards Circular Justice: A Proposition. Resources, Conservation and Recycling, Vol. 173. https://doi.org/10.1016/j.rescfonrec.2021.105712

Kirkpatrick, J., Davison A., Harwood A. (2013). How tree professionals perceive trees and conflicts about trees in Australia's urban forest in Landscape and Urban Planning Volume 119, Pages 124-130. http://dx.doi.org/10.1016/j.landurbplan.2013.07.009

Kirkwood, J., Walton, S. (2010). What motivates ecopreneurs to start businesses? in International Journal of Entrepreneurial Behaviour & Research. https://doi.org/10.1108/13552551011042799

Klewitz, J., Hansen, E.G. (2014). Sustainability-oriented innovation of SMEs: a systematic review. Journal of Cleaner Production, Volume 65, Pages 57–75. https://doi.org/10.1016/j.jclepro.2013.07.017

Klyver, K., Terjesen, S. (2007). Entrepreneurial network composition: An analysis across venture development stage and gender in Women in Management Review, Volume 22, Pages 682–688. https://doi.org/10.1108/09649420710836344

Kok, L., Wurpel, G., & Ten Wolde, A. (2013). Unleashing the power of the circular economy.

Konietzko, J., Bocken, N., Hultink, E. J. (2019). Online Platforms and the Circular Economy. Innovation for Sustainability: Business Transformations Towards a Better World, Chapter: 23. Palgrave Macmillan, Cham. Pages 435-450.

Konietzko, J., Bocken, N., Hultink, E. J. (2020). Circular ecosystem innovation: An initial set of principles. Journal of Cleaner Production, Volume 253. https://doi.org/10.1016/j.jclepro.2019.119942

Kopnina, H. (2018). Teaching circular economy: Overcoming the challenge of green-washing. Handbook of Engaged Sustainability: Contemporary Trends and Future Prospects. Ed. by S. K. Dhiman and Marques, J. Dordrecht: Springer

Kopnina, H. (2019). Green-washing or best case practices? Using circular economy and Cradle to Cradle case studies in business education. Journal of Cleaner Production, Volume 219, Pages 613-621, https://doi.org/10.1016/j.jclepro.2019.02.005.

Kopnina, H. (2021). Towards Ecological Management: Identifying Barriers and Opportunities in Transition from Linear to Circular Economy. Philosophy of Management 20, 5–19. https://doi.org/10.1007/s40926-019-00108-x

Kopnina, H., Poldner, K. (2021). Circular Economy: Challenges and Opportunities for Ethical and Sustainable Business (1st ed.). Routledge. https://doi.org/10.4324/9780367816650

Korhonen, J., Nuur, C., Feldmann, A., Birkie, S. E. (2018). Circular economy as an essentially contested concept. Journal of Cleaner Production, 175, 544–552. https://doi.org/10.1016/j.jclepro.2017.12.111

Körner, I. (2015). Chapter 7 - Civilisation Biorefineries: Efficient Utilisation of Residue-Based Bioresources. Editor(s): Ashok Pandey, Rainer Höfer, Mohammad Taherzadeh, K. Madhavan Nampoothiri, Christian Larroche. Industrial Biorefineries & White Biotechnology. Elsevier. Pages 295-340. https://doi.org/10.1016/B978-0-444-63453-5.00009-4.

Kosmol, L. (2019). Sharing is Caring - Information and Knowledge in Industrial Symbiosis: A Systematic Review. IEEE 21st Conference on Business Informatics (CBI), Moscow, Russia, pp. 21-30. https://doi.org/10.1109/CBI.2019.00010.

Kouhizadeh, M., Zhu, Q., Sarkis, J. (2020). Blockchain and the circular economy: potential tensions and critical reflections from practice. Production Planning & Control, 31:11-12, pp. 950-966. https://doi.org/10.1080/09537287.2019.1695925

Kouhizadeh, M., Zhu, Q., Alkhuzaim, L. and Sarkis, J. (2022). Blockchain Technology and the Circular Economy: An Exploration. Bals, L., Tate, W.L. and Ellram, L.M. (Ed.) Circular Economy Supply Chains: From Chains to Systems, Emerald Publishing Limited, Bingley, pp. 189-213. https://doi.org/10.1108/978-1-83982-544-620221010

Kraus, S., Filser, M., O'Dwyer, M., Shaw, E. (2013). Social Entrepreneurship: An exploratory citation analysis. Review of Managerial Science, Vol. 8, pp. 275-292. https://doi.org/10.1007/s11846-013-0104-6

Krausmann, F., Gingrich, S., Eisenmenger, N., Erb, K.-H., Haberl, H., Fischer-Kowalski, M. (2009). Growth in global materials use, GDP and population during the 20th century. Ecological Economics, Volume 68, Pages 2696–2705. https://doi.org/10.1016/j.ecolecon.2009.05.007

Krauze, K., Wagner, I. (2019). From classical water-ecosystem theories to nature-based solutions — Contextualizing nature-based solutions for sustainable city in Science of the Total Environment, Volume 655, Pages 697-706. https://doi.org/10.1016/j.scitotenv.2018.11.187

Krippendorff, K. (2013). Content Analysis. An Introduction to Its Methodology (3rd ed). California, CA: Sage Publications.

Kristensen, H., Mosgaard, M. (2020). A review of micro level indicators for a circular economy – moving away from the three dimensions of sustainability? Journal of Cleaner Production, Volume 243. https://doi.org/10.1016/j.jclepro.2019.118531

Kronenberg, J. (2015). Why not to green a city? Institutional barriers to preserving urban ecosystem services in Ecosystem Services Volume 12, Pages 218-227. http://dx.doi.org/10.1016/j.ecoser.2014.07.002

Kuckertz, A., Wagner, M. (2010). The influence of sustainability orientation on entrepreneurial intentions — Investigating the role of business experience. Journal of Business Venturing, Volume 25, Issue 5, pp. 524-539. https://doi.org/10.1016/j.jbusvent.2009.09.001

Kühl, C., Tjahjono, B., Bourlakis, M., Aktas, E. (2018). Implementation of Circular Economy principles in PSS operations. Procedia CIRP, Volume 71, Pages 124-129. https://www.sciencedirect.com/science/article/pii/S2212827118304840

Kunz, N., Mayers, K., Van Wassenhove, L. (2018). Stakeholder views on extended producer responsibility and the circular economy, Calif. Manag. Rev., 60 (3). (2018), pp. 45-70

Kusa, R., Duda, J., Suder, M. (2021). Explaining SME performance with fsQCA: The role of entrepreneurial orientation, entrepreneur motivation, and opportunity perception. Journal of Innovation & Knowledege In press.

Kvale, S. (1983). The qualitative research interview: A phenomenological and a hermeneutical mode of understanding. Journal of Phenomenological Psychology, 14(2), 171–196. https://doi.org/10.1163/156916283X00090

Kyaw, T. Y., Ng, A. K. (2017). Smart Aquaponics System for Urban Farming in Energy Procedia, Volume 143, Pages 342-347. https://doi.org/10.1016/j.egypro.2017.12.694

Kyrö, P. (2001). To grow or not to grow? Entrepreneurship and sustainable development in The International Journal of Sustainable Development and World Ecology, Volume 8, Issue 1, pp. 15-28

L

Lacy, P., Rutqvist, J. (2016). Waste to Wealth: The Circular Economy Advantage. Palgrave Macmillan, London, United Kingdom.

Lafortezza, R., Sanesi, G. (2019). Nature-based solutions: Settling the issue of sustainable urbanisation in Environmental Research, Volume 172, Pages 394-398. https://doi.org/10.1016/j.envres.2018.12.063

Lambert, D. M., Stock, J. R. (1982). Strategic Physical Distribution Management. Homewood, IL. RD: Irwin

Larrue, P. (2021). The design and implementation of mission-oriented innovation policies: A new systemic policy approach to address societal challenges. OECD Science, Technology and Industry Policy Papers. Vol. 100. http://dx.doi.org/10.1787/3f6c76a4-en

Larson, K., Sandholm, T. (2004). Strategic deliberation and truthful revelation: an impossibility result in EC '04: Proceedings of the 5th ACM conference on Electronic commerce, pp. 264–265. https://doi.org/10.1145/988772.988825

Larsson, J.P. (2022). Innovation Without Entrepreneurship: The Pipe Dream of Mission-Oriented Innovation Policy. In: Wennberg, K., Sandström, C. (eds) Questioning the Entrepreneurial State. International Studies in Entrepreneurship, vol 53. Springer, Cham. https://doi.org/10.1007/978-3-030-94273-1_5

Lawrence, T. B., Leca, B., Zilber, T. B. (2013). Institutional Work: Current Research, New Directions and Overlooked Issues. Organisation Studies, 34(8), 1023–1033. https://doi.org/10.1177/0170840613495305

Lawrence, T., Suddaby, R. (2006). Institutions and institutional work. In S. R. CleggC. Hardy, & T. B. Lawrence The SAGE handbook of organisation studies, pp. 215-254. SAGE Publications Ltd, https://www.doi.org/10.4135/9781848608030.n7

Lenox, M., York, J.G. (2011). Environmental Entrepreneurship. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199584451.003.0004

Lewandowski, M. (2016). Designing the Business Models for Circular Economy – Towards the Conceptual Framework. Sustainability, Volume 8, Issue 1. https://doi.org/10.3390/su8010043

Li, M., Wiedmann, T., Fang, K., Hadjikakou, M. (2021). The role of planetary boundaries in assessing absolute environmental sustainability across scales. Environment International, Volume 152. https://doi.org/10.1016/j.envint.2021.106475.

Li, Y., Ding, R., Cui, L., Lei, Z., Mou, J. (2019). The impact of sharing economy practices on sustainability performance in the Chinese construction industry. Resources, Conservation and Recycling, Volume 150, 104409, https://doi.org/10.1016/j.resconrec.2019.104409.

Lieder, M., Asif, F.M.A., Rashid, A. et al. (2017). Towards circular economy implementation in manufacturing systems using a multi-method simulation approach to link design and business strategy. Int Journal of Advanced Manufacturing Technologies, Vol 93, pp. 1953–1970. https://doi.org/10.1007/s00170-017-0610-9

Lieder, M., Rashid, A. (2016). Towards circular economy implementation: a comprehensive review in context of manufacturing industry. Journal of Cleaner Production, Volume 115, Pages 36-51. https://doi.org/10.1016/j.jclepro.2015.12.042

Lim, X. (2021). Millions of electric car batteries will retire in the next decade. What happens to them? in Guardian. https://www.theguardian.com/environment/2021/aug/20/electric-car-batteries-what-happens-to-them

Linder, M., Williander, M. (2017). CBM innovation: inherent uncertainties. Business Strategy and Environment, Volume 26, Issue 2, Pages 182-196. https://doi.org/10.1002/bse.1906

Linnanen, L. (2002). An Insider's Experiences with Environmental Entrepreneurship in Greener Management International, Volume 38, pp. 71-80.

Lohr, V. I., Pearson-Mims C., Tarnai J., Dillman, D. (2004). How urban residents rate and rank the benefits and problems associated with trees in cities. Journal of Arboriculture, Volume 30, Pages 28-35. https://opinion.wsu.edu/tarnai/paper/jarbhr.pdf

London Waste and Recycling Board (2017). London's circular economy route map. https://www.lwarb.gov.uk/wp-content/uploads/2015/04/LWARB-London%E2%80%99s-CE-route-map_16.6.17a_singlepages_sml.pdf. Last accessed on 14/05/2019.

Long, T. B., Blok, V., Coninx, I. (2019). The diffusion of climate-smart agricultural innovations: Systems level factors that inhibit sustainable entrepreneurial action. Journal of Cleaner Production, 232, pp. 993-1004. https://doi.org/10.1016/j.jclepro.2019.05.212

Loorbach, D. (2007). Transition management: New mode of governance for sustainable development. International Books, Utrecht, the Netherlands

Loorbach, D. (2010). Transition management for sustainable development: A prescriptive, complexity-based governance framework. Governance 23, 161–183. https://doi.org/10.1111/j.1468-0491.2009.01471.x

Low, J. (2019). A Pragmatic Definition of the Concept of Theoretical Saturation in Sociological Focus, Volume 52, Issue 2: Special Issue on Grounded Theory. https://doi.org/10.1080/00380237.2018.1544514

Lubis, R. L. (2015). The Triple Drivers of Ecopreneurial Action for Taking The Recycling Habits to The Next Level: A Case of Bandung City, Indonesia in International Journal of Multidisciplinary Thought, Volume 5, Issue 2, pp. 17-48

Lüdeke-Freund, F., Carroux, S., Joyce, A., Massa, L., Breuer, H. (2018). The sustainable business model pattern taxonomy—45 patterns to support sustainability-oriented business model innovation in Sustainable Production and Consumption, Volume 15, Pages 145–162. https://doi.org/10.1016/j.spc.2018.06.004

Lüdeke-Freund, F., Dembek, K. (2017). Sustainable business model research and practice: Emerging field or passing fancy? Journal of Cleaner Production, Volume 168, Pages 1668–1678. https://doi.org/10.1016/j.jclepro.2017.08.093

Luger, M., Koo, J. (2005). Defining and Tracking Business Start-Ups in Small Business Economics, Volume 24, Issue 1, Pages 17-28

Luiten, H., Knot, M., van der Horst, T. (2001). Sustainable PSSs: the Kathalys method at Proceedings Second International Symposium on Environmentally Conscious Design and Inverse Manufacturing, Pages 190-7

Luo, J., Han, H., Jia, F., Dong, H. (2020). Agricultural Co-operatives in the western world: A bibliometric analysis. Journal of Cleaner Production, Vol. 273, https://doi.org/10.1016/j.jclepro.2020.122945

M

Maes, J., Jacobs, S. (2017). Nature-Based Solutions for Europe's Sustainable Development in Conservation Letters Volume 10, Pages 121–124. https://doi.org/10.1111/conl.12216

Maitre-Ekern, E. (2021). Re-thinking producer responsibility for a sustainable circular economy from extended producer responsibility to pre-market producer responsibility. Journal of Cleaner Production, Volume 286, 125454, https://doi.org/10.1016/j.jclepro.2020.125454.

Manzini, E. Vezzoli, C., Clark, G. (2001). PSSs: using an existing concept as a new approach to sustainability. Journal of Design Research, Volume 1, Issue 2. https://dx.doi.org/10.1504/JDR.2001.009811

Maresch D., Harms R., Kailer N., Wimmer-Wurm B. (2015). The impact of entrepreneurship education on the entrepreneurial intention of students in science and engineering versus business studies universities programs. Technological Forecasting & Social Change, Vol. 104, pp. 172-179.

Martin-Rios, C. et al. (2018). Food waste management innovations in the foodservice industry. Waste Management, Volume 79, Pages 196-206. https://doi.org/10.1016/j.wasman.2018.07.033

Martins, N. O. (2016). Ecosystems, strong sustainability and the classical circular economy. Ecological Economics, 2016, Volume 129, pp. 32-39. https://doi.org/10.1016/j.ecolecon.2016.06.003

Masi D., Kumar V., Garza-Reyes J.A., Godsell J. (2018). Towards a more circular economy: exploring the awareness, practices, and barriers from a focal firm perspective. Production Planning and Control, Volume 29, Issue 6, pp. 539-550.

Massa, L., Tucci, C. (2014). Business Model Innovation in The Oxford Handbook of Innovation Management. Oxford Press. https://doi.org/10.1093/oxfordhb%2F9780199694945.013.002

Mathias, B.D., Williams, D.W. (2014). The Impact of Role Identities on Entrepreneurs' Evaluation and Selection of Opportunities. Journal of Management, Vol. 43 (3). https://doi.org/10.1177/0149206314544747

Mayer-Haug, K., Read, S., Brinckmann, J., Dew, N., Grichnik, D. (2013). Entrepreneurial talent and venture performance: A meta-analytic investigation of SMEs in Research Policy, Vol. 42, Issue 6-7, pp. 1251-1273. https://doi.org/10.1016/j.respol.2013.03.001

Mazzucato M., O'Donovan C. (2016). 'The BBC as market shaper and creator,' in Seth-Smith N., Mackay J., Hind D. (eds), Rethinking the BBC: Public Media in the 21st Century. Commonwealth Publishing. http://commonwealth-publishing.com/shop/rethinking-the-bbc-public-media-in-the-21st-century/

Mazzucato, M. (2016). From market fixing to market-creating: a new framework for innovation policy. Ind. Innov., 23 (2), pp. 140-156, 10.1080/13662716.2016.1146124

Mazzucato, M. (2017). Mission-oriented policy innovation report. https://www.thersa.org/globalassets/pdfs/reports/mission-oriented-policy-innovation-report.pdf

Mazzucato, M. (2018a). Mission-oriented innovation policies: challenges and opportunities. Industrial and Corporate Change, Volume 27, Issue 5, Pages 803–815, https://doi.org/10.1093/icc/dty034

Mazzucato, M. (2018b). Mission-Oriented Research & Innovation in the European Union - A problem-solving approach to fuel innovation-led growth. https://ec.europa.eu/info/sites/info/files/mazzucato_report_2018.pdf

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

McIntyre, K., Ortiz, J.A. (2016). Multinational Corporations and the Circular Economy: How Hewlett Packard Scales Innovation and Technology in Its Global Supply Chain, in: Clift, R., Druckman, A. (Eds.), Taking Stock of Industrial Ecology. Springer International Publishing, Cham, Pages 317–330. https://doi.org/10.1007/978-3-319-20571-7_17

McKinsey & Co. (2015). "Europe's circular-economy opportunity." In. USA: McKinsey & Company

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

Middleton, K., Donellon, A. (2014). Personalizing entrepreneurial learning: A pedagogy for facilitating the know why. Competitive Research Article, Vol 4 (2), pp. 167-204. https://doi.org/10.1016/j.cya.2016.10.005

Mischel, W. (2004). Toward an integrative science of the person. Annual Review of Psychology, 55, 1–22. http://doi.org/10.1146/annurev.psych.55.042902.130709

Mishra, J. L., Chiwenga, K., D., Ali, K. (2019). Collaboration as an enabler for circular economy: a case study of a developing country. Management Decision, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/MD-10-2018-1111

Momente, D. (2020). A unified framework for assessing the readiness of European Union economies to migrate to a circular modeling. Science of The Total Environment, Volume 718. https://doi.org/10.1016/j.scitotenv.2020.137375

Mont, O., Tukker, A. (2006). Product-Service Systems: reviewing achievements and refining the research agenda. Journal of Cleaner Production, Volume 14, Issue 17, Pages 1452-1454. https://doi.org/10.1016/j.jclepro.2006.01.017

Moreau, V., Sahakian, M., van Griethuysen, P. and Vuille, F. (2017). Coming Full Circle: Why Social and Institutional Dimensions Matter for the Circular Economy. Journal of Industrial Ecology, 21: 497-506. https://doi.org/10.1111/jiec.12598

Moreno, M., Court, R., Wright, M., Charnley, F. (2019). Opportunities for redistributed manufacturing and digital intelligence as enablers of a circular economy. International Journal of Sustainable Engineering, Vol 12. Issue 2, 77-94, https://doi.org/10.1080/19397038.2018.1508316

Moreno, M., De los Rios, C., Rowe, Z., Charnley, F. (2016). A conceptual framework for circular design. Sustainability, Volume 8, Issue 9, Pages 1-15. https://doi.org/10.3390/su8090937

Morgan, R. M., Hunt, S. D. (1994). The commitment-trust theory of relationship marketing. Journal of Marketing, 58(3), 20–38. https://doi.org/10.2307/1252308.

Morris, M. H., Neumeyer, X., Jang, Y., & Kuratko, D. F. (2016). Distinguishing Types of Entrepreneurial Ventures: An Identity-Based Perspective. Journal of Small Business Management, Volume 56, Issue 3, pp. 453–474. https://doi.org/10.1111/jsbm.12272

Morseletto, P. (2020). Targets for a circular economy. Resources, Conservation and Recycling, Volume 153. https://doi.org/10.1016/j.resconrec.2019.104553

Mortensen, L., Kørnøv, L. (2019). Critical factors for IS emergence process. Journal of Cleaner Production, Volume 212, Pages 56-69. https://doi.org/10.1016/j.jclepro.2018.11.222

Mourad, M., Recycling, recovering and preventing “food waste”: competing solutions for food systems sustainability in the United States and France. Journal of Cleaner Production, Volume 126, (2016), Pages 461-477, https://doi.org/10.1016/j.jclepro.2016.03.084.

Murnieks, C. Y., Klotz, A., Shepherd, D. (2019). Entrepreneurial motivation: A review of the literature and an agenda for future research. J Organ Behav., Vo. 41, pp 115–143. https://doi.org/10.1002/job.2374

Murnieks, C.Y., Mosakowski, E., Cardon, M.S. (2014). Pathways of passion: Identity centrality, passion, and behaviour among entrepreneurs. Journal of Management, Volume 40, Issue 6, pp. 1583-1606

Murphy, P. (1986). A Preliminary Study of Transportation and Warehousing Aspects of Reverse Distribution. Transportation Journal, Volume 25, Issue 4, Pages 12-21. https://www.jstor.org/stable/20712872

Murphy, P. R., Poist, R. F. (1988). Management of logistical retromovements: an empirical analysis of literature suggestions. Journal of the Transportation Research Forum, Volume 29, Issue 1. No. HS-040 801.

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, Volume 140, Pages 369-380. https://link.springer.com/article/10.1007/s10551-015-2693-2

Musiolik, J., Markard, J., Hekkert, M., Furrer, B. (2020). Creating innovation systems: How resource constellations affect the strategies of system builders. Technological Forecasting and Social Change, Elsevier, Vol. 153. 10.1016/j.techfore.2018.02.002

Musters, C., Graaf, H., ter Keurs, W. (1998). Defining socio-environmental systems for sustainable development in Ecoogical Economics, Vol. 26, Issue 3, pp. 243-258. https://doi.org/10.1016/S0921-8009(97)00104-3

N

Nahapiet, J., & Ghoshal, S. (1998). Social Capital, Intellectual Capital, and the Organisational Advantage. The Academy of Management Review, 23(2), 242–266. https://doi.org/10.2307/259373

Narayan, R., Tidström, A. 2020. Tokenizing coopetition in a blockchain for a transition to circular economy. Journal of Cleaner Production, Volume 263, https://doi.org/10.1016/j.jclepro.2020.121437

Närvänen, E., Mattila, M., Mesiranta, N. (2021). Institutional work in food waste reduction: Start-ups' role in moving towards a circular economy. Industrial Marketing Management, Vol 93, pp. 605-616. https://doi.org/10.1016/j.indmarman.2020.08.009

Navis, C., Glynn, M. (2011). Legitimate distinctiveness and the entrepreneurial identity: Influence on investor judgments of new venture plausibility. Academy of Management Review, vol. 36, pp. 479-499

Neely, A. (2008). Exploring the Financial Consequences of the Servitisation of Manufacturing in Operations Management Research, Volume 1, Issue 2, Pages 103-118. https://doi.org/10.1007/s12063-009-0015-5

Nelles, M., Grünes, J., Morscheck, G. (2016). Waste Management in Germany – Development to a Sustainable Circular Economy? Procedia Environmental Sciences, Volume 35, Pages 6-14. https://doi.org/10.1016/j.proenv.2016.07.001

NewsDesk, (2021). London-based start-up Twig marries fintech and second-hand fashion. https://exbulletin.com/fashion/966209/

Nhemachena, C., & Murimbika, M. (2018). Motivations of sustainable entrepreneurship and their impact on enterprise performance in Gauteng Province, South Africa. Business Strategy and Development, 1, 115–127. https://doi.org/10.1002/bsd2.16

Niero et al. (2017). Combining Eco-Efficiency and Eco-Effectiveness for Continuous Loop Beverage Packaging Systems. Journal of Industrial Ecology, Volume 21, Issue 3, Pages 742-753. https://doi.org/10.1111/jiec.12554

NSW Government, (2019). NSW Circular Economy Policy Statement – Too Good To Waste. https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/recycling/19p1379-circular-economy-policy-final.pdf?la=en&hash=F80151EA9C2C3E27BA889D15D18041CDF7A4D25A

Nußholz, J. (2017). Circular business models: Defining a concept and framing an emerging research field. Sustainability, Vol 9, Issue 10, pp. 1–16. https://doi.org/10.3390/su9101810

O

Osterman, C., Nascimento, L., Zen, A. (2021). Business Model Innovation for Circular Economy in Fashion Industry: A Startups' Perspective in frontiers. Sustainability, Vol. 2. https://doi.org/10.3389/frsus.2021.766614

Osterwalder, A., Pigneur, Y., Clark, T. (2010). Business model generation: a handbook for visionaries, game changers, and challengers. Wiley, Hoboken, NJ.

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. https://doi.org/10.17705/1CAIS.01601

Ostrom, E. (2010). Polycentric systems for coping with collective action and global environmental change in Global Environmental Change, Volume 20, pp. 550–557

Ostrom, E. (2012). Nested externalities and polycentric institutions: Must we wait for global solutions to climate change before taking actions at other scales? Economic Theory, Volume 49, pp. 353–369

P

Pacheco, D. F., Dean, T. J., Payne, D. S. (2010). Escaping the green prison: Entrepreneurship and the creation of opportunities for sustainable development. Journal of Business Venturing, Sustainable Development and Entrepreneurship, Volume 25, Pages 464–480. https://doi.org/10.1016/j.jbusvent.2009.07.006

Parker, S. (2011). Intrapreneurship or entrepreneurship? Journal of Business Venturing, Volume 26, Issue 1, pp- 19-34. https://doi.org/10.1016/j.jbusvent.2009.07.003

Parrique T., Barth J., Briens F., C. Kerschner, Kraus-Polk A., Kuokkanen A., Spangenberg J.H. (2019). Decoupling debunked: Evidence and arguments against green growth as a sole strategy for sustainability. European Environmental Bureau. https://mk0eeborgicuypctuf7e.kinstacdn.com/wp-content/uploads/2019/07/Decoupling-Debunked.pdf

Parrish, B.D. (2010). Sustainability-driven entrepreneurship: Principles of organisation design. Journal of Business Venturing, Sustainable Development and Entrepreneurship, Volume 25, Pages 510–523. https://doi.org/10.1016/j.jbusvent.2009.05.005

Patzelt, H., Shepherd, D. A. (2011). Recognizing opportunities for sustainable development. Entrepreneurship: Theory and Practice, Volume 35, pp. 631–652. https://doi.org/10.1111/j.1540-6520.2010.00386

Paunescu, C., Raluca Badea, M. (2014). Examining the Social Capital Content and Structure in the Pre-start-up Planning. Procedia Economics and Finance, Volume 15, Pages 560-568. https://doi.org/10.1016/S2212-5671(14)00510-3

Peng, B, Tu, Y., Wei, G. (2018). Governance of electronic waste recycling based on social capital embeddedness theory. Journal of Cleaner Production, Volume 187, Pages 29-36. https://doi.org/10.1016/j.jclepro.2018.02.26

Peng, H., Zhou, C., Liu, Y. (2020). Entrepreneurial Experience and Performance: From the Aspect of Sustainable Growth of Enterprises. Sustainability, Vol. 12, Issue 18, https://doi.org/10.3390/su12187351

PepsiCo Inc. (2022). PepsiCo Beverages North America Invests $35 Million to Help Close Gap In Recycling Access through investment in Closed Loop Local Recycling Fund. https://www.prnewswire.com/news-releases/pepsico-beverages-north-america-invests-35-million-to-help-close-gap-in-recycling-access-through-investment-in-closed-loop-local-recycling-fund-301464726.html

Pereira Pesoa, M. V., Jauregui Becker, J. M. (2017). Overcoming the product-service model adoption obstacles. Procedia CIRP, Volume 64, Pages 163-168. https://doi.org/10.1016/j.procir.2017.03.062

Persson, O. (2015). What Is Circular Economy? – The Discourse of Circular Economy in the Swedish Public Sector. Uppsala University.

Philips, M. (2013). On being green and being enterprising: narrative and the ecopreneurial self. Organisation, Vol. 20 (6). https://doi.org/10.1177%2F1350508412455084

Phillips, P., Read, A., Green, A., Bates, M. (1999). UK waste minimisation clubs: a contribution to sustainable waste management. Resources, Conservation and Recycling, Volume 27, Issue 3, Pages 217-247. https://doi.org/10.1016/S0921-3449(99)00016-6

Pieroni, M. P. P., McAloone, T. C., Pigosso, D. C. A. (2019). Business model innovation for circular economy and sustainability: A review of approaches. Journal of Cleaner Production, Volume 215, Pages 198–216. https://doi.org/10.1016/j.jclepro.2019.01.036

Pinkse, J., Groot, K. (2015). Sustainable Entrepreneurship and Corporate Political Activity: Overcoming Market Barriers in the Clean Energy Sector. Entrepreneurship - Theory and Practice, Volume 39, Pages 633–654. https://doi.org/10.1111/etap.12055

Planko, J., Cramer, J., Chappin, M., Hekkert, M. (2016). Strategic collective system building to commercialise sustainability innovations. Journal of Cleaner Production, Volume 112, Pages 2328-2341

Planko, J., Cramer, J. (2021). The Networked Business Model for Systems Change: Integrating a Systems Perspective in Business Model Development for Sustainability Transitions. In: Aagaard, A., Lüdeke-Freund, F., Wells, P. (eds) Business Models for Sustainability Transitions. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-77580-3_3

Plewina, Guenther, (2018). Management Decision. Issue(s). available: 438 – From Volume: 1 Issue: 1, to Volume: 59 Issue: 13. http://www.emeraldinsight.com/0025-1747.htm

Politis, Diamanto, Gabrielsson, Jonas, (2005). "Exploring the Role of Experience in the Process of Entrepreneurial Learning". Working Paper Series 2005/1, Lund University, Institute of Economic Research

Pontoni, F., Bruschi, I. (2018). Sustainable consumption: a multi-level perspective of a systematic transition.
https://www.unido.org/api/opentext/documents/download/10378550/unido-file-10378550

Potting, J., Hekkert, M., Worrel, E., Hanemaaijer, A. (2017). Circular Economy: Measuring Innovation in the Product Chain. PBL Netherlands Environmental Assessment Agency. https://www.pbl.nl/sites/default/files/downloads/pbl-2016-circular-economy-measuring-innovation-in-product-chains-2544.pdf

Pratt, A. (2014). The Great Turning: From Mutant Capitalism to the Circular Economy. http://impakter.com/great-turning-mutant-capitalism-circular-economy/

PRC (2008). Circular Economy Promotion Law of the People’s Republic of China. https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/documents/China_CircularEconomyLawEnglish.pdf

Preston, F., Lehne, J. (2017). A Wider Circle? The Circular Economy in Developing Countries. Chatham House. ISBN: 978 1 78413 256 9

Presutti, M., Odorici, V. (2019). Linking entrepreneurial and market orientation to the SME's performance growth: The moderating role of entrepreneurial experience and networks in International Entrepreneurship and Management Journal, 15 (3). (2019), pp. 697-720

Prosman, E. J., B. V. Wæhrens, Liotta, G. (2017). Closing global material loops: Initial insights into firm-level challenges. Journal of Industrial Ecology 21, Issue 3, Pages 641–650. https://doi.org/10.1111/jiec.12535

R

Rabideau, M. M., Wong, K., Gordon, E. S., Ryan, L. (2016). Genetic Counselors in Startup Companies: Redefining the Genetic Counselor Role. Journal of Genetic Counselng, Volume 25, Pages 649–657. https://doi.org/10.1007/s10897-015-9923-8

Ramanathan, R. (2011). An empirical analysis on the influence of risk on relationships between handling of product returns and customer loyalty in E-commerce. International Journal of Production Economics, Volume 130, Issue 2, Pages 255–261. https://doi.org/10.1016/j.ijpe.2011.01.005

Ranta, V., & Saari, U. (2019). Circular economy: enabling the transition towards sustainable consumption and production. In W. Leal Filho, A. M. Azul, L. Brandli, P. G. Özuyar, & T. Wall (Eds.), Responsible Consumption and Production (The Encyclopedia of the UN Sustainable Development Goals). Springer, Cham. https://doi.org/10.1007/978-3-319-71062-4_3-1

Ranta, V., Aarikka-Stenroos, L., Mäkinen, S.J. (2018). Creating value in the circular economy: A structured multiple-case analysis of business models. Journal of Cleaner Production, Volume 201, Pages 988–1000. https://doi.org/10.1016/j.jclepro.2018.08.072

Ranta, V., Keränen, J., Aarikka-Stenroos, L. (2020). How B2B suppliers articulate customer value propositions in the circular economy: Four innovation-driven value creation logics. Industrial Marketing Management, Vol 87, pp. 291-305. https://doi.org/10.1016/j.indmarman.2019.10.007

Rauch, A., Frese, M. (2007). Let's put the person back into entrepreneurship research. A meta-analysis on the relationship between business owners' personality traits, business creation, and success. European Journal of Work and Organisational Psychology, Volume 16 Issue 4, pp. 353–385. https://doi.org/10.1080/13594320701595438

Raven, R., Sengers, F., Spaeth, P., Xie, L., Cheshmehzangi, A. & de Jong, M. (2019). Urban experimentation and institutional arrangements. European Planning Studies, 27:2, 258-281, https://doi.org/10.1080/09654313.2017.1393047

Ravi, V., Shankar, R., Tiwari, M. K. (2005). Analysing alternatives in reverse logistics for end-of-life computers: ANP and balanced scorecard approach. Computers and Industrial Engineering, Volume 48, Issue 2, Pages 327–356. https://doi.org/10.1016/j.cie.2005.01.01

Reddy, (2020). Entrepreneurial Motivation to Participate in the Circular Economy. Handbook of Research on Entrepreneurship Development and Opportunities. Circular Economy. https://doi.org/10.4018/978-1-7998-5116-5.ch014

Reike, D., Vermeulen, W.J.V., Witjes, S. (2018). The circular economy: New or Refurbished as CE 3.0? — Exploring Controversies in the Conceptualisation of the Circular Economy through a Focus on History and Resource Value Retention Options. Resources, Conservation and Recycling, Sustainable Resource Management and the Circular Economy, Volume 135, Pages 246–264. https://doi.org/10.1016/j.resconrec.2017.08.027

Ren, S., Zhang, Y., Liu, Y., Sakao, T., Huisingh, D., Almeida, C.M.V.B. (2019). A comprehensive review of big data analytics throughout product lifecycle to support sustainable smart manufacturing: A framework, challenges and future research directions. Journal of Cleaner Production, Volume 210, Pages 1343–1365. https://doi.org/10.1016/j.jclepro.2018.11.025

Ribeiro-Soraino, (2017). Small business and entrepreneurship: their role in economic and social development. Entrepreneurship & Regional Development, Volume 29, pp. 1-3. https://rsa.tandfonline.com/doi/full/10.1080/08985626.2016.1255438

Ribeiro, I., Sobral, P., Pecas, P., Henriques, E. (2018). A sustainable business model to fight food waste. Journal of Cleaner Production, Volume 177, Pages 262-275

Richardson, J. (2008). The business model: an integrative framework for strategy execution. Strategic Change, Volume 17, Pages 133–144. https://doi.org/10.1002/jsc.821

Rigg, C., O'Dwyer, B. (2012). Becoming an entrepreneur: researching the role of mentors in identity construction in Education + Training, 54 (4). (2012), pp. 319-329

Rigo E. Melgar-Melgar, Charles A.S. Hall. (2020). Why ecological economics needs to return to its roots: The biophysical foundation of socio-economic systems. Ecological Economics, Vol 169, 106567. https://doi.org/10.1016/j.ecolecon.2019.106567

Ritala, R., Tidström, A. (2014). Untangling the value-creation and value-appropriation elements of coopetition strategy: A longitudinal analysis on the firm and relational levels. Scandinavian Journal of Management, Volume 30, Issue 4, Pages 498-515, https://doi.org/10.1016/j.scaman.2014.05.002

Ritter, M., Schanz, H. (2019). The sharing economy: A comprehensive business model framework. Journal of Cleaner Production, Volume 213, Pages 320-331. https://doi.org/10.1016/j.jclepro.2018.12.154

Ritzén, S., Ölundh Sandström, G. (2017). Barriers to the Circular Economy – Integration of Perspectives and Domains. Procedia CIRP, Vol 64, pp. 7-12. https://doi.org/10.1016/j.procir.2017.03.005

Rizos, V. et al. (2016). Implementation of circular economy business models by small and medium-sized enterprises (SMEs): barriers and enablers. Sustainability, Volume 8, p. 1212. https://doi.org/10.3390/su8111212

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, 1212. https://doi.org/10.3390/su8111212

Robehmed, N. (2013). What Is A Startup? https://www.forbes.com/sites/natalierobehmed/2013/12/16/what-is-a-startup/#53c3b5bd4044

Rodrik D. (2004), 'Industrial policy for the twenty-first century,' John F. Kennedy School of Government Working Paper Series, No. RWP04–047.

Rogers, D. S., Tibben-Lembke, R. S. (1999). Going backwards: reverse logistics trends and practices (Vol. 2). Pittsburgh, PA. Reverse Logistics Executive Council.

Rosenbloom, D., Andersen, A., Fuenfschiling, L., Kanger, L., Klerkx, L., Frenken, K. (2021). Can we overcome the climate crisis one sociotechnical system at a time? International Sustainability Transitions Conference 2021, Karlsruhe. http://dx.doi.org/10.13140/RG.2.2.20620.85120

Rosenzweig, C., Karoly, D., Vicarelli, M. et al. (2008). Attributing physical and biological impacts to anthropogenic climate change. Nature 453, 353–357. https://doi.org/10.1038/nature06937

Ruskin, J., Seymour, R. G., & Webster, C. M. (2016). Why create value for others? An exploration of social entrepreneurial motives. Journal of Small Business Management, 54, 1–23. http://doi.org/10.1111/jsbm.12229

Ryberg, M., Andersen, M., Owsianiak, M., Hauschild, M. (2020). Downscaling the planetary boundaries in absolute environmental sustainability assessments – A review. Journal of Cleaner Production, Volume 276. https://doi.org/10.1016/j.jclepro.2020.123287

S

Sabel, C. 2012. BEYOND PRINCIPAL-AGENT GOVERNANCE: EXPERIMENTALIST ORGANIsationS, LEARNING AND ACCOUNTABILITY.

Saebi, T., Foss., N. J., Linder, S. (2018). Social Entrepreneurship Research: Past Achievements and Future Promises. Journal of Management, Vol. 45, Issue 1. https://doi.org/10.1177%2F0149206318793196

Saffer, A. J. (2019). Fostering social capital in an international multi-stakeholder issue network in Public Relations Review, Volume 45, Issue 2, Pages 282-296. https://doi.org/10.1016/j.pubrev.2019.02.004

Sanden, B., Hillman, K. (2011). A framework for analysis of multi-mode interaction among technologies with examples from the history of alternative transport fuels in Sweden in Research Policy, Vol. 40, Issue 3, pp. 403-414. https://doi.org/10.1016/j.respol.2010.12.005

Santa-Maria, T., Vermeulen, W., Baumgartner, R. (2021). Framing and assessing the emergent field of business model innovation for the circular economy: A combined literature review and multiple case study approach, Sustainable Production and Consumption, Volume 26, Pages 872-891. https://doi.org/10.1016/j.spc.2020.12.037.

Santini, C. (2017). Ecopreneurship and Ecopreneurs: Limits, Trends and Characteristics, Sustainability, 9 (4), https://doi.org/10.3390/su9040492

Sarango-Lalangui, P., Santos, J.L.S., Hormiga, E. (2018). The development of sustainable entrepreneurship research field. Sustainability, Volume 10, Issue 6. 10.3390/su10062005

Sariatli, Furkan. (2017). Linear Economy Versus Circular Economy: A Comparative and Analyser Study for Optimisation of Economy for Sustainability. Visegrad Journal on Bioeconomy and Sustainable Development. 10.1515/vjbsd-2017-0005

Sarkar, A., Koohikamali, M., Pick, J.B. (2013). Spatiotemporal patterns and socioeconomic dimensions of shared accommodations: the case of Airbnb in Los Angeles, California. ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences, 4 (2013), pp. 107-114

Schallehn, H., Seuring, S., Strähle, J., Freise, M. (2019). Customer experience creation for after-use products: A product–service systems-based review. Journal of Cleaner Production, Volume 210, Pages 929-944. https://doi.org/10.1016/j.jclepro.2018.10.292

Schaltegger, S. (2002). A Framework for Ecopreneurship: Leading Bioneers and Environmental Managers to Ecopreneurship in Greener Management Journal, Volume 38, Pages 45-58. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1512312

Schaltegger, S. (2016). A framework and typology of ecopreneurship: leading bioneers and environmental managers to ecopreneurship. In: Schaper, M. (Ed.), Making Ecopreneurs. Routledge, London, UK, pp. 95-114

Schaltegger, S., Lüdeke-Freund, F., & Hansen, E. G. (2016). Business Models for Sustainability: A Co-Evolutionary Analysis of Sustainable Entrepreneurship, Innovation, and Transformation. Organisation & Environment, 29(3), 264–289. https://doi.org/10.1177/1086026616633272

Schaltegger, S., Synnestvedt, T. (2002). The link between `green' and economic success: environmental management as the crucial trigger between environmental and economic performance. Journal of Environmental Management, Volume 65, pp. 339-346. 10.1006/jema 2002.0555

Schaltegger, S., Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: categories and interactions. Business Strategy and the Environment, Volume 20, Pages 222–237. https://doi.org/10.1002/bse.682

Schaltegger, S., Wagner, M. (2008). Types of sustainable entrepreneurship and conditions for sustainability innovation: from the administration of a technical challenge to the management of an entrepreneurial opportunity

Schick, H., Marxen, S., Freimann, J. (2002). Sustainability Issues for Start-up Entrepreneurs in Greener Management International, Volume 38, pp. 59-70.

Schiederig, T., Tietze, F., Herstatt, C. (2012). Green innovation in technology and innovation management – an exploratory literature review in R&D Management, Volume 42, Pages 180–192. https://doi.org/10.1111/j.1467-9310.2011.00672.x

Schlaile, M.P., Urmetzer, S., Blok, V., Andersen, A.D., Timmermans, J., Mueller, M., Fagerberg, J., Pyka, A. (2017). Innovation systems for transformations towards sustainability? Taking the normative dimension seriously. Sustain. 9. https://doi.org/10.3390/su9122253

Schlange, L. (2006). What drives sustainable entrepreneurs? Proceedings of the 3rd Applied Business and Entrepreneurship Association International (ABEAI). Conference, Kona, HI, USA.

Schot, J., Geels, F. (2008). Strategic niche management and sustainable innovation journeys: theory, findings, research agenda, and policy in Technol. Anal. Strateg. Manage., 20 (5), pp. 537-554.

Schot, J., Kanger, L. (2018). Deep transitions: emergence, acceleration, stabilisation and directionality Res. Policy, 47 , pp. 1045-1059, 10.1016/j.respol.2018.03.009

Schot, J., Steinmueller, W. E. (2018). Three frames for innovation policy: R&D, systems of innovation and transformative change in Resarch Policy, Volume 47, pp. 1554-1567. https://doi.org/10.1016/j.respol.2018.08.011

Schröder, P., Lemille, A., Desmond, P. (2020). Making the circular economy work for human development in Resource, Conservation and Recycling, Volume 156.

Schulz, C., Hjaldottir, R., Hild, P. (2019). Practising circles: Studying institutional change and circular economy practices. Journal of Cleaner Production, Vol. 237. https://doi.org/10.1016/j.jclepro.2019.117749

Scott, W. R. (2008). Approaching Adulthood: The Maturing of Institutional Theory in Theory and Society Vol. 37, No. 5, Special Issue on Theorizing Institutions: Current Approaches and Debates (Oct., 2008), pp. 427-442. http://www.jstor.org/stable/40345595

Semrau, T., Ambos, T., Kraus, S. (2016). Entrepreneurial orientation and SME performance across societal cultures: An international study. Journal of Business Research, Volume 69, Issue 5, pp 1928-1932. https://doi.org/10.1016/j.jbusres.2015.10.082.

Seuring, S., Müller, M. (2008). From a Literature Review to a Conceptual Framework for Sustainable Supply Chain Management. Journal of Cleaner Production, Volume 16, Issue 15, Pages 1699–1710.

Shahbazi, S., Wiktorsson, M., Kurdve, M., Jönsson, C., Bjelkemyr, M. (2016). Material efficiency in manufacturing: swedish evidence on potential, barriers and strategies. Journal of Cleaner Production, Vol 127, pp. 438-450. https://doi.org/10.1016/j.jclepro.2016.03.143

Shane, S., Locke, E. A., & Collins, C. J. (2003). Entrepreneurial motivation. Human Resource Management Review, Volume 13, Issue 2, pp. 257–279. https://doi.org/10.1016/s1053-4822(03)00017-2

Shane, S., Venkataraman, S., 2000. The promise of entrepreneurship as a field of research in Acad. Manag. Rev., 25 (1). (2000), pp. 217-226

Sheldon, K. M. (2002). “The Self-Concordance Model of Healthy Goal Striving: When Personal Goals Correctly Represent the Person,” in Handbook of Self-Determination Research. Eds. E. L. Deci, and R. M. Ryan. Rochester: University of Rochester Press, 65–86.

Shepherd, D. A., Patzelt, H. (2011). The New Field of Sustainable Entrepreneurship: Studying Entrepreneurial Action Linking “What Is to Be Sustained” With “What Is to Be Developed.” in Entrepreneurship Theory and Practice, Volume 35, Pages 137–163. https://doi.org/10.1111/j.1540-6520.2010.00426.x

Sihvonen, S., Ritola, T. (2015). Conceptualizing ReX for aggregating end-of-life strategies in product development. Proc. CIRP, Volume 29, Pages 639–644. http://linkinghub.elsevier.com/retrieve/pii/S2212827115000293

Singh, M.P., Chakraborty, A., Roy, M. (2018). Developing an extended theory of planned behaviour model to explore circular economy readiness in manufacturing MSMEs, India. Resources, Conservation and Recycling, Volume 135, pp. 313-322. https://doi.org/10.1016/j.resconrec.2017.07.015

Singh, S. K., Chen, J., Del Giudice, M., El-Kassar, A.N. (2019). Environmental ethics, environmental performance, and competitive advantage: role of environmental training in Technol. Forecast. Soc. Change, Volume 146, pp. 203-211

Sitra, (2020). Traceability-as-a-service to enable responsible, closed-loop supply chains. https://www.sitra.fi/en/cases/traceability-as-a-service-to-enable-responsible-closed-loop-supply-chains/

Slaper, T., Hall, T. (2011). The Triple Bottom Line: What Is It and How Does It Work? in Indiana Business Review, Bloomington, Volume 86, Issue 1, pp. 4-8.

Smith, A., Raven, R. (2012). What is protective space? Reconsidering niches in transitions to sustainability in Research Policy, Volume 41, Issue 5, pp. 1025-1036. https://doi.org/10.1016/j.respol.2011.12.012

Smith, A., Stirling, A. (2007). Moving Outside or Inside? Objectification and Reflexivity in the Governance of Socio-Technical Systems. J. Environ. Policy Plan. 9, 351–373. https://doi.org/10.1080/15239080701622873

Smith, R., Bell, R., & Watts, H. (2014). Personality trait differences between traditional and social entrepreneurs. Social Enterprise Journal, Voume 10, Issue 3, pp. 200–221. https://doi.org/10.1108/SEJ-08- 2013-0033

Spence, M., Ben Boubaker Gherib, J., Ondoua Biwolé, V. (2011). Sustainable Entrepreneurship: Is Entrepreneurial will Enough? A North-South Comparison. Journal of Business Ethics, Volume 99, Issue 3, pp. 335-367. 10.1007/s10551-010-0656-1

Spring, M., Araujo, L. (2017). Product biographies in servitisation and the circular economy in Industrial Marketing Management, Volume 60, Pages 126-137. https://doi.org/10.1016/j.indmarman.2016.07.001

Stahel, (2016). The circular economy in Nature, Volume 531, pp.435–438.

Stahel, W. R. (2010). The performance economy. Hampshire UK: Palgrave Macmillan Hampshire.

Staniewski, M., Awruk, K. 2019. Entrepreneurial success and achievement motivation – A preliminary report on a validation study of the questionnaire of entrepreneurial success. Journal of Business Research, Volume 101, 433-440. https://doi.org/10.1016/j.jbusres.2019.01.073

Starik, M. (1995). Should trees have managerial standing? Toward stakeholder status for non-human nature. Journal of Business Ethics, Volume 14, pp. 207-217. https://doi-org /10.1007/BF00881435

Startup Blink, (2019). Startup Ecosystem Rankings Report 2019. https://www.startupblink.com/

Stead, J. G., Stead, E., 2000. Eco-Enterprise Strategy: Standing for Sustainability. Journal of Business Ethics, Volume 24, pp. 313-329.

Steffen W. Broadgate W., Deutsch L., Gaffney O., Ludwig C. (2015). The trajectory of the Anthropocene: The Great Acceleration. The Anthropocene Review, Vol 2, Issue 1, pp 81-98. https://doi.org/10.1177/2053019614564785

Steinz, H., van Rijnsoever, F., Nauta, F. (2015). How to Green the red Dragon: A Start-ups' Little Helper for Sustainable Development in China. Business Strategy and the Environment, Volume 25, Issue 8, pp. 593-608. 10.1002/bse.1899

Stephan, U., Drencheva, A. (2017). The person in social entrepreneurship: A systematic review of research on the social entrepreneurial personality.The Wiley Handbook of Entrepreneurship, pp. 205–230.

Stern, P., Dietz, T. (1994). The Value Basis of Environmental Concern. Journal of Social Issues, Vol. 50, Issue 3. https://doi.org/10.1111/j.1540-4560.1994.tb02420.x

Stern, Paul C., Dietz, T., Abel, T. D., Guagnano, G., Kalof, L. (1999). A Value-Belief-Norm Theory of Support for Social Movements: The Case of Environmentalism. Huxley College on the Peninsulas Publications, 1. https://cedar.wwu.edu/hcop_facpubs/1

Stevenson, H. H., Jarillo, j. C. (1990). A Paradigm of entrepreneurship: Entrepreneurial management Strategic Management Journal, 11 (4), pp. 17-27

Stewart, R., Niero, M. (2018). Circular economy in corporate sustainability strategies: A review of corporate sustainability reports in the fast-moving consumer goods sector. Business Strategy and the Environment, Volume 27, Issue 7, Pages 1005-1022. https://doi.org/10.1002/bse.2048

Stiles, (2020). Strategic niche management in transition pathways: Telework advocacy as groundwork for an incremental transformation in Environmental Innovation and Societal Transitions, Vol 34. https://doi.org/10.1016/j.eist.2019.12.001

Storbacka, K., Nenonen, S. (2015). Learning with the market: Facilitating market innovation, Industrial Marketing Management, Volume 44, Pages 73-82, ISSN 0019-8501, https://doi.org/10.1016/j.indmarman.2014.10.009.

Stubbs, W., Cocklin, C. (2008). Conceptualizing a “Sustainability Business Model in Organisation & Environment, Volume 21, Pages 103–127. https://doi.org/10.1177/1086026608318042

Sun, H., Lo. C. (2012). Impact of role models on the entrepreneurial intentions of engineering students. Proceedings of IEEE International Conference on Teaching, Assessment, and Learning for Engineering, Hong Kong. https://doi.org/10.1109/TALE.2012.6360368

Sundararajan, A. (2016). The Sharing Economy: The End of Employment and the Rise of Crowd-Based Capitalism. MIT Press, Boston, United States

Swami et al. (2009). Egoistic, altruistic, and biospheric environmental concerns: A path analytic investigation of their determinants in Scandinavian Journal of Psychology, Volume Q Issue 2, pp. 139-145.

T

Taylor-Brown A, Booth R, Gillett A, Mealy E, Ogbourne SM, Polkinghorne A, et al. (2019). The impact of human activities on Australian wildlife. PLoS ONE, Vol. 14, Issue 1: e0206958. https://doi.org/10.1371/journal.pone.0206958

Teran-Yepez, E. et al. (2020). Sustainable entrepreneurship: Review of its evolution and new trends. Journa of Cleaner Production, Vol. 252. https://doi.org/10.1016/j.jclepro.2019.119742

Thakker, V., Bakshi, B. R. (2021). Toward sustainable circular economies: A computational framework for assessment and design. Journal of Cleaner Production, 295. https://doi.org/10.1016/j.jclepro.2021.126353

The Times, (2021). Strange Bedfellows - The Times view of the partnership between the SNP and the Greens: Strange Bedfellows. https://www.thetimes.co.uk/article/strange-bedfellows-vkb2mcc9w

Thelken, H., de Jong, G. (2020). The impact of values and future orientation on intention formation within sustainable entrepreneurship. Journal of Cleaner Production, Volume 266, https://doi.org/10.1016/j.jclepro.2020.122052

Thi, N., Biswarup, S., Chen, C.C., Gopalakrishnan, K., Lin C.Y. (2014). Food waste to bioenergy via anaerobic processes in Energy Procedia, Volume 61, Pages 307-312. https://doi.org/10.1016/j.egypro.2014.11.1113

Thompson, N. A., Herrmann, A. M., Hekkert, M. P. (2015). How sustainable entrepreneurs engage in institutional change: insights from biomass torrefaction in the Netherlands. Journal of Cleaner Production, Bridges for a more sustainable future: Joining Environmental Management for Sustainable Universities (EMSU). and the European Roundtable for Sustainable Consumption and Production (ERSCP). conferences, Volume 106, Pages 608–618. https://doi.org/10.1016/j.jclepro.2014.08.011

Thompson, N., Kiefer, K., York, J. G. (2011). Distinctions not Dichotomies: Exploring Social, Sustainable, and Environmental Entrepreneurship, in: Social and Sustainable Entrepreneurship. Emerald Group Publishing Limited, Bingley, pp. 201–229. https://doi.org/10.1108/S1074-7540(2011)0000013012

Tiba, S., van Rijnsoever, F., Hekkert, M.P. (2020). The lighthouse effect: How successful entrepreneurs influence the sustainability-orientation of entrepreneurial ecosystems. Journal of Cleaner Production, Volume 264,ISSN 0959-6526. https://doi.org/10.1016/j.jclepro.2020.121616.

Todeschini, B.V., Cortimiglia, M.N., Callegaro-de-Menezes, D., Ghezzi, A. (2017). Innovative and sustainable business models in the fashion industry: entrepreneurial drivers, opportunities, and challenges. Bus. Horiz., 60, pp. 759-770. 10.1016/J.BUSHOR.2017.07.003

Tseng, M., Chiu, A.S.F., Liu, G., Jantaralolica, T. (2020). Circular economy enables sustainable consumption and production in multi-level supply chain system, Resources, Conservation and Recycling, Volume 154, 104601, https://doi.org/10.1016/j.resconrec.2019.104601.

Tukker, A. (2004). Eight types of product–service systems: eight ways to sustainability? Experiences from SusProNet. Business Strategy and the Environment, Volume 13, Pages 246–260. https://doi.org/10.1002/bse.414

Tukker, A. (2015). Product services for a resource-efficient and circular economy – a review. Journal of Cleaner Production, Volume 97, Pages 76-91. https://doi.org/10.1016/j.jclepro.2013.11.049

Tukker, A., Tischner, U. (2006). Product-services as a research field: past, present and future. Reflections from a decade of research. Journal of Cleaner Production, Product Service Systems: reviewing achievements and refining the research agenda, Volume 14, Pages 1552–1556. https://doi.org/10.1016/j.jclepro.2006.01.022

Tunn, V., Fokker, R., Luijkx, K., de Jong, S., Schoormans, J. (2019). Making Ours Mine: Increasing Consumer Acceptanceof Access-Based PSS through Temporary Product Customisation. Sustainability, Volume 11, Issue 1, Pages 274 ff. https://doi.org/10.3390/su11010274

U

Ünal, E., Shao, J. (2018). A taxonomy of circular economy implementation strategies for manufacturing firms: Analysis of 391 cradle-to-cradle products. Journal of Cleaner Production, Volume 212, Pages 754–765. https://doi.org/10.1016/j.jclepro.2018.11.291

Ünal, E., Urbinati, A., Chiaroni, D., Manzini, R. (2019). Value Creation in Circular Business Models: The case of a US small medium enterprise in the building sector. Resources, Conservation and Recycling, Volume 146, pp. 291-307. https://doi.org/10.1016/j.resconrec.2018.12.034

Urbinati, A., Chiaroni, D., Chiesa, V. (2017). Towards a new taxonomy of circular economy business models. Journal of Cleaner Production, Volume 168, Pages 487–498. https://doi.org/10.1016/j.jclepro.2017.09.047

Urbinati, A., Chiaroni, D., Chiesa, V. (2017). Towards a new taxonomy of circular economy business models. Journal of Cleaner Production, Vol 168, pp. 487-498. https://doi.org/10.1016/j.jclepro.2017.09.047

V

Van der Lugt, ThangLong, T., King, C. (2020). Carbon sequestration and carbon emissions reduction through bamboo forests and products. INBAR Working Paper. https://www.inbar.int/wp-content/uploads/2020/05/1541657603.pdf

Van der Vleuten, E. (2019). Radical change and deep transitions: Lessons from Europe's infrastructure transition 1815–2015. Environmental Innovation and Societal Transitions, Volume 32, Pages 22-32. https://doi.org/10.1016/j.eist.2017.12.004.

Van der Zwan, P., Thurik, R., Verheul, I., Hessels, J. (2016). Factors influencing the entrepreneurial engagement of opportunity and necessity entrepreneurs. Eurasian Bus Rev, Vol 6, 273–295. https://doi.org/10.1007/s40821-016-0065-1

Van Dijck, J., Poell, T., de Waal, M. (2018). The Platform Society - public values in a connective world. Oxford University Press. ISBN: 0190889772

Van Maanen, J., Sørensen, J. B. and Mitchell, T. R. (2007). ‘The interplay between theory and method’ in Academy of Management Review, 32, 1145–54. https://doi.org/10.5465/amr.2007.26586080

Van Renswoude, K., ten Wolde, A., Joustra, D. J. (2015). CBMs – Part 1: An introduction to IMSA’s CBM scan, IMSA Amsterdam, April 2015

Vargo, S. L., Wieland, H., Akaka, M.A. (2015). Innovation through institutionalisation: A service ecosystems perspective in Industrial Marketing Management, Vol. 44, pp. 63-72

Veleva, V., Bodkin, G. (2018). Corporate-entrepreneur collaborations to advance a circular economy. Journal of Cleaner Production, Volume 188, Pages 20-37. https://doi.org/10.1016/j.jclepro.2018.03.196

Verbong, G., Geels, F. (2010). Exploring sustainability transitions in the electricity sector with socio-technical pathways in Technol Forecast Soc Change, Vol 77 (8), pp. 1214-1221. https://doi.org/10.1016/j.techfore.2010.04.008

Vezzoli, C., Ceschin, F., Diehl, J. C., Kohtala, C. (2015). New design challenges to widely implement ‘Sustainable Product–Service Systems’. Journal of Cleaner Production, Volume 97, Pages 1–12. https://doi.org/10.1016/j.jclepro.2015.02.061

Victoria State Government, (2019). A circular economy for Victoria – Creating more value and less waste. https://s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.vic-engage.files/5115/6324/2021/A_circular_economy_for_Victoria_Issues_Paper_July2019.pdf

Vujcic M., Tomicevic-Dubljevic J., Grbic M., Lecic-Tosevski D., Vukovic O., Toskovic O. (2017). Nature based solution for improving mental health and well-being in urban areas in Environmental Research, Volume 158, Pages 385-392. https://doi.org/10.1016/j.envres.2017.06.030

W

Walley, E., Taylor, D. (2002). Opportunists, Champions, Mavericks…? A Typology of Green Entrepreneurs. Greener Management International, Volume 38, pp. 31-43. 10.9774/GLEAF.3062.2002.su.00005

Walrave, B., Raven, R. (2016). Modeling the dynamics of technological innovation systems, Research Policy, 45 (9), 1833-1844. https://doi.org/10.1016/j.respol.2016.05.011

Walsh, N. P. (2018). Biohm's "Vegan Insulation" System offers a Future for Green Construction in ArchDaily. https://www.archdaily.com/903744/biohms-vegan-insulation-system-offers-a-future-for-green-construction

Ward, J., Chiveralls, K., Fioramonti, L., Sutton, P., Costanza, R. (2017). The decoupling delusion: rethinking growth and sustainability. https://theconversation.com/the-decoupling-delusion-rethinking-growth-and-sustainability-71996

Washington, H., Maloney, M. (2020). The need for ecological ethics in a new ecological economics. Ecological Economics, Volume 169. https://doi.org/10.1016/j.ecolecon.2019.106478

Wastling, T., Charnley, F., Moreno, M. (2018). Design for Circular Behaviour: Considering Users in a Circular Economy. Sustainability, Volume 10, Issue 6, pp 1743. https://doi.org/10.3390/su10061743

WBCSD, (2021). Circular Transition Indicators (CTI). https://www.wbcsd.org/Programs/Circular-Economy/Factor-10/Metrics-Measurement/Circular-transition-indicators

Weber, K., Heinze, K. L., DeSoucey, M. (2008). Forage for thought: Mobilizing codes in the movement for grass-fed meat and dairy products in Administrative Science Quarterly, 53, 529–567.

Weber, K.M., Rohracher, H. (2012). Legitimizing research, technology and innovation policies for transformative change: Combining insights from innovation systems and multi-level perspective in a comprehensive 'failures' framework. Research Policy, Volume 41, Issue 6, Pages 1037-1047, ISSN 0048-7333, https://doi.org/10.1016/j.respol.2011.10.015.

Weick, K.E. (1989). Theory Construction as Disciplined Imagination. Acad. Manag. Rev. 14, 516–531. https://doi.org/10.2307/258556

Wesseling, J. H., Meijerhof, N. (2021). Developing and applying the Mission-oriented Innovation Systems (MIS). approach (Working Paper). https://www.uu.nl/sites/default/files/Wesseling%20and%20Meijerhof%202020_working%20paper.pdf

Williams, A. (2007). Product service systems in the automobile industry: contribution to system innovation? Journal of Cleaner Production, The Automobile Industry & Sustainability, Volume 15, Pages 1093–1103. https://doi.org/10.1016/j.jclepro.2006.05.034

Winans, K., Kendall, A., Deng, H. (2017). The history and current applications of the circular economy concept. Renew. Sustain. Energy Rev. 68, 825–833. https://doi.org/10.1016/j.rser.2016.09.123

World Bank Group (2020). Digital Ag Series: Blockchain-Powered Traceability Digital Platforms: Unlocking Supply Chain 2.0. https://olc.worldbank.org/content/digital-ag-series-blockchain-powered-traceability-digital-platforms-unlocking-supply-chain

Worrel, E., Reuter M. (2014). Handbook of Recycling: State-of-the-art for Practitioners, Analysts, and Scientists, ISBN: 978-0123965066, Published by Newnes

Wu, L., Huang, K., Ridoutt, B., Yu, Y. (2021). A planetary boundary-based environmental footprint family: From impacts to boundaries. Science of The Total Environment, Volume 785. https://doi.org/10.1016/j.scitotenv.2021.147383.

Y

Yadav, M. (2010). The Decline of Conceptual Articles and Implications for Knowledge Development. Journal of Marketing, Vol. 74, Issue 1, pp. 1-19. https://doi.org/10.1509%2Fjmkg.74.1.1

Yadav, M. (2018). Making emerging phenomena a research priority. Journal of the Academy of Marketing Science, Vol. 46, pp. 361–365. https://doi.org/10.1007/s11747-017-0575-0

Yan, J., Wu, N. (2011). Technology supporting system of circular economy of mining cities at 2011 Asia-Pacific Power and Energy Engineering Conference. IEEE, Pages 1–5. http://ieeexplore.ieee.org/document/5749062/

Yang, M., Evans, S. (2019). PSS business model archetypes and sustainability. Journal of Cleaner Production, Volume 220, Pages 1156-1166. https://www.sciencedirect.com/science/article/pii/S0959652619304524

Yap, N. T., 2005. Towards a circular economy: progress and challenges. Greener Manag. Int., 50, pp. 11-24.

York, J.G., Venkataraman, S. (2010). The entrepreneur–environment nexus: Uncertainty, innovation, and allocation. Journal of Business Venturing, Sustainable Development and Entrepreneurship, Volume 25, Pages 449–463. https://doi.org/10.1016/j.jbusvent.2009.07.007

York., J., O'Neil, I., Sarasvathy, S. (2016). Exploring Environmental Entrepreneurship: IdentityCoupling, Venture Goals, and Stakeholder Incentives. Journal of Management Studies, Vol. 53, Issue 5, pp 695-737

Young, C. W., Russell, S. V., Robinson, C. A., Chintakayala, P. K. (2018). Sustainable retailing − influencing consumer behaviour on food waste. Business Strategy and the Environment, Volume 27(1), Pages 1–15. https://doi.org/10.1002/bse.1966

Z

Zahra, S. A., Ireland, R. D., Hitt, M. A. (2000). International Expansion by New Venture Firms: International Diversity, Mode of Market Entry, Technological Learning, and Performance in Academy of Management Journal, Volume 43, Pages 925–950. https://doi.org/10.5465/1556420

Zeng, H., Chen, X., Xiao, X., Zhou, Z. (2017). Institutional pressures, sustainable supply chain management, and circular economy capability: Empirical evidence from Chinese eco-industrial park firms. Journal of Cleaner Production, 155, pp. 54-65

Zhang, D., Huang, X., Wen, Y., Trivedi P., Joghee, S. (2021). Sustainable Circular Business Model for Transparency and Uncertainty Reduction in Supply Chain Management. J. Theor. Appl. Electron. Commer. Res. Vo. 16, 959–975. https://doi.org/10.3390/jtaer16040054

Zuboff, S. (2019). The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power. Hachette Book Group, New York

Zucchella, A., Previtali, P. (2018). Circular business models for sustainable development: A "waste is food" restorative ecosystem, Volume28, Issue 2, Pages 274-285. https://doi.org/10.1002/bse.2216

Zucchella, A., Urban, S. (2019). Circular Entrepreneurship. Palgrave Macmillan, Cham, Switzerland. https://doi.org/10.1007/978-3-030-18999-0

Zvolska, L., Palgan, Y.V., Mont, O. (2019). How do sharing organisations create and disrupt institutions? Towards a framework for institutional work in the sharing economy. Journal of Cleaner Production, Volume 219, Pages 667-676, https://doi.org/10.1016/j.jclepro.2019.02.057.

Appendices to the chapters

Appendix 1. Chapter 1 - Overview of expert interviews

#	Location	Start-up	Position
1	Amsterdam	CocoPallet	Co-Founder and CEO
2		DeKlik	Founder and CEO
3		Mayya Saliba Design	Founder and CEO
4		PickThisUp	Founder and CEO
5	Rotterdam	Aloha Bar	Founder and CEO
6		FruitFlyNinja	Co-Founder and COO
7		Kees	Founder and CEO
8		MastersThatMatter	Co-Founder and Creative Director
9		Rotterzwam	Co-Founder and CEO
10		Vet and Lazy	Co-Founder and CEO
11	Berlin	aluc	Co-Founder and CEO
12		bonaverde	COO
13		Design for Circularity	Founder and CEO
14		Diaper Cycle / Dycle	Co-Founder and CEO
15		Dzaino	Co-Founder and CEO
16		ECOBrotbox	Founder and CEO
17		GreenMe Berlin	Founder and CEO
18		KAFFEEFORM	Founder and CEO
19		Material Mafia	COO
20		mimycri	Co-Founder and CEO
21		Mitte GmbH	Business Development
22		mundraub	Founder and CEO
23		selo	Business Development
24		Upcycling Deluxe	Co-Founder and CMO
25	London	Aceleron	Co-Founder and CEO
26		BuildingBloqs	Co-Founder and CEO
27		GrowUp	Co-Founder and CEO
28		Nimber	Founder and CEO
29		Remakery	COO
30		Biohm	Founder and CEO

Appendix 2. Chapter 1 - Overview of the sources for the data sample

Databases and maps	
Amsterdam Economic Board's CSUs map	http://economicboard.magazines.center/circulaire-activiteit#!/startups-in-nederland
Startups solutions for the energy transition	https://www.startupdelta.org/wp-content/uploads/2018/09/Startup-solutions-for-the-energy-transition-%E2%80%94-Bid-book-StartupDelta.pdf
StartupDelta database	https://www.startupdelta.org/
Circular Economy Club Mapping Week	Link
CSU awards	
Green Alley Award	https://green-alley-award.com/
CE Booster	https://cebooster.nl/
CSU hubs	
CRCLR, Berlin	https://crclr.org/
BlueCity010, Rotterdam	https://www.bluecity.nl/
Sustainable workspaces, Londn	https://www.sustainableworkspaces.co.uk/

Appendix 3. Chapters 2, 3 and 4 - Consolidated interview guide

Founder interview guide for Conceptualising Business Models, Ambitions and Innovation Ecosystems of Circular Startups

Thank you for taking the time for this interview. We are part of the Copernicus Institute for Sustainable Development of Utrecht University where we focus on sustainability and innovation research, among other things. Also, Circular Economy is one of our focus topics and we are doing a survey that examines circular start-ups. For this, we interview 40-50 startups in a series of 45-60 minutes expert interviews analysing their general background, scope, approach to circularity, vision and business model. The results of this research will be published in a series of peer-reviewed scientific papers and shared among all participants. In the presentation of the results, we will make sure that all inputs remain anonymous, or to ask for your consens in case of direct/identifiable citation. Please answer the following questions to the best of your knowledge and belief.

Interviewee profile

1. Could you please tell us a little more about yourself? Such as your name (for the recording), job description and career path?

Circularity and business model

2. Please describe the business model of the company you work for.
3. Which sector do you operate in (e.g., waste management, energy, transportation)?
4. Do you consider yourself as a circular start-up?
5. *Optional if not clear based on answer to 2.:* Is the key area of application of circularity in your business model
    - ☐ Product-based (e.g., increasing of durability of products, "modulisation" of mobile phone parts to meet customer needs more flexibly)
    - ☐ Service- based (e.g., renting of tools at DIY store, lease of fleet tires)
    - ☐ Sharing-based (e.g., car sharing)
    - ☐ Supply chain- based (e.g., recycling of food waste to create clean energy)
    - ☐ Knowledge-based (e.g., knowledge exchange, educational)
    - ☐ Other (please explain)?
6. Do you consider the sustainability/circular component of your business model part of your USP? With ‘sustainability’ we mean that your firm simultaneously aims to accomplish positive environmental, economic and social impacts.
7. Why did you decide to start this business? Can you please explain how the idea and your business model emerged?

- Did circularity, [define] play a central role in your product/service design process from the very beginning?
- What are problems you encountered while launching your start-up and how did you deal with them?

Ambition of Circular Startups

8. What do you want to achieve with your company? What is your vision?
9. Please rank the 5 following dimensions based on where your business models focus lies from most to least
    - Incremental profit
    - Environmental conservation
    - Social equity
    - Consumer (usage and EoL)
    - Sustainable supply chains
10. Do you operate with a focus on [city], [country], [continent], worldwide or anything else?
    - *Optional if company not only operates in [city]:* Are there any regional differences (at least in different countries) between your sourcing, sales and production?
    - Why did you decide to launch your startup in [city] and not elsewhere?
    - Are there any plans to expand your geographical focus in the next 3 years? Please explain.
    - How importance are local factors for your success? Do you think you would have the same success in other regions as well?
11. Please rate what relevance scalability, i.e. the possibility to grow your business into a global one, had when you launched your company and now?
    - Launch: ☐ Highly relevant, ☐ Relevant, ☐ Included, ☐ Irrelevant
    - Now: ☐ Highly relevant, ☐ Relevant, ☐ Included, ☐ Irrelevant
    - What are problem you encountered while scaling your start-up and how did you deal with them?
12. Would you sell your company to a financial investor within the next three years if a lucrative offer came across?
    - What would be criteria in choosing a suitable investor?
13. Is your interaction with other players in the market rather

- ☐ Competitive i.e. product/service is already offered in a very similar way?
- ☐ Complementary i.e. novel product/service closing a gap in an existing system of business models?
- ☐ Disruptive novel product/service making existing business models obsolete?

Circular Startups in innovation ecosystems

14. What are the main activities that ensure your company's success?
15. There is a distinction in academia between firm internal activities (product development, HR, finance etc.) and external activities that are directed at other actors that are necessary to develop and diffuse an attractive business model (suppliers, clients, policy makers, etc). What amount of time do you as an organisation spend on each of the categories (split 100%)?
16. What are for you the main players in the ecosystem you operate in, e.g., competitors, clients or suppliers? Ecosystem in this regard means a multi-actor network and thus not only your company's value chain (customers, suppliers etc.), but also societal actors, policy makers, educational institutions, investors, incubators etc.
    - How do you interact with these players in particular?
    - Did you actively seek for this ecosystem in case it was already existing? If so, please explain how?
    - Did you actively develop this ecosystem? If so, please explain how?
17. On a scale from 1-10 (1 = low importance, 10 = high importance) how important is your current ecosystem for your success?
    - ☐ 1, ☐ 2, ☐ 3, ☐ 4, ☐ 5, ☐ 6, ☐ 7, ☐ 8, ☐ 9, ☐ 10
18. Please assess the importance of external actors for you by prioritising them based on the focus of your external activities. Please chose among the actor categories presented in the table below (see question 19) allocating a total of 100 points (equivalent to importance, more points = higher relevance). Please elaborate.
19. Please state how much of the total time you spend on external activities you actually spend on each external actor. Please chose among the actor categories presented in the table below allocating a total of 100 points (equivalent to time spent, more points = more time). Please elaborate.

Category	Points importance	Points time spent
Government		

Educational institutions/science		
Customers		
Investors		
Competitors		
Suppliers		
Consultants		
Incumbents		
Incubators		
Others (please explain)		

20. Please assess the relevance of systemic activities that are conducted by external players in your ecosystem for your company's success. Which are the most important activities?

    - Please select among the following categories or add missing ones. Please allocate a total of 100 points (equivalent to relevance) and elaborate

Category	Points
Development and diffusion of knowledge on your business sector/innovation etc.	
Supply of resources (capital and competence)	
Reduction of resistance to change of relevant stakeholders	
Harmonisation of strategic goals among players in your ecosystem (e.g., industry associations setting goals on usage of renewable energy)	
Creation/stimulation of markets incl. policy making	
Other (please explain)	

21. Please explain the major barriers you encounter implementing your external strategy. An example for a barrier could be a lack of access to public authorities due to limited capacity on their end

22. Please explain the major drivers you encounter implementing your external strategy. An example for a driver could be a targeted subsidiary for your specific business sector or business model

Success and impact measurement

23. How do you measure the success of your business?
    - *Optional if not clear based on answer to 23.*: What are your key performance indicators?
    - *Optional if not clear based on answer to 23.:* Do you use classic financial metrics like Return on Investment (ROI)?
24. *Optional if not clear based on answer to 23.:* Do you measure your impact e.g., on society (FTE positions created) or the environment (CO2 emission reduction)? If so, how do you quantify it?

Company background

25. Please provide the following data for the last 5 years if possible: profit, revenue, number of employees, date founded
26. How did/do you generate funding? E.g., through investors, startup awards, state subsidies, the business model, bootstrapping?
27. How much funding did you obtain so far? How long do you expect it to last as of now?

Other/Closure

28. Is there anything else you would like to add?
29. Can you name any other circular start-ups in Berlin that may be of interest for this research?
30. Is it OK for you if we contact you again for a potential follow-up within the next 3-6 months?

Appendix 4. Chapter 5 - Manually corrected keywords

#	Original keyword(s)	Revised keyword[39]

[39] Revised keyword appeared at least once in the dataset prior to undertaking of revisions

1	Airbnb.com	Airbnb
2	Algorithms	Algorithm
3	Analytic hierarchy process(AHP)	Analytic hierarchy process (AHP)
4	Bike sharing	Bikesharing
5	Bio-composites	Biocomposites
6	Biological processes	Biological process
7	Biomasse	Biomass
8	Business models	Business model
9	C2C	Cradle to Cradle
10	Car-sharing	Carsharing
11	Case studies	Case study
12	Circular business models	Circular business model
13	circular economies	Circular economy (CE)
14	circular economy	Circular economy (CE)
15	Cities	City
16	Clean production	Cleaner production
17	Closed-loop	closed loop
18	Closed-loop recycling	Closed loop recycling
19	COD	COD (chemical oxygen demand)
20	Combined heat and power	Combined heat and power (CHP)
21	Communities	Community
22	Consumer behaviour	Consumer behaviour
23	Consumer Decision-Making	Consumer decision making
24	Cradle-to-cradle	Cradle to Cradle
25	Crouwdfunding	Crowdfunding
26	Crowd-funding	Crowdfunding
27	DEA	Data envelopment analysis (DEA)
28	Decision-making	Decision making
29	Design for recycling	Design for recycling (DFR)
30	Eco-design	Ecodesign
31	Eco-efficient	Eco-efficiency
32	Eco-industrial park (EIP)	Eco-industrial park
33	Eco-industrial parks	Eco-industrial park
34	Ecological industrial parks	Eco-industrial park
35	education for sustainability	Education for sustainable development (ESD)
36	End-of-Life	End of life

Appendix 4. Chapter 5 - Manually corrected keywords (continued)

#	Original keyword(s)	Revised keyword[40]
37	End-of-life vehicles	End-of-life vehicle
38	Environmental impacts	Environmental impact
39	Green economy	Green economy (GE)
40	Greenhouse gases (GHG)	Greenhouse gas (GHG)
41	Indicators	Indicator
42	Industrial systems	Industrial system
43	Influencing factors	Influence factors
44	Input-output analysis	input-output analysis (IOA)
45	Institutional pressures	Institutional pressure
46	IoT	Internet of things
47	Life cycle assessment	Life cycle assessment (LCA)
48	Lifecycle analysis	Life cycle analysis (LCA)
49	Lifecycle thinking	Life Cycle Thinking
50	Low-carbon	Low carbon
51	low-carbon economy	Low carbon economy
52	Material Flow Analysis	Material flow analysis (MFA)
53	Material flows	Material flow
54	MFA	Material flow analysis (MFA)
55	Mobile phones	Mobile phone
56	Mobility services	Mobility service
57	Motivations	Motivation
58	Optimisation	Optimisation
59	Peer -to-peer	Peer-to-Peer
60	Plastics	Plastic
61	Plattformen	Platform
62	Poly-hydroxy-alkanoate	Polyhydroxyalkanoates
63	Product-Service Systems	Product-service system
64	Rare earth elements	Rare Earth Elements (REE)
65	Recycle	Recycling
66	Redistributed manufacturing	Re-distributed manufacturing (RdM)
67	Re-manufacturing	Remanufacturing
68	Renewable energies	Renewable energy
69	Renewable resources	Renewable resource
70	Reputationssysteme	Reputation systems
71	Resources recovery	Resource recovery

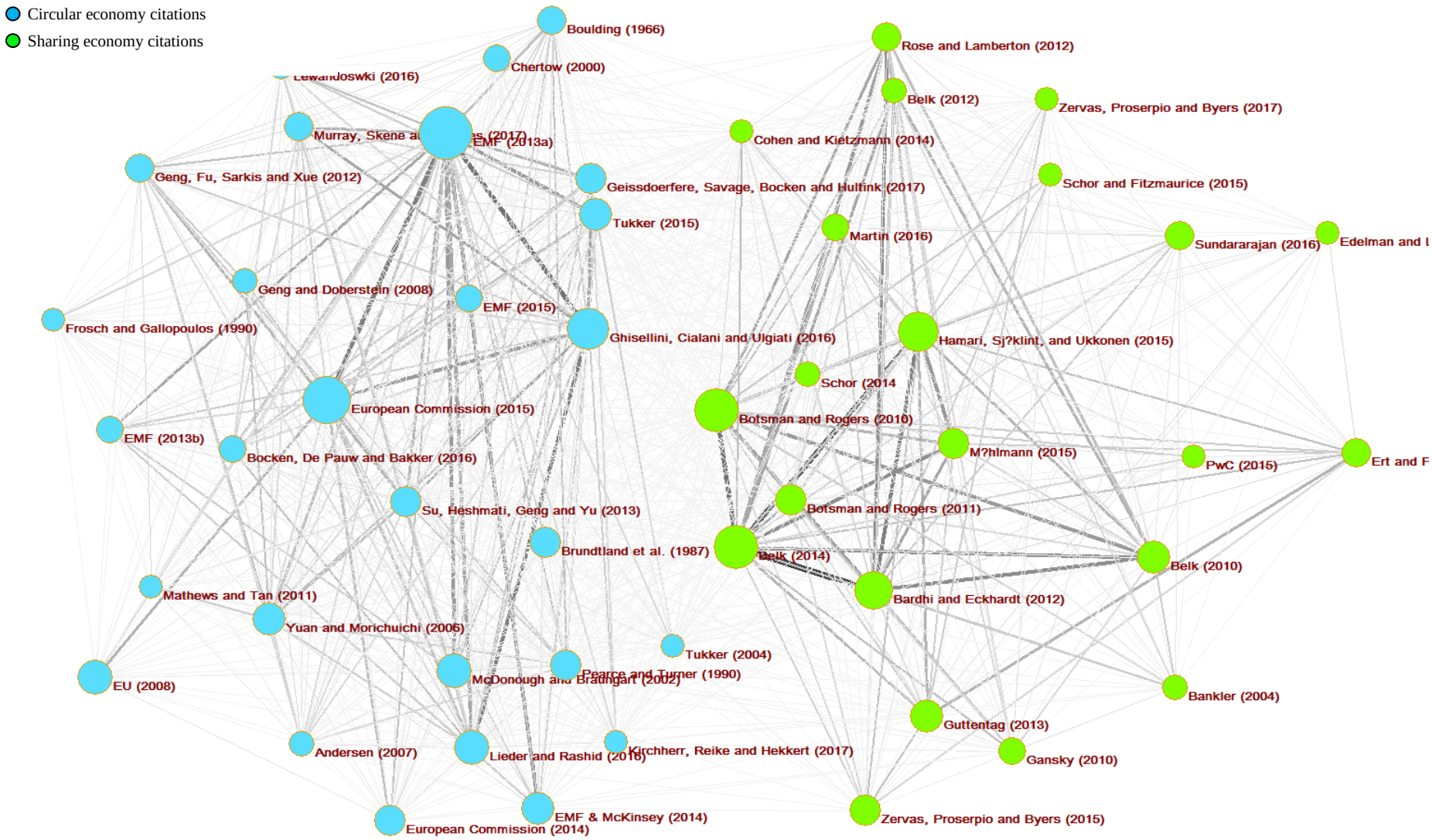
Appendix 4. Chapter 5 - Manually corrected keywords (continued)

[40] Revised keyword appeared at least once in the dataset prior to undertaking of revisions

#	Original keyword(s)	Revised keyword[41]
72	Re-use	Reuse
73	Reverse logistic	Reverse logistics
74	Ride sharing	Ridesharing
75	Ride-sharing	Ridesharing
76	Servitisation	Servitisation
77	Sewage sludge ash	Sewage sludge ash (SSA)
78	Shareconomy	Sharing economy
79	shared economy	Sharing economy
79	Sharing economies	Sharing economy
80	Sharing rconomy	Sharing economy
81	Smart cities	Smart City
82	Socio-technical transitions	Socio-technical transition
83	Strategy management	Strategic management
84	sustainable	Sustainability
85	Sustainable transition	Sustainability transitions
86	The eco-economy	Eco-economy
87	The sharing economy	Sharing economy
88	The Steel Industry	Steel industry
89	Time banking	Timebanking
90	Time-banking	Timebanking
91	Transitions	Transition
92	Uncertainties	Uncertainty
93	waste electrical and electronic equipment	Waste electrical and electronic equipment (WEEE)
94	Wastes	Waste
95	WEEE	Waste electrical and electronic equipment (WEEE)

[41] Revised keyword appeared at least once in the dataset prior to undertaking of revisions

Appendix 5. Chapter 5 - Overview of articles in co-citation analysis



Appendix 6. Chapter 5 - Top 50 cited publications by CE/SE article library

#	Author (year)	Title	Citations	Dominant field (>90%)
1	EMF (2013)	Towards the CE – Economic and Business Rationale for an Accelerated Transition	366	CE
2	European Commission (2015)	Communication roadmap to a resource-efficient Europe	299	CE
3	Belk (2014)	You are what you can access – sharing and collaborative consumption	261	SE
4	Botsman and Rogers (2010)	What's mine is yours – the rise of collaborative consumption	249	SE
5	Ghisellini, Cialani and Ulgiati (2016)	A review on CE – The expected transition to a balanced interplay of environmental and economic systems	241	CE
6	Hamari, Sjöklint, and Ukkonen (2015)	The sharing economy – why people participate in collaborative consumption	220	SE
7	Bardhi and Eckhardt (2012)	Access-based consumption in the case of car-sharing	197	SE
8	McDonough and Braungart (2002)	Remaking the way we make things: cradle to cradle	160	CE
9	Lieder and Rashid (2016)	Towards CE implementation: A comprehensive review in context of manufacturing industry	155	CE
10	EU (2008)	On waste and repealing certain directives – Waste framework directive	153	CE
11	Yuan and Morichuichi (2006)	Report of the world commission on environment and development: Our common future	147	CE
12	EMF & McKinsey (2014)	Towards the CE – Accelerating the scale-up across global supply chains	141	CE
13	Belk (2010)	Sharing	140	SE
14	Tukker (2015)	Product services for a resource efficient and circular economy – A review	139	CE
15	Guttentag (2013)	Airbnb – Disruptive innovation and the rise of informal tourism	137	SE
16	Botsman and Rogers (2011)	What's mine is yours – The rise of collaborative consumption – How collaborative consumption is changing the world	136	SE
17	Su, Heshmati, Geng and Yu (2013)	A review of the circular economy in China – Moving from rhetoric to implementation	134	CE
18	European Commission (2014)	The 12th five-year plans for economic and social development of China	131	CE

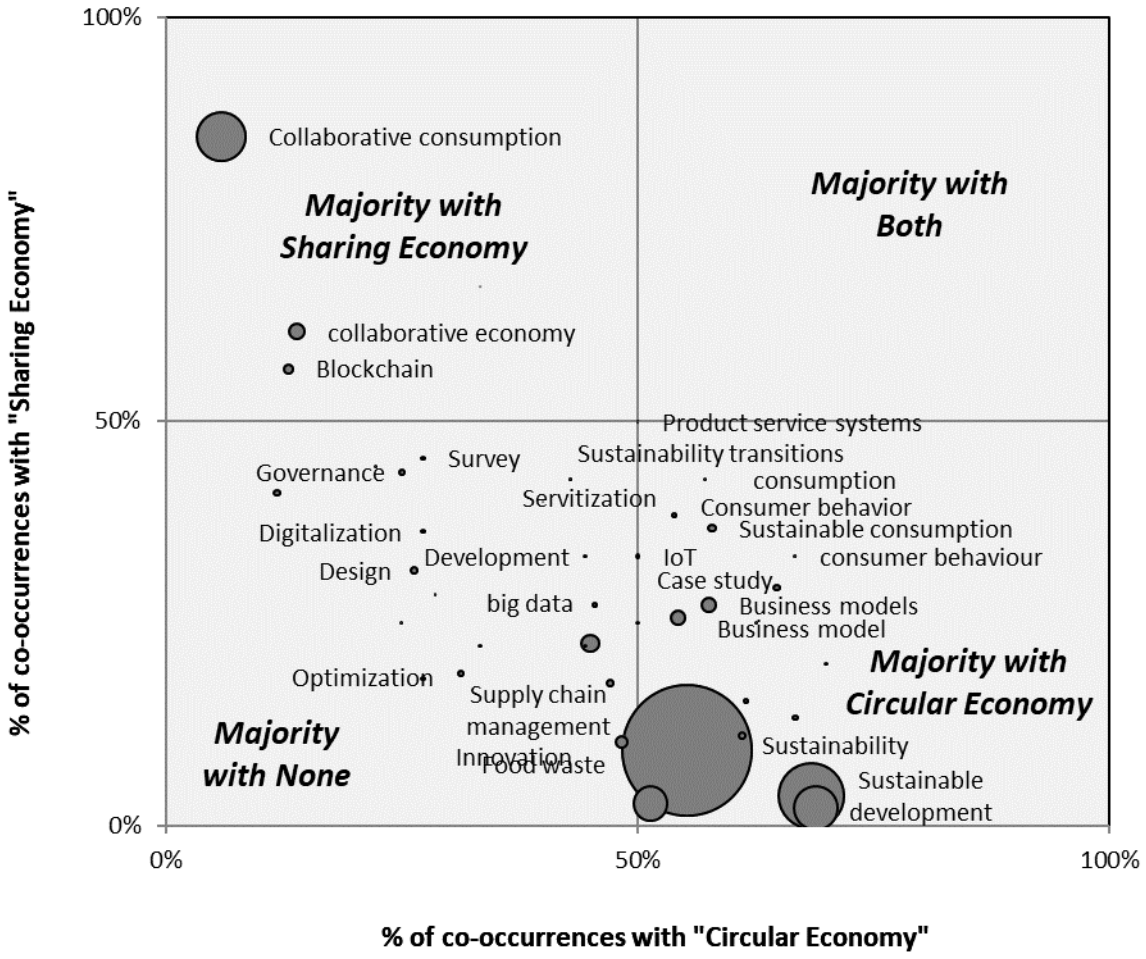
Appendix 6. Chapter 5 - Top 50 cited publications by CE/SE article library (continued)

#	Author (year)	Title	Citations	Dominant field (>90%)
19	Möhlmann (2015)	Collaborative consumption: Determinants of satisfaction and likelihood of using a sharing economy option again	125	SE
20	Pearce and Turner (1990)	Economics of natural resources and the environment	123	CE
21	Brundtland et al. (1987)	Stratégies d'acteurs et gouvernance des démarches d'écologie industrielle et territorial	122	CE
22	Geissdoerfer, Savage, Bocken and Hultink (2017)	The circular economy – A new sustainability paradigm?	122	CE
23	Zervas, Proserpio and Byers (2015)	The rise of the sharing economy: Estimating the impact of Airbnb on the hotel industry	121	SE
24	Ert and Fleischer (2016)	Trust and reputation in the sharing economy – The role of personal photos on Airbnb	117	SE
25	Sundararajan (2016)	The sharing economy: The end of employment and the rise of crowd-based capitalism	115	SE
26	Boulding (1966)	The economics of the coming spaceship earth – Environmental quality in a growing economy	113	CE
27	Geng, Fu, Sarkis and Xue (2012)	Towards a national circular economy indicator system in China – An evaluation and critical analysis	109	CE
28	Murray, Skene and Haynes (2017)	The circular economy: An interdisciplinary exploration of the concept and application in a global context	108	CE
29	Rose and Lamberton (2012)	When is ours better than mine? A framework for understanding and altering participation in commercial sharing systems	107	SE
30	Gansky (2010)	Why the future of business is sharing	104	SE
31	EMF (2015)	Growth within: A circular economy vision for a competitive Europe	101	CE
32	Martin (2016)	The sharing economy: A pathway to sustainability or a nightmarish form of neoliberal capitalism?	99	SE
33	Bocken, De Pauw and Bakker (2016)	Product design and business model strategies for a circular economy	97	CE
34	EMF (2013)	Towards the circular economy: Opportunities for the consumer goods sector	96	CE

Appendix 6. Chapter 5 - Top 50 cited publications by CE/SE article library (continued)

#	Author (year)	Title	Citations	Dominant field (>90%)
35	Chertow (2000)	Industrial symbiosis – Literature and taxonomy	95	CE
37	Andersen (2007)	An introductory note on the environmental economics of the circular economy	92	CE
38	Benkler (2004)	Sharing nicely – On shareable goods and the emergence of sharing as a modality of economic production	91	SE
39	Geng and Doberstein (2008)	Developing the circular economy in China – Challenges and opportunities for achieving 'leapfrog development'	87	SE
40	Schor (2014)	Debating the sharing economy	87	CE
41	PwC (2015)	The sharing economy	75	SE
43	Lewandowski (2016)	Designing the business models for circular economy: Towards the conceptual framework	74	CE
44	Edelman and Luca (2014)	Digital discrimination – The case of Airbnb.com	73	SE
45	Schor and Fitzmaurice (2015)	Collaborating and connecting: The emergence of the sharing economy	73	SE
46	Kirchherr, Reike and Hekkert (2017)	Conceptualising the circular economy – An analysis of 114 definitions	73	CE
47	Frosch and Gallopoulos (1989)	Strategies for manufacturing	73	CE
48	Cohen and Kietzmann (2014)	Ride on! Mobility business models for the sharing economy	72	SE (89%) / CE (10%)
49	Tukker (2004)	Eight types of product-service systems – Eight ways to sustainability?	72	CE (78%) / SE (18%)
50	Mathews and Tan (2011)	Progress towards a CE in China – The drivers (and inhibitors) of eco-industrial initiative	72	CE

Appendix 7. Chapter 5 - Percentage of author keywords co-occurring with CE and SE



Note: Bubble size ≙ #appearences

Appendix 8. Chapter 5 - Most frequently featured outlets in the CE and SE article library

Circular Economy			Sharing Economy		
#	Outlet	# of occurrences	#	Outlet	# of occurrences
1	Journal Of Cleaner Production	234	1	Sustainability (Switzerland)	30
2	Sustainability (Switzerland)	118	2	ACM International Conference Proceeding Series	25
3	Resources Conservation And Recycling	102		Lecture Notes In Computer Science*	25
4	Advanced Materials Research	94	4	Journal Of Cleaner Production	21
5	Procedia CIRP	86	5	International Journal Of Contemporary Hospitality Management	19
6	Waste Management	62	6	Conference On Human Factors In Computing Systems Proceedings	15
7	Applied Mechanics And Materials	49		Technological Forecasting And Social Change	15
8	Journal Of Industrial Ecology	47	8	International Journal Of Hospitality Management	14
9	Energy Procedia	45	9	Economist United Kingdom	12
10	International Multidisciplinary Scientific Geoconference Surveying Geology And Mining Ecology Management Sgem	39	10	Amcis 2017 America S Conference On Information Systems A Tradition Of Innovation	11

* Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics

Appendix 9. Chapter 5 - 21 overlap articles – identified with AND-operator in Scopus search query

Author(s)	Date	Title
Aboulamer, A.	2018	Adopting a circular business model improves market equity value
Avital, M., Andersson, M., Nickerson, J., Sundararajan, A., Van Alstyne, M., Verhoeven, D.	2014	The collaborative economy: A disruptive innovation or much ado about nothing?
Barbu, C.M., Florea, D.L., Ogarcă, R.F., Răzvan	2018	From ownership to access: How the sharing economy is changing the consumer behaviour
Bonciu, F., Bâlgăr, A.-C.	2016	Sharing economy as a contributor to sustainable growth. An EU perspective
Camacho-Otero, J., Boks, C., Pettersen, I.N.	2018	Consumption in the circular economy: A literature review
Coca-Stefaniak, A., Carroll, S.	2015	Traditional or experiential places? Exploring research needs and practitioner challenges in the management of town centres beyond the economic crisis
Cohen, B., Muñoz, P.	2016	Sharing cities and sustainable consumption and production: towards an integrated framework
Fournier, G.	2016	The new mobility paradigm. transformation of value chain and value proposition through innovations
Frenken, K.	2017	Political economies and environmental futures for the sharing economy
Hobson, K., Lynch, N.	2016	Diversifying and de-growing the circular economy: Radical social transformation in a resource-scarce world
Junnila, S., Ottelin, J., Leinikka, L.	2018	Influence of reduced ownership on the environmental benefits of the circular economy
Kopnina, H.	2017	Sustainability: new strategic thinking for business

Appendix 9. Chapter 5 - 21 overlap articles – identified with AND-operator in Scopus search query (continued)

Author(s)	Date	Title
Lacy, P., Rutqvist, J.	2016	Waste to wealth: The circular economy advantage
McIntyre, K., Ortiz, J.A.	2015	Multinational corporations and the circular economy: How Hewlett packard scales innovation and technology in its global supply chain
Prendeville, S., Cherim, E., Bocken, N.	2018	Circular Cities: Mapping Six Cities in Transition
Romero, D., Noran, O., Bernus, P.	2017	Green virtual enterprise breeding environments enabling the resolve framework
Sposato, P., Preka, R., Cappellaro, F., Cutaia, L.	2017	Sharing economy and circular economy. How technology and collaborative consumption innovations boost closing the loop strategies
Švecová, L., Veber, J.	2017	Is the sharing economy unfair competition and should it be regulated?
Todeschini, B.V., Cortimiglia, M.N., Callegaro-de-Menezes, D., Ghezzi, A.	2017	Innovative and sustainable business models in the fashion industry: Entrepreneurial drivers, opportunities, and challenges
Townsend, J.H., Coroama, V.C.	2018	Digital acceleration of sustainability transition: The paradox of push impacts
Wu, H.-T., Su, Y.-J., Hu, W.-C.	2018	A study on blockchain-based circular economy credit rating system

Appendix 10. Chapter 5 - Excerpt from SE/CE article library

G1231

ABSTRACT: Online peer-to-peer (P2P) lending occurs at the intersection of the sharing economy and e-commerce, and has developed into an immense finance industry in China. This study evaluates the business performance of the P2P finance industry and is the first to examine P2P lending activities from an efficiency perspective. We apply an improved version of the modified slacks-based measure that accommodates non-controllable inputs, undesirable inputs and outputs under a two-dimensional growth and operating efficiency paradigm. The results confirm the presence of contradictions between two types of efficiency in P2P platforms. They also show that listed companies, platforms with venture capital investment, and platforms funded by state-owned capital exhibit higher growth efficiency, while platforms with financial group involvement and diversified ownership show increased operating efficiency. Further, management incentives and the relative economic level of the platform location have no significant impact on efficiency. © 2018 Elsevier B.V.

	B	C	D	E	F	G	H	I
1	HITS	Author	Title	Journal information	Publi	ABSTRACT	Select 1st Author keyword:	Select 2nd Author Keyword:
1222	CE	Gao, F., Ye	The environment load evaluation and opt	Materials China, 35 (3), pp. 179-186. Cited 1 time.	2016	ABSTRACT: The production, consumption and recycling of non-ferrous metals are a complicate	; Energy saving and emissions reduction; Envir	; Energy saving and emissions reduc
1223	CE	Gao, L., Ch	Research on informationalization of reso	International Conference on Management and Service Science, MASS 2011, art. no. 59989	2011	ABSTRACT: This paper analyses the application characteristics of information to resource-base	; Circular economy; Informationalizaion; Reso	; Circular economy; Informational
1224	CE	Gao, L., Ch	Analysis and discussion on circular econo	Petroleum Processing and Petrochemicals, 43 (7), pp. 80-84.	2012	ABSTRACT: The characteristics of circular economy system based on the integration of petroch	; Adjustment and salt chemical integration; An	; Adjustment and salt chemical inte
1225	CE	Gao, L., Li,	Pretreatment of coking wastewater by an	Physicochemical Problems of Mineral Processing, 52 (1), pp. 422-436. Cited 6 times.	2016	ABSTRACT: A new technique for pretreatment of coking wastewater is introduced based on the	; Adsorption; COD; Coking coal; Coking waste	; Adsorption; COD; Coking coal; C
1226	CE	Gao, M., P	A cross-disciplinary overview of naturally	Materials Today Energy, 7, pp. 58-79. Cited 7 times.	2018	ABSTRACT: Due to global climate change and resource shortages, significant attention has beer	; Circular economy; Environmental benefits; F	; Circular economy; Environmenta
1227	CE	Gao, Q.-P.	Research on green marketing of real esta	Wuhan Ligong Daxue Xuebao/Journal of Wuhan University of Technology, 31 (16), pp. 183-	2009	ABSTRACT: In this paper, the context of circular economy of green marketing on the real estate	; Circulation economic; Green marketing; Rea	; Circulation economic; Green mar
1228	SE	Gao, S., Jir	The Role of trust with car-sharing service	Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelliger	2017	ABSTRACT: The development and advancement of ICT enable people to share excess capacity i	; Car-sharing service; Didi chuxing; Familiarity	; Car-sharing service; Didi chuxing;
1229	SE	Gao, S., Zh	Understanding business models in the sha	Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelliger	2016	ABSTRACT: Along with a growing environmental consciousness and the advancement of inform	; Business model; The sharing economy; Uber	; Business model; The sharing ecor
1230	CE	Gao, Y., Le	Constructing evaluation index system of a	Proceedings of 2013 6th International Conference on Information Management, Innovatio	2013	ABSTRACT: Through comprehensive analysis of the factors about the supply chain of agricultur	; Agricultural products supply chain; Cycle of e	; Agricultural products supply chain
1231	SE	Gao, Y., Yu	The performance of the P2P finance indu	Electronic Commerce Research and Applications, 30, pp. 138-148. Cited 1 time.	2018	ABSTRACT: Online peer-to-peer (P2P) lending occurs at the intersection of the sharing econom	; Business performance; Data envelopment ar	; Business performance; Data enve
1232	CE	Gao, Z., He	The coordination development between e	Advanced Materials Research, 524-527, pp. 3477-3482. Cited 1 time.	2012	ABSTRACT: Under the background of building the "Resource-conserving and Environment-frien	; Economy and environment; Forecast; Xinjiar	; Economy and environment; Fore
1233	CE	Gao, Z.-N.	Intensify environmental safety to ensure	Rural Eco-Environment, 21 (2), pp. 74-76,80.	2005	ABSTRACT: Intensification of environmental safety has been discussed from the angle of the cc	; Ecological safety; Environmental safet; Sust	; Ecological safety; Environmental
1234	SE	Garcia Gu	The emergence of hybrid economy as pro	Ilu, 19, pp. 439-450.	2014	ABSTRACT: The culture generated within what has come to be known as the sharing economy f	; Cooperation; Culture; Hibrid economy; Ren	; Cooperation; Culture; Hibrid eco
1235	CE	Garcia, B.,	Methodology to assess sustainable indica	International Journal of Economic Research, 14 (5), pp. 253-274.	2017	ABSTRACT: The aim of this paper is to develop a methodology to assess the sustainable indicat		
1236	SE	Garcia, J.M	Edge and cloud pricing for the sharing eco	IEEE Internet Computing, 21 (2), art. no. 7867718, pp. 78-84. Cited 4 times.	2017	ABSTRACT: Edge devices and cloud services form crucial parts of the Internet of Things technol	; edge devices; fog computing; Internet of Thi	; edge devices; fog computing; Int
1237	CE	García, M.	Identifying agri-food research priorities fc	Spanish Journal of Agricultural Research, 16 (3), art. no. e0001, 11 p.	2018	ABSTRACT: Among other functions, the INIA is involved in national and international cooperatic	; Climate change; Competitiveness; Efficiency	; Climate change; Competitiveness
1238	CE	García-Bu	Development of indicators for the sustain	Environmental and Socio-Economic Studies, 6 (4), pp. 22-38.	2018	ABSTRACT: Sustainable development has been highlighted widely in productive sectors such as	; AHP; carbon footprint; decision makers; life	; AHP; carbon footprint; decision
1239	CE	García-He	Connecting wastes to resources for clean	Clean Technologies and Environmental Policy, 20 (2), pp. 229-242. Cited 5 times.	2018	ABSTRACT: Our current economic model is experiencing increasing demand and increasing pres	; Chlor-alkali industry; KCl wastes; Life cycle a	; Chlor-alkali industry; KCl wastes;
1240	CE	García-Mu	The paradigms of Industry 4.0 and circula	Social Sciences, 7 (12), art. no. 255, . Cited 3 times.	2018	ABSTRACT: Sustainable development and the circular economy are two important issues for thi	; Circular business models (CBMs); Circular eco	; Circular business models (CBMs);
1241	CE	Garcier, R.	Introduction: Circulating matter, circular e	Flux, 108 (2), pp. 1-7. Cited 2 times.	2017	ABSTRACT: This introduction to the special issue Flux 2017/2 (No 108) questions the growing pc	; Circular economy; Circulation; Matter; Recy	; Circular economy; Circulation; M
1242	CE	Garcier, R.	Critical but disposed of: Making Sense of	Flux, 108 (2), pp. 51-63. Cited 1 time.	2017	ABSTRACT: Rare earths are a group of 17 metals used in technological applications (electric an	; Criticality; Rare earths; Recycling; Waste stu	; Criticality; Rare earths; Recycling
1243	SE	Gargiulo, E	Dynamic Ride Sharing Service: Are Users F	Procedia Manufacturing, 3, pp. 777-784. Cited 19 times.	2015	ABSTRACT: Nowadays we are experiencing a shift of paradigm from ownership of goods to sha	; Dynamic ridesharing; Lifecycle design proces	; Dynamic ridesharing; Lifecycle de
1244	CE	Gargori, C.	Recycling of Cr/Ni/Cu plating wastes as bl	Materials Letters, 218, pp. 341-345. Cited 2 times.	2018	ABSTRACT: The non-ferrous metal industry, such as Cr/Ni/Cu plating, produces acid sludge whic	; Ceramic pigment; Circular economy; Plating	; Ceramic pigment; Circular econo
1245	CE	Garmulew	Disruptive Technology as an Enabler of th	California Management Review, 60 (3), pp. 112-132. Cited 2 times.	2018	ABSTRACT: Three-dimensional (3D) printing has been widely identified as an emerging disruptiv	; 3D printing; circular economy; disruptive tec	; 3D printing; circular economy; di
1246	CE	Garza-Rey	A circularity measurement toolkit for mar	International Journal of Production Research, . Article in Press.	2018	ABSTRACT: The development and adoption of the concept of circular economy in the last two d	; circular economy; circularity; environmenta	; circular economy; circularity; en
1247	CE	Garza-Rey	Total quality environmental management TQM Journal, 30 (1), pp. 2-19. Cited 5 times.		2018	ABSTRACT: Purpose: To address the critical sustainability challenges currently faced by China, n	; China; EMS; Environmental management sys	; China; EMS; Environmental mana
1248	CE	Gaspari, L.	Modularization in material flow simulatio	Journal of Remanufacturing, 7 (2-3), pp. 139-157. Cited 3 times.	2017	ABSTRACT: Remanufacturing is recognized as a major circular economy option to recover and u	; Kanban; Modularity; Production control poli	; Kanban; Modularity; Production
1249	CE	Gauffin, A.	The global societal steel scrap reserves ar	Resources, 5 (3), art. no. 27, . Cited 3 times.	2016	ABSTRACT: In this study a newly developed method called the Progressing and Backcasting mod	; Dynamic material flow modelling; Forecast;	; Dynamic material flow modelling;
1250	CE	Gaustad, G	Dissipative Use of Critical Metals in the Al	Minerals, Metals and Materials Series, Part F4, pp. 1137-1139. Cited 1 time.	2018	ABSTRACT: To improve properties such as weldability, corrosion resistance, strength, etc. the a	; Aluminum; Critical metals; Dissipative loss	; Aluminum; Critical metals; Dissip
1251	CE	Gaustad, G	Circular economy strategies for mitigating	Resources, Conservation and Recycling, 135, pp. 24-33. Cited 14 times.	2018	ABSTRACT: Raw materials deemed critical are defined as having potential issues in their supply	; Business cases; Dematerialization; Diversific	; Business cases; Dematerializatio

Addenda

List of publications

- Henry, M., Bauwens, T., Hekkert, M., Kirchherr, J. (2020). A typology of circular start-ups: An Analysis of 128 circular business models. Journal of Cleaner Production, Vol. 245. https://doi.org/10.1016/j.jclepro.2019.118528
- Henry M., Kirchherr J. (2020). Conceptualising circular start-ups. In Tudor, T., & Dutra, C.J. (Eds.). The Routledge Handbook of Waste, Resources and the Circular Economy (1st ed, Chapter 11). Routledge. https://doi.org/10.4324/9780429346347
- Henry M., Kirchherr J. (2020). Circular start-ups - Five business model archetypes as frontrunners of circular disruption. In Tudor, T., & Dutra, C.J. (Eds.). The Routledge Handbook of Waste, Resources and the Circular Economy (1st ed, Chapter 27). Routledge. https://doi.org/10.4324/9780429346347
- Henry, M., Hoogenstrijd, T., Kirchherr, J. (2022). Motivations and Identities of “Grassroots” Circular Entrepreneurs: An Initial Exploration. Business Strategy and the Environment, Towards a Circular Disruption (Special Issue Article). https://doi.org/10.1002/bse.3097
- Henry, M., Hoogenstrijd, T., Kirchherr, J. (2021). The rise of the circular entrepreneur - An altruistic spirit and the pursuit of mass-market expansion. In Kopnina, H., & Poldner, K. (Eds.). Circular Economy: Challenges and Opportunities for Ethical and Sustainable Business (1st ed., Chapter 6). Routledge. https://doi.org/10.4324/9780367816650
- Henry, M., Schraven, D., Bocken, N., Frenken, K., Hekkert, M., Kirchherr, J. (2021). The battle of the buzzwords: A comparative review of the circular economy and the sharing economy concepts, Vol. 38, pp. 1-21. https://doi.org/10.1016/j.eist.2020.10.008

Summary

The circular economy (CE) is a much contested and praised concept in the context of sustainable development. Essentially, CE implementation strives for higher resource utilisation and lower leakage by closing resource loops in socio-economic systems - at best at higher efficiency than current, linear processes allow. Large-scale implementation of CE innovation can rarely be observed to date. However, socio-economic systems need to transition towards a CE in order to achieve a more co-evolutionary relationship with ecological systems. To advance the insight into CE innovation, this study zooms in on the cases of start-ups that build their business models based on principles of CE. Therefore, the research question of this project is 'How can circular start-ups contribute to the transformation towards a circular economy?'

The first study of this thesis analyses more than 120 circular start-ups (CSUs) and proposes a framework for CSU business models through which CSUs contribute to a CE transformation. The study identifies five archetypes of CSUs: design-based, waste-based, platform-based, service-based and nature-based CSUs. A comparison with CE innovation strategies of multinational corporations shows that CSUs tend to deploy strategies that have a higher impact.

The second study brings the founders of CSUs into focus by studying their motivation and identities. Founders of entrepreneurial ventures are considered one of the key determinants for the venture's development path, positioning, and success. We find that CSU founders have a high ambition towards holistic circularity, and that they prioritise societal value creation over their own ventures' success. Furthermore, these entrepreneurs tend to follow complementary and collaborative approaches towards business development as they rely on open innovation, information/resource sharing, and value co-creation.

The third study sheds light into CSUs' contributions to wider CE transformation processes. Therefore, the common CE mission of CSUs is defined and the roles that CSUs adopt in circular innovation systems are analysed. We observe that CSUs' roles often go much further than only novelty creation. The four roles of CSUs as actors in circular innovation systems are stimulators, conveners, pioneers, and champions/mentors. The roles differ according to the stakeholders, the institutional elements that are addressed, as well as the directionality that CSUs showcase.

The first 3 studies show that CSUs dominantly work with open innovation approaches, and that their business models and roles relate to the sharing of knowledge or resources - either as participators or facilitators. In the fourth study the scholarly links between CE and the sharing economy (SE) are scrutinised to align and strengthen the respective innovation

narratives. As such, avenues are proposed for a stronger bottom-up dynamic in CE innovation as well as interventions to mitigate CE's "weak point" of the social dimension.

Coming back to the research question, this thesis shows that CSUs contribute to CE transformation through their business models, through the various roles that they adopt to enable circularity in innovation systems, and by contributing to a necessary redefinition of value creation and entrepreneurship. CSUs can serve as important frontrunners from a governmental perspective as they can contribute to the legitimation of transformative, mission-based policy. To date, the social altruism that is apparent in CSU founder's personal value system is often missing structural embedding in their business models. Therefore, this research proposes that CSUs can benefit from a more structural inclusion of the social dimension, and a strengthening of bottom-up dynamics in CE innovation. This can be facilitated by building on learnings and applications of sharing economy innovation.

Samenvatting

De circulaire economie (CE) als concept in de context van duurzame ontwikkeling is zowel vaak betwist en als vaak geprezen. In wezen wordt bij de implementatie van CE gestreefd naar het behoud van grondstoffen, onderdelen en producten door het sluiten van kringlopen in sociaaleconomische systemen - in het beste geval met een hogere efficiëntie dan de huidige, lineaire processen toelaten. Grootschalige effecten van innovatie in de circulaire economie kunnen tot op heden zelden worden waargenomen. Sociaaleconomische systemen moeten echter overgaan naar een CE om een sterkere co-evolutionaire relatie met ecologische systemen te bereiken. Om het inzicht in CE-innovatie te vergroten, bouwt deze studie voort op de casussen van start-ups die hun bedrijfsmodellen bouwen op basis van CE-principes. De onderzoeksvraag van dit project is daarom: 'Hoe kunnen circulaire start-ups bijdragen aan de transformatie naar een circulaire economie?'

Het eerste onderzoek van dit proefschrift analyseert meer dan 120 circulaire start-ups (CSU's) en stelt een raamwerk voor CSU-bedrijfsmodellen dat uiteenzet hoe CSU's bijdragen aan een CE-transformatie. Het onderzoek identificeert vijf archetypes van CSU's: design-, afval-, platform-, service- en natuur-gebaseerd. Uit een analyse van waar de CE innovatiestrategieën van multinationals zijn vergeleken met die van CSU's, lijken CSU's de strategieën te implementeren die een grotere impact hebben op duurzaamheid dan de benaderingen van bestaande multinationals.

Het tweede onderzoek brengt de oprichters van CSU's in beeld door hun motivatie en identiteit te bestuderen. Oprichters van ondernemingen worden beschouwd als een van de meest bepalende factoren voor het ontwikkelingstraject, de positionering en het succes van de onderneming. We zien dat CSU-oprichters een hoge ambitie hebben ten aanzien van

holistische circulariteit en dat ze het creëren van maatschappelijke waarde voorrang geven boven het succes van hun eigen ondernemingen. Deze ondernemers hebben de voorkeur om complementaire en collaboratieve benaderingen voor bedrijfsontwikkeling te volgen, aangezien zij vertrouwen op open innovatie, waarde co-creatie en het delen van informatie, mensen en middelen.

Het derde onderzoek geeft inzicht op de werkelijke bijdrage van CSU's aan bredere CE-transformatieprocessen. Hiervoor zijn de rollen die CSU's vervullen in circulaire innovatiesystemen geanalyseerd. Uit deze analyse blijkt dat de rollen van CSU's vaak veel breder zijn dan het creëren van innovaties. De vier rollen van CSU's in circulaire innovatiesystemen zijn die van stimulator, verbinder, pionier en champion/mentor. De rollen verschillen op basis van de stakeholders, de institutionele elementen die aan bod komen en de richting die de CSU's uitdragen.

Uit de eerste drie onderzoeken blijkt dat CSU’s met name werken met open innovatie en dat hun bedrijfsmodellen en rollen vaak betrekking hebben op het delen van kennis of middelen, dan wel als deelnemer of als facilitator. In het vierde onderzoek worden daarom de wetenschappelijke verbanden tussen de CE en de sharing economy (SE) onder de loep genomen zodat de eerder besproken innovatierichtingen op elkaar afgestemd kunnen worden en elkaar kunnen versterken. Op die manier worden suggesties gedaan om de bottom-up-dynamiek in CE-innovatie te versterken, maar ook interventies om het 'zwakke punt' van de CE, namelijk de sociale dimensie van de CE, te verminderen.

Terugkomend op de onderzoeksvraag toont dit proefschrift aan dat CSU’s op verschillende manieren bijdragen aan de CE-transformatie, namelijk via hun innovatieve bedrijfsmodellen, via hun bijdrage aan een herdefinitie van waarde creatie en ondernemerschap en via de verschillende rollen die zij aannemen om circulariteit in innovatiesystemen mogelijk te maken. Hierbij wordt de nadruk gelegd op de interactie met institutionele elementen en andere actoren in circulaire innovatiesystemen. Zo kunnen CSU's vanuit overheidsperspectief als belangrijke koplopers fungeren, aangezien zij kunnen bijdragen aan de legitimering van een transformatief, missiegericht beleid. Tot op heden is het sociaal altruïsme, dat duidelijk aanwezig is in het persoonlijke waardesysteem van de oprichters van CSU's, vaak niet structureel verankerd in hun bedrijfsmodellen. Dit onderzoek stelt dat CSU's baat kunnen hebben bij een meer structurele opname van de sociale dimensie en een versterking van de bottom-up-dynamiek in CE-innovatie, die kan worden gefaciliteerd door voort te bouwen op de lessen en toepassingen van innovatie in de sharing economy.

Author CV

Marvin Henry is an academic from Copernicus Sustainable Development Institute at Utrecht University (the Netherlands). He examines sustainability transformations with a focus on the circular economy and innovation systems. Most of his current work investigates CE bottom-up dynamics and the role of entrepreneurship and consumers as drivers of systemic, circular transformation processes. He has taught BSc and MSc courses at Utrecht University, and supervised several research projects and MSc theses on the circular economy and sustainable development. Marvin works for London-based fintech & circular start-up twig. Before his role at twig, he worked on sustainability and digital transformation projects at strategic consulting company McKinsey and for the World Business Council for Sustainable Development (WBCSD). He specialised in product-level carbon accounting and supply chain decarbonisation. Marvin supports the Ashoka Globaliser program as a pro-bono advisor and is a mentor for scholars from Deutschlandstiftung Integration.

Cover design by Marie-Louise Schmidlin
Print by repros Amsterdam, supported by Utrecht University
DOI: https://doi.org/10.33540/1584