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Barriers to a circular economy in small- and medium-sized enterprises and their integration in a sustainable strategic management framework

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ABSTRACT

A circular economy limits the consumption of virgin resources, fosters cleaner production, and promotes the efficient utilization of resources. However, many companies still struggle with its implementation. In this study, we explore the barriers that companies encounter internally and externally when implementing circular economy measures. Based on 59 interviews with Swiss small- and medium-sized enterprise managers from three industries, we identify six company-internal barriers (risk aversion, short-term orientation, economically dominated thinking, unwillingness to engage in trade-offs, shortage of resources, and lack of knowledge) and four levels of company-external barriers (technology, market, legislative, and society and consumers). We further identify their interrelationships and integrate them into a holistic sustainable strategic management framework. Finally, we present six broader strategic recommendations building on the study framework.

1. Introduction

A circular economy (CE) is broadly defined as a regenerative industrial economy that captures vast amounts of resources for repeated use while ideally, positively impacting the environment (Ellen MacArthur Foundation, 2013). It aims to keep products, components, and materials at their maximum utility and value at all times, reduce waste, and minimize the extraction and processing of virgin resources (Bocken et al., 2017). CE unites different aspects of environmental sustainability as a sustainable *umbrella concept* (Blomsma and Brennan, 2017) and internalizes the negative externalities that emerge during product life cycles through company activities (Grafström and Aasma, 2021). Thus, manufacturing, distribution, use, and recovery systems are designed to keep resources in the loop and minimize energy use (Wells and Seitz, 2005; Winkler, 2011), thus promoting cleaner production in society. CE has become increasingly popular in recent years, and while various initiatives and declarations favor it, the transition remains in its infancy (Ghisellini et al., 2016). Currently, less than 9% of the global economy is circular (Circle Economy, 2021).

Many studies have tried to explain this discrepancy by identifying barriers to CE implementation (Bocken and Geradts, 2020; Kirchherr et al., 2018; Ormazabal et al., 2018), mainly focusing on company-external barriers (de Jesus and Mendonça, 2018; Grafström and Aasma, 2021). Accordingly, an in-depth understanding of why and how company-internal barriers prevent CE implementation is lacking. Prior studies show that internal barriers are largely hidden by cultural (Kirchherr et al., 2018), financial (de Jesus and Mendonça, 2018), or cultural-cognitive factors (Ranta et al., 2017). Grafström and Aasma (2021) underline the importance of identifying barriers from a company's perspective to mitigate business risks for companies implementing a CE. Moreover, prior studies primarily focus on different barriers and largely ignore their interrelationships (Bening et al., 2021). Thus, a holistic framework that integrates CE barriers at the company's internal and external levels and explains how they interact and relate is missing (Tura et al., 2019). Finally, prior studies do not formulate clear strategic recommendations for companies regarding their potential to influence and overcome CE barriers. This study bridges the above-mentioned gaps in the literature in the following ways: First, it identifies the internal barriers to CE implementation. Second, it furnishes a better understanding of external barriers and how they can be structured. Third, it investigates how internal and external barriers are interrelated. Finally, it develops strategic management recommendations from the derived insights for company leaders who wish to implement a CE in their organization.

The objectives of this study are particularly salient in the context of small- and medium-sized enterprises (SMEs), as SMEs are indispensable

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for transforming linear economies into circular ones (Garrido-Prada et al., 2020; Rizos et al., 2015; Zamfir et al., 2017). First, SMEs shape the core of economies worldwide; in the European Union (EU), SMEs account for more than 99.8% of all companies in the non-financial business sector (Muller et al., 2017). Consequently, while the environmental impact of one SME is almost negligible, SMEs are highly relevant collectively, accounting for approximately 60%–70% of all industrial pollution in the EU (Miller et al., 2011). Second, from a political economy perspective, the EU provides considerable financial support for SMEs in the CE transition (European Commission, 2019). Third, CE transformation often requires the interplay of various companies in a circular supply chain, and SMEs often take on the role of connecting companies (Lüdeke-Freund et al., 2018; Takacs et al., 2020). Hence, the research questions are as follows:

(1) What company-internal barriers exist for SMEs seeking to implement a CE?
(2) What company-external barriers exist for SMEs, and how can they be categorized?
(3) How are company-internal and external barriers related, and how can they be integrated into a holistic, sustainable strategic management framework?

Thus, this study employs an inductive, grounded theory approach (Corbin and Strauss, 1990; Strauss and Corbin, 1994), interviewing 59 company managers, owners, and founders of Swiss SMEs in three industries (*food and beverage*, *textile*, and *logistics*). Switzerland is a suitable study setting because its SMEs have strong economic power and CE implementation is high on top managers' agendas (Bocken et al., 2021). The three selected industries represent a broad spectrum of SMEs in Switzerland and qualify for CE implementation. They encompass important CE perspectives, such as transportation, packaging, supply chains, and product design. The data analysis identified company-internal and company-external barriers and their relationships. It then integrated the identified barriers into a broader framework, building on the sustainable strategic management (SSM) concept of Stead and Stead (2008) with an open-system perspective. Hence, we formulate strategic recommendations for SMEs to address CE barriers.

2. Concept and theory

2.1. Barriers to implementing a circular economy

Many CE barrier studies have attempted to identify and categorize the factors that hinder CE implementation, resulting in three main strands of barrier categorization. The first strand categorizes barriers into thematic levels, making no distinction between internal and external barriers. According to Grafström and Aasma (2021), the following four levels emerge most frequently from their comprehensive literature review: technological, economic, cultural, and institutional. Others process this categorization with minor adjustments to the thematic levels, adding, for example, policy, regulation, financial, or customer levels (Araujo Galvão et al., 2018; Ghisellini and Ulgiati, 2020; Hart et al., 2019; Kirchherr et al., 2018). de Jesus and Mendonça (2018) condense the categorization into a hard versus soft factor division, classifying technical and economic barriers as hard factors (forcing change) and institutional and culture as soft factors (enabling change by attracting through values). Ranta et al. (2017) apply an institutional perspective and identify regulatory, normative, and cultural-cognitive barriers. Govindan and Hasanagic (2018) show barriers in an unstructured mode but offer a multi-perspective framework, which has inspired this study; they distinguish between organizational and external perspectives, focusing on government, society, consumers, and suppliers. Regarding internal barrier findings, Ritzén and Sandström (2017) come closest to this study. They conduct interviews in two large manufacturing companies without reporting internal barriers; however, they identify two thematic levels (*attitudinal* and *financial*) with an internal focus.

The second strand classifies barriers along with specific types of economic actors (e.g., SMEs), economic structures (e.g., networks), and specific industries. Rizos et al. (2015) theoretically examined that CE barriers for SMEs are comprehensively but conceptually unstructured. They report *upfront investment costs* and *a lack of knowledge of CE*, both classifiable as internal barriers, in addition to various other barriers, such as government barriers; the results are confirmed descriptively in a survey-based case study with 30 Spanish SMEs (Rizos et al., 2016). Ormazabal et al. (2018) divide barriers into two categories in the SME context: *hard* (e.g., lack of financial support) and *human-based* (e.g., lack of customer interest) *barriers*. Garcés-Ayerbe et al. (2019) show that different barriers occur per firms' CE proactivity. Other studies address specific industries, such as the coffee industry (van Keulen and Kirchherr, 2020), examining value, technology, business cases, and governmental barriers; and the packaging industry (Bening et al., 2021), using causality networks (Gue et al., 2020).

The third strand categorizes barriers regarding CE measures, such as material efficiency in manufacturing (Shahbazi et al., 2016) or energy savings in supply chain practices (Zhu and Geng, 2013). Some studies further present ways to circumvent the barriers (i.e., so-called drivers) (Agyemang et al., 2019; Moktadir et al., 2018; Pheifer, 2017). Nonetheless, the literature has hitherto ignored the company-internal perspective; there have been various calls in the literature to close this gap and identify barriers in practice for companies and across sectors (Grafström and Aasma, 2021; Kirchherr et al., 2018; Ormazabal et al., 2017). Therefore, although prior research shows that barriers to CE implementation represent a pertinent research topic, it lacks a detailed analysis of internal barriers and their relationship to external barriers.

2.2. Business models as core mechanisms to realize circular economy in organizations

The most common way for SMEs to implement a CE is to transform the underlying business model from linear to circular (Frankenberger et al., 2021; Geissdoerfer et al., 2020; Rizos et al., 2016; Santa-Maria et al., 2021; Ünal et al., 2018). Business models broadly describe how a company generates value, the value proposition it offers, and how it captures value (e.g., Gassmann et al., 2014; Casadesus-Masanell and Ricart, 2010). Following the triple bottom line approach (Elkington, 1997), researchers are increasingly focusing on sustainable business models that extend traditional business model research by combining the environmental aspects of sustainability with the well-being of people and the economic dimensions of the company. Circular business models are sub-forms of sustainable business models that describe how organizations must design their underlying business models to realize a CE. They are *"business models that are cycling, extending, intensifying, [or] dematerializing material and energy loops to reduce the resource inputs into and the waste and emission leakage out of an organizational system"* (Geissdoerfer et al., 2020, p.7). Designing and implementing circular business models can lead to cost advantages for the focal company (Christmann, 2000; Ranta et al., 2018) and enable organizations to create and capture new value and gain a competitive advantage (Simpson et al., 2004; Stewart and Gapp, 2014). However, research on business models, specifically circular ones, lacks insight into the main antecedents of designing and implementing business models (Foss and Saebi, 2017). Studies on the company-internal antecedents of business model design remain rare (e.g., Frankenberger and Sauer, 2019). Thus, analyzing CE barriers contributes significantly to this growing research field.

2.3. SMEs in the circular economy

As mentioned above, SMEs are indispensable for transforming economies into circular ones. However, the characteristics of SMEs

differ from those of larger companies (Zahra et al., 2006). First, the owners and founders of SMEs are often the managers; thus, management and ownership are in the hands of the same person or group of people, especially in family-run businesses. Many SMEs lack formalized structures and specialized managers and have personalized leadership and management styles (Jenkins, 2006; Rizos et al., 2015). Second, the strategic management of SMEs strongly focuses on investment decisions on direct returns and benefits from the core businesses, which are then strongly linked to a business case evaluation (Dex and Scheibl, 2001). Third, SMEs demonstrate a high degree of flexibility and agility in the market, adapt quickly, and compete well in niches (Jenkins, 2006; Koirala, 2018). Fourth, SMEs are strongly anchored in the analog world, maintaining good relationships in their networks rather than using digitally sophisticated solutions for operational development. Fifth, SMEs usually have a rather low level of knowledge of the concepts and opportunities of a CE (Ormazabal et al., 2018; Rizos et al., 2015). Hence, a study on CE barriers in the context of SMEs proves to be worthwhile.

3. Methodology

Given this study's exploratory nature, a qualitative research design is suitable for answering the research questions (Yin, 1994). The design is driven by an inductive, grounded theory approach (Corbin and Strauss, 1990; Gioia et al., 2012), allowing for the development of a theory from the data (Strauss and Corbin, 1994). The study builds the theory while performing social research, regarding them as two aspects of the same procedure (Glaser, 1978).

3.1. Sampling and data collection

3.1.1. Industry selection

We conducted 59 interviews with (top-level) managers, owners, and founders of Swiss SMEs from three industries—*food and beverages, textiles,* and *logistics*—between September 2018 and January 2019. These industries represent a diverse range of SMEs with CE-relevant characteristics. The food and beverage industry has expandable circular potential, which can be seen in its packaging (Agamuthu and Visvanathan, 2014; Geueke et al., 2018), single-use plastic waste (Foschi and Bonoli, 2019), water usage, land degradation, and greenhouse gas emissions (Pagotto and Halog, 2016). The textile industry, principally the garment sector, is among the most polluting industries worldwide, with a recycling rate of only 1%, massively driving the overutilization of resources (Ellen MacArthur Foundation, 2017). Hence, the circular potential of the textile industry is enormous, as it involves product (re)design and material selection (Franco, 2017), closing resource loops (Ashby, 2018), and sustainable production methods to reduce emissions or water pollution (Alkaya and Demirer, 2014; Angelis-Dimakis et al., 2016; Jia et al., 2020). The logistics industry, which involves transportation, is central to the CE (van Buren et al., 2016) and covers a wide range of activities such as the distribution of resources for production, reverse logistics after product usage with incentive take-backs (Abdulrahman et al., 2014; Govindan et al., 2015; Klausner and Hendrickson, 2000), or waste disposal logistics (Seroka-Stolka and Ociepa-Kubicka, 2019).

3.1.2. Company selection

This study is tailored for SMEs with 8–250 employees. It aligns with the official EU definition of SMEs, where small (medium-sized) companies have 10–50 (50–250) employees (European Commission, 2003). We also include companies with eight or nine employees because they offer interesting cases and are sufficiently large to represent a company with different CE measures. We have excluded non-Swiss subsidiaries of the firms from the study.

3.1.3. Data collection

We employed a judgment (purposeful) sample—a non-randomized sample of respondents (Marshall, 1996)—according to the company and the interviewees' positions therein (Kirchherr et al., 2018). We first used various lists provided by official Swiss bodies (e.g., the Federal Statistics Office, regional commerce chambers) and created a unique list containing companies that met the SME and industrial sector criteria. We extended it by including additional companies during the data-gathering process using snowball sampling (Noy, 2008). Ultimately, we contacted 341 companies and conducted 59 interviews, with a 17.3% response rate. An interview lasted, on average, for 30–60 min; we conducted approximately 50 h of interviews. The interviews were mostly in German (89%) and the rest in French (11%), as per the main language of the interviewees. Table 1 shows the interview schedule with an overview of the participants, industries, and products. The study aimed to create the largest possible sample to ensure theoretical saturation when processing the data (Bowen, 2008).

The study employed semi-structured interviews. We carefully constructed the interview guide to generate different types of information and avoid inconsistencies and ambiguities (Bogner et al., 2014). First, the interviewers ascertained the exact business model of SMEs. Second, the interviewers presented a comprehensive definition of CE (Kirchherr et al., 2017). They ensured the interviewees understood this definition well and, thus, explored the kinds of CE measures the company had already implemented. Third, the interviewer explored implementation barriers. The interviewees were then asked about mitigating actions and what barriers arose subsequently. Finally, the interviewers checked the company data (e.g., number of employees) to ensure that the sampling was correct. All interviews were conducted by telephone, recorded, and transcribed verbatim.

3.2. Data analysis

We followed the grounded theory approach of Gioia et al. (2012) and Corbin and Strauss (1990) to develop a conceptual framework from the data. Methodologically, it is crucial to evaluate the interviews in detail (coding and classification), *semi-ignorant* of prior studies (Gioia et al., 2012). This approach requires a data-based elaboration of categories and concepts, which does not induce hypothesis bias through literature knowledge; of course, complete detachment from prior research is impossible (Bogner et al., 2014). We started with a first-order analysis and coded it close to the text in open coding, not to generate categories directly but to summarize the essence of the excerpts. This descriptive coding method generated numerous codes (Saldana, 2009). Next, we determined the similarities and differences between codes (axial coding), reducing the number of codes. In the second-order analysis, themes were formed from the codes. These theoretical themes were then labeled as informatively as possible and equipped with phrasal descriptions; rearrangements and reclassifications were performed when necessary (Gioia et al., 2012; Saldana, 2009). We then employed selective coding to form core categories, visualized as aggregate levels, to get closer to the theoretical level. We subsequently examined all emerging themes in the different categories to determine whether they explained the phenomena under study (Corbin and Strauss, 1990, 2008). We reached theoretical saturation before analyzing the 59th interview; that is, no more new categories and themes emerged from the data (Glaser and Strauss, 1967). Fig. 1 shows the data analysis process.

Furthermore, to elaborate on the emerging theory, one researcher collected the data and worked closely with the data, while two other researchers with sufficient distance supported the analysis. This approach strengthened the findings. The two distant researchers acted as critical, questioning voices and, thus, improved the theory (Bocken and Geradts, 2020). The recurrent back and forth regarding theory, data, and analysis enabled the formation of elaborate categories and relationships (Flick, 2009).

Finally, to answer the third research question, we developed a holistic framework to illustrate the interrelationships and interdependencies between the identified barriers. We built on the framework of Stead and Stead (2008). This framework highlights the

Table 1
Overview of interviewees.

Industry	No.	Position of the interviewee	Company description	Type of company (according to EU definition of SMEs)	Company size
Food & Beverage	1	product development	breakfast & snacks	medium	195
	2	managing director	soup & dressing	medium	65
	3	managing director/owner	pastry & confectionery specialties	small	25
	4	managing director/board of directors	pastry & confectionery specialties	small	8
	5	managing director	mineral water	small	30
	6	management/subdivision	soft drinks & fruit juices	medium	250
	7	management/subdivision	coffee processing & roasting	small	9
	8	management/subdivision	food from insects & consulting	small	8
	9	managing director/owner	fruit juices	small	26
	10	management/subdivision	bakery (bread)	small	30
	11	managing director	olive packaging	small	30
	12	managing director	organic fruit juices	medium	54
	13	managing director	bread & cake	small	12
	14	management/subdivision	processing fruit/vegetables for convenience	medium	100
	15	managing director/founder	ice cream production	small	12
	16	managing director/owner	mill: grain processing	small	10
	17	managing director	mixed spices	small	10
	18	management/subdivision	spices & sauces	small	12
	19	managing director/owner	meat processing	medium	60
	20	managing director/owner	bread & cake	medium	54
	21	owner/management	butchery & meat processing	small	11
	22	managing director/owner	butchery & meat processing	small	28
	23	managing director/owner/founder	beer	small	20
	24	management/subdivision	fruit & vegetables processing	medium	200
	25	management/subdivision	butchery & meat processing	medium	200
	26	managing director	fruit & vegetables processing	medium	190
	27	managing director/founder	beer	medium	96
Logistics	28	management/subdivision	storage & distribution	medium	55
	29	managing director/board of directors	logistic coordination	small	16
	30	managing director/owner	transportation service for pianos	small	14
	31	managing director	transportation of fossil fuels	small	18
	32	managing director	transportation, storage & logistics	small	25
	33	management/subdivision	transportation of building materials & machinery	small	12
	34	managing director	transportation of wood & timber related goods	small	22
	35	managing director	food import & processing	small	40
	36	managing director/owner	transportation & logistics	medium	70
	37	management/subdivision	transportation & logistics in construction	small	10
	38	managing director	transportation & logistics	small	30
	39	owner/management	transportation & logistics in construction	small	10
	40	management/subdivision	transportation of building materials & recycling	medium	55
Textile	41	managing director	work wear	medium	150
	42	founder/management of subdivision	high quality clothing (women)	small	30
	43	managing director	zippers	small	13
	44	management/subdivision	protection work wear & consulting	medium	80
	45	president of the board of directors	knitwear	small	25
	46	managing director/owner	specialized textile production	small	9
	47	managing director/owner	high-quality textiles for interior decoration	medium	170
	48	managing director	uniforms	small	30
	49	managing director/owner	work wear & service provider	medium	70
	50	management/subdivision	high-quality fabrics for shirts	small	18
	51	managing director	sustainable fashion	small	8
	52	owner/president of the board of directors	fabrics processing	small	10
	53	managing director/owner	knitwear, fabrics & textiles	small	12
	54	management/subdivision/founder	wool shoes	small	29
	55	managing director/owner	various textile products	small	18
	56	managing director/owner	urban fashion	small	13
	57	managing director	work wear fabrics	medium	208
	58	managing director	e-commerce womenswear	small	23
	59	management/subdivision/founder	shoes	small	50

embedded and interrelated nature of a company, being in constant interaction with the following levels: technology, markets, legislative, society and consumers, and the environment. That is, the SSM framework considers human beings, organizations, society, and other systems embedded in the ecological environment (Starik and Kanashiro, 2013). For instance, Neumeyer and Santos (2018) note the importance of embedding companies and their sustainability-driven business models in their environment to enhance understanding and make relationships visible. Thus, we developed a holistic framework and integrated the identified barriers.

4. Findings

First, we present the company-internal barriers comprising six main themes (4.1). Second, we describe the company-external barriers comprising 12 themes and four categories (4.2). As per Tracy (2010), we

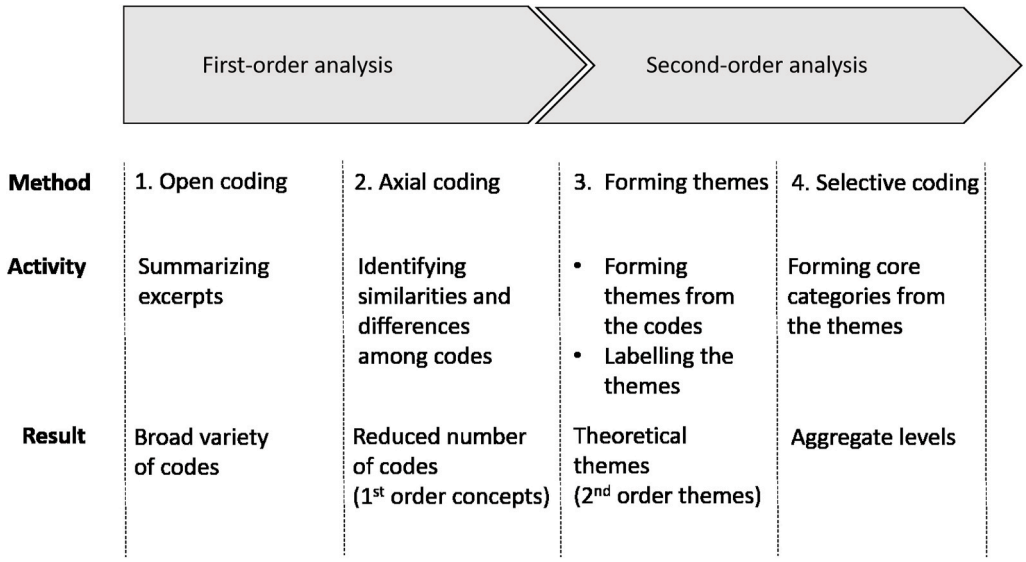

Fig. 1. Data analysis.

created a visualization of the relationship between raw data, first-order concepts, second-order themes, and aggregate levels (Fig. 2), displaying the results on the identified barriers. Matching passages from the interviews were used to enrich the corresponding barriers.

4.1. Company-internal barriers

Table 2 shows the six identified company-internal barriers, including the name, description, and representative quotes.

4.2. Company-external barriers

Table 3 shows the company-external barriers identified, including the name, description, and representative quotes. Following prior research (Stead and Stead, 2008), we clustered them at the following four levels: technology, market, legislative, and society and consumers.

5. Discussion

Based on our findings, we develop a holistic framework that integrates the identified barriers and shows their interrelationships (5.1). Afterward, we present strategic recommendations to overcome the barriers (5.2).

5.1. Integration of barriers into a holistic framework

Fig. 3 shows our holistic framework, including the barriers identified as mentioned above, based on the Stead and Stead (2008) framework. The identified barriers were allocated to different framework levels. To develop the framework and allocate the individual barriers to the different levels, we followed an iterative approach spanning data, theory, and literature (Locke et al., 2008). The following section discusses the interaction of company-internal barriers (5.1.1) and company-internal and -external barriers (5.1.2) together with the relevant literature.

5.1.1. Interaction of company-internal barriers

The three barriers—*risk aversion (I1), short-term orientation (I2)*, and *economically dominated thinking (I3)*—are considered the fundamental interwoven barriers that build the foundation of internal resistance to a CE, potentially conditioning the other three internal barriers: *unwillingness to engage in trade-offs (I4)*, *shortage of resources (I5)*, and *lack of knowledge (I6)*. The first three barriers form the basic assumption about coping with problems within and outside the company, impacting managerial attitudes toward change (Bleicher and Abegglen, 2017). The three barriers are closely related and interact. Their interactions can be powerful, may stop entire change processes, and can substantially impact a company's culture and leadership (Schein, 1986). Implementing CE measures is often associated with radical innovation and structural change in SMEs (Korhonen, 2004), increasing perceived uncertainty regarding economic outcomes. A certain willingness to take risks, tolerate failure, and unlearn what is known to learn something new is necessary for innovation (Sinkula, 2002). Organizational learning is closely related to deviating from the existing corporate culture (Simon, 1991). A lack of acceptance of failure can lead to an atmosphere of low risk-taking (Lawler and Galbraith, 1994). Critically questioning one's business model and breaking out of familiar thinking patterns also represents risk-taking (Ritzén and Sandström, 2017). A high level of risk aversion narrows the manager's view, distorts information gathering, and reduces the focus on business opportunities (Bleicher and Abegglen, 2017). Risk-taking can impact *short-term orientation (I2)*, as it influences how intertemporal decisions are made, which can influence *trade-off (I4)* decisions. A company's approach to determining trade-offs ultimately distinguishes it from other companies (Kaptein and Wempe, 2001). Furthermore, *short-term orientation (I2)* influences the organization's ability to learn from the past, connecting the past, present, and future (Ashkanasy et al., 2004). Organizations and individuals with the ability to consider a long-term perspective and tolerate uncertainties can better innovate and invest sustainably in the context of their tradition and entrepreneurial continuity (Haugh et al., 2019; Longoni and Cagliano, 2018). CE implementation often requires upfront investments, diminishing a company's short-term financial performance.

The broader influence of *economically dominated thinking (I3)* is shown in its interaction with *risk aversion (I1)*, as risk aversion can be influenced by miscalculating the opportunity costs of not investing in the CE (e.g., losing the possibility of cooperating with stakeholders or developing new technologies); that is, postponing CE investments because opportunity costs are considered too low (Cassimon et al., 2016). Closely related to this is the fact that business calculations often include only short-term economic factors, ignoring environmentally and socially relevant issues (Bleicher and Abegglen, 2017). *Economically dominated thinking (I3)* is the counterpart of valuing pluralism, influencing *trade-offs (I4)* by the fact that individuals ascribe only an economic value to objects of their consideration (Lo, 2014). It stems from companies perceiving their value creation as detached and separate from society (Dyllick and Muff, 2016), resulting in a lack of

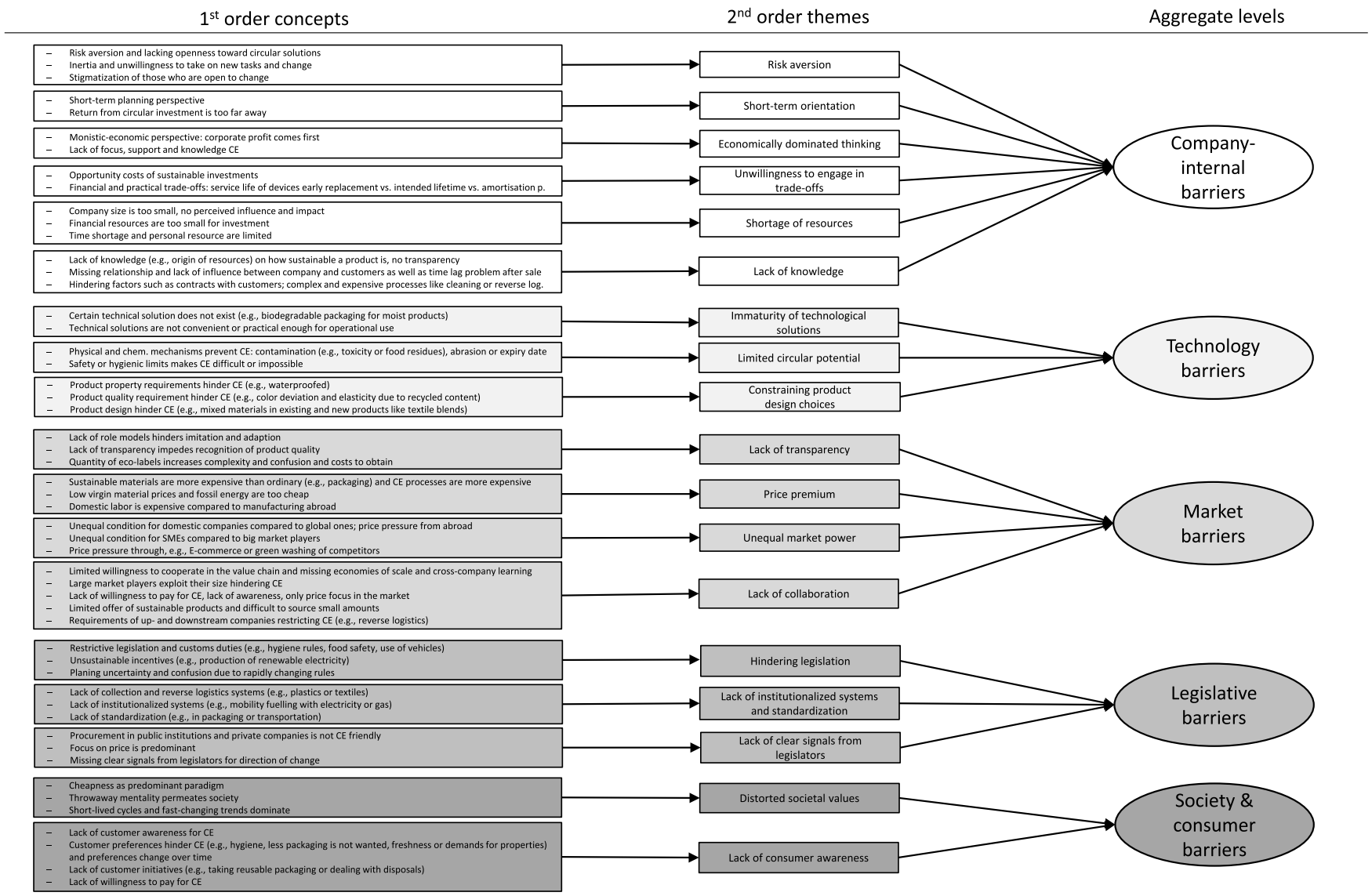

Fig. 2. Visualization of the data structure. Adapted from Gioia et al. (2012).

Table 2
Company-internal barriers.

Barrier theme	Description of how the barrier functions	Representative quotes
(I1) Risk aversion	The desire to avoid risk and a lack of openness to new solutions among management and employees hinder a CE. It is characterized by a strong orientation toward high stability, a fear of suffering financial losses, and leaving familiar paths. Managers assess business risk associated with a CE higher than the environmental risk (e.g., resource scarcity) of not implementing a CE. It may be accompanied by inertia in change processes, a fundamental desire to keep things as they are, and stigmatization of those willing to change.	*Skeptical attitude; leaving the comfort zone; critics call you a dreamer with illusions; it is better to wait for the right time to come; how much risk are we willing to take?*
(I2) Short-term orientation	Short-term perspective on planning and payback periods can act as a barrier because it runs counter to the CE implementation goal of the most extended possible usage of resources. The role of time and how it is viewed by management in planning and investment decisions determine how companies respond to environmental issues. Implementing a CE can be time-consuming, resulting in intertemporal decisions complicated by a strong preference for the present.	*Lack of focus on long-term planning, which would cover three or five years; management thinks in short [-term] dimensions; we do it differently than our competitors who always focus only on one quarter or another*
(I3) Economically dominated thinking	Economic value creation as an end in itself is omnipresent in entrepreneurial decisions and acts as a barrier. A lack of understanding of the environmental contexts and one's impact on the environment reinforces this.	*Economic sword of Damocles; ecologists rarely sit at the top, [but] economists do, we need ecological thinking for the future; corporate profit is elementary*
(I4) Unwillingness to engage in trade-offs	Various business trade-offs act as barriers (e.g., machine utilization time with defined payback periods vs. sustainable replacement). Missing guidance on how to address trade-offs is predominant in opportunity cost discussion. Investments in CE are often directly opposed to the availability of financial resources, thus revealing conflict dilemmas.	*Cost–benefit ratio was not good enough; running out of payback time; destroying room energy of existing machines; waiting until the old system is replaced*
(I5) Shortage of resources	Three types of interconnected resources can act as barriers if limited or their availability is considered too low: company size (e.g., turnover and market share), financial resources, and human resources. This limits the possibilities for new, innovative solutions, which need additional research and development (R&D) efforts and investments.	*We thought about heat recovery, but we are too small, and so is the utilization effect; Awareness-raising among customers is extremely cost-intensive; we do not have the personnel resources; time and competence are the problems*
(I6) Lack of knowledge	Lack of knowledge on the concrete implementation options for CE, for example, about the different stages of the value chain (e.g., the origin of raw materials) or how to take back products after customer usage. This can be accompanied by a lower effort to implement concrete projects.	*We only have an indirect influence and insight into the production of these articles; trouble returning the product; lack of experience with recycled materials; washing, chemical use, and logistics for return is far too complex*

understanding of environmental relationships, thereby negating one's impact on the environment, also known as a low level of *ecoliteracy* (Tilley, 1999).

Although SMEs often face a chronic *shortage of resources (I5)*, availability depends on corporate strategies and *trade-off (I4)* decisions. Trade-off situations demand sacrifices in one area to gain an advantage in another (Byggeth and Hochschorner, 2006). If companies want to apply the triple bottom line, trade-offs arise, and managers must address those conflicting dilemmas. The multi-faceted nature of a CE (Hahn et al., 2010) shows how difficult it can be to generate a win-win situation in environmental decision-making in the short term (Walley and Whitehead, 1994) if market price signals do not account for negative externalities. Trade-offs influencing capability and *knowledge (I6)* formation consider issues beyond the core business, such as the CE (González-Benito and González-Benito, 2005). A *lack of resources (I5)* influences new process implementation, knowledge acquisition, and a successful partner search. Many SMEs are limited in their design of marketing campaigns and introduction of a new revenue model, such as leasing, as these may incur high investment costs, which they may not bear on their own because of a lack of resources (Rizos et al., 2016). A *lack of knowledge (I6)* can inhibit new partnerships and collaborations (Ritzén and Sandström, 2017) and hinder the gathering and adoption of technical skills outside the SME's bubble and the establishment of new technical solutions (Trianni and Cagno, 2012). Insufficient technical training of employees induces insufficient knowledge of the technical CE possibilities (Shahbazi et al., 2016). A *lack of resources (I5)* leaves less space for strategic reflection on one's activities in the context of environmental and social issues and reinforces a culture where CE is perceived with skepticism or stigmatization (Hoevenagel et al., 2007).

These barriers can become central, especially when they occur in the sphere of influence of decision-makers. Managers are often also owners of SMEs or related to them; much depends on their time, risk, and perspectives on their company's role toward society, as they are responsible for strategic initiatives and investments (Hoevenagel et al., 2007). This situation is particularly critical given that a personal risk assessment goes hand in hand with personal value judgments and individual and socialized perceptions of hazards (Lorenzoni et al., 2005). Thus, as per agency theory, managers or owners of family-run SMEs emotionally attached to their company are less driven to diversify their risk (i.e., more risk-averse) (Hiebl, 2015). A strong risk aversion means that possible disadvantages are perceived as more important than the advantages of a CE (Rizos et al., 2016). Trivially, if managers are unaware of CE, they may completely ignore it in corporate decision-making (Seidel et al., 2008).

5.1.2. Interaction of internal and external barriers

While understanding the interplay of different internal barriers is crucial for understanding the dynamics at stake in a transition process, it is also important to recognize that a company and, hence, its internal barriers are embedded in a larger picture. The internal barriers depend

Table 3
Company-external barriers.

Barrier theme	Description of how the barrier functions	Representative quotes
Technology barriers		
(E1) Immaturity of technological solutions	Specific technical solutions for a CE are not yet practical enough for operational use, do not exist in a marketable form, or have not been sufficiently tested. This immaturity of technical solutions can be seen in, for example, biodegradable packaging for moist products or energy sources in transportation.	*Not tested enough and suitable for everyday use*; *problem with material, it dissolves*; *technology and infrastructure of electric cars are in their infancy*; *shelf life in a compostable bag with moist content*
(E2) Limited circular potential	As a product is not detached from its environment, it undergoes physical and chemical interactions that reduce its CE potential. Various mechanisms can increase a product's entropy level and reduce its usefulness for CE per the rules of thermodynamics (e.g., degradation or dispersion).	*After 30 wash cycles, a textile loses its luminosity*; *filter must, of course, be thrown away; contaminated with food residue, which is a challenge for recycling*
(E3) Constraining product design choices	Product and property requirements (e.g., waterproofing) can make CE measures impractical and challenging. Product design determines how much input goes into a product and how much recovery is possible. Design, application, and functionality considerations and adding alternative materials and components to pure materials in manufacturing can induce impurities that hinder a CE (e.g., additives or pigments).	*Weight reduction means a thinner film, if we have weak films, then the packaging opens; mixed fibers; if the finesse, the resistance, the tear strength is not right, we do not have a product that will be successful on the market*
Market barriers		
(E4) Lack of transparency	Lack of transparency in different forms in the market prevents CE implementation. Missing transparency about possible treatments and ingredients of products and materials (e.g., organic) impedes recognition of real product quality. Sometimes, eco-labeling provides a remedy; however, many labels exist, and their evaluation can be overwhelming and challenging. Moreover, a lack of CE role models hinders imitation and adaptation.	*Organic coffee from Brazil: not certified organic because the hurdles with all the effort are immense for a small business*; *can we check if it is only greenwashing? Only a few companies are shining examples that are really carrying this to the outside world and convincing the consumers and ultimately the politicians*
(E5) Price premium	The prices of sustainable materials, products, and CE measures often differ from those created conventionally to the disadvantage of more sustainable ones (e.g., packaging). Frequently, virgin materials and fossil energy are cheaper than recycled materials or renewable energy. The low prices of less ecological products and materials often lead to fewer ecological purchase decisions in SMEs.	*Recycled cotton: It is simply more expensive than cotton on the open market, although the price of raw materials is rising*; *sustainable packaging is expensive*; *price of boat transport too cheap*
(E6) Unequal market power	Competition between large companies and SMEs (including e-commerce) is challenging for SMEs, as large competitors can charge lower prices through economies of scale or cross-financing less lucrative products. The same reality exists between domestic products and global ones. This can inhibit innovation, as SMEs suffer from price pressure, and reduced resources are available for CE measures. Misleading use of environmental claims in marketing, known as greenwashing, can also be a barrier.	*Wholesalers lure customers with fresh bread at low prices, and they subsidize the bread by selling other stuff, and we cannot do that; cheap water from discounters, imported at low prices from abroad, increases the price pressure, and this is not conducive to a CE; CE costs money; We have competitors who make polyethylene terephthalate (PET) collections and say that it is from the sea. That is pure communication. Nothing is gained from that*
(E7) Lack of collaboration	Limited willingness to cooperate along value chains and in networks acts as a barrier, leading to missing economies of scale and cross-company learnings. Large market players exploit their size, hindering CE measures in SMEs upstream (e.g., no offering of reusable containers) and downstream (e.g., demand more packaging than necessary).	*Competitors or colleagues are not open to a CE at all, we tried to buy shared machines to create a common database to avoid waste, but no one is willing to do it; recycled materials not available in small quantities; [they are determined to be] bound to bulk [buying]; possible transport load on trains is prescribed*
Legislative barriers		
(E8) Hindering legislation	Besides negative incentives for CE investments, burdensome legal prescriptions and customs duties hinder a CE. These are reflected in restrictive regulations, such as hygiene rules in food safety or vehicles use. This can lead to planning uncertainty and confusion given rapidly changing rules and bureaucratic burdens.	*We must package it in a special way or we are not allowed to redistribute it; very foolish and inconvenient with the food laws that forbid to cleanly wash out and reuse a plastic container, so I have to throw them away; more and more time-consuming and administrative effort*
(E9) Lack of institutionalized systems and standardization	Lack of institutionalized systems, such as in collection, reverse logistics, or mobility systems, are barriers because, usually, SMEs lack the size to internalize such activities. Lack of standardization between different entities can hinder CE measures such	*Gas vehicles have proven to be economical, but the range with gas has not been as good, and gas stations have been somewhat scarce; we can use a lot of things only once, like the pallets on international deliveries that we are not allowed to use here; in the textile industry, there are hardly any protective*

(*continued on next page*)

Table 3 (*continued*)

Barrier theme	Description of how the barrier functions	Representative quotes
	as proper reuse or refurbishment.	*mechanisms; slave labor is allowed to be sold right next to us on the shelves*
(E10) Lack of clear signals from legislators	As a procurer of goods and services, the state does not place enough importance on CE in public procurement and lacks a clear vision for sustainable change. There is often a strong price focus, neglecting environmental factors. Unclear political signals prevent secured markets in which SMEs intend to invest.	*Politicians say the energy transition will take place by 2050, and three years later, they say that it will happen differently again, but we have to plan now; the tendering system does not consider ecological points; no framework in big institutions, so they could hide behind price and quality; submission procedure; the most inexpensive is considered*
Society and consumer barriers		
(E11) Distorted societal values and trends	Consumer society and its attitudes toward consumption represent an essential barrier. SMEs claim the prevalence of a cheapness paradigm, the decay of values, and a throwaway mentality, making the implementation of CE measures challenging. Socially occurring phenomena such as short-lived cycles and fast-changing trends hinder CE implementation. This manifests itself in SMEs as frustration or anger because of a feeling of powerlessness.	*Affluent society is used to having everything and is unable to live without it; cheapness as a new quality; price sensitivity; spoiled society with enormous desire to consume; optics of price, inertia, and convenience; fast-moving characteristics*
(E12) Lack of consumer awareness	Customers have preferences regarding products and their functions, appearance, and price, all of which influence companies' scope of action. The lack of customer awareness, preference, and initiative for change (e.g., adopting reusable packaging) hinders CE and shows itself a lack of willingness to pay for CE.	*Packaging depends on the customer requirement; reducing packaging means customers must bring their own, and they do not; do you want to wear polyester—certainly not; awareness is not there. What drives a logistical delivery: it is ordered, prepared, provided, loaded*

on—and, to some extent, are shaped by—external barriers that may indirectly influence them. The different external barriers we describe are interwoven and can impact one another. Some of the relationships seem evident, whereas others are latent but remain conceptually explorable.

The technological barriers, especially the barrier *constraining product design choices (E3)*, are characterized by upstream and downstream companies and customers' requirements for which the company does not yet have a suitable answer; the company may not have adapted product designs to a suitable business model (Lewandowski, 2016), which may also trace back to a *lack of knowledge (I6)*. A better interplay of products, system design, and revenue model can facilitate CE measures, such as longevity, disassembly, and recycling (Hart et al., 2019; Pajunen et al., 2013; Pheifer, 2017). Although some authors identify *the immaturity of technological solutions (E1)* as an essential barrier for CE implementation and describe technical bottlenecks as the greatest challenge (Agyemang et al., 2019; de Jesus and Mendonça, 2018), here it appears as a minor barrier (c.f. Kirchherr et al., 2018). Many technical solutions exist but are not available where needed. Alternatively, there is a *lack of knowledge (I6)* of such solutions in SMEs or a *shortage of resources (I5)* to invest in them. Technological path dependencies can prevent the replacement of old, inefficient technologies with newer ones, which can be reflected in the company *trade-offs (I4)* (Korhonen et al., 2018).

The level of market barriers is crucial and influences internal and various external barriers. This requires a detailed examination of the characteristics of modern market economies.

First, the *lack of transparency (E4)* reveals imperfect information as a market failure in the CE context, following classical economic theory (Stiglitz, 2000). If the role models that SMEs can adapt and copy are not visible to them, this can reinforce the barriers of *risk aversion (I1)* and *lack of knowledge (I6)*. It also influences the barrier *immaturity of technological solutions (E1)*, as SMEs are strongly anchored in their bubble and have only a few opportunities to discover new technologies, business models, and processes given a lack of information (Hoevenagel et al., 2007). Eco-labels help overcome imperfect information because of a reduction of information asymmetries between buyers and sellers (Bratt et al., 2011); with labels, informed stakeholders can play out market forces (Sinclair-Desgagné and Gozlan, 2003). However, an increase in the importance of labels impacts SMEs, as they must free up extra resources for employees working in procurement and sales to acquire labels and classify them as buyers. Often, it is too burdensome and costly for SMEs to acquire eco-labels, and the ever-growing plethora of labels can cause confusion and generate a lack of transparency. Moreover, there are no specific and widely accepted labels for the CE. There is also a reported lack of CE role models to concretely show how to implement a CE successfully. Other sustainability research has showed that role models are important for sustainable change, and companies, individuals, and institutions imitate each other (Adger et al., 2005; Wamsler and Brink, 2015).

Second, firms must focus on the barrier *price premium (E5)*. The market economy is based on exchange and competition, making prices a central factor with a balancing function (Saari and Simon, 1978). The allocative function of prices should induce the efficient use of resources. Thus, the price of resources is central to steering business and consumer decisions (Thi et al., 2016). However, it may happen that not all emerging costs (including environmental and social costs) are correctly reflected in the price. If the extraction of resources and manufacturing of products generates negative externalities (e.g., air pollution) that are not priced, the market price loses its efficient allocation function, inducing overproduction of the externalities (Stiglitz, 2000). The consequences are a decline in ecological welfare, resource overexploitation (Fischer-Kowalski and Swilling, 2011; Nelson et al., 2007), and failure of intergenerational resource allocation (Bithas, 2011). Market externalization prevention and market functioning are typically considered tasks involving legislators' regulatory power. If there is *hindering legislation (E14)*, counteracting or under stimulating CE, such as enabling distorted prices of virgin resources or less environmentally friendly products, it directly affects *trade-off (I4)* decisions in SMEs. Given frequent *shortages of resources (I5)*, SMEs are price-sensitive and show an elastic demand that would react to rising prices and cause substitution and innovation boost toward ecological resources, products, and processes (González-Benito and González-Benito, 2005). For SMEs willing to push CE transformation, it means being aware and using the systemic link between companies and legislation to seek environmentally friendly price internalizations and gain a competitive advantage for the firm's circular solution.

Third, many SMEs operate in isolation and reduced collaboration efforts *(E7)* with reduced market strength and face *unequal market power (E6)* and great pressure from large competitors that exploit their power, often accompanied by a lack of access to *knowledge (I6)*. Reduced market power can lead to less bargaining power regarding suppliers and buyers (Crook and Combs, 2007), leading to adopting preferences and the *lack of collaboration* (E7). Usually, the competition promotes innovation, as it drives companies to create new solutions (Dereli, 2015), such as cost

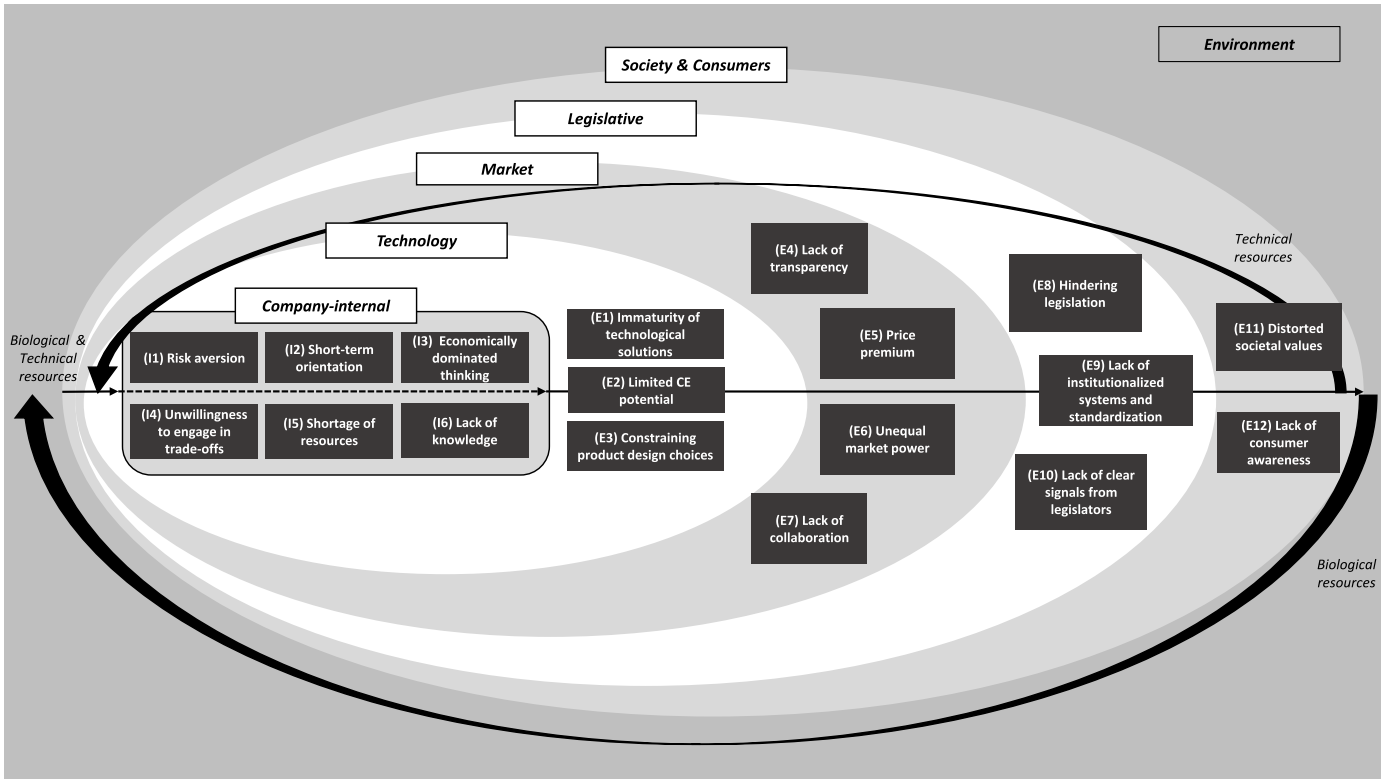

Fig. 3. Multi-level framework with integrated barriers. Adapted from Stead and Stead (2008).

reduction through material efficiency (Grafström and Aasma, 2021). However, it can be challenging for SMEs to compete with large market players. The literature clarifies the benefits of efficiency gains and cost-saving from CE measures (Charonis, 2012; van Keulen and Kirchherr, 2020); however, the barriers from asymmetric competition between large market players and SMEs have received less attention (Desarbo et al., 2006). Various authors acknowledge the lack of willingness to collaborate across companies in the value chain as a barrier (Kirchherr et al., 2018; Mont et al., 2017) and highlight cross-sectoral collaboration as a success factor in CE implementation (Rizos et al., 2015).

A strong barrier for SMEs lies in the prevailing societal values of cheapness and consumer behavior. Contemporary society is confronted with *"a kind of fantastic conspicuousness of consumption and abundance, constituted by the multiplication of objects, services, and material goods,"* which initiated a *"fundamental mutation in the ecology of the human species"* (Baudrillard, 1998, p. 25). The terms *materialism* (Belk, 1985) and *consumerism* (Trentmann, 2004) are emblematic of the present time, encompassing the phenomenon of modern humans and their relationship to objects, which is partially shown in the *distorted societal values and trends (E11)* barrier. The consumption of products or services in a linear economy is always accompanied by an increased in entropy in the system, breaking down materials into waste with low potential energy and (almost) no value (Csikszentmihalyi, 2000; Desing et al., 2020). Linear consumption occurred concurrently with ecological depreciation. Behind fast-moving consumerism lies a reciprocal relationship between the consumers and companies, driven by manufacturers—some of whom rely on low-cost, non-recyclable, and fast-depleting materials, and extensively large marketing efforts—and consumers and their demand for recurring, low-priced products, and their inclination toward a hedonistic, fast-paced, and convenient lifestyle (O'Shaughnessy and O'Shaughnessy, 2002). This modern phenomenon is well known as *fast fashion* in the textile industry, where new collections are sometimes launched several times a year (Franco, 2017). Moreover, a *lack of awareness (E12)* among consumers can induce a decline in the motivation of companies to address a CE, as they expect little enthusiasm from consumers and unduly low sales (Kuo et al., 2010). Frequently, determinants such as novelty, identity, and price are more central to many customers than the question of the ecological implications of their consumption (Fisher et al., 2008). The intertwining complexity is evident at the legislative level, as people in state institutions and political authorities are consumers affected by the prevailing social values and consumerism.

Finally, the legislative barriers interact with other external barriers and impact company-internal barriers. Prior studies describe the legislation as a *double-edged sword*, considered necessary for transition while being an obstacle (Backes, 2017; Bening et al., 2021; Milios, 2018). Legislative barriers are closely linked with market barriers, as they influence price mechanisms through subsidies, green taxes, and importation regulation (Albrecht, 2006; Bithas, 2011). The market requires a framework to allocate resources and internalize externalities. Hence, the transition from a linear economy to a CE requires an adaptation of the framework conditions for the market to induce a less wasteful allocation of resources. The price signal should internalize environmental externalities linked with the production of goods, which implies the relative prices of less sustainable resources and fossil fuels are much more expensive (Ghisellini et al., 2016; Thi et al., 2016). Legislations to avoid cartels and other restraints to competition clearly influence market barriers. In certain contexts, information exchange and close cooperation among companies are prohibited by the state because it could undermine business competitiveness (IMSA, 2013). The potential lack of collaboration *(E7)* can be explained by the competitive instincts of companies (Hart et al., 2019) and legal uncertainties around new forms of close cooperation between companies and their qualification regarding competition regulations (Claassen and Gerbrandy, 2018; Rizos et al., 2016). Legislative barriers also influences the technology level, for example, when setting new norms for efficiency standards, which tends to render older models obsolete.

The legislator sends signals to the market via laws and the public procurement system. The clear direction and targets set by the

authorities are key to streamlining investments and innovation in companies toward a CE (Milios, 2018). The *EU Action Plan for the Circular Economy* recognizes public procurement as a key driver of the transition toward the CE. This critique was addressed in Switzerland by a revision of the *Federal Act on Public Procurement* (PPA; RS 172.056.1), which entered into force at the beginning of 2021, abandoning competition based solely on the price criterion in favor of the quality of services to overcome a *lack of clear signals from legislators (E10)*. The contracting authority can now meet certain sustainability criteria, including a certain production method and life cycle costs.

Regarding the reciprocal interaction between the regulatory external and company-internal barriers, a link can be drawn connecting *risk aversion (I1), short-term orientation (I2),* and *economically dominated thinking (I3)*. It is challenging to exit a short-term perspective, with accounting methods focused on annual statements and sales contract legislation designed for a linear economy (Nadeem et al., 2018). The Swiss *Code of Obligations* sets statutory warranties for only two years (cf. Art. 197 ff. CO, in particular, art. 210 para. 1 CO). In the event of a defect, the code foresees replacement or price reduction, whereas repair is not compulsory for the producer. A short-term perspective, risk aversion, and economically dominated thinking, which can act as internal barriers, can also act as societal barriers via *distorted societal values and trends (E11)*. While consumers with a *lack of awareness (E12)* are set in their habits and lack the time and knowledge to switch to more aware consumption patterns, politics is also embedded in a fast-paced logic, adapted to the rhythms of election cycles, as per *the lack of clear signals from legislators (E10)*. The fact that environmental legislation is a distinct field of law, with no integration into commercial law, shows that *economically dominated thinking (I3)*, which can act as an internal barrier, mirrors a larger phenomenon, where institutional and legal rules still reflect a reductionist and linear perspective on complex problems (Desing et al., 2020). An accompanying increase in regulations could also negatively affect the innovative spirit of SMEs (Ünal et al., 2018).

5.2. Broader strategic recommendations

Corporate sustainability and CE are long-term projects requiring leadership and direct managerial attention and will fail without such involvement and commitment (Stead and Stead, 2008). Furthermore, continuous stakeholder interactions strengthen entrepreneurial survivability and business resilience (Volberda and Lewin, 2003). Thus, an SME must see itself as an open system constantly in touch with its internal and external environments, incorporating feedback, and exploring and exploiting opportunities via strategic adaptation, innovation, and improvement (Madu and Kuei, 2012). Hence, we present six sustainable management strategies (Fig. 4), building on the study framework.

Strengthen internal awareness for sustainable change: Internalizing CE means aligning company values with the ecological environment. Given that the personal judgments and perceptions of managers and owners highly drive SMEs, raising awareness from the top down on the linear economic externalities, multiple consequences of resource waste, and links to climate change and biodiversity loss—to mention only the best-known consequences of resource overconsumption—is necessary. A shift in management perspective and mindset on CE helps to appreciate the boundary spanning and reciprocal interrelationships of the company and its business environment in its entirety over time. It includes stimulating sensing and seizing capabilities to identify opportunities for circular solutions. Management often connotes a denatured view of a company's environment, categorically excluding the environment level (Shrivastava, 1995). It also connotes the rationale for doing business and its ethical foundations (Stead and Stead, 2008). It includes allowing for failures and a range of uncertainties that may appear during the CE implementation, which requires that all corporate functions internalize more sustainable behavior and implement it in their areas of responsibility, such as adjustments to the marketing strategy or accounting standards. This situation involves aligning all entrepreneurial functions with the shared CE vision, which is monistic-economical and pluralistic-environmental (Bleicher and Abegglen, 2017).

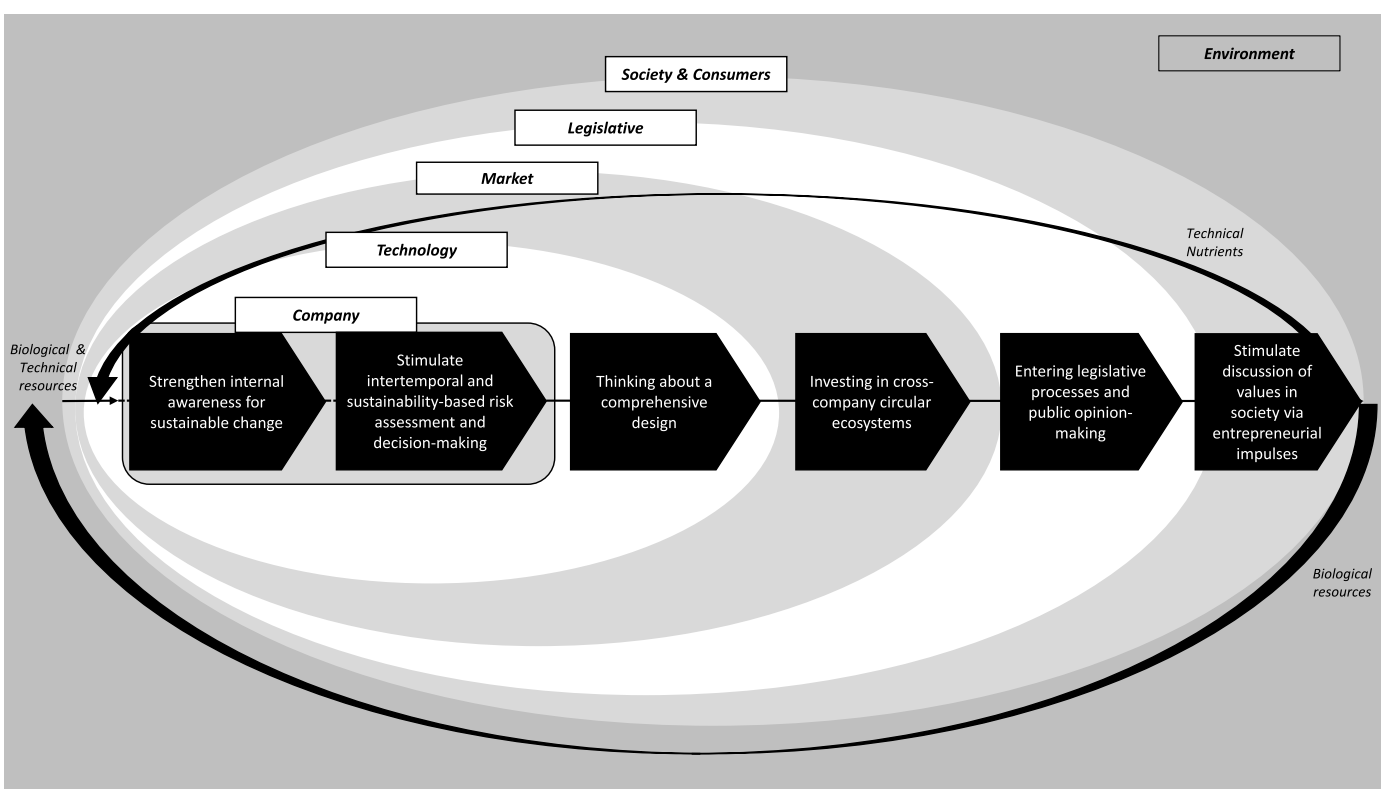

Fig. 4. Six strategic management implications embedded at five levels.

Stimulate intertemporal and sustainability-based risk assessment and decision-making: Managers and employees must constantly make business trade-off decisions, some of which are at odds with environmental and social issues. Specified decision-making guidelines dedicated to an overarching sustainability goal and CE implementation are required to reallocate entrepreneurial resources and introduce innovative (sometimes low) technologies and work processes (Madu and Kuei, 2012). Regarding risk, more holistic integration of future aspects focuses on short- and long-term economic risks associated with market, consumer, and environmental changes. Especially for family-owned SMEs with a long tradition spanning generations, it fits well into the intertemporal perspective. It also regards accepting multiple conflicting rationalities on risk from a wide variety of stakeholders, and those who produce risks can also be affected by them (Shrivastava, 1995). Risk must be understood more broadly as the basis for comprehensive stakeholder legitimacy (Driscoll and Starik, 2004), including a reciprocal relationship with legislative powers and society (Bansal and Clelland, 2004).

Thinking about a comprehensive design: It is necessary to take a holistic view of the company and its production to exploit the full CE potential. A product is more than a bundle of materials. Its handling and how it can be repaired, monitored, returned, and recycled relate strongly to its overall design. Therefore, it requires the integration of all relevant factors, such as the revenue model or consumer usage. Service should also be included to extend the value proposition, linking to an entrepreneurial vision of consumer purchases. It helps with undertakings initially considered challenging (e.g., product returns), given targeted revenue models with appropriate intensification mechanisms for consumers, and aligns entrepreneurial value creation with customer requirements.

Investing in cross-company circular ecosystems: Technology, market, and internal barriers, such as resource shortages or lack of knowledge, can be addressed by forming business ecosystems. Stead and Stead (2013) consider ecosystems the perfect SSM structure to co-evolve and drive innovation across company boundaries and establish a shared vision for sustainable change. Developing sustainable business models is a challenging process supported by entrepreneurial ecosystems (Neumeyer et al., 2020; Neumeyer and Santos, 2018). It enables cross-company collaboration between SMEs and institutions and promotes cross-sectoral cooperation, leading to an increase in market and negotiating power. Collaborations can compensate for knowledge deficits in SMEs and share risks. As product design is a key factor in successfully managing resource loops, a circular ecosystem can make an important contribution, as it can have a unifying and balancing effect on R&D across several companies. Various mechanisms, such as standardization, nurturing, and negotiation, can facilitate the successful orchestration of such ecosystems (Parida et al., 2019). A circular ecosystem offers increased leverage in product design, procurement of resources, and sales, as it moves from a competitive to a collaborative paradigm and includes partners. By operating in networks, SMEs can make an essential contribution to solving systemic problems that underlie industrial ecology (Moore and Manring, 2009).

Entering legislative processes and public opinion-making: Various strategies allow SMEs to influence the legislation-making process and public opinion. SMEs can promote their CE through targeted lobbying and agenda-setting in industry associations. This influence can be direct or indirect and does not necessarily lead to changes exerted by the legislator but can induce rules and industry standards that anticipate regulations (Flynn and Hacking, 2019). CE measures can be anticipated through transparency initiatives, process adaptation, appropriate marketing strategies, or directly raising awareness among customers. Seeking and entering co-creation processes and partnerships with various stakeholders—public authorities, representatives of civil society or consumers, and academics (quadruple helix model)—can induce insight and an evolving interest among various stakeholders.

Stimulate discussion of values in society via entrepreneurial impulses: SMEs should see themselves as embedded in society. Through their activities, they can partially influence the values, attitudes, perceptions, decisions, and actions of people with whom they interact (Starik and Kanashiro, 2013). As people in society have difficulty classifying long-term, incremental, and silent environmental degradations, such as biodiversity loss (Driscoll and Starik, 2004), SMEs can contribute to framing the relevance of such problems and sharpen people's understanding to trigger actions. Adopting measures to raise awareness is considered an effective means of anchoring CE more strongly at the center of society (Geng and Doberstein, 2008). It includes management actively addressing social values, recognizing them, and perceiving itself as an integral part of society (Rahardjo et al., 2013). New circular solutions can especially be beneficial if the company's strategic orientation is decoupled from common social values, such as throwaway mentality, and the company starts to evaluate solutions critically and reflexively, without bias on individual customers or partner groups.

6. Conclusions

Although a CE is conceptually convincing, many companies still struggle to implement it. This study explored the key internal and external barriers companies face when implementing a CE. We identified six internal barriers: risk aversion, short-term orientation, economically-dominated thinking, unwillingness to engage in trade-offs, shortage of resources, and lack of knowledge. Furthermore, we identified 12 external barriers in the areas of technology, market, legislative, and society and consumer. All identified barriers were integrated into a holistic framework, highlighting the interactions between different barriers. This study contributes to research and practice, as it identified unnoticed company-internal barriers and discusses the embeddedness and reciprocal interaction between barriers at different levels in the context of a holistic and integrative SSM framework. The implications for research and practice and the limitations of this study are addressed below.

6.1. Implications for research

This study has important implications for CE research and related fields.

Implications for the CE literature: First, the study builds on and extends the existing literature on barriers to CE implementation. Prior studies in this field largely focused on company-external barriers. We extend this research by adding a company-internal perspective. Specifically, we introduce six internal barriers and highlight their interrelationships. We find that *risk-taking*, *time orientation*, and *economically dominated thinking* are three highly relevant and interdependent barriers. For each, there exists a dichotomy (long-term vs. short-term, risk-averse vs. risk-taking, and monistic-economic vs. pluralistic-environmental). Prior studies on CE barriers have already identified themes such as risk aversion and short-term horizons (Hart et al., 2019; Ritzén and Sandström, 2017). However, studies thus far have not provided an overview of all company-internal barriers. This study, based on a large data set and thorough analysis, provides an overview of all internal barriers in CE implementation. Thus, by adding an internal barrier perspective to the discussion, we bridge an important theoretical void and offer a more nuanced understanding of why firms may fail to implement a CE.

Second, this study provides a holistic framework that categorizes different barriers into different levels and puts them into relationships. Thus, we extend Kirchherr et al. (2018), who argued that research would benefit from an understanding of the embeddedness and interrelations of different CE barriers. Using the holistic framework, we demonstrate the barriers at each level. Such an overview is important to understand which stakeholders are responsible for addressing these barriers. Psychology research posits that people create excuses if they are unwilling to take over responsibility. Furthermore, people tend to externalize their

behavior when they either have no control over the situation or when their responsibilities are unclear (Sheldon and Schachtman, 2007). However, when a meaningful rationale is provided and individuals have choices, they assume responsibility (Deci et al., 1994). By placing the barriers into an SSM framework, which shows clear areas of responsibility, we can help solve the problem of unclear responsibilities. For SMEs, the framework visualizes that certain barriers fall directly under their level of influence (company-internal barriers), whereas other barriers can only be addressed indirectly. We build on these findings and propose strategic recommendations for companies, thereby linking the CE and SSM literature.

Third, research thus far has focused on the size of companies. This study contributes to the existing CE barrier research by tailoring the identified barriers to the SME context. SMEs drive many societies, making it even more important to understand the barriers to CE transition. de Massis et al. (2018) noted that for SMEs endowed with relatively limited resources, a holistic understanding of their embeddedness is central to activating innovation. Following Schumpeter, SMEs show great potential to develop organizational innovation and innovative technological solutions for CE (Hashi and Krasniqi, 2011). Individual SMEs do not have high market shares, but the sum of SMEs is influential in market power and provides blueprints for other companies to replicate circular business models (Schaltegger et al., 2016).

Implications for circular business models and sustainable business model research: Research on sustainable and circular business models has skyrocketed over the last few years. While this study does not directly focus on circular business models, it does, directly and indirectly, influence such research fields. Companies must adapt their business models to implement a CE (Santa-Maria et al., 2021). More specifically, companies must transform from a linear to a circular business model at the operational level when they want to implement a CE in their organization (Brendzel-Skowera, 2021; Geissdoerfer et al., 2018). Thus, this study contributes insights into the antecedents of circular business model innovation (Santa-Maria et al., 2021), an under-researched area in business model research (Foss and Saebi, 2017; Frankenberger and Sauer, 2019).

Implications for corporate responsibility research: Although our study is not positioned in the corporate responsibility research, which broadly deals with the topic that firms engage in social beneficial activities beyond their interests and legal requirements (McWilliams et al., 2006; McWilliams and Siegel, 2001), connecting our study with this research stream shows a lot of potential. Future research could combine these two research streams of *barriers toward CE implementation* and *corporate social responsibility*, offering a CE-inspired conceptualization of corporate responsibility, thereby advancing both fields.

6.2. Implications for managers

The identified barriers and their embeddedness in a comprehensive framework are particularly relevant for practitioners.

First, this study shows the barriers that exist when managers implement a CE in their organization. Thus, managers can address the barriers accordingly. Second, the study highlights the interactive nature of the barriers and the interrelationships between organizations, markets, society, and the environment (Stead and Stead, 2008). Given that CE implementation in an organization requires interaction with different organizations, the interrelated view allows for accurate CE implementation. Moreover, it highlights the importance of including environmental topics in organizational strategies—the implicit goal of SSM (Stead and Stead, 2013). Third, the analysis indicates that the business value chain is embedded in the processes of human capital, stakeholders, and social and environmental resources. The multi-level framework shows that SMEs are strongly nested in other levels, from which they receive decisive impulses (e.g., obstructive external barriers) on which they can have an impact (e.g., overcoming barriers) (Kapp, 1976). Fourth, implementing a CE at the corporate level is about internalizing responsibilities at the management level and reducing negative externalities by enacting business models and process changes. Identifying clear levels of strategic responsibility can help company representatives observe what is within their scope and help other stakeholders, such as politicians or consumers, realize their responsibilities regarding the barriers.

6.3. Limitations and future research

This study had several limitations. A major limitation stems from examining only three industries. Additional industries, such as the machinery or electronics industry, would have enriched the results. Another limitation of the study is its pure focus on Switzerland, which could limit the representativeness of the results (e.g., for the EU region). The political conditions regarding CE in the EU differ from those in Switzerland; for example, the EU has already sent stronger political signals toward CE implementation, including the *Circular Economy Action Plan* (European Commission, 2018). However, as Switzerland is politically and economically strongly oriented toward the EU because of its strong export economy and cultural closeness, the findings of this study can indeed be generalized to the EU countries. The fact that Switzerland is strongly oriented toward the political efforts existing in the EU is shown, for example, by the motions submitted in the Swiss parliament and the efforts of both cantonal and national authorities. A third limitation could be the focus on SMEs. Company-internal and external barriers may differ for shareholder-driven companies.

A study's limitations always offer interesting potential paths that future research could take. One interesting area could be a detailed analysis of sector-specific differences with respect to the identified barriers. Moreover, it would be interesting to examine whether shareholder-driven companies face the same barriers or different ones. Another promising approach would be to examine companies in detail regarding their concrete implementation of CE measures (e.g., different recycling strategies) and place these measures in the context of the barriers. Thus, further research could quantitatively explore how the identified barriers interact and how strongly they affect CE implementation. Building on such categorization and embedding it in a larger context, further research can show which drivers are most effective in circumventing the identified barriers.

CE implementation in SME practices is an ecological necessity. Even prior to this study, it was clear that such barriers existed. This study demonstrates the barriers and their categories in the context of SMEs. This knowledge can make it easier to design solutions in business and political contexts that concretely address existing barriers across multiple levels and enable a more resource-efficient and sustainable future with closed resource loops. In recent workshops with SMEs and institutions, many participants prefer to externalize their responsibility to actors external to their perspective. This study shows that while there are always barriers at the level of external actors, there are also barriers at one's internal level that can be overcome, thereby creating a positive effect on others, given reciprocal relationships.

CRediT authorship contribution statement

Fabian Takacs: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft. **Dunia Brunner:** Conceptualization, Data curation, Investigation, Validation, Writing – review & editing. **Karolin Frankenberger:** Conceptualization, Funding acquisition, Investigation, Resources, Supervision, Validation, Writing – review & editing, Approval of the version of the manuscript to be published.

Declaration of competing interest

The authors declare that they have no known competing financial

interests or personal relationships that could have appeared to influence the work reported in this paper.

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