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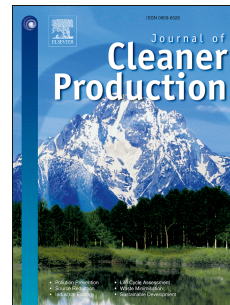
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Title page:

A systematic literature review of the transition to the circular economy in business organizations: Obstacles, catalysts and ambivalences

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A systematic literature review of the transition to the circular economy in business organizations: Obstacles, catalysts and ambivalences

Abstract: There is a need for a transition from unsustainable linear business models to a more sustainable circular approach, called the circular economy. To promote this need, a deeper understanding of which issues hinder organizations' transition to the circular economy and which ones catalyse it is needed. A systematic literature review was performed on the business implementation of the circular economy and 69 articles covering the topic were found. The review identifies different types of catalyst, obstacles and ambivalent factors influencing circular economy implementation in business. This study contributes to research on circular economy implementation at business organizations by providing understanding on the role of these factors in supporting or hindering the change. This study also opens discussion on ambivalent factors that in certain contexts can act as a catalyst to and in others as a hindrance to circular economy. This understanding further enables identification of the origins of these different types of factors, especially concerning their intraorganizational or interorganizational role. The study further identifies gaps to be studied in future research.

Keywords: circular economy, business transition, catalysts, obstacles, systematic literature review

1 INTRODUCTION

There is a growing recognition that the current linear model of our economy is highly unsustainable, and we need to move forward with a sustainable way of conducting business and generating wealth. A more sustainable model, called the circular economy (CE), where resources are circulating in the economy and society (Ellen MacArthur Foundation 2017; Ghisellini et al., 2016) is seen as a viable option to replace the linear model. According to the European Union, CE is a model 'where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised' (European Commission, 2018, 1).

The importance of the transition towards CE has been realized on the governmental level. For example, in 2015, the EU proposed a Circular Economy Action Plan (EU, 2015) in which 54 actions were considered as being met or implemented in 2019 (EU, 2019). In 2016, Finland constructed its own road map for becoming a global leader in the CE (Sitra, 2016). The CE was also noted as one of the key projects of the previous government in Finland (Prime Minister's Office, 2015).

The CE is a novel approach, still in its development phase (Ghisellini et al., 2016), and it requires rebuilding and restructuring our processes and systems, so that there is effectiveness, resource intellect and a supporting infrastructure in place. It also needs societal acceptance, involvement of all actors, and operational as well as technological modifications to flourish. Prior research has found that there is still theoretical and practical ambiguity on the concept and principle of CE (Geissdoerfer et al. 2017; Kalmykova et al. 2018) and, however, despite

this ambiguity, it seems that the concept has multiple links with the idea of the concept of sustainability (Geissdoerfer et al. 2017).

Reike et al. (2018) propose that, on the basis of their literature review, the concept of the CE has evolved through three stages. In the first stage (1970–1990s), called CE 1.0, the concept concerned with dealing with waste. The main idea at this time was that one should not just dump waste but find ways to manage and recycle it. The second stage (1990s–2010), CE 2.0, is labelled by Reike et al. (2018) as ‘connecting input and output in strategies for ecoefficiency’. The literature uses concepts such as life cycle thinking, industrial ecology and design for environment. The emphasis is on companies profiting from solving environmental problems. The third stage (2010–), CE 3.0, focuses on ‘maximizing value retention in the age of resource depletion’. Reike et al. (2018) highlight that the difference in the third phase in comparison to other stages is that a closed-loops approach is not applied only in geographically close areas but in whole supply chains. In addition, stakeholders (such as suppliers, consumers, NGOs and governments) are widely involved in the CE process. The third new aspect in CE 3.0 is the focus on business models and instead of just focusing on technical aspects, covers also the cultural aspects of an organization. Reike et al.’s (2018) work addresses important aspects on the development of the concept of CE and related discussion.

Furthermore, multiple CE-related literature reviews have been conducted. The previous literature reviews can be divided into three board categories. First category consists of the reviews of concept of CE (e.g. Kirchherr et al. 2017, Kalmykova et al. 2018, Schögl et al. 2020). Second category are the cross-cutting reviews that review the whole academic literature on CE. For example, Merli et al. (2018) studied the focuses scholars have taken in CE research and identified three main focus areas: social and economic dynamics at the macro and administrative level, firm circular process implementation and related consumption and product design at the micro level and industrial symbiosis at the meso level. However, the reviews in these categories lack detailed understanding of the influences to change at the micro level, where the concrete CE changes are implement. Third category are the more focused reviews. This is the category, where also the current review contributes to. The more focused reviews have targeted multiple different contexts. For example, -Sassanelli et al. (2019) focused on reviewing CE assessment methods and developed a framework for assessing and measuring CE at the micro level. Camacho-Otero et al. (2018) reviewed consumption related CE research and identified a focus on factors driving and hindering consumption of CE-based products. Furthermore, Masi et al. (2017) did a systematic review of supply chain configurations in the CE at the meso level and identified how differences in CE definitions lead to fragmented research streams. De Jesus et al. (2018) reviewed the role of eco-innovations in CE at the macro, meso and micro levels and showed that the transition to CE requires specific, eco-innovation-based solutions. These more focused reviews are able to provide interesting results by zooming into a particular context. However, understanding changes within all types of organizations is still largely fragmented around research and journals. Changes at the organizational level are, however, one of the important perquisites for the change, because CE transition is not limited to specific country, industry or supply chain contexts and these influence each other. Although Centobelli et al. (2020) reviewed how business models can be designed to fit circular economy principles, a systematic understanding of CE-related change catalysts and obstacles at the micro level, meaning the organizational or firm level, is still missing.

The literature on CE implementation at the organizational level has discussed the issues in very different contexts. For example, technical solutions such as waste handling and other end-of-life (EOL) considerations (Nizami et al., 2017; Saidani et al., 2017; Pan et al., 2015) have been covered, and only slowly started to consider the business potential and possible business models that would support the CE approach. The potential business models of the CE model are considered (Lahti et al., 2018; Ranta et al., 2018a; Sousa-Zomera et al., 2018; Stål and Corvellec, 2018) and the CE developments of different regions are studied (Ranta et al., 2018a; Ranta et al., 2018b). Some authors aim to develop models for CE implementation or CE business model transition (Lewandowski, 2016; Mendoza et al., 2017). Although research has been conducted on CE, it is still a diffuse field of research.

As a topical issue, we still know very little about the CE and its potential in its current form. We do know that being circular on more than just a microscopic level requires large-scale modifications and restructuring of different operations. There is still a need for further research on the catalysts and obstacles which companies face when transitioning to CE business, as well as understanding how management and company personnel can act to enable the transition.

Previous literature has also studied obstacles and catalysts for the CE (Kirchherr et al., 2018; Rizos et al., 2016). However, the approach in this review differs from those, as the aim is to perform a systematic literature review on the key catalysts and obstacles in the transition to the CE from a business organization viewpoint. The review does not focus on any particular industry, but rather aims to gather a bird's-eye view of the current state. This was chosen as a functioning CE demand that the lines and borders of industries and nations are set aside and the flows and cycles of materials and knowledge, which are central to CE, are emphasised. In this paper, the aim is to understand what issues are hindering the CE transition on a company level and what issues can act as catalysts to enable the change. Based on the sense of urgency to transition to the CE, there lies the desire to understand why businesses have not been more eager to change their performance. To address this issue, the following research questions were formulated: (1) What kinds of catalysts promote the transition to the CE? (2) What kinds of obstacles hinder the transition to the CE? The main findings recapitulate the current understanding of CE research and acknowledge the diffuse nature of the previous literature. This study contributes to the research on CE implementation at business organizations by providing understanding of the role these factors play in supporting or hindering the CE change. This study also opens discussion on ambivalent factors that, in certain contexts, can act as a catalyst to CE and, in others, as a hindrance. This understanding further enables identification of the origins of these different types of factors.

The rest of the paper is structured as follows. The next section introduces the research methods used in this study, explaining how the literature review was conducted. The findings section presents the results and discusses the main categories in catalysts and obstacles. Finally, the discussions section collects the thoughts generated by the articles and addresses the defects in the dataset.

2 METHOD

2.1 Data collection

To gain insights into the current state of CE literature, a systematic literature review was conducted. According to Bettany-Saltikov (2012, p. 5), “a systematic review is a summary of the research literature that is focused on a single question. It is conducted in a manner that tries to identify, select, appraise and synthesize all high quality research evidence relevant to that question.” Several authors have described the process and the various steps of systematic literature reviews. In this paper, the authors synthesized the processes of Engert et al. (2016), Pittaway and Cope (2007), Fisch and Block (2018), Danese et al. (2018), Macpherson and Jones (2010), Correia et al. (2017) and Popay et al. (2006). In the current research, the systematic literature review proceeded in seven steps (see Figure 1) and each step is explained in detail in below.

Figure 1. The literature review process

The possibilities for literature for review were considered from several databases: Google Scholar, Scopus and Web of Science. Finally, Web of Science and Scopus were chosen, as the two databases provided extensive coverage of the topic, and an interface in which a systemic search was easy to execute. Both databases are also reputable, with representation of high-quality journals. Data collection was first made on April 2019 for search word “business” and an additional search was made on October 2019 for the search words “enterprise” and “company.” The time range was chosen to cover all relevant articles from the databases up until the most recent full year, which was 2018.

As the aim was to study catalysts and obstacles companies experienced concerning the implementation of CE in their functions, the following search words “business / company / enterprise” and “implementation /adoption” were used together with “circular economy” to find potential articles. The search words did not contain the positive or negative aspects of CE, as the aim was to find impartial content on the subject. The search was made in title, abstract, and keywords. The search was not limited to any particular journals.

The search generated 193 articles from Web of Science and 248 articles from Scopus (see Table 1 for details). The amount included a number of duplicate articles that were generated during the different search word searches within each dataset as well as overlapping articles, which included articles that appeared in both the Web of Science and Scopus datasets. After removing these duplicate (108 articles from Web of Science, and 90 from Scopus) and overlapping (4 articles from Web of Science, and 47 from Scopus) articles, the total of generated articles was 192.

Table 1. Search words and generated articles

	Number of articles in Web of Science	Number of articles in Scopus
Search words		

circular economy AND adoption AND business	25	25
circular economy AND adoption AND enterprise	6	2
circular economy AND adoption AND company	11	16
circular economy AND implementation AND business	71	88
circular economy AND implementation AND enterprise	21	42
circular economy AND implementation AND company	59	75
Grand total	193	248
Duplicate articles within a database	108	90
Overlapping articles between databases	4	47
Total (duplicate and overlapping removed)	81	111

The generated set of 192 articles was skimmed so the authors could familiarize themselves with the discussed themes. During this initial analysis, it was noticed that not all the articles dealt with CE change on the organizational level. Therefore, criteria were developed for which articles to include in the review and which ones to exclude (see Table 2 for details). The articles in which the key research themes were present were included. It was decided that articles that did not reflect the research aim were excluded. For example, articles in which CE was not a central theme, when organizational or company centric views, or discussion on catalysts or obstacles (from an organizational viewpoint) were not presented in the article were rejected. Articles that discussed, for example, only governmental views on CE were not included. Nor were articles, where the focus was solely on a specific topic (e.g. industrial symbiosis) and which included the CE-related aspects only in association to another topic, such as sustainability. This was chosen so that CE centric issues were the actual content and articles, which discussed other environmentally friendly terms, and merely mentioned CE as a term did not provide the depth content-wise for the review. Other exclusion criteria included articles written in a language other than English, conference papers or book chapters, or those that required paid access. After the exclusion criteria were applied, out of the 192 articles, 118 were left for thorough reading. Finally, after rejecting 49 articles due to their content not being relevant with the research aim, 69 articles were found suitable for the literature review. The coverage period was from 2005 to 2018 (the distribution of publication years is provided in Figure 2.).

Table 2. Exclusion criteria

Exclusion criteria	The number of articles
Total articles after data collection	192
Exclusion step 1 (no access, language barrier or cost)	32
Exclusion step 2 (conference papers, book chapters)	42
Exclusion step 3 (no relevance with research aim)	49
Total articles included for the review	69

Figure 2. The distribution of the articles' years of publication

The search was not limited to any particular journals. However, it seemed that a few publications occurred more often: *Journal of Cleaner Production* (17 articles, 25%), *Sustainability* (12, 17%), *Resources, Conservation & Recycling* (9, 13%), *Management Research Review* (3, 4%), and other publications (28), mostly related to industrial, engineering or technical issues. All the reviewed articles and the journals are listed in the Appendix.

2.2 Analysis

The selected 69 articles were analysed in two rounds: first, each article was individually analysed to identify its perspectives on CE transition in business organizations. Second, a thematic analysis was done to identify the obstacles and catalysts presented in the articles.

In the first round, the authors reviewed each article to identify the theoretical and methodological approaches applied in the study, the key research context or contexts in each study. Concerning the context of the study, attention was paid to geographical and industrial levels. The analysis then proceeded to organizational-level catalysts and obstacles in the selected articles. Each article was carefully read to identify the factors that may be a catalyst and which factors may be obstacles for CE change at the organizational level. At this stage of the analysis, an interpretative perspective was taken, as the catalysts and obstacles were not necessarily explicitly named as such in the articles, but the view could be interpreted from the findings. This meant that catalysts or obstacles were presented as such by other similar types of terminology. For each selected article, information on the theory, methodology, contexts and identified catalysts and obstacles was entered into an analysis table. Each author of the article participated in this round of coding: the first author coded 40 articles, the second author 20 articles and the third author 9 articles. The coding in each case was reviewed by the first author, and to validate the coding process, the articles were discussed and the coding processes compared. To confirm that the coding followed the same principles among the three researchers, coding was constantly discussed together and problematic cases were coded by more than one author.

In the second round, a thematic analysis was conducted on the coded catalysts and obstacles identified in the analysed articles. In the early phases of this round, it was noticed that a third category also exists. It consists of a group of factors in organizational change to CE that can act either as catalysts or as obstacles, depending on the case. These factors have a dual role: in certain circumstances they can obstruct the implementation and in other circumstances they can promote it. The category was named ‘ambivalent factors’ based on its character. Then the authors proceeded to analyse each category further in order to identify the subthemes for each main category. This also happened by comparing the similarities and differences in the identified factors. This phase of the analysis enabled the authors to form a list of the main categories divided into subcategories. It was also noted that multiple articles contained elements of multiple categories, and presented, for example, both catalysts and obstacles. After this, a description of each subcategory based on the analysed material was written. In the following, the identified catalysts, obstacles and ambivalent factors for CE transition at the organizational level are introduced.

3 THEORETICAL, METHODOLOGICAL AND CONTEXTUAL APPROACHES

As a part of the analysis process, the theoretical and methodological approaches applied in the studies were reviewed as well as the contexts in which the empirical studies were conducted. This helped the authors to deepen the understanding of the basis on which the studies have been done, and at the end of the review, also to evaluate how these basic premises may have influenced the current understanding of CE implementation in business organizations.

Concerning *theoretical approaches*, it was found that a clear majority (51 out of 69 studies) of the studies did not apply a specific, well-defined theory. Instead, the theoretical portions of the studies were typically based on literature reviews of each study’s key concepts and their connection to the CE. For example, Zamfir et al. (2017) reviewed key drivers for sustainability entrepreneurship, and Lewandowski (2016) reviewed business model development related to the CE. However, some studies were connected to clear theoretical approaches. Ranta et al. (2018b) and Stål and Corvellec (2018) applied institutional theory, and Singh et al. (2018) applied the theory of planned behaviour. Some studies applied international sustainability tools, systems and frameworks as a part of their theoretical approach. For example, Scheepens et al. (2016) applied a life cycle assessment framework, Pauliuk (2018) applied BS8001:2017 environmental management system framework, and Yazan et al. (2018) applied an input–output approach.

Concerning *methodological approaches*, it was found that 14 studies approached the CE at the organizational level quantitatively, 23 studies qualitatively and two studies combined these approaches with a multimethod or mixed method approach. Twenty-two studies were based on reviewing existing literature and concepts, and thus had no empirical datasets. Eight studies were categorized as ‘other studies’. They were calculations or simulations that cannot be categorized as qualitative or quantitative studies as such. The figures are presented in Table 3.

Table 3. Methodological approaches in the articles

Methodological approach	Amount of studies
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Qualitative methods	23 studies
Conceptual modelling and review based studies	22 studies
Quantitative methods	14 studies
Multimethod – mixed method approach	2 studies
Others	8 studies
Total	69

The quantitative studies typically aimed to measure the level and applied practices of the CE in certain country contexts (e.g. Fonseca et al., 2018; Botezat et al., 2018; Zhu et al., 2011). The qualitative studies typically consisted of case studies, in many of which a theoretical model was formed for empirical testing (e.g. Urbinati, 2017; Bressanelli et al., 2018; Gaustad et al., 2018). The conceptual modelling and review-based studies offered conceptual tools for CE implementation for certain contexts (e.g. Ridaura et al., 2018) or reviewed CE approaches and understanding in certain broad contexts, such as scholars' understanding (Merli et al., 2018), or a country context, such as China (e.g. Zhijun and Nailing, 2007).

The dominating *country or industry contexts* was also reviewed. In the majority of studies (42 out of 69), the country was the dominating context, and industry-specific studies were conducted to a lesser extent. The analysed studies discussed the CE in multiple different country contexts. The largest amount of studies related to the CE in Chinese companies. Among the 69 analysed studies, there were 10 studies related to China (Yap, 2005; Zhu et al., 2011; Zhu et al., 2010; Fang et al., 2017; Bai et al., 2015; Bai et al., 2015; Yong, 2007; Zhijun, 2007; Young, 2012; Liu, 2017). The second highest amount (4 studies) concerned the United Kingdom (Cooper and Hammond, 2018; de Abreu and Ceglia, 2018; Liu et al., 2017; Fogarassy, 2017). However, not all of the studies focused on a specific country context. Instead, they took, for example, a global perspective with no limitations. There were also five studies that focused specifically on a European or EU-level context (Kirchherr et al., 2018; Rizos et al., 2016; Franco et al., 2017; Saidani et al., 2017; Zamfir et al., 2017). Some of the studies were not attached to certain country contexts but instead analysed the context of a certain industry. For example, Witjes and Lozano (2016) took the perspective of public procurements, Lieder et al. (2017) focused on washing machines, and Molina-Moreno et al. (2018) examined energy systems.

4 CATALYSTS, OBSTACLES AND AMBIVALENT FACTORS

During the analysis, the three main categories that influence the organizational-level transition to the CE, were identified. These main categories are catalytic, ambivalent and obstructive factors. The catalytic category includes three subcategories, *expected economic and other benefits*, *the threat to business-as-usual*, and *managerial support and existing management systems*. The ambivalent factors category includes five subcategories, *legislative and regulative aspects*, *design and technical aspects*, *the importance of collaboration*,

customers and demand, and companies' existing knowledge and learning. Finally, the found obstructive factors category includes three subcategories, *uncertainty of expectations and outcomes, linear economic model embedded, and shortage of resources.* The subcategories presented catalysts, obstacles and ambivalent factors as emerging from three different sources: intraorganizational circumstances and approaches, interfirm relationships, and an organization's external environment. The main categories and subcategories are described in Table 4, including an extract from the analysed articles to exemplify the content of each category.

Table 4. The summary of the main and subcategories together with demonstrative quotes from the articles

Categories	Subcategories	Quotes from articles
Catalysts factors	<i>Expected economic and other benefits</i>	"Small and medium-sized enterprises (SMEs) are increasingly aware of the benefits of closing loops and improving resource efficiency, such as saving material costs, creating competitive advantages, and accessing new markets." (Rizos et al., 2016, 1)
	<i>The threat for business-as-usual</i>	"At the micro level, many organizations have begun to notice that the linear economic system increases their exposure to risks, most notably through volatility in resource prices and vulnerability to supply restrictions." (Franco, 2017, 833)
	<i>Managerial support and existing management systems</i>	"Top management and company creativity, together with the capacity for and commitment to change, are important for companies to initiate a new generation of business models." (Lahti et al., 2018, 12)
Ambivalent factors	<i>Legislative and regulative aspects</i>	"Targeted governmental interventions regarding the identified market barriers, e.g. the easing-out of subsidies that favor linear products, while, simultaneously, adopting policies that favor circular products such as reduced value added tax (VAT) for reparation, may provide a much-needed push for the CE." (Kirchherr et al., 2018, 271)
	<i>Design and technical aspects</i>	"...there has been a lack of consideration toward circular design and innovative strategies to slow material and resource loops." (Merli et al., 2018, 719)
	<i>The importance of collaboration</i>	"More intense collaboration practices between companies and stronger support from supply chain agents and consumers

	are also required." (Fonseca et al., 2018, 23)	
<i>Customers and Demand</i>	"One major cultural-cognitive barrier to reuse also seems to be customer preference for new products." (Ranta et al., 2018b, 78)	
<i>Companies' existing knowledge and learning</i>	"...while there is a good level of awareness, there is a clear need to articulate the benefits of the circular economy in a transparent and measurable manner." (Adams, 2017, 3)	
Obstructive factors	<i>Uncertainty of expectations and outcomes</i>	"...companies are not fully convinced that CE can bring them tangible benefits in cost reduction or financial profits and in the sustainability of the company over the long term..." (Ormazabal et al., 2018, 163)
	<i>Linear economic model embedded</i>	"Implementing the CE at the firm level is a challenging task given the linear mindset prevalent in most industries." (Franco, 2017, 837)
	<i>Shortage of resources</i>	"...the change from a linear business model to a circular business model may sometimes also require substantial investments..." Lahti et al., 2018, 12)

4.1 Catalyst factors

The first main category consists of subcategories that were presented as supporting the organizational-level transition to the CE. These factors may be positively or negatively experienced by organizational actors, and thus either push or trigger them towards change. Thus catalysing may occur through positive triggers or negative threats, such as experiencing a threat for future possibilities or a possibility to increase sales. However, from the CE transition viewpoint, they perform favourably, influencing and encouraging transition towards circular business operations.

4.1.1 Expected economic and other benefits

In the catalyst category, the most dominating subcategory, with 56% of the results, was the expected economic and other benefits. This subcategory deals with both internal and external factors. Based on the analysed literature, transition to the CE was favoured due to its attractiveness for business potential and possibility to decrease costs. The CE is said to increase profitability and competitiveness, as well as yield environmental benefits. The CE can offer new business models, new ways to utilize resources, enhance brand reputation and offer access to new markets and work opportunities. Similarly, the CE can create employment opportunities and a new way of approaching ownership.

Based on the analysed literature, financially attractive CE aspects include cost savings from both raw material and waste costs. If companies are able to utilize their own waste streams as raw materials for products, that creates savings from waste management as well as a potential additional revenue stream. For example, de Abreu and Ceglia (2018) discussed possible financial benefits in the form of cost reductions. Cost reductions were also used as a “selling argument” for companies participating in the CE. At the time of the programme, the costs of dumping waste in a landfill were rising, so the companies sought solutions to decrease these costs. In addition, Ranta et al. (2018b) mention how resource value through efficiency favours CE transition and in some aspects it is already current practice in many organizations. Cooper and Hammond (2018) and Heyes et al. (2018) take a wider perspective on the possible economic benefits of a transition to the CE transition. Cooper and Hammond (2018) stressed the positive economic outcomes of the CE at the national and organizational levels. They stated that the CE may increase employment, effectively capture value, and mitigate exposure to supply chain and market risks as well as develop better customer relationships, however, achieving those benefits depends on how well the small number of key technologies are adopted and on the decarbonisation of the electricity supply chain. It also has the potential to save energy and some CE approaches may improve business-to-business interactions. Similarly, Heyes et al. (2018) mention that as a sustainable operator, the company gains marketing benefits as well as a stronger position in the supply chain due to a proactive approach to future struggles (resource scarcity, policy issues and costs).

Furthermore, the discourse of potential benefits accelerating CE transition was labelled a win-win perspective on environmental and economic gains. For example, Espíndola et al. (2018) stressed the utility perspective of the CE as a benefit. According to them, the CE carries the potential to maximize the value of existing resources. To this environmental benefit, they added economic benefits, as new CE-based technical solutions may prevent economic losses. While Flores et al. (2018) stressed CE-based economic incentives for water re-use, Nizami et al. (2017) supported the view that the CE has both environmental and economic benefits. According to them, CE-based waste biorefineries may offer solutions to current waste disposal problem but they may also provide energy generation, land saving, new business, save landfill costs, reduce GHG emissions, and save natural resources.

4.1.2 The threat to business-as-usual

The amount of research results in this subcategory was 22% of the total category. The threat to business-as-usual deals with external factors supporting the transition to the CE and the experienced threat related to the societal change. The analysed literature suggests that some companies and industries have realized the potential future threat of resource scarcity. By realizing the limits of the planet and the need to continue doing business in the future, as well as sensible resource use due to its cost, companies have learned to embrace resource efficiencies. The CE encourages reuse, recycling and repairing goods. Combined with the possibility to save costs on raw materials, it makes it more likely that companies will be motivated to pursue such a transition. This is done by applying resource wisdom: careful material usage, utilizing recycling of rare material and considering even take-back programmes to obtain resources (Winkler, 2011; Fonseca et al., 2018). Franco (2017) recognized that resource scarcity is understood on a company level. The importance of resource scarcity was even raised as a concern of national security by Gaustad et al. (2018).

Similarly, Korhonen et al. (2018) mentioned how what is a threat for one industry can enhance business opportunities for other segments.

It was also mentioned that some companies had a proactive mind-set to engage in different arenas, where new initiatives, projects and platforms for the transition were discussed. The participation was motivated by gaining access there, where initial discussions for future legislation or other regulative directions were held. By engaging in discussions, the companies can gain first-mover advantages if the negotiations turned into future policies and strategies (Ferreira et al., 2017; Stål and Corvellec, 2018; Mendoza et al., 2017).

4.1.3 Managerial support and existing management systems

The amount of studies linked with this subcategory was similar to the threat to business-as-usual subcategory, with 22% of the results in the catalysts category. This subcategory deals especially with internal factors supporting CE transition in organizations. It combines studies suggesting that companies, which have already invested time and resources to address their environmental impacts, would be more likely to implement CE instruments in their business operations.

For example, cleaner production practices force companies to consider their material flows and environmental aspects, and can influence them to continue implementing sustainable practices through CE practices. Favourable aspects in environmental management programmes and environmental practices include competitive advantages and direction for change. For example, Merli and Preziosi (2018) supported the view that existing environmental programmes and management systems support organizational change towards CE. They stressed that this support is especially based on the positive outcomes of an existing environmental management system (EMS) system: maximization of material productivity and energy efficiency, the creation of value from waste and the implementation of standardized environmental indicators.

Although existing environmental management systems may support the transition, they are said to require further support from the top management to give clarity and direction for the company. Fonseca et al. (2018) found that CE implementation is favoured by established EMSs in companies but added that the support of top management is an important factor in CE implementation. Although all the individual actors can influence change, the support of top management is needed for the company to pursue CE transition on an operational level (Masi et al., 2017; Ferreira et al., 2017). Lahti et al. (2018) mention that top management support is a prerequisite, so that the will, ability and resources can be harnessed to enable the change.

4.2 Ambivalent factors

The ambivalent factors category consists of such factors that were presented as both supporting and hindering the organizational level transition to CE, depending on the situation, circumstances and other contextual factors. To catalyse the change, these factors may push and pull the organizations towards change, and then in some other cases, hinder the change due to, for example, a lack of structures and demand. These factors are thus considered to have a dual role in CE transition in the reviewed literature.

4.2.1 Legislative and regulative aspects

The amount of studies linked with this subcategory was the second largest, with 24% of the results among studies categorized under ambivalent factors. This category deals especially with external factors supporting and hindering CE transition in organizations depending on the context. The subcategory consists of studies suggesting that legislative and regulative aspects have both enabling and hindering effects on CE implementation. Governments have the power to decide on regulation that would encourage CE transition. However, even with governmental statements supporting the CE, legislation is not updated as fast as the public awareness and business cases develop. The potential for the CE and newly identified options to actualize circular solutions face a number of restrictions, such as when legislation has not considered waste as a form of raw material.

Multiple studies showed how governments can create favourable and unfavourable conditions for CE transition through legislation. For example, Scheepens et al. (2016) demonstrated how governmental involvement can favour the development of environmentally sound businesses by restricting some activities or the use of unsustainable options, the more sustainable businesses have favourable positioning in the market and regulative setting. Similarly, government can foster transition by well-placed subsidies. Furthermore, Zamfir et al. (2017) showed how favourable or unfavourable conditions in country-based regulations can stimulate or hinder the adoption of CE practices in the country. Similarly, De Abreu and Ceglia (2018) focused on the CE implementation in UK within the National Industrial Symbiosis Programme. Their interviewees often mentioned the key role of legislation. The need to address the problem of waste (not just dumping it to the landfill) originated from the EU requirements to limit landfills. In addition, the UK government increased landfill taxes and introduced waste-recycling targets.

Not only does regulation act against CE implementation, but it also seems there is a lack of motivating incentives to pursue CE transition. Pan et al. (2015), in their study of waste-to-energy (WTE) implementations, observed that legislation or the lack thereof can be a barrier. If a country does not have a vision or goals for WTE implementation, companies might not invest in it. Legislation can also support WTE implementation. Pan et al. (2015) point out that renewable energy is considered expensive and, therefore, it is not always selected by the customers. Their solution is that energy subsidies should be removed from fossil fuels and transferred to the production of renewable energy. In their view, the energy price should reflect the energy source harm to the environment.

4.2.2 Design and technical aspects

The amount of studies linked with this subcategory was the largest, with 29% of the results among the studies categorized under ambivalent factors. This subcategory deals especially with internal and interfirm factors that support and hinder CE transition in organizations depending on the context. The subcategory consists of studies suggesting that technical and design aspects have both enabling and hindering effects on CE implementation. It seems that there is still a need to innovate new technologies to enable CE implementation and further develop solutions. Similarly, it seems that there is a lack of motivation or knowledge hindering the design of goods for circularity. However, considering the possibilities in design

and the end-of-life (EOL) of products and their components, the environmental and circular potential should be utilized.

Technology can aid in CE implementation and delivery throughout the product lifecycle and supply chain, starting from design and production to use and EOL, then returning resources to be recycled materials for new products. It seems reasonable that new innovations and technologies are being developed, but current technologies are already able to execute many processes that could perform needed processes for companies implementing CE practices. Despite this, multiple studies showcase the restrictions on transition because of technical shortcomings. For example, Geisendorf and Pietrulla (2018) showed that one notable obstacle to CE adoption in societies is related to the need for further technological development. They conclude that the current technological stage of societies does not yet provide enough support for CE adoption. Similarly, Pan et al. (2015) noticed that technology is one of the main barriers in implementation, when evaluating the waste-to-energy implementation of CE. The companies could lack the information of available technology. Some technologies could be only locally available. In addition, it might be difficult for the companies to select the suitable technology for them. Kirchherr et al. (2018) supported the view of limited technological development. They noticed that technological solutions were not the most restricting issue among interviewees. Instead, it was the sociocultural factors. Technical shortcomings were mentioned in relation to the lack of CE design and remanufacturing.

Despite the views on limited technical development, multiple studies stressed the importance of design and planning from the lifecycle perspective. For example, Bressanelli et al. (2018) studied digitalization in CE transition. The study demonstrated how technological solutions can make a difference in all stages of the product lifecycle. Digital technologies can help significantly in product design, longer lifespan as well as EOL solutions. Technological processes can be utilized also in marketing and monitoring operations. Cooper and Hammond (2018) paid attention to the role of design for recyclability of products. They suggest that if producers make recycling items easy, then consumers are much more likely to do it. In addition, Khan et al. (2018) studied lifetime extension for products, particularly upgradability, as a function of the CE. The main challenges were recognized in customer preferences. To attract both producers and consumers, products need to gain or still contain value, be attractive and feasible as well as profitable (Khan et al., 2018).

4.2.3 The importance of collaboration

The amount of studies linked with this subcategory was the third largest, with 21% of the results among the studies categorized under ambivalent factors. It deals with internal, interfirm and external factors supporting and hindering CE transition in organizations depending on the context. The subcategory consists of studies that address how different actors in the value chain can aid or hinder, influence or restrict CE innovations or changes in the business-as-usual approach. It depends on more than a company's size and position in the value chain, if they are able to transition to the CE also the motives and abilities of the different actors have an effect in the matter. Some companies are formed around an innovation or solution, which itself is based on CE principles. The solutions may be circular or more environmentally friendly and thus the smaller actor is able to contribute to the change as well. Circular economy can be realised within a company or regionally, however, to gain

better momentum and a global effect, it requires larger circles of actors. Therefore, different types of collaboration and partnerships are needed.

Evidently, networks are needed: a functioning CE model requires individual actors to participate in the same cause. Circularity requires flows in materials both upstream and downstream in the value chain. Therefore, collaboration and new partnerships are needed, because remanufacturing and reverse logistics have to be developed to enable the CE on a larger scale. It seems that the power of the current linear model, and continuing with the status quo, fails to motivate companies to consider the creation of new networks to accommodate CE, as efforts are not being allocated to this cause. Several articles mention that there is a lack of cooperation and a lack of a holistic approach to CE in the value chain (e.g. Kirchherr et al., 2018; Adams et al., 2017). Similarly, several articles state that value chains require relevant and functioning networks and cooperation (e.g. Scheepens et al., 2016; Franco, 2017). The studies stress collaboration as a key to CE implementation in business. For example, De Abreu and Ceglia (2018) noticed a key success factor for CE implementation is collaboration. Companies need not only to collaborate with other companies, but also with other types of stakeholders, such as customers and authorities. In de Abreu and Ceglia's case, the National Industrial Symbiosis Programme helped to match companies with each other. Witjes and Lozano (2016) studied the public procurement process from the point of view of the CE.

They noticed that the key factor in successful CE implementation was collaboration. They concluded 'that collaboration between procurers and suppliers can lead to reductions in raw material utilization and waste generation, whilst promoting the development of more sustainable business models, thus better contributing to making societies more sustainable' (42).

4.2.4 Customers and demand

The amount of studies linked with this subcategory was 15% of the results among studies categorized under ambivalent factors. It deals with external influences supporting and hindering CE transition in organizations depending on the context. The subcategory consists of studies suggesting that, as in any business environment, the way customers approach and value the company and its offering is crucial. In terms of CE, there are both positive and negative factors affecting how buyers view the CE offerings. This discourages companies from investing in CE transition, because the benefits are uncertain.

A particular challenge is to understand customer preferences and the willingness to buy. As sustainability issues have become mainstream, there is a clear customer interest in more environmental and more sustainable options. However, this does not mean customers would act on it, because there is a great gap between the sustainability intentions and what is actually consumed. For example, Scheepens et al. (2016) mention that due to the higher cost of sustainable goods, value creation and consumer-perceived value is important to overcome. Ranta et al. (2018b) noticed that consumer preferences are still focused on new products, not reused or recycled goods. Therefore, as Urbinati et al. (2017) stated, consumer preference, habits and perceptions are still issues that need to be addressed before CE options can gain momentum. Thus, customer level uncertainties contain issues with product quality and breaking of habits. Concerns include the view that recycled and reused products are still seen

as less durable and thus unattractive. For example, repaired or remanufactured products are believed to not perform as well as new ones.

Another challenge lies with the unknown demand for CE offerings. The CE markets are not that established, and companies may test the market with certain pilots, but larger scale market penetration has yet to happen. The demand for CE products or raw materials can be low or fluctuating, which increases insecurities about moving forward. (D'Amato et al., 2018; Gaustad et al., 2018)

4.2.5 Companies existing knowledge and learning

The amount of studies linked with this subcategory was the smallest, with 11% of the results among the studies categorized under ambivalent factors. It deals with internal factors supporting and hindering CE transition in organizations depending on the context. The subcategory consists of studies in which knowledge and learning is mentioned as one of the crucial aspects to CE implementation, and lack of knowledge and learning hinder the transition. Any type of implementation or change requires competences and new approaches, therefore the knowledge of individuals and corporations on environmental and CE issues enable the transition. It seems that companies have many approaches to CE, including resource efficiency and waste utilisation (Gaustad et al. 2018; Nußholz 2017; Ranta et al. 2018b), and therefore the level of CE-related knowledge of a company can vary. This does not, however, prevent them from performing CE or CE-related practices. In some cases, the companies might not be aware that these actions are a part of CE. Yet gaining CE-specific knowledge or experience should favour effective CE implementation.

Multiple studies stressed the importance of knowledge and understanding. For example, one of the main findings of de Abreu and Ceglia's (2018) study was the key role of knowledge. In order for companies to participate in CE projects, they need to have knowledge about similar, successful projects and the necessary technology. If a certain topic, such as the possibilities to recycle or reuse waste in de Abreu and Ceglia's case, is new to companies, they need to know where they can search for innovations or new ways to handle the issues that are becoming a problem. It was also stressed that significant learning and knowledge sharing happens in projects. For example, de Abreu and Ceglia (2018) focused on the UK's National Industrial Symbiosis Programme. It was a UK government-organized project to reduce waste. The project was deemed a success, which was enabled by the project's nature. The project organized workshops where companies could meet other companies and stakeholders, learn about successful waste reduction projects and find new collaborative partners. The project's nature also made it possible to visit the companies and match the companies for collaboration.

Multiple studies have also stressed lack of knowledge as a hindering factor for transition. Adams et al. (2017) found that lack of knowledge kept organizations from transitioning to the CE. Rizos et al. (2016) mention that SME actors are familiar with resource efficiencies because they constantly consider how to do more with less due to limited resources (resource, pull, time, money, knowledge and R&D). Therefore, the SME's ability to invent new ways to conduct their business despite limitations will impact their business. Furthermore, Sihvonen and Partanen (2018) stressed that internal change requires a shared understanding of CE terminology within the organization, and the lack of such may hinder change.

4.3 Obstructive factors

The obstructive factors category consists of factors that act against CE and hinder the transition. These factors may provoke negative or positive attitudes, but from the CE transition viewpoint they can discourage or obstruct the transition to circular business operations. Thus, these factors were seen in the reviewed literature to have a hindering role in CE transition.

4.3.1 Uncertainty of expectations and outcomes

The amount of studies linked with this subcategory was the second largest, with 37% of the results among the studies categorized under obstructive factors. This subcategory deals with internally experienced but externally influenced factors hindering CE transition in organizations. The subcategory consists of studies in which uncertainty and confusion is related to expectations and outcomes of CE. This influences on several levels and among different actors. On a company level, uncertainty may affect business decisions and long-term targets: investments and resources to CE transition are reconsidered and holistic change towards CE is avoided. The studies show that companies struggle to understand CE business potential and business models on a greater scale. As the CE model is relatively novel in this form, there is little data or examples to show the benefits of CE in the longer term. Moreover, it seems that companies that apply CE throughout their operations are small actors or companies founded on CE principles, so there are few relevant reference points. Companies have been able to implement partial CE practices or functions, but a large-scale CE model would require both internal and external actors to commit and act in a new way. Due to the lack of reference points, companies lack the courage to change. For example, Lahti et al. (2018) demonstrated that uncertainty casts the strongest shadow over CE implementation: there is uncertainty from the companies, supply chain actors, and customers. Similarly, the lack of reference point discourages companies (Rizos et al., 2016; Botezat et al., 2018). Furthermore, as there is a lack of standards or metrics for CE, companies have difficulties in seeing the benefits of CE (Adams et al., 2017; Stål and Corvellec, 2018). Heyes et al. (2018) mention unclear demand as a high risk factor, where the unprofitability of the new system could endanger current operations. Another particular cause for uncertainty is the challenge to understand consumer preferences and the willingness to buy. This discourages companies from investing in CE transition, because the benefits are uncertain (Khan et al., 2018; Lewandowski, 2016; Mendoza et al., 2017).

Several articles mentioned that companies were not convinced that CE can actually benefit them (Ormazabal et al., 2018) or provide a return on investments (Botezat et al., 2018). CE included a fear of cannibalization, which further increases uncertainty among companies (Nußholz, 2017; Popescu, 2018; Bressanelli et al., 2018). The term *cannibalisation* is used to describe a scenario, where a company fails to make new sales, as their own products or the products of their competitors last longer in use (e.g. are more durable), so that customers do not have to replace them that often. The fact that goods are used for a longer time means that companies do not have the possibility to sell another product to the same customer base that fast. This affects the future sales negatively. Cannibalization at the moment is seen as a significant threat, and business models to address the issue are being considered, such as servitization and repairs (Nußholz, 2017; Bressanelli et al., 2018).

4.3.2 Linear economic model embedded

The amount of studies linked with this subcategory was the smallest, with 20% of the results among the studies categorized under obstructive factors. This subcategory deals with external factors hindering CE transition in organizations. The subcategory consists of studies in which it is stressed that one of the obstacles hindering CE implementation is the current linear economic model and the way it is embedded in all aspects of business. The model has been developed over decades, so it has had time to be integrated. Challenging such a multilevel structure requires time and the rethinking of processes. Even with a favourable environment, disassembling the linear model would take time. Now that there is clear cynicism regarding the relevance of the CE, it will take much more for circularity to find its place and start growing stronger. Multiple articles mentioned the current linear model as the main hindrance of CE transition (e.g. Ranta et al., 2018b; Stål and Corvellec, 2018; Franco, 2017). Kirchherr et al. (2018) found that in some cases virgin raw materials were less expensive than recycled material, and Masi et al. (2017) mention that regulation favours the linear model in, for example, taxes and material prices.

Currently, most processes are supported by regulative and habitual practices, so that the linear model can thrive. It extends from raw material purchasing to the way design is considered, business is conducted and citizens are consuming goods. Finally, it has been well demonstrated in the way goods are disposed of and forgotten. Thus, this maintenance of the linear model is linked to multiple other hindering factors. For example, Flores et al. (2018) stressed that there are multiple barriers that still need to be overcome in order to adopt the CE. According to them, these obstacles include the hurdles of top-down implementation, low availability of resources, prioritization of short-term results and the lack of enforcement of the 'polluter pays' principle and the dominance of the linear model of water systems.

4.3.3. Shortage of resources

The amount of studies linked with this subcategory was the largest, with 43% of the results among the studies categorized under obstructive factors. This subcategory deals with both internal and external factors hindering CE transition in organizations. The subcategory consists of studies in which resource shortage is stressed as hindering CE transition at the organizational level. The studies especially discussed the lack of infrastructure and financial resources.

To enable any systemic change, having infrastructure in place to support the system is essential. As mentioned previously, since current processes support the linear model, to accommodate CE solutions would require modifying different systems for circularity. For example, Scheepens et al. (2016) mention the importance of infrastructure to support CE or sustainable business models in general. The development of such an infrastructure often requires governmental support. Furthermore, they described how technological solutions might not get utilized if the infrastructure to use it effectively is not developed. This view was supported by Mendoza et al. (2017), as they stressed the hardship of systemic or systemsthinking change. It was mentioned that functioning infrastructure required, among other things, the availability of recycled materials and an understanding of the required supply chain model with reverse logistics. Moreover, Gaustad et al. (2018) and Stål and

Corvellec (2018) mention the importance of existing, functioning infrastructure to further implement CE practices.

A lack of financial investments was also seen to hinder the change. To develop or implement new solutions in one's current business operation, or to develop a completely new operation always requires time and investment. Thus, CE implementation demands some type of investment from the company or on external investment. For example, Pan et al. (2015) identified money as the main obstacle for CE transition. The waste-to-energy solutions were deemed as expensive investments. An aspect that makes this type of investment particularly unattractive is the structure of the current energy market, which is dominated by the large, established energy companies. Furthermore, Rizos et al. (2016) identified the financial investments needed in CE transition as capital, human resources and R&D. Mendoza et al. (2017) also mentioned that the cost of implementation included customer engagement and education as well as staff training. The amount of needed changes, from stakeholder engagement and possible mixed interests, to internal operation changes demands financial inputs.

In Figure 3, the identified categories, subcategories and their amounts in the reviewed literature is summarized. Ambivalent factors were the dominating main category in the data set. Concerning subcategories, expected economic and other benefits (catalysts) and design and technical aspects (ambivalent factors) were the largest subcategories. When considering these amounts, it is important to note that typically more than one subcategory was present in almost each article.

Figure 3. Identified categories, subcategories and their amounts in the reviewed literature

5 DISCUSSION

5.1 State of the art

The purpose of this literature review was to provide a systematic review of circular economy (CE) transition at the micro level, meaning CE implementation in the business environment. More specifically, the authors wanted to understand what kind of catalysts promote and what obstacles hinder the transition towards the CE. The review identified different types of catalysts, obstacles and ambivalent factors influencing CE transition at the firm level. Catalysts promote and support the transition, but companies also face obstacles in the change. Ambivalent factors have a dual role: in certain circumstances they can obstruct the implementation and in other circumstances can promote it. Based on the review, the concept of the CE is used in multiple settings and the research on it is diffuse. This could be because the CE represents a rather novel approach to doing business. In the data, just over half of the published articles came from 2018. The review further reveals that companies have recognized that there is a threat to the business-as-usual approach. This recognition brings hope. It gives the impression that companies understand their actions are needed in order to solve the global environmental problems we are facing.

This study contributes to the literature on CE implementation in business organizations by providing understanding on the role these factors play in supporting or hindering the CE

change. This study also opens discussion on ambivalent factors that can, in certain contexts, act as a catalyst to CE and, in others, as a hindrance. This understanding further enables identification of the origins of these different types of factors. Based on the review, the identified catalysts, obstacles and ambivalent factors can originate from within or outside of the company. Internal catalysts include the expected financial and other benefits as well as managerial support. External catalysts include the threat that affects the business-as-usual approach. Similarly, the obstacles can be internal and external. External obstacles relate to the uncertainty of how the new business approach is accepted in the market. The identified internal obstacles are twofold. The first is the current linear business model and the reluctance to change it to CE business models. The second is the shortage of different types of resources, typically money. Ambivalent factors that can either hinder or promote CE are often external. Legislation is typically an external factor to the company, as is cooperation with the supply chain and customers. The only clearly internal factor is the knowledge inside the company. Oftentimes, a CE start-up is directly linked with available knowledge: how knowledgeable are the managers about the CE and its possibilities? The same applies to the technological factor: do companies have the needed CE technology knowledge in-house or do they know where to acquire it?

Furthermore, the obstacles and catalysts were most often related to economic, political and technological aspects. Based on the review, money seems to be most important catalyst for CE implementation. The companies expect profits when applied to a CE approach in their business. Regulation was identified as an ambivalent factor. In cases where the national government has set targets for CE implementation, the companies also identified regulation as a promoting factor. The opposite applied in cases where companies operated in countries with no legislative pressure to adopt CE practices. Similar to legislation, technological aspects were seen as an ambivalent factor. Technology can be a barrier if technological knowledge to promote CE is not available for companies. On the other hand, access to new innovation promotes CE implementation.

Theory-wise, it seems that previous studies on CE implementation were rather weak. In the majority of the articles, the theory section consisted mainly of a literature review of the key concepts and their relationships to the CE. Regarding the used method, the studies were dominated by qualitative approaches. This is logical, as CE implementation seems to be a rather new approach. Qualitative studies, including case studies and project-based studies, are suitable in describing the CE trials and start-ups rather than, for example, large-scale surveys – assuming that there would not be a large sample to survey. Among the previous studies, it has been typical that the context has been either China or an EU country. This is coherent with the finding of legislation as a CE-promoting factor. Both China and EU have regulations to promote CE.

CE literature has mainly focused on technical possibilities and solutions in the past. This seems logical as CE has its origins in industrial ecology. In addition, the majority of the articles in the literature review were published in engineering-focused journals. CE research focus has been on engineering, and only recently has it been noticed that research on issues such as business potential and human aspects are also needed. Thus, this type of research has not yet been conducted extensively. Little attention has been given to the people behind the needed transition, even though it has been mentioned that managerial support is essential

when companies aim to transition towards CE solutions (Masi et al., 2017; Ferreira et al., 2017).

The review naturally contains some limitations due to the applied search criteria. These criteria provided 69 articles and different criteria would have yielded different articles. First, certain search words and search strings were applied. The selected search words described the search focus well from the point of view of the authors. Second, the search was limited to certain databases. The selected databases were Scopus and Web of Science, which were considered to be the top two academic databases. Third, this review focused only on journal articles. This appears to be a common approach in literature reviews because journal articles are considered to be more high-quality publications in comparison to conference papers. Finally, the journal articles needed to be published in English. The authors made the assumption that English is the language of science.

5.2 Future research

Based on the results and contributions of the study, there are multiple gaps that could be covered by future micro-level CE research. Based on the current literature review, three concerns emerge about the previous studies and suggestions for future streams of research. First, there is a lack of studies on human action and involvement, both within and between organizations. Second, the project nature of CE seems to be neglected. Third, the theoretical and methodological approaches of CE implementation studies should be strengthened and diversified. These are discussed in detail next.

There was a clear technology dominance in the reviewed research, but the importance of human action was also mentioned. The studies especially identified the role of attitudes. Some studies found that there is a growing demand from the customer side for more sustainable products. However, there is concern whether the more sustainable option is as high quality as the traditional option. However, little is said about the role of human action in CE implementation, both intraorganizationally as well as interorganizationally. Intraorganizationally, this calls for more research on active change agents, the contexts of their actions, and the resistance they face. Especially in-depth case studies, applying theories of human agency and organizational psychology, are called for to fill this research gap. Furthermore, narrative approaches to success stories in CE transition may enable wider adoption of CE. Large surveys among employees, applying, for example, motivation and social identity theories, can create understanding of how to increase intraorganizational commitment and overcome resistance to change. Interorganizationally, this calls for more research on interorganizational engagement and collaboration. To become mainstream, CE solutions need acceptance from different stakeholders, and the creation and sustenance of multiple new networks. We need to know how and in which circumstances such networks may appear, and what their hindrances are. These research questions can apply both qualitative, in-depth case studies as well as large surveys among key actors of such networks. In particular, different applications of stakeholder theory and reviews of such concepts as trust and cooperation are useful in exploring these research questions.

Many of the previous studies focused on CE implementation projects. This is a natural approach at this stage because the CE is a new approach for companies. Of course, start-up projects are needed in order to learn more about CE implementation. However, the project

nature of CE implementation was not really discussed in the articles. The obvious question is what happens after the project. Because the review showed that there are certain obstacles for CE implementation, what happens when the extra effort of the project ends? Will the companies forget the CE and revert to their previous ways of operating? For this reason, longitudinal studies on CE implementation would be a particularly fruitful research approach. These longitudinal studies could apply theories of wider sustainability changes, such as MLP theory. Case study approaches would best serve such longitudinal studies, as multiple data sources should be applied to provide an in-depth understanding. It has been acknowledged that research funding is often short-term but if the current global problems are to be solved, a long-term focus is needed.

Overall, more theoretical, methodological, contextual and discipline-based rigour for CE implementation studies at the micro level is called for based on this review. As suggested above, this would especially mean both quantitative and qualitative empirical studies applying different theoretical perspectives. There is especially a need for management and organizational psychology theorists to engage with this topic. Contextually, especially CE implementation in China has received attention, but also other countries are tackling the same change. Thus, it can be suggested that the studies should be conducted in multiple contexts, and more specifically, with a micro-level focus at certain organizations and supply chains. Despite the fact that CE-related literature reviews have already been done, there is a need for at least one more systematic literature review. The review could consider linkages and interdependence of the catalysts, obstacles and ambivalent factors that have been identified in this study. This would provide greater understanding on how such factors shape the CE implementation in business and how they interact.

5.3 Practical implications

In Figure 3, the three main categories, *catalyst factors*, *ambivalent factors*, and *obstructive factors*, are colour coded to represent the difference between the categories in terms of the required changes and the expected resistance or difficulties in making those changes. The most positive was coded green, the more demanding yellow and the most challenging red in relation to CE implementation in business. The coding is further explained below.

The green category consists of catalyst factors, which companies should be able to encounter on their own, without the considerable participation of other actors. The subcategories discuss factors, which are already positively charged, and companies should be able to find these issues as rather favourable additions to their operations. Therefore, it is more likely that companies mainly need to understand the potential benefits of these factors and, when emphasized, they are then motivated to pursue those themselves. This does need rethinking and restructuring within the company, but it does not necessarily require large-scale efforts.

The yellow category consists of ambivalent factors, which are overwhelming for companies to address on their own. However, with joint efforts they can be eased and perhaps even solved. With these factors, companies do need reassurance and more proof as well as support from external actors, so that they have more confidence and a more active role in the CE transition. Additionally, this category encompasses broader societal elements, so the benefits are not solely for single companies to utilise. Similarly, when changed, they affect larger systems, which requires restructuring of entities larger than any single company and its internal actions. Even though, the yellow category factors demand more input, it is recommended that companies participate in these areas. Being involved in the formulation of

new networks, influencing regulative developments and technology deployment, educating one's self as well as customers should offer numerous benefits; it just requires willing and able actors to commit to the change.

The red category consists of obstructive factors, which are the most difficult to change and influence. At the moment, effort should be applied to dealing with the green and yellow category factors and after those change, the red factors become easier, perhaps even changed. By strengthening the other factors, those in the red category will weaken. The red category concerns cultural habits, legislation, distribution of resources and the way our economic model has been constructed. This means that it will take time and effort from multiple actors to modify it, so that a new approach can be accommodated. Therefore, it is impossible for one actor to make the change. Thus, although companies should keep their eye on these more challenging factors, they should focus their energy on the categories that are easier to influence and take less time to modify.

6 CONCLUSIONS

This study performed a systematic literature review on the business implementation of CE. The key findings of the review can be summarized in three aspects. First, companies are facing obstacles in order to achieve the transition to CE. Second, there are catalysts that promote the transition. Third, there are ambivalent factors that in certain circumstances can obstruct the implementation and in other circumstances can promote it. The obstacles and catalysts were most often related to economic, political and technological aspects. Money is the most often mentioned catalyst for CE implementation. The companies expect profits when applied to a CE approach in their business. Regulation was identified as an ambivalent factor. In cases where the national government has set targets for CE implementation, the companies also identified regulation as a promoting factor. The opposite applied in cases where companies operated in countries with no legislative pressure to adopt CE practices.

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APPENDIX

Table A.1 All included articles of the review in order of amounts per journal

Journal of Cleaner Production

- 1 Ackermann, L. Mugge, R., Schoormans, J. 2018. Consumers' perspective on product care: An exploratory study of motivators, ability factors, and triggers. *J. Clean. Prod.* 183, 380-391. DOI: 10.1016/j.jclepro.2018.02.099.
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Sustainability

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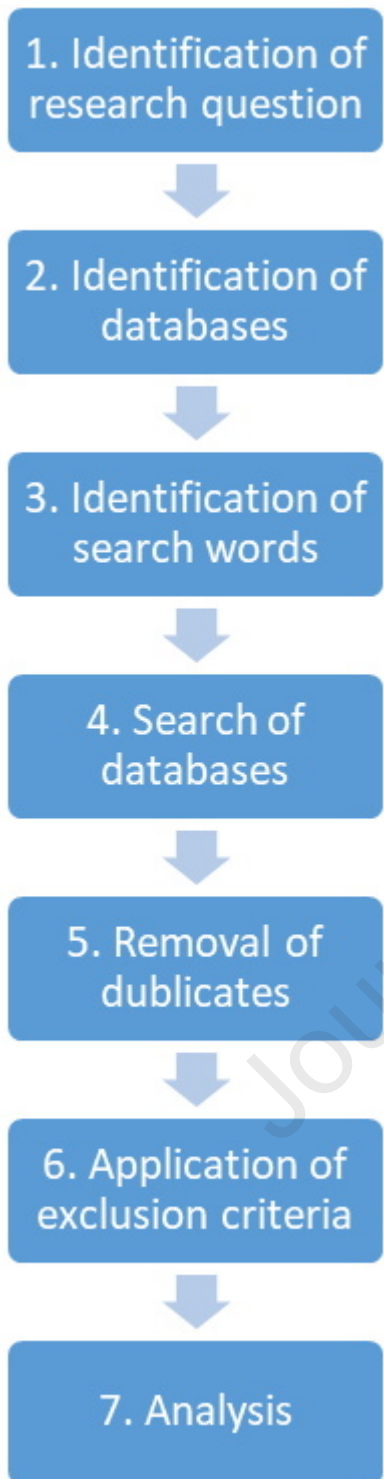
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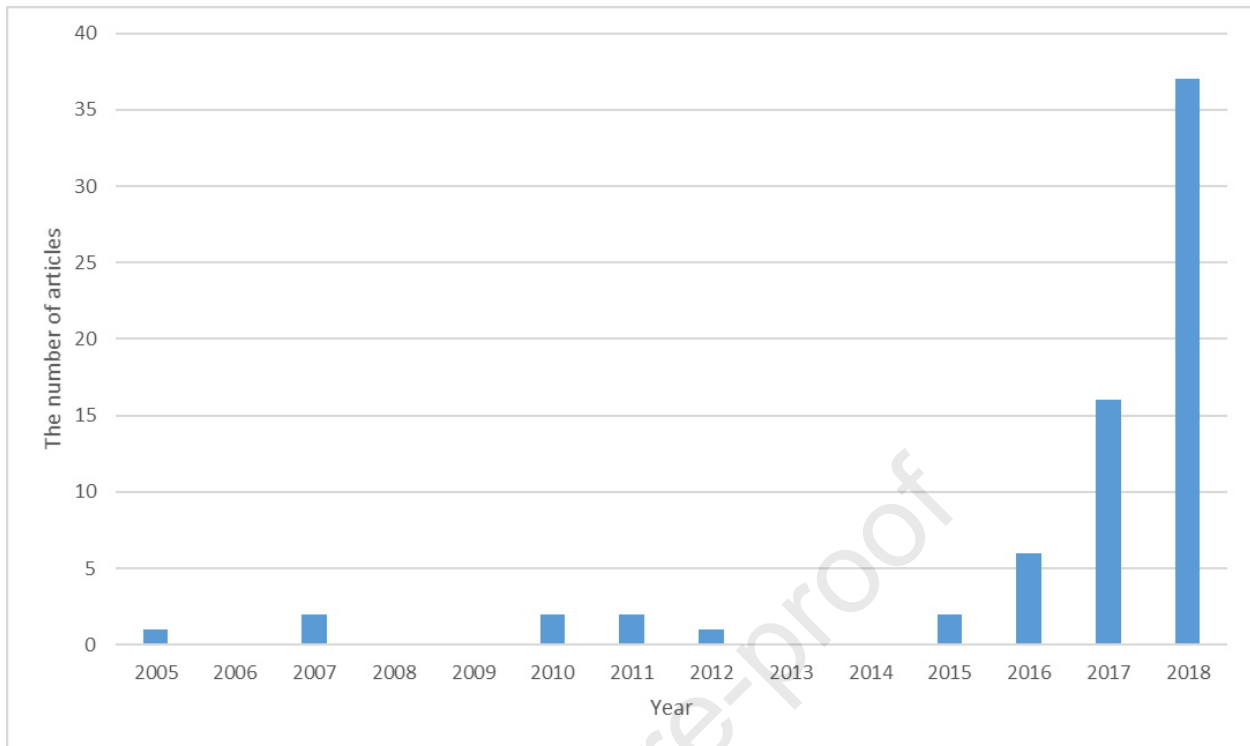
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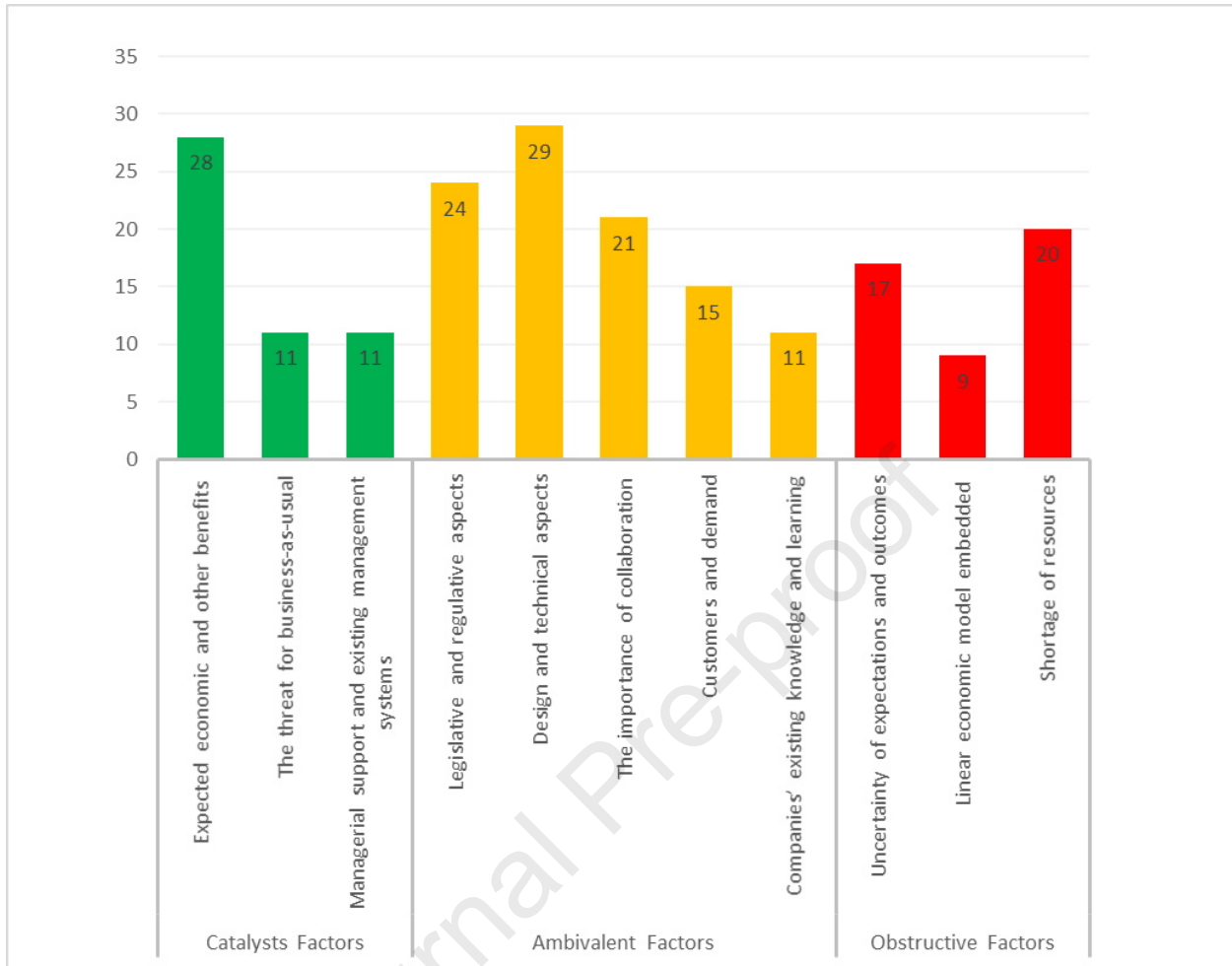
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Highlights

- A systematic literature review on CE catalysts and obstacles was performed.
- Findings suggest clear catalysts such as economic benefits and managerial support.
- Linear economic models and a lack of resources obstruct CE transition.
- Ambivalent factors may hinder or support the CE depending on the context.
- Ambivalent factors include legislation, collaboration and design.

Journal Pre-proof

Declaration of interests

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

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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