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RESEARCH ARTICLE

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Circular business model experimentation capabilities—A case study approach

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Abstract

Real-world experiments are best suited for testing and validating novel circular business models (CBMs). Despite the increasing prominence of experimentation in CBM research, there is a lack of investigations on how firms manage and organize CBM experiments. This study aims to fill this research gap by examining the organizational capabilities needed to orchestrate CBM experiments, beyond prototyping, piloting, iterating, and scaling up. Drawing on a systematic within- and cross-case analysis with two fundamentally different firms that nevertheless share the same objective—the dynamic stabilization of a long-term viable CBM—we offer a new perspective on the management and organization of CBM experiments. The study shows how the investigated firms have developed three CBM experimentation capabilities over time, which can be disaggregated into (1) contextualizing, (2) dynamic co-structuring, and (3) governing intangible assets. Moreover, the findings provide further theoretical directions for CBM experiments and identify gaps for future research.

KEYWORDS
business model experimentation, business model innovation, capabilities, circular business models, circular economy, sustainable business models

1 | INTRODUCTION

The circular economy (CE) is a promising "towards-sustainability concept," which has gained growing popularity among politicians, corporate representatives, business consultancies, nongovernmental organizations (NGOs), and scientists (Blomsma & Brennan, 2017; Friant et al., 2020; Korhonen et al., 2018). It conflates various sustainability-oriented schools of thought, such as industrial ecology (Graedel & Allenby, 1995; Tibbs, 1993), industrial symbiosis (Chertow, 2000), performance economy (Stahel, 2010), cradle-to-cradle (McDonough & Braungart, 2002), and natural capitalism (Hawken et al., 1999), and postulates methods to slow down and close material flows in production and consumption systems, such as refuse, repair, reuse/redistribute, repurpose, remanufacture, or recycling (Reike et al., 2018).

Advocates of CE often emphasize the importance of circular business models (CBMs) in accelerating the shift to a CE (Bocken et al., 2018; Hofmann, 2019; Lüdeke-Freund et al., 2018). CBMs theoretically have the potential to trigger market dynamics that shake unsustainable and linear-based industries and, thus, rearrange the organizational processes of entire societies towards circularity by expediting new collaborations between multiple social actors and moderating circular production and consumption practices (Bidmon & Knab, 2017; Evans et al., 2017; Hofmann & Jaeger-Erben, 2020). A CBM is a representation of a complex system (Martins et al., 2015; Massa et al., 2017,

Abbreviations: BM, business model; CBM, circular business model; CE, circular economy; CEO, chief executive officer; CSO, chief sales officer; CIS, circular innovation system; MO, mainstream organization; PESTEL, political, economic, social, technological, ecological, legal; VUCA, volatility, uncertainty, complexity, ambiguity.

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2018), centered on sets of activities and resources (Osterwalder & Pigneur, 2010; Zott & Amit, 2010), that explains how an organization creates, captures, and delivers value,[1] while using and offering pre-existing products, components, or materials that pass through multiple use cycles (Hofmann, 2019; Lüdeke-Freund et al., 2018; Manninen et al., 2018). It achieves this by drawing boundaries and mapping the structured interdependent relationships between a focal organization and its circular ecosystem (Konietzko, 2020). CBMs downscale overall consumption levels to reduce anthropogenic pressure on nature by extending product lifetimes, dematerializing value creation processes and value propositions, sensitizing and empowering users to rethink their consumption behavior, and adopting a sufficiency attitude of marketing (Freudenreich & Schaltegger, 2020; Hansen et al., 2021; Hofmann & Jaeger-Erben, 2020).

The steady growth in academic interest in CE as a purpose and mission-oriented program over the past few years (Bauwens et al., 2020; Hekkert et al., 2020), has led to progress in conceptualizing CBMs. While the first phase of research into CBM investigated the conceptual foundations (Bocken et al., 2016; Hofmann, 2019; Lewandowski, 2016; Lüdeke-Freund et al., 2018; Rosa et al., 2019), such as the drivers, opportunities, risks, and barriers of CBMs (Gusmerotti et al., 2019; Linder & Williander, 2015; Tura et al., 2019; Vermunt et al., 2019), the second phase explores circular entrepreneurship and the organizational dynamics of incumbents initiating CBMs (Chen et al., 2020; Henry et al., 2020; Hofmann & Jaeger-Erben, 2020; Khan et al., 2020). Most of the successful market launches of CBMs have so far occurred in niches in the premium segment; therefore, CBM innovation is not yet a part of the mainstream. It is thus necessary to examine how established players attempt to overcome the hurdles that hinder the success of CBMs. Therefore, more recently, the approach of *experimentation* has attracted greater attention in sustainable innovation and CBM research (Baldassarre et al., 2020; Bocken et al., 2018, 2021; Brown et al., 2021; Konietzko et al., 2020; Weissbrod & Bocken, 2017). Experimentation plays a crucial role in detecting, trialing, and validating new value creation activities that stimulate CBM innovation (Bocken et al., 2021). It helps incumbents overcome organizational rigidity and structural inertia, and contributes to "an evolutionary process of discovery and refinement to explore what constitutes a sustainable enterprise" (Bocken et al., 2021, p. 2). In this sense, the transitional nature of CBMs requires changes in organizational resources and activities to foster experimentation and innovation that aid in the transition to a sustainable business enterprise. However, despite the rising prominence of experimentation in CBM research, there is a lack of clarity regarding the relationship between incumbents' lifeworld laboratories for a CE and organizational capabilities. Therefore, a key gap remains unexplored: the identification of experimentation capabilities that are necessary to shape and manage a circular innovation system[2] (CIS). To fill this research gap, we examined the resources and set of activities needed to orchestrate CBM experiments, beyond the recognition that prototyping, piloting, iterating, learning, and scaling up play important roles. Additionally, the study attempts to reveal the rationale behind CBM experiments within firms that aim to diffuse CBM innovation.

Drawing on a case study approach, the study examined a medium-sized firm and a major multinational enterprise. Using a systematic within- and cross-case analysis, we analyze the development of three CBM experimentation capabilities at the investigated firms: (1) contextualizing; (2) dynamic co-structuring; (3) governing intangible assets. These capabilities can aid companies survive in future societies beset by ecological catastrophes, where accumulated experiences, current knowledge assets, and existing customer bases may not be sufficient to ensure future corporate viability.

2 | THEORETICAL BACKGROUND

2.1 | The need for BM experimentation

From a practical strategic management point of view, BM innovation is vitally important for ensuring the long-term survival of the firm; however, it is very difficult to achieve (Christensen, 2016; Christensen et al., 2016). Barriers, challenges, drivers, and catalysts to change BMs have been extensively studied to determine whether they are conventional (nonsustainable) or sustainable (Chesbrough, 2010; Linder & Williander, 2015; Sousa-Zomer et al., 2017; Tura et al., 2019; Vermunt et al., 2019). While instruments, tools, and chronologically structured process flow schemes have been developed (Baldassarre et al., 2020; Bocken et al., 2013; Brown et al., 2021; Guldmann et al., 2019; Hofmann et al., 2017; Nußholz, 2018), they do not sufficiently account for the uncertainty and complexity associated with CBM innovation. Organizational processes, which cannot be mapped by tool kits or static business design approaches, must also be reformed (Amit & Zott, 2020; Evans et al., 2017; Massa et al., 2018; Parrish, 2010; Roome & Louche, 2016; Thomke, 2020). CBM innovation can be difficult to accurately predetermine and be controlled by management, as firms as social systems are simultaneously stable and dynamic in their emergence, subject to a plethora of opportunities, and are shaped by creative moments (Foss & Saebi, 2015; Rüegg-Stürm & Grand, 2016). Therefore, "companies must adopt an effectual attitude toward business model experimentation" (Chesbrough, 2010, p. 362) to deal with volatility, uncertainty, complexity, ambiguity (VUCA; Bennis & Nanus, 1985) and contingency of organizational evolution.

Unlike in the natural sciences, where experiments often take place in controllable laboratory environments, BM experiments are performed in real-world settings on a small scale, bounded in space and time (Bocken et al., 2021; Thomke, 2020). Since CBMs are diametrically opposed to dominant linear BM configurations—slowing down instead of boosting the number of products sold, assuming a stewardship role for products instead of selling them, collaboration instead of cooperation (Hofmann, 2019; Lüdeke-Freund et al., 2018)—real-world CBM experiments are best suited for testing and validating these novel value creation modes. Implementing such substantial alterations in the strategic alignment of firms requires the use of trial-and-error routines, an entrepreneurial mindset among the team responsible for the lifeworld laboratory, continuous customer feedback loops, and short internal communication channels to facilitate fast decision-making procedures

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as standard features (Bocken et al., 2021). Additionally, top management must be willing to take financial risks and demonstrate a high tolerance for failure (Christensen, 2016).

2.2 | Lifeworld laboratories and organizational ambidexterity

An issue that has attracted extensive academic research in recent years is whether creating a new BM from scratch is more conducive to accomplishing BM innovation, than the adapting of an existing BM (Bogers et al., 2015; Chesbrough, 2010; Christensen et al., 2016; Massa et al., 2017; Rasmussen & Foss, 2015). Executives prefer investing in the modification of existing BMs due to considerations regarding efficiency, avoid costs, and address legitimacy pressure. While this form of investment may appear to be less risky than developing a new BM, over the long term, the greatest risk can be the decision to not reinvest freed-up capital into the development of new BMs that liberate the organization from its current value creation modes, especially in the case of radical innovations such as CBMs (Christensen et al., 2016). There are several reasons why starting a new BM can be more beneficial. Established players with a successful history in mature markets tend to have little interest in emerging markets, or even in markets that do not yet exist, and are unwilling to invest scarce resources into these. Even when the management anticipates the "right" BM that may be appropriate for the future, it does not receive the necessary commitment as the established asset configuration is aligned with those that have been successful in the past (Amit & Zott, 2001; Chesbrough, 2010; Christensen et al., 2016). Therefore, a CBM experiment should be independent of the established firm's resource allocation logic and detached from the associated investment and cost structure to ensure that the new CBM is adequately resourced to develop its capabilities and flourish.

Additionally, developing a new BM is necessary as the organizational information processing logic that evolved from the past can lead to cognitive barriers (Chesbrough, 2010; Chesbrough & Rosenbloom, 2002). This aspect builds on the dominant logic of how information from the organizational environment is transformed and used for decision-making processes in the existing BM. To open up the organizational environment as a sphere of business opportunities, it must be captured in a differentiated and precise logic so that operational and strategic decisions can subsequently be made. This logic guides the firm in assessing the importance of information; and functions as a navigational aid in a chaotic-complex, nonlinearly developing organizational environment. The firm only processes information that fits into this logic and ignores information that conflicts with it (Rüegg-Stürm & Grand, 2016). However, this can lead to a failure in spotting viable future trajectories that do not conform to their current BM(s).

Resource allocation and information processing logics are deeply entrenched in organizations and reinforce rigidity and structural inertia. These limit firms' strategic capacity to perform BM innovation. Therefore, a small, selected part of the organization must unlearn these logics to build up transformative knowledge assets and expertise. CBM innovation requires an autonomous lifeworld laboratory that is segregated but still coupled with the incumbents' broader setting to sense, seize, and negotiate new circular value creation modes and value propositions (Hofmann & Jaeger-Erben, 2020). There is a need for organizational conditions that allow the orchestration of two or more different BMs based on the concept of organizational ambidexterity (Duncan, 1976; March, 1991; O'Reilly & Tushman, 2008; Tushman & O'Reilly, 1997). According to Schumpeter (1934), Holland (1975), and Kuran (1988), March (1991) refers to this as the balanced "relation between the exploration of new possibilities and the exploitation of old certainties … (which) is a primary factor in system survival and prosperity" (p. 71). Ambidexterity enables organizations to simultaneously perform two or more logically antagonistic BMs and thereby exploit current linear BMs to organize mainstream operations more (ecological) efficiently to ensure short- to medium-term operability, while simultaneously experimenting with CBMs to find possible answers to ecological and socio-economic challenges (Hofmann & Jaeger-Erben, 2020).

2.3 | Capabilities

The roots of the notion of capabilities, in management and organizational research, can be traced back to the influential theoretical framework of the "resource-based view of the firm" (Barney, 1991; Nelson & Winter, 1982; Penrose, 1959; Prahalad & Hamel, 1990; Schumpeter, 1934). The resource-based view assumes that a firm can be conceptualized as a group of diverse resources, which constitute the uniqueness of a company and explains the reasons for the differences in their configuration. According to Helfat and Peteraf (2003) and Winter (2003), an organizational resource refers to tangible or intangible assets that are needed for (re-)producing the outputs that an organization develops, owns, controls, or has access to. The firm needs to orchestrate the utilization of its resources to achieve its objectives; this requires organizational capabilities. Organizational capabilities refer to the firm's ability to collectively perform coordinated sets of activities, utilizing organizational resources, to achieve a particular purpose.

Based on the insights of the resource-based view of the firm, the theory of dynamic capabilities has become an important domain in management research over the last two decades (Arndt & Pierce, 2018; Helfat & Peteraf, 2003; Eisenhardt & Martin, 2000; Teece et al., 1998; Teece, 2007; Teece, 2018a, 2018b; Winter, 2003). They have achieved great relevance in the search for determinants that enable strategic and corporate change. Teece (2007), p. 1319) have disaggregated dynamic capabilities "into the capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets." The goal of engaging with dynamic capabilities is not short-term profit but rather maintaining the organizational recipe for evolutionary fitness. Consequently, it includes the firm's ability to design new product-service systems, innovate technologies, or implement new BMs to achieve an organizational transition to survive in highly uncertain environments in the long term (Arndt et al., 2018; Teece, 2018a).

Dynamic capabilities have also been linked to sustainable BM and CBM innovation research (Bocken & Geradts, 2020; Inigo & Albareda,

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2019; Khan et al., 2020; Pieroni et al., 2019; Reim et al., 2021; Santa-Maria et al., 2021; Weissbrod & Bocken, 2017). Weissbrod and Bocken (2017, p. 2663) specifically focus on "developing (a) sustainable business experimentation capability"; however, while they make a conceptual link between organizational capabilities and triple-bottom-line value creation, they do not bridge the gap between experimentation capabilities and CBMs. Research beyond the level of CBM experimentation is simply not possible, since no company that we know has yet stabilized and established an economically viable overall corporate CE transition "within rapidly changing environments" (Teece, 2018a, p. 360). CBM research is still in its infancy, as incumbents are just beginning to discover CBMs with tentative initiatives; hence, we focus on the origins of CBM innovation and experiments as lifeworld laboratories.

3 | RESEARCH DESIGN

3.1 | A case study approach

This study adopts a case study research strategy as there is a lack of comprehensive empirical research on how and why firms shape and manage CBM experiments. Following methodological references from well-established qualitative researchers (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Ridder, 2017), we applied grounded theory (Glaser & Strauss, 1967; Strauss & Corbin, 1990), which allowed us to develop emerging constructs and their relationships based on a continuous and iterative analysis of data.[3] Utilizing constant comparison (Strauss & Corbin, 1998), a perpetual oscillation between data collection, analysis, and consultation of academic literature was undertaken to successively modify the outputs in the form of a framework of CBM experimentation capabilities. Consequently, the study distances itself from strict and stubborn inductivism, as "Strauss and Corbin noted that induction was overemphasized in grounded theory research. They observed that researchers are engaged in deduction when conceptualizing data, and that effective grounded theory requires 'an interplay between induction and deduction (as in all science)" (Strauss & Corbin, 1998, p. 137) (Suddaby, 2006, p. 639). The research process might be viewed as a tandem of mutual conceptualization: a reciprocal reference to empirical data and existing theory, as suggested by Gioia et al. (2013), Strauss and Corbin (1998), and Suddaby (2006).

As CBM research is still in its infancy, qualitative data may provide important insights into complex processes of the investigated social phenomenon that may not be revealed by quantitative approaches. The case study approach is particularly appropriate for CBM experiments, which are lifeworld laboratories, as case studies capture the richness of the real-world environmental contexts in which the social phenomenon evolves (Ridder, 2017). Enriched with qualitative data, case studies in organizational research shed light on the emergence and disappearance of structures, the set of activities and resources that may unlock organizational inertia, and the change in contextual circumstances (Dougherty, 2002). As Eisenhardt and Graebner (Eisenhardt & Graebner, 2007, p. 26–27) point out, "theory-building research using cases, typically answers research questions that address 'how' and 'why' in unexplored areas, particularly well."

3.2 | Case selection

The case selection was based on theoretical and purposive sampling principles that aligned our research process with the research interest. We searched for polar types (Eisenhardt, 1989; Eisenhardt & Graebner, 2007) by sampling cases that differ in size, industrial contexts, and economic scope but nevertheless shared the objective of achieving the dynamic stabilization of a long-term viable CBM innovation, to generate comprehensive insights and identify co-occurring patterns across firms that exhibit large differences in their business attributes. We decided to explore two cases in depth instead of increasing our sample size to obtain deeper insights into the black box of CBM experiments. Additionally, focusing on two cases allowed us to draw up deep descriptions while considering the specific characteristics of the CISs and their contexts (Ridder, 2017). Hence, we aim to offer in-depth empirical evidence to shed light on the organization and management of CBM experiments and thereby contribute to the literature on sustainable innovation and CBM research (Aagaard et al., 2021; Bocken et al., 2021; Hansen et al., 2021; Hofmann & Jaeger-Erben, 2020; Inigo & Albareda, 2019; Konietzko et al., 2020; Lüdeke-Freund, 2020; Schaltegger et al., 2016; Weissbrod & Bocken, 2017).

We employed a combination of criterion-based and conceptually driven sampling, by utilizing four criteria for case selection: (1) type of CBM innovation, (2) approach of organizational integration, (3) performance, and (4) maximum variation in operating contexts.

1. The selected firms must have adopted a service-based CBM, where the firm assumes a stewardship role by shifting from selling physical products to offering service solutions (Heyes et al., 2018; Hofmann, 2019; Sousa-Zomer et al., 2017). The shift from sales- to functions-oriented CBMs is often associated with the provision of integrated product-service systems, which may be defined as "tangible products and intangible services designed and combined so that they are jointly capable of fulfilling specific customer needs" (Tukker, 2015, p. 246). The scope of CBM innovation involves novelty to the firm, which results in entirely new value creation processes and value propositions to slow down *and* close material flows.
2. In the interest of differences in organizational CBM integration, the first firm must have established an in-house start-up as a subsidiary to implement the CIS, while the other must have integrated the CIS horizontally into the functional department structures (matrix project organization) of the mainstream organization (MO). In addition, it was a requirement that the firms must have established a new BM from scratch, rather than modify an existing one.

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TABLE 1 Main features of the sample companies

Attributes	*HomeAppliances* (mainstream organization) *washing_together* (circular innovation system)	*Mountaineer* (mainstream organization) *sharing_backpacks* (circular innovation system)
Company description	Developing and manufacturing products for cooking and baking, dishwashing, cooling and freezing, washing and drying, and digital home connecting applications.	Developing, producing, and distributing outdoor equipment: functional outdoor clothing, backpacks, bags, sleeping bags, tents, shoes, and camping accessories.
Industry	Home appliance industry.	Outdoor and textile industry.
Size	Approx. 60,000 employees worldwide.	Approx. 530 employees worldwide.
Operating radius	Headquarter in Germany. 38 factories in Europe, USA, Latin America, and Asia.	Main site with own production facility in Germany, sales offices in Europe, global supply chain.
Sustainability concept	Advocate of the triple-bottom-line-approach. They want to prove that nature conservation, social responsibility, and economic performance are not mutually exclusive, rather than their interdependence is the basis for a prosperous business.	Pioneer company of the common good economy—sustainability is the omnipresent corset of business operations. Multiple winners of national and international sustainability awards.
Motivation/guiding principle	"We want to be the first choice for consumers worldwide. We grow responsibly and contribute to protecting our natural resources."	"As the most sustainable outdoor outfitter in Europe, we contribute to a world worth living in."
CBM archetype	Adopt a stewardship role, deliver functionality, and retaining ownership of the product.	Adopt a stewardship role, deliver functionality, and retaining ownership of the product.
CBM focus	Instead of selling washing machines and dryer, offering their functionality by equipping and running common shared laundry rooms. Digitizing everything from booking the machines up to the actual payment per washing and drying cycle simplifies the entire process of doing the laundry.	Instead of selling backpacks, tents, camping mats, saddlebags, and trolleys, offering their functionality by temporary access through renting contracts. Products can be rented via an online platform, at the company's own stores, or at the main site.
Customer segments	Business-to-business-to-user: providers of student accommodations, serviced apartments, micro-apartments, property managers, and the private and social housing sector.	Business-to-user: product users.
CBM operating domain	Main business activities in Germany, with selected projects in Austria and Switzerland. Existing future plans to expand the CBM to other European countries.	Expansion to interested dealers is planned. Currently, the rental service is only available in Germany. Existing future plans to expand the CBM to other European countries.
Organizational integration	Establishment of an in-house start-up as a subsidiary of the mainstream-organization.	Horizontal integration into the functional department structures (matrix project organization) of the mainstream organization.
Communicative framing of the CBM	Washing together means washing sustainably. Through digitization and a holistic service concept, they want to make the use of communal machines more attractive.	Using instead of owning protects nature, saves money and space at home.

3. The performance requirement was that the CIS must have been operating for several years and must be organizationally secure and stable; i.e., it is not at risk of insolvency or abandonment, regardless of profitability.
4. The cases selected differed in sector, size, operation radius, notion of sustainability, CBM focus, motivation/guiding principles, and communicative framing of the CBM, to achieve maximum variation in the operating contexts.

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TABLE 2 Overview of qualitative data sources

Data type	Organizational area	# Count	Length (hh:mm)	Documentation type—pages
HomeAppliances				
Semi-structured interviews		5	06:08	Transcripts—115
	CEO (*washing_together*)	1	01:13	
	Top management	2	01:32	
	Management	2	03:24	
Archival data		15	n/a	Electronic documents—n/a
Publicly available interviews				
	CEO (*washing_together*)	4	n/a	
Press releases	n/a	9	n/a	
Corporate websites	n/a	2	n/a	
Site visits with observations		1	n/a	Field notes, photographs—n/a
Mountaineer				
Semi-structured interviews		5	05:52	Transcripts—95
	CSO	1	01:05	
	Top management	2	02:27	
	Management	2	02:20	
Archival data		15	n/a	Electronic documents—n/a
Publicly available interviews				
	CEO	4	n/a	
	Top management	1	n/a	
Press releases	n/a	8	n/a	
Corporate websites	n/a	1	n/a	
Public letter	CEO	1	n/a	
Site visits with observations		1	n/a	Field notes—n/a
Expert interviews				
Problem centered interviews		15	15:19	Transcripts—306
Business consultants				
	CEO	3	03:43	
	Associate director	3	02:43	
	Associate	6	06:53	
Business sustainability experts				
	CEO	1	01:28	
	Management	2	01:32	

Note: The various categories of data types are underlined to make clear that there are differences between the collected data sources.

A summary along key characteristics of each case is presented in Table 1.

3.3 | Data collection

Following the grounded theory approach (Glaser & Strauss, 1967; Strauss & Corbin, 1990), we iteratively collected data over a 15-month period (April 2019 to June 2020) and triangulated primary and secondary data from various sources; this resulted in a detailed case description (Fiss, 2009; Ridder, 2017). We specify data sources in Table 2. These include:

1. Semi-structured interviews ($n = 10$). We conducted five semi-structured interviews with high-level representatives from each firm. Our target was to identify highly knowledgeable informants who observed the CIS from distinct perspectives to reduce "knee-jerk" reactions and data biases. Hence, we interviewed organizational actors from both the MOs and the CISs from varying levels of the hierarchy and functional areas. The interviews at *HomeAppliances* were conducted with (1) the CEO and founder of *washing_together* and four employees from the top management of *HomeAppliances*: (2) the head of corporate technology and innovation, (3) the head of corporate sustainability, (4) a manager for product-related environmental protection, and (5) a representative

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of in-house consulting for sustainability. Similarly, the interviews at *Mountaineer* were conducted with the CSO, the heads of quality/process management and product design, who are responsible for the *sharing_backpacks* business, and two managers from the sales and innovation departments. Interviews lasted from 40 min to over 2 h and were conducted in German. All interviews were recorded and transcribed verbatim to codify the data.

2. Archival data ($n = 30$). We utilized secondary data in the form of publicly available press interviews with company representatives, press articles, corporate websites, and opinion letters to enrich the body of data with complementary sources. The contents of the text covered the two CBM experiments.
3. Site visits with observations ($n = 2$). The lead author visited the two firms. The respondents gave us the opportunity to study the work spaces, innovation hubs, and the facilities to interact with other employees. During the site visits, the lead author had informal discussions with the respondents about market dynamics, competitors, the firm's histories, and firm cultures.
4. Expert interviews ($n = 15$). We conducted 15 problem-centered interviews (Witzel, 2000) with executives from business consultancies and sustainability professionals working at other companies, who can be classified as experts in the fields of CBM innovation and business development, to ensure information triangulation and reflection. Twelve high-level representatives of three small and six medium-to-large business consultancies were interviewed; the interviews lasted between 55 and 90 min. They were selected for their capacities to act as mediators of factual and experiential knowledge to supervise and observe business dynamics of CBM innovation and organizational transitions as "experienced events." Consequently, as economic authorities, they affect the thoughts and actions of firm leaders and indirectly contribute to the arrangement and development of markets. The three other interviewed sustainability experts worked in pioneering firms, which were known for their consistently sustainable/circular business practices. The semi-structured interview guide was not geared to the two cases studied, but rather investigated personal experiences with CBM experiments; organizational resources and activities of CBM innovation and experiments; and the functional rationality of CBMs. All interviews were recorded and transcribed verbatim to codify the data.

3.4 | Data analysis

Data analysis involved a process of codification following the systematic approach for new concept development by Gioia et al. (2013), who articulated their methodological principles on the basis of grounded theory. We coded the interviews, archival data, and field notes using the qualitative data analysis software program ATLAS.ti. The coding process was segmented into three phases (Gioia et al., 2013; Glaser & Strauss, 1967); however, separating them into chronologically successive analysis steps is neither appropriate nor practicable, as the proposed approach by Gioia et al. (2013) is recursive in nature. While constantly going back and forth between these three phases, we compared new concepts and themes as they emerged, and traced their relationships.

The two cases were studied separately from each other during open coding to enable us to become familiar with each case as a stand-alone entity (Eisenhardt, 1989; Eisenhardt & Graebner, 2007). This allowed us to obtain a comprehensive and detailed picture of each case before ascertaining their similarities (Ridder, 2017). In the first-order and second-order analysis, we merged the findings of each case to generalize three sequential CBM experimentation capabilities and reveal the overarching purposes of the CBM experiments. The data structure can be found in the Appendix A. The coding process was carried out as follows:

1. First-order concepts: In the first phase, we stayed close to the data and parsed the written documents into descriptive codes, generating as many open codes as possible through multiple iterations (e.g., "evaluation and investment planning," "risk assessment," "communicatively processed reflection of customer opinions and experiences," and "institutionalizing CE as part of the corporate strategy"). We obtained 136 different open codes for the *Home-Appliances* case and 153 for the *Mountaineer* case, which resulted in many cross-case duplications. While constantly producing and contrasting open codes, we simultaneously sought first-order concepts that could cluster the open codes under more abstract categories.
2. Second-order themes: At this point of the research progress, we started seeking similarities and differences among the first-order concepts, by testing the mutual interdependencies and relationships that helped to refine them. This process reduced first-order concepts to a manageable number. We then labeled these second-order categories with applicable designations to build conceptual linkages at multiple levels between data, open codes, and more abstract, first-order concepts. This helped us to understand why the investigated firms conducted CBM experiments, and identify the resources and set of activities that were of particular importance for the emergence of CBM experimentation capabilities at each firm.
3. Aggregate dimensions: We accomplished a third level of abstraction, seeking aggregate dimensions, involving conceptual linkages between the cases studied (Gioia et al., 2013). In this stage of distilling second-order themes into aggregate dimensions, we generalized three sequential CBM experimentation capabilities, which could be observed across case boundaries: (1) contextualizing, (2) dynamic co-structuring, and (3) governing intangible assets. Most of the case-related interviews provided a historical narrative of the emergence of CBM experimentation; this allowed us to conceptualize the experimentation capabilities developed over time. Moreover, we synthesized the three rationalities of CBM experiments to reveal the overall normative settings that frame them.

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4 | RESULTS

The following section presents the main output of the data analysis, by portraying the raisons d'être of the CBM experiments and the three identified CBM experimentation capabilities. There are differences between the two firms in the way they test, explore, and play with CBM experiments, which can be observed in their implementation of CIS integration into the existing organizational structure. However, the research objective was to identify the two firms' motives for realizing CBM experiments and conceptualizing cross-company CBM experimentation capabilities, despite their differences in market environments, historical backgrounds, path dependencies, and approaches to sustainability. Additionally, the amounts of financial, human, and physical resources invested by the two firms also varied significantly. Nevertheless, both firms intend to create, organize, and manage new circular-based value creation processes and value propositions by adopting a stewardship role, delivering functionality, and retaining ownership of the product, which is historically a novelty for both firms.

4.1 | Raison d'être

The specification of target paths enables the identification of the strategic origins of the firms' practices and procedures. The subsequently described aims reflect the corporate problems addressed by CBM experiments that, in turn, inevitably raise the question about the right to exist. The primary rationales for experimenting with CBMs in both cases were a desire to break internal path dependencies, the controllable accessibility of the future, and open up new entrepreneurial opportunities. Consequently, these can be interpreted as the legitimacy of CBM experiments.

4.1.1 | Breaking internal path dependencies

Many interviewees interpreted the CIS as a way of deliberately cracking the path dependencies of historically evolved linear and unsustainable organizational structures. The initial argument is that the CIS liberates firms from the dominant organizational arrangements. As observed in our data, diverse transition blockers that demand an intra-organizational and autonomous CIS, that is, segregated and coupled with the MO setting, were identified. For example, shaping a new CBM from scratch avoids high switching costs that are likely to occur due to lock-in effects. Balancing successful organizational ambidexterity prevents potential conflicts that may arise from different conceptions of temporality of linear exploitation (MO requires elaborated decision procedures) and circular exploration (CIS requires agility and fast decision making), or from the current MO overhead cost structures that nip the CIS in the bud.

> If you build up an in-house start-up, which is like a small plant, and if you put the overall cost structure of a big incumbent on it, it's dead before you have started (Interviewee D from *HomeAppliances*).

4.1.2 | Controllable accessibility of the future

One of the novel elements of the CBMs in both cases, perhaps the main argument why this kind of innovation can be labeled as "radical" is the shift in ownership conditions. *Washing_together* and *sharing_backpacks* adopt a stewardship role; thus, they are deeply involved in the product use phase and generate revenues by providing services that satisfy the user's needs. By shifting product ownership conditions, they nurture the imagination and desire to ensure accessibility in the future. The monitoring and managing of the use of their products as tangible assets enables them to make natural resources, materials, and product components accessible; and anticipate the expected growth in resource scarcity, the rising volatility of raw material prices, and the risk of increasing supply shortages. This leads to more autonomy from international commodity markets, and prepares them to deal with changes in environmental regulations and increasing taxes on the consumption of finite raw materials.

The analysis of product usage data can be used to detect weaknesses in product and service design to develop services tailored to current and future customer segments. Moreover, smart and tracked products that collect usage data document the lifeworld of users. Thus, daily routines and decision-making patterns can be revealed by assessing the personality profiles. Applying a stewardship role supports companies in making customers and their behavior accessible and partially controllable, which, in turn, helps with customer loyalty and deeper customer interactions to secure future revenue streams.

> I believe that service around the product is quintessential, therefore we have the claim: "Mountaineer, your lifelong companion" (Interviewee C from *Mountaineer*).

4.1.3 | Open up new entrepreneurial opportunities

The CIS offers an attractive, environmentally sustainable economic growth model in both cases. Most of the interviewees argued that CBMs allow the dematerialization of value propositions by decoupling economic growth from natural resource consumption. The efforts to engage in post-materialized CBM configurations are largely motivated by the rationale that the extension of the product-service-system portfolio might contribute to strategic differentiation in evolving digital-based markets. They consider CBM innovation as a complement to their existing BM landscape to enter emerging niche markets and expand the customer base.

> We have to prepare ourselves to make the company robust, and develop and explore new sources of revenues. We know that the entire outdoor trend, including our sales market, is pretty saturated (Interviewee D from *Mountaineer*).

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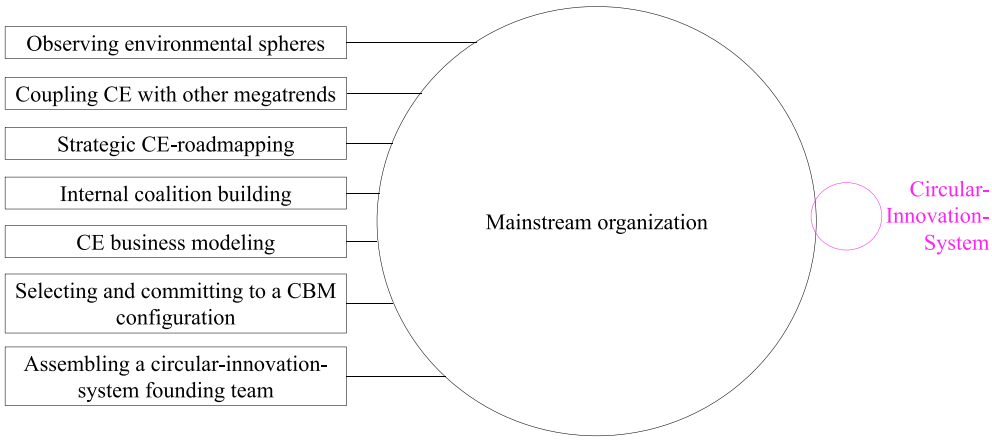

FIGURE 1 Sets of activities explicating the CBM experimentation capability *contextualizing*

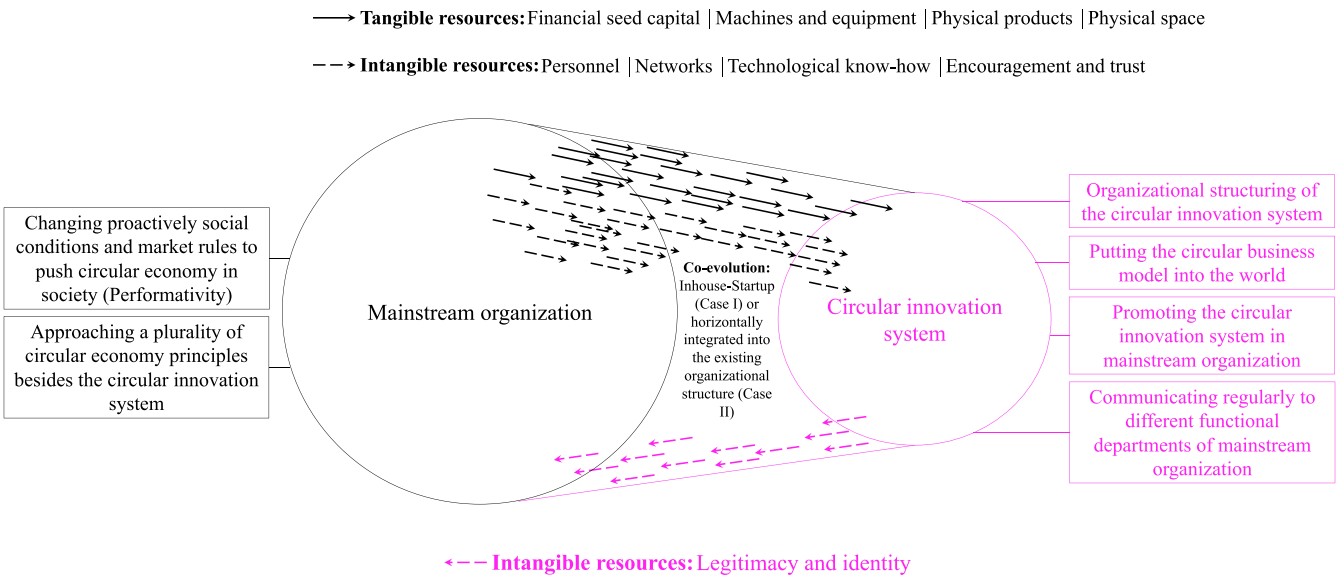

FIGURE 2 Sets of activities and resources explicating the CBM experimentation capability *dynamic co-structuring*

4.2 | CBM experimentation capabilities

Figures 1–3 depict the foundations of each CBM experimentation capability alongside the set of activities performed by the MO (documented in boxes on the left side of the figures) and the CIS (documented in boxes on the right side of the figures). Moreover, they illustrate the tangible and intangible resources that flow reciprocally between them, as the arrows indicate their direction of flux. To ensure a structured introduction to the three CBM experimentation capabilities developed in this study, the overall nature of each capability is outlined first, and its micro-foundations are explicated in a later step by describing the relevant collectively coordinated sets of activities. After the relevant set of activities and resources have been described in the text, their designation follows in brackets and italics to provide the references to the Figures 1–3.

4.2.1 | Contextualizing

Firms must constantly scan and interpret the external social subsystems they are nested in (economic, political, etc.) and anticipate developments across market and technological boundaries to perceive business opportunities in different VUCA environments (Christensen, 2016; March, 1991; Teece, 2007). The CBM experimentation capability *contextualizing* involves not only research activities to estimate trends in the light of its potential for their own BM portfolio but also includes overcoming a narrow scanning radius that has so far been limited to sensing opportunities for the linear business paradigm. Once CE business opportunities have been unveiled, they must adapt to the peculiarities of the incumbent firm to harmonize the corporate strategy with CE-oriented investments. In addition, this implies the translation of the evaluated CE business opportunities into a

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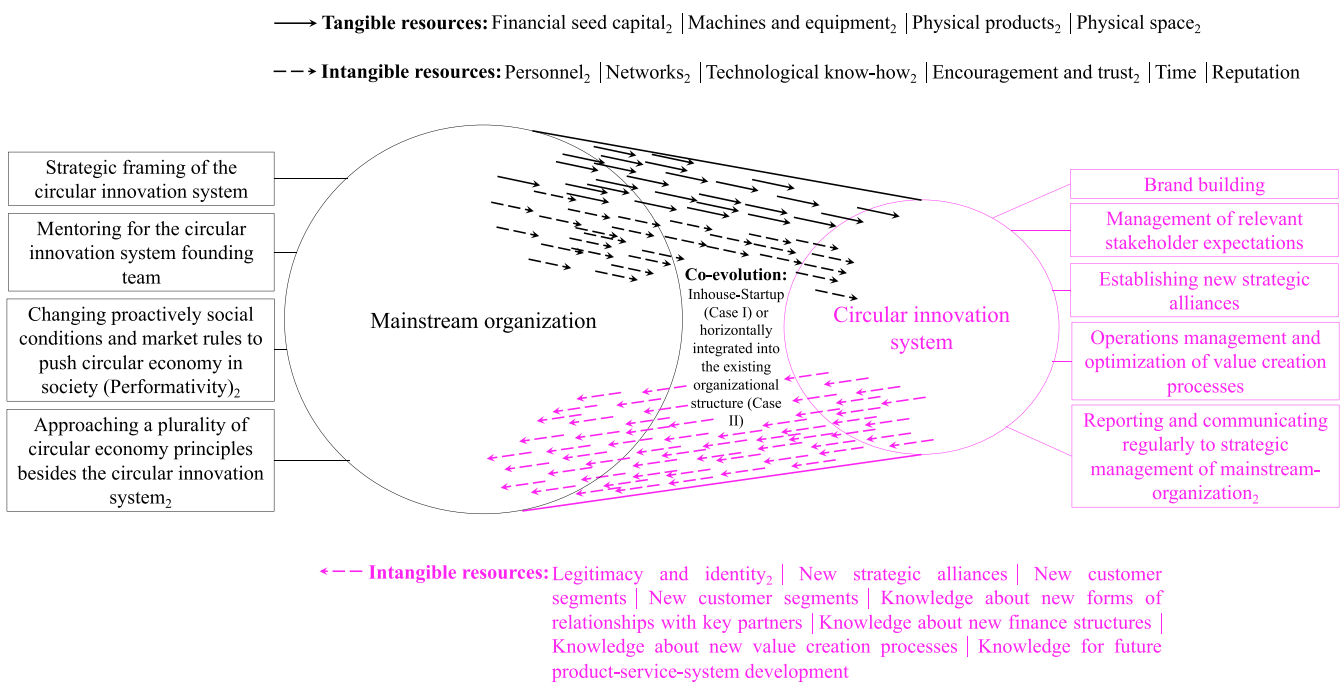

FIGURE 3 Sets of activities and resources explicating the CBM experimentation capability *governing intangible assets*

potentially viable CBM that can be explored, tested, and reflected by the assembled CIS founding team (Figure 1).

Explicating the capability

Mainstream organization. Massive ecological challenges, new unfolding digital technologies, and economic glocalization tendencies will direct our socio-technical systems for the next century, which simultaneously entails opportunities and threats for the two incumbents studied. Most emerging megatrends are relatively easy to discern, but translating their implications for a particular business is a challenging and ambitious endeavor. When opportunities were first glimpsed by observing the wider business environments with the support of analytical instruments (e.g., PESTEL trend analyses), the top management teams at both firms had to figure out how to construe new developments and trends by considering the demands of different business ecosystem participants. They created interconnections between trends and stakeholder needs, opened up and dived into complexity, and recognized the need to invest in sustainable CE experiments that radically scrutinized their core capabilities (*set of activities: observing environmental spheres*).

Based on our data, we can observe that *HomeAppliances* and *Mountaineer* link and combine CE solutions with other social megatrends (e.g., urbanization) and digitalization (*set of activities: coupling CE with other megatrends*).

> Urbanization, micro-living, co-living, sharing and, last but not least, the topics of digitalization and sustainability will shape the way we live in the future. For example, shared laundry rooms show how the housing industry can combine various trends (Interviewee B, *washing_together*).

New digital technologies offer powerful ingredients for CBM experiments for both firms. For example, in the case of *HomeAppliances*, digital applications convert autonomous washing machines into connected ones to transmit real-time information to centrally monitor and manage them. The monitoring system allows the early identification of defective machines and enables timely maintenance.

Once business environment information is filtered, processed, translated, and the opportunity to couple CE with other megatrends was tapped, CE was institutionalized as a strategic field of corporate development. To avoid unidimensional silo solutions and simultaneously encourage cross-functional collaboration, a heterogeneous team of selected employees from different departments constructed and elaborated a CE roadmap (in the case of *HomeAppliances*, it was a specially assembled team, whereas in the case of *Mountaineer*, it was the long-established Sustainability Council) that was communicated within the company (*set of activities: strategic CE-roadmapping*). Interviewee C from *HomeAppliances* explained:

> We are a part of an interdisciplinary team responsible for the strategic process with a clear mission from our top-management. Different departments work together to develop and shape this (CE) strategy.

In the case of *HomeAppliances*, the CBM idea originated from a trio of the MO's strategic management department, which successfully passed through the internal centralized BM development process

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and convinced parts of the top management to support the investment. The creative forms of approaching decision makers, personal commitment beyond the daily obligations as an employee, and micropolitical skills are indispensable prerequisites for the trio to internally push the CBM idea forward (*set of activities: internal coalition building*). The CEO of *washing_together* describes this as follows:

> You need a sponsor, so we went through the company and talked to many department heads. And then we were lucky that the head for innovation said: "Wow guys, super cool. Come on, let us start a project."

Besides forming coalitions with powerful internal supporters for CBM experiments, both firms passed through a CBM ideation and business planning process based on a centralized, clearly structured, and customer-centric approach. It helped define which key business network partnerships, value creation activities, and tangible and intangible resources had to be assembled to meet the needs of the identified customer segments while being grounded on a CE value proposition (*set of activities: CE business modeling*). Selecting the "right" CBM configuration and resource commitment requires not just effort, judgment, and a comprehension of future organizational implications but also concise communication and persuasion by decision makers to mobilize employees, who will be involved and directly affected by the new CIS (*set of activities: selecting and committing to a CBM configuration*). A representative from *Mountaineer* and *sharing_backpacks* pointed out:

> Basically, the problem is not a dearth of ideas, but rather selecting the right one considering the question of feasibility in terms of money, time, manpower, and acceptance. That is actually the bottleneck.

Once the CBM ideas matured into concrete business plans comprising goals, performance indicator matrices, and budget plans, a CIS team, whose leadership was intrinsically motivated and had a strong emotional bond with the MO, had to be assembled. As a representative of the top management of *HomeAppliances* noted:

> This is probably intentional, because they (the founding team) have a strong emotional connection and bond with the company.

A small team size ensures that the team has the agility and maneuverability needed to proactively respond to unforeseen events and requirements (*set of activities: assembling a circular innovation system founding team*).

4.2.2 | Dynamic co-structuring

Since a CIS founding team, which is responsible for the execution of the CBM experiment, has been composed, decisions regarding the investment and allocation of resources as well as the organizational integration of the system into the current corporate structure need to be made. How should the CIS be embedded into the current organizational structure to ensure that it becomes emancipated from the path dependencies of the MO, while developing proximity to utilize its existing internal resource pools, such as technological know-how or access to important stakeholder networks? The challenge is in drawing suitable structural boundaries between the conflicting MO ("linear old") and the CIS ("circular new") without separating them completely (Birkinshaw & Gibson, 2004; March, 1991; O'Connor, 2008; O'Reilly & Tushman, 2008).

How much seed capital does the organization invest in CIS? Which employees are suitable for the establishment of such a system? The CBM experimentation capability *dynamic co-structuring* addresses the ability to answer these questions, while considering contextual conditions that provide time and space for the CIS to creatively emerge. Furthermore, it encompasses the ability to adopt concrete measures to actualize the CIS, which includes not only iteratively practicing and learning first tentative circular value creation activities but also preparing and realizing the market launch of the CBM experiment (Figure 2).

Explicating the capability

Circular innovation system. At *HomeAppliances*, the *washing_together* founding team is given the autonomy to organize itself, recruit new staff, allocate staff responsibilities, etc., and thus has structural flexibility with well-defined boundaries, and a distinct function within the larger MO system (*set of activities: organizational structuring of the circular innovation system*). It is a clearly identifiable organizational group responsible for the firm's CBM innovation efforts that was established as an in-house start-up in the form of a subsidiary that is physically separated from the MO (*intangible resource: personnel* and *tangible resource: physical space*). In the case of *Mountaineer*, the *sharing_backpack* founding team is horizontally integrated into the MO's functional department structure. Compared to *washing_together*, it is a part-time innovation project that is tightly coupled with the MO and has fewer personnel and financial capital (*intangible resource: personnel* and *tangible resource: financial seed capital*). The part-time *sharing_backpack* team is not physically separated from the *Mountaineer*, and machines, equipment, and working space are shared (*tangible resources: machines and equipment*; *physical space*). Consequently, *HomeAppliances* and *Mountaineer* apply two different approaches to configuring an intra-organizational polycentric structure to ensure that the interacting MO and CIS evolve together.

In addition to sensitively promoting the intention to establish the new CIS in the MO, which appears to be vital to raising awareness, obtaining the acceptance of internal stakeholder groups, and preventing potential rejections (*set of activities: promoting the circular innovation system in the mainstream organization*), in both cases, the CIS has the assignment to set up and bring the CBM idea to life. It includes planning and performing in concrete terms such as finding IT infrastructure solutions, establishing recurring value creation processes, designing the web presence, developing digital device

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applications, seeking and negotiating new key partnerships, ensuring frequent interactions with individual prospective customers, and reflecting their opinions and experiences to steadily reconfigure and refine the value creation processes and value proposition. Additionally, the CIS founding teams need to have a positive attitude towards fast decision making to correct failures as quickly as possible and rapidly adapt the CBM under ever-changing conditions during the foundation and market launch phases (*set of activities: putting the CBM into the world*).

The CIS founding team is responsible for coordinating day-to-day business practices and regularly reporting the operational progress to the MO's top management. The team must legitimize the CBM performance and trace back positive and negative developments, while receiving encouragement and trust from the MO's top management through reflection and feedback discussions (*intangible resource: encouragement and trust*). As the CEO of *washing_together* (interviewee B) noted in a publicly available document:

> Without the support of the *HomeAppliances* management, who believed in our idea from the beginning and trusted us as a team, we would not have been able to realize our business model.

Additionally, there is a need for continuous dialog between the CIS team and the departments of the MO to ensure easy access to existing business networks, external communication channels, and technological know-how about the physical products provided (*intangible resources: networks, technological know-how* and *tangible resource: physical products*). The permanent dialogs guarantee the important communicative interplay between the "linear old" and the "circular new" (*set of activities: communicating regularly with different functional departments of the MO*).

Mainstream organization. In both cases, we can observe that the MO is trying to initiate a CE discourse in the public and political spheres to facilitate the economic survival of the CIS. Through awareness-raising campaigns, which are more salient at *Mountaineer*, and political lobbying, they intend to performatively change the social conditions for promoting CE in society. Thus, for them, future-oriented business thinking involves striving to reformulate market rules to generate and/or strengthen the long-term competitive advantages of the CIS while simultaneously contributing to the reduction of systemic non-sustainability. This idea of political and social performativity (Hofmann & Jaeger-Erben, 2020), framed by an organizational awareness of ecological issues, does not imply adapting to stakeholder needs in a reactive sense; rather, it involves a proactive contribution to sustainability transitions (*set of activities: changing proactively social conditions and market rules to push CE in society*). The following quote from interviewee E, from *sharing_backpacks*, illustrates the idea of social and political performativity for a CE:

> Her (the CEO of *Mountaineer*) attitude is that we must continue to expand our influence to give more impetus to politics and make more radical demands (for sustainability-based market rules).

The CIS symbolizes not merely the seizing of new economic opportunities for organizational transition and growth (Teece, 2007; Teece, 2018a, 2018b) but also presents credible sustainability promise as an attractive business case for sustainability (Schaltegger et al., 2012). This gives the MO a new identity and legitimizes its right to exist in a society that must find ways to prosper within planetary boundaries (*intangible resource: legitimacy and identity*). In this way, the MO demonstrates to both internal stakeholder groups and external business ecosystem participants that it is not just their own future but the future of society in general that is at stake.

We found that *HomeAppliances* and *Mountaineer* approach a plurality of CE principles besides the CIS, which reveals their ambition to foster organizational circular literacy (Zwiers et al., 2020). For example, *Mountaineer* provides repair and care instructions for their products via the Internet platform iFixit. Users can find reliable information on fixing products themselves and can order spare parts directly using the platform. Additionally, both firms have been exploring new product material compositions based on recycled plastics and natural fibers, applying new product design criteria, and collaborating with well-known digital platforms operating second-use marketplace (*set of activities: approaching a plurality of CE principles besides the circular innovation system*). Adapting the product design to the requirements of the CIS is particularly important for the long-term success of both CBMs. Interviewee B from *Mountaineer* highlights the following:

> It is a nice counter-trend that we are designing more robust products, which are more durable and consider circular economy principles in product development, for example, repairability. Rethinking product design becomes much more important, as adopting a stewardship role would not be economically viable if we have to replace the products after one or two times of use.

4.2.3 | Governing intangible assets

The ability to integrate and combine created intangible assets, becomes salient with increasing lifetime and growing acceptance of the CIS within and across intra-organizational boundaries. Since the CIS generates knowledge about new value creation processes, obtains novel insights for future product-service-system development, and builds up other intangible assets such as new strategic alliances, it can be labeled as a CE knowledge hub. Both the MO and the CIS must cultivate an effective approach to ensure that the new intangible assets gained by the CIS are transmitted and assimilated into the MO, particularly those driven by transformational experiences that can accelerate the transition of the MO towards CE-based value creation logics. While some intangible assets, such as tacit knowledge, are difficult to transfer due to their specific form of "natural" protection (Teece, 2007),

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orchestrating, sharing, and translating intangible resources is a key foundation of the CBM experimentation capability *governing intangible assets*.

The CBM experimentation capability *governing intangible assets* relates to the development and refinement of a knowledge governance approach to handle and reprocess knowledge stocks and intangible assets elicited by the CIS. It encompasses understanding internal requirements and external market dynamics to push forward the development of the CIS, reflecting and addressing the needs and concerns of different stakeholder groups that are relevant to the establishment of the CIS, and merging insights from the CIS that can benefit the MO.

Owing to the recursive nature of CBM experimentation capabilities, some resource flows and sets of activities from the second capability *dynamic co-structuring* are also relevant for the third capability *governing intangible assets*. They were not explained again to avoid repetition. Nevertheless, they are considered in Figure 3 and marked by a subscripted "2."

Explicating the capability

Circular innovation system. *Washing_together* and *sharing_backpacks* attempt to reach relevant stakeholder groups through standard communication channels and social networks (*set of activities: brand building*), using the reputation of the MO as a distribution accelerator (*intangible resource: reputation*). Building on *HomeAppliances* and *Mountaineer's* high level of brand awareness in Europe, especially in Germany, and their reputation for quality, reliability, and integrity in their respective business fields, the CISs attempt to combine these attributes with new features. In press releases and corporate websites, CISs are directly associated with the MOs. In a publicly available interview, the CEO of *washing_together* emphasized the following:

> *washing_together* is *HomeAppliances's* first innovation spin-off – and we are mightily proud of it.

Accompanying a narrative of sustainability that is linked to natural resource conservation, the ideas of hygiene, flexible access, and convenience are communicatively accentuated and assessed as critical usage hurdles in sharing washing machines and outdoor equipment. The management of relevant external stakeholder groups goes hand-in-hand with increasing brand awareness. In particular, the interests and reactions of retail partners, who represent the target customer segments of both MOs with the highest turnover to date, need to be addressed, as the retail partners are skipped by the CBMs because of their direct relationship to users (*set of activities: management of relevant stakeholder expectations*).

Besides the management of relevant stakeholder expectations, *washing_together* and *sharing_backpacks* were also building new trustful partnerships, which provided them with the tangible and intangible resources necessary for long-term stabilization of their value creation processes. Both case studies confirm the findings of other studies (e.g., Hansen & Revellio, 2020; Hansen & Schmitt, 2020) that effective partnering and inter-organizational collaboration within business networks are at the core of establishing CBMs. In addition to the partnerships and networks that the MOs have built up over the years, the CIS also needs to form new networks through new strategic alliances (*intangible resource: new strategic alliances*). Selecting and contacting potential partners who operate in previously unknown sectors, examining their conditions and willingness to cooperate, and managing this relationship are just a few of the activities that go hand-in-hand with careful network orchestration (*set of activities: establishing new strategic alliances*). In this way, they acquire situation-specific knowledge about new forms of relationships through expanded cross-sectoral alliances (*intangible resource: knowledge about new forms of relationships with key partners*). For example, *washing_together* collaborates closely with a new key business partner that develops a technology to open doors and gates digitally. By integrating the technology into the *washing_together* app, the option was introduced to unlock the door of the shared laundry rooms run by *washing_together* without the need for a conventional key. When booking a washing machine, access authorization to the laundry room is automatically assigned. Such a cross-sector partnership would have been irrelevant to the traditional business of *HomeAppliances*.

The notion of "profitability" does not appear in the vocabulary of the interview respondents in either case. *HomeAppliances* and *Mountaineer* are not concerned with being in the black. From their perspectives, CIS failures and missteps are contributions towards capacity and knowledge building that ensure future viability (*intangible resource: time*). A representative of *HomeAppliances* made the following remarks:

> To be able to think and act freely, we said: "No, we are not focusing on costs right now. We want to understand how the processes should be designed and how they can function."

In this phase, the endeavor of the CIS is to reinforce the knowledge gained from value creation processes and gradually convert them into daily routines, while remaining flexible enough to quickly respond to irritations. Testing and adjusting different pricing models (*intangible resource: knowledge about new finance structures*); developing and intensifying strong customer relationships to ensure repeated use of the services offered (*intangible resource: new customer segments*); and caring, maintaining, and controlling the quality of the physical products used for the value proposition (*intangible resource: knowledge about new value creation activities*) are the responsibilities of the CIS (*set of activities: operations management and optimization of value creation processes*). As both firms' CBMs imply a stewardship role, the CIS is deeply involved in the product use phase and can gather valuable feedback for the services and products from deeper user interactions. Moreover, functioning CBMs enable new ways to gain customer insights into product use patterns that can be utilized to tailor future offerings to customer needs more precisely (*intangible resources: knowledge for future product-service-system development; knowledge about new customer segments*).

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Since the set of activities *regularly communicating with different functional departments of the MO* has already been introduced in the context of the CBM experimentation capability *dynamic co-structuring*, it is not explained again, which does not mean that it has become less relevant.

Mainstream organization. Our data indicate that in the case of both firms, the MOs are responsible for the long-term alignment of the CIS by providing a strategic setting that offers the CIS a relatively high degree of operational freedom and a wide-ranging scope for evolvement (*set of activities: strategic framing of the CIS*). Interviewee B, from *washing_together*, highlighted,

> We are a 100 percent subsidiary of *HomeAppliances*, but we have a lot of freedom that traditional subsidiaries do not have.

The MO arranges recurring dialogs with the CIS team, to allow them to zoom out from the daily business operations and thereby reflect and create future development opportunities to carefully advance the strategic setting of the CIS. In this way, their relationships with each other were critically assessed for internal consistency. The operational development of the CIS is reviewed in terms of its logical consistency with the strategic plans of the MO, which have been embodied in the strategic CE-roadmap (see CBM experimentation capability *contextualizing*). For this purpose, self-developed formats and indicator metrics for monitoring, assessment, and promotion have been established. In addition, the reflection dialogs help to draw a holistic picture and adopt an outside-in observer perspective to contextualize problem-solution situations jointly (*set of activities: mentoring for the CIS founding team*).

> We need to reflect and ask ourselves, where are we currently? What is going well? What is going poorly? Are we still on the right track or have the target changed in the meantime? (Interviewee B from *Mountaineer*).

Since the sets of activities *that proactively change social conditions and market rules to push CE in society (performativity)* and *approaching a plurality of CE principles besides the circular innovation system* have already been introduced in the context of the CBM experimentation capability *dynamic co-structuring*, they are not explained again; however, this does not mean that they have become less relevant.

4.3 | Framework of CBM experimentation capabilities

The CBM experimentation capabilities recognize that firms are shaped but not necessarily paralyzed by their own path dependencies. Moreover, they demonstrate that firms do not just adapt to external environmental conditions and stakeholder expectations, but also shapes their ecosystems. The two CBM experiments studied accentuate the efforts of the firms to face the seemingly insurmountable challenges of the ecological transformation of markets; this proves that they do not "stand with their backs to the wall" and do not freeze in the face of the multitude of barriers that have been identified in the research into CBM innovation (Gusmerotti et al., 2019; Hansen et al., 2021;

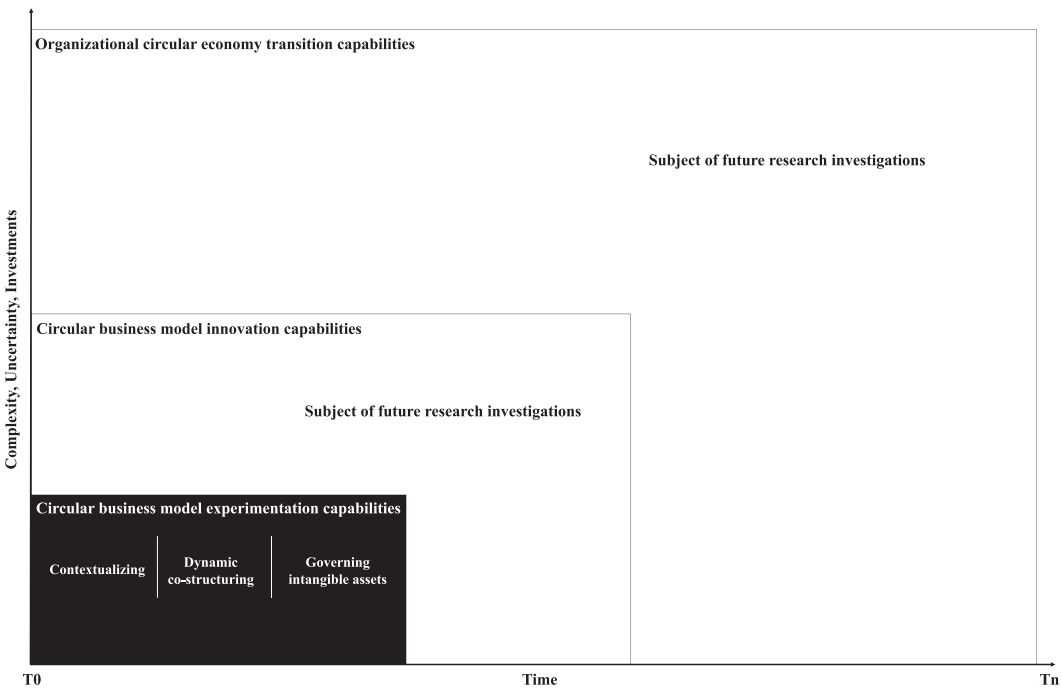

FIGURE 4 Framework of circular business model experimentation capabilities

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Linder & Williander, 2015; Tura et al., 2019; Vermunt et al., 2019). Whether the two CISs can successfully transcend the status of experiments and be economically viable with the current CBM configuration while simultaneously reducing the absolute environmental footprint of the MOs' business practices is subject to future contingency. However, CBM experimentation capabilities offer starting points and support engagement in managing, governing, and structuring CBM experiments. They provide valuable contributions to the theoretical foundations and practical implications of CBM innovation by bridging the "in-between" of incumbents and their lifeworld laboratories for a CE. They endeavor to identify the types of organizational resources required by incumbents to conduct CBM experiments and analyze the initiation of exploratory activities by forward-thinking businesses.

Based on the findings of the two cases investigated, the general framework sees CBM experimentation capabilities as a part of CBM innovation, which, in turn, is also just one part of an organizational transition (Figure 4). It focuses exclusively on the beginning of a possible overall corporate shift towards CE-based value creation logics, which can last for years or even decades. CBM experiments alone are insufficient. In addition, investments into different types of resources and learning new sets of activities necessary to conduct CBM experiments effectively are insufficient. The navigation of firms from a linear-unsustainable system dynamic equilibrium "A" to a circular-sustainable system dynamic equilibrium "B" requires more than an intra-organizational autonomous experimental space that is coupled with the MO setting, to test new game rules for circularity. More research is necessary to understand the novel organizational capabilities that must be developed by companies to innovate CBMs that succeed in mass markets in the long term and pave the way for a CE focused reorganization of the overall firm.

5 | DISCUSSION

Scholars have a strenuous way to go to increase our understanding of how firms can systematically radically transform their value creation patterns to ensure long-term survival while solving major societal challenges. Despite the growing literature on the study of CBM in recent years (e.g., Bocken et al., 2021; Geissdoerfer et al., 2020; Henry et al., 2020; Hofmann, 2019; Lüdeke-Freund et al., 2018), the successful establishment of viable CBM innovations remains elusive. Therefore, this study focuses on the conceptualization of CBM experimentation capabilities at the beginning of a corporate transition towards CE value creation logics, which is often accompanied by organizational conflicts and paradoxes (Hofmann & Jaeger-Erben, 2020).

It is erroneous to assume that every firm will develop the capabilities to find adequate solutions to the ecological wicked problems of the 21st century under the conditions of rapidly changing markets driven by increasing digitalization. In times of "great transformation(s)" (Polanyi, 1944), formerly powerful players and institutions will fail, which are at least the lessons of past eras of human evolution. Some firms will be more capable due to the idealistic will of corporate leaders, the cherishing of sustainability approaches, or other sustainability-driven organizational design characteristics (Bezerra et al., 2020; Hopkinson et al., 2018; Inigo & Albareda, 2019; Parrish, 2010; Roome & Louche, 2016).

The two cases demonstrate that an essential ingredient for CBM innovation lies in organizational ambidexterity. But which organizational coupling modus between the "linear-old" and "circular-new" are the right choice for type of business, considering available resource pools for investment (financial, personnel, etc.)? How should the organizational coupling modus be configured in the short term and in the long run? Is the differentiation of the time horizon important? Should the CIS be loosely or tightly coupled to the MO? Loosely coupled CISs offer a large playing field for creativity, provide a risk-tolerant space that is liberated from the resource allocation and information processing logic of the MO, and keep the MO away from existential failures (Chesbrough, 2010; March, 1991; March & Simon, 1958; O'Connor, 2008; O'Reilly & Tushman, 2008). Additionally, how far should the CIS be "distanced" from the MO to allow the CIS to develop the creative freedom needed to prosper, while guaranteeing the proximity the MO requires to incorporate the body of knowledge, learnings, and experiences for a transition towards circularity? Among others, the physical distance between two systems can be determined as a potential couple parameter. While *washing_together* as an in-house start-up has its own offices, which are segregated from *HomeAppliances* premises, but nevertheless in the same city, *sharing_backpacks* does not have any specially rented or arranged working space, which is, of course, also associated with the differences in the allocation of available resources. Is a physical loose coupling useful, as demonstrated by the *washing_together* case, given that the intent of *washing_together* is to constitute, leverage, and foster intangible assets that should be transmitted and assimilated into *HomeAppliances*? Furthermore, as our data show, both cases rely on tight coupling regarding the strategic alignment of the MO. *Washing_together* and *sharing_backpacks* are considerable puzzle pieces in their MO's strategic CE roadmaps. If the purpose of a CIS is to contribute to corporate renewal by cracking internal path dependencies and opening up new entrepreneurial opportunities, the linkage to the MO must be close and reciprocal but only to the degree that the path dependencies do not affect the CIS. According to Covin and Miles (2003), O'Reilly and Tushman (2008), and O'Connor (2008), tight coupling on strategic alignment can be ensured by communicating and reporting regularly between the top management of the MO and the innovation-system leadership; this was confirmed by our findings.

Spatial distance or strategic alignment are only two organizational coupling parameters out of many that are relevant for the calibration of a suitable government approach, which seeks to gradually abandon the dominant "linear-old" value creation modes of the MO. Further coupling parameters include partner networks, vision and values, incentive systems, resource allocation mode, and performance metrics. A large body of research and a historically grown corpus of academic literature examines different coupling parameters under the umbrella of organizational ambidexterity research (Beckman, 2006; Foss & Stieglitz, 2015; O'Reilly & Tushman, 2008; Rasmussen &

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Foss, 2015; Tushman et al., 2007). However, in the field of sustainable BM and CBM research connected with organizational ambidexterity, large unexplored research territories can be found. Given the obvious uncertainties, financial risks, and organizational paradoxes (Hofmann & Jaeger-Erben, 2020) that emerge with the institution of such lifeworld laboratories, incumbents need long-term reflection and innovation partnerships against the backdrop of transdisciplinary and action-based research approaches (Rüegg-Stürm & Grand, 2016). The co-production of knowledge for circular literacy (Zwiers et al., 2020) through the collaboration of actor groups from academics and businesses encourages mutual learning processes.

As researchers who observed cases from outside the business systems, it was not possible for us to examine the internal dynamics between the MOs and the CISs in real time. Furthermore, data were not collected at different time points. The findings are grounded in the experiences and subjective perceptions that each high-level firm representative and each business sustainability expert gave us about the investigated issues. Consequently, we used individual historically embedded experiential reflections for our data codification, abstraction, and aggregation processes, which allowed us to conceptualize the CBM experimentation capabilities that were developed over time. However, this includes potential recall biases, which refer to the recomposing of interview participants' memories on the basis of subsequent events and experiences (Brassey & Mahtani, 2017; Inigo & Albareda, 2019). We tried to tackle recall biases through data and respondent triangulation, but this limitation must be recognized. Hence, future research investigations should follow the CBM experimentation efforts more closely through longitudinal case studies and ethnographic research designs. In addition, since the academic CBM literature is still only beginning the discovery process, despite the sharp increase in scientific publications in the last 3 years, there is a general demand for quantitative studies that test the findings of past qualitative research projects, such as this study, to broaden theoretical and practically applicable knowledge into approaches that raise the quality of scientific knowledge.

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CONFLICT OF INTEREST

The authors declare no conflict of interest. The founding sponsors had no role in the study design; collection, analyses, or interpretation of data; writing of the manuscript and decision to publish the results.

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ENDNOTES

[1] Based on Lüdeke-Freund et al. (2020), value "is defined as the net benefits perceived by stakeholders from their perspective."

[2] A circular innovation system is a social system that has been initiated by an incumbent to experiment with a CBM. It is founded to establish a CBM from scratch, rather than modify an existing linear oriented business model. Consequently, it represents a radical novelty to the incumbent that results in entirely new value creation processes and value propositions to slow down *and* close material flows.

[3] It must be accentuated that the study uses the data analysis and interpretation mode of the grounded theory to develop starting points for a theory-driven understanding of CBM experiments, which needs to be more empirically tested, specified, and further developed in subsequent research phases. Against the backdrop of the grounded theory, further heterogeneous cases, case groups (e.g., business case studies from different industrial sectors), longitudinal studies, and so on need to be selected and investigated. The theory development process is thus far from finalized.

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APPENDIX A.

Case I				Case II		
Open codes	**1st Order Concepts**	**2nd Order Themes**	**Aggregate dimensions**	**2nd Order Themes**	**1st Order Concepts**	**Open codes**
Conceptions of temporality; Dependencies of current strategic alliances; Internal power structures; IT infrastructure; Overhead cost structure; Product fetishism	Break internal path dependencies	**Rationalities** behind CBM experiments	Raison d'être	**Rationalities** behind CBM experiments	Break internal path dependencies	Dependencies of current strategic alliances; IT infrastructure
Control and ensure the accessibility of its own tangible assets; Long-term customer bonding; Make customers accessible; Make natural resources accessible; Expansion of the value creation activity area (vertical integration)	Controllable accessibility of the future				Controllable accessibility of the future	Expansion of the value creation activity area (vertical integration); Long-term customer bonding
Competitive advantage; Creating a new market; Embedding in evolving digital-based markets; Extension of the product and service portfolio; Fundamentally new value creation modes; Service innovation ecosystem to orchestrate consumer practices; Return on investment (long time horizont); Niche marketing; Shifting ownership as a moment of radical innovation; Strategic differentation	Open up new entrepreneurial opportunities				Open up new entrepreneurial opportunities	Competitive advantage; Creating new markets; Extension of the product and service portfolio; Growth; Return on investment (long time horizont); Niche marketing; Service innovation ecosystem to orchestrate consumer practices
Competitive analyses; Customer analyses; Environmental impact assessment; Market analyses; Observation of legislative changes; Scenario analyses; Trend analyses	Observing and conceiving environmental spheres	**Set of activities** Mainstream-organization	Contextualizing	**Set of activities** Mainstream-organization	Observing and conceiving environmental spheres	Competitive analyses; Customer analyses; Environmental impact assessment; Evaluation of scientific literature; Market analyses; Supply chain analyses; Trend analyses
Anticipate new trends; Combine trends; Digitalization; Digitalization as a means to an end; Digitalization of artefacts; Digitalization of collaborative; consumption; Digitalization of physical spaces; Sharing; Urbanization	Coupling CE with other megatrends				Coupling CE with other megatrends	Anticipate new trends; Climate change; Combine Trends; Digitalization; Mobility; Urbanization
Constructing and elaborating a CE-roadmap; Managing heterogeneity; Institutionalizing CE as a strategic field of corporate development	Strategic CE-roadmapping				Strategic CE-roadmapping	Constructing and elaborating a CE-roadmap; Managing heterogeneity; Institutionalizing CE as a strategic field of corporate development
Business planing based on centralized innovation processes; Customer-centric approach to innovation; Innovation as Bottom-Up-Impulse	CE business modeling				CE business modeling	Business planing based on centralized innovation processes; Clearly structured innovation process; Customer-centric approach to innovation; Evaluation and investment planing; Innovation as Bottom-Up-Impulse; Life Cycle Thinking; Risk assessment; Selection process of products for circular-innovation-system; Sustainability assessment
CE transition as a collective mission; Intrinsic motivation of employees; Convince parts of top management to support the idea	Internal coalition building				Internal coalition building	Convince colleagues (internal stakeholder) to support the idea; CE transition as a collective mission; Convince parts of top management to support the idea; Promoting acceptance of the employees involved in the value creation processes
Committing to a business model configuration; Innovation Council; Idea selection as a challenge	Selecting idea and committing to a CBM configuration				Selecting idea and committing to a CBM configuration	Collective decision-making procedures; Cross-departmental sustainability/ CSR council; Idea selection as a challenge
Former employees of mainstream-organization; Intrinsic motivation; Small team size; Strong emotional bond with mainstream-organization	Assembling a circular-innovation-system founding team				Assembling a circular-innovation-system founding team	Circular-innovation-system project head from business development; Intrinsic motivation and enthusiasm
Experimenting with different CE strategies	Approaching a plurality of CE strategies besides Circular-innovation-system	**Set of activities** Mainstream-organization	Dynamic co-structuring	**Set of activities** Mainstream-organization	Approaching a plurality of CE strategies besides Circular-innovation-system	Experimenting with different CE strategies
CE lobbying for generating competitive advantages; Driving socio-technical transitions	Changing proactively social conditions and rules to push CE in society (Performativity - doing transition)				Changing proactively social conditions and rules to push CE in society (Performativity - doing transition)	CE lobbying for generating competitive advantages; Driving socio-technical transitions; Ecological performativity; Knowledge transfer (performativity); Political commitment as a balancing act (can lead to loss of customers); Political performativity (as a political actor); Societal performativity
Functional organizational structure; Small is beautiful; Structural flexibility	Organizational structuring of the circular-innovation-system	**Set of activities** Circular-innovation-system		**Set of activities** Circular-innovation-system	Organizational structuring of the circular-innovation-system	Small is beautiful; Small team size; Circular-innovation-system is horizontally integrated the mainstream organizational structure (matrix organization); very small scaled
Finding IT solutions; Testing price mechanisms; Establishing and revising recurring value creation processes; Close contact with customers; Communicatively processed reflection of customer opinions and experiences to refine value creation processes and value proposition	Putting the CBM into the world				Putting the CBM into the world	Building an IT infrastructure to automate value creation processes; Establishing and revising recurring value creation processes; Investigating reverse logistics; Locating the right rental stations; Testing price mechanisms; Finding IT solutions
Internal communicative diffusion of the circular-innovation-system	Promoting the circular-innovation-system in Mainstream-organization				Promoting the circular-innovation-system in Mainstream-organization	Internal communicative diffusion of the Circular-innovation-system
Annual legitimization of operative plans; Dialogues at management level Dialogues with finance department; Dialogues with marketing and public relations; Dialogues with environmental department; Direct access to the top management; Feedback and reflection	Communicating regularly with different functional departments of mainstream-organization				Communicating regularly with different functional departments of mainstream-organization	Dialogues at management level; Dialogues with financial accounting; Dialogues with IT department; Dialogues with logistics; Dialogues with marketing and public relations; Dialogues with quality management; Dialogues with repair service department; Dialogues with sales department; Feedback and reflection; Regular communicative exchange with the sustainability council
Provision of financial capital	Financial seed capital	**Tangible resources** From mainstream-organization to circular innovation-system		**Tangible resources** From mainstream-organization to circular innovation-system	Financial seed capital	Cross-subsidization
Access to mainstream-organization products	Physical products				Machines and equipment	Sophistication and utilization of the mainstream-organization's plant and equipment
					Physical products	Access to mainstream-organization products
Physical distance from the headquarter of the mainstream-organization - own offices in the same city	Physical space				Physical space	Local proximity for product storage (warehouse)
Human resources	Personnel	**Intangible resources** From mainstream-organization to circular innovation-system		**Intangible resources** From mainstream-organization to circular innovation-system	Personnel	Human resources
Access to networks and distribution channels	Networks				Networks	Access to networks and distribution channels
Access to know-how	Technological know-how				Technological know-how	Access to know-how
Encouragement and trust from top management	Encouragement and trust				Encouragement and trust	Encouragement and trust from top management
Business case for sustainability; Circular-innovation-system as a credible sustainability promise; Circular-innovation-system is not a CSR project	Legitimacy and identity	**Intangible resource** From circular-innovation-system to mainstream-organization		**Intangible resource** From circular-innovation-system to mainstream-organization	Legitimacy and identity	Business case for sustainability; Circular-innovation-system as a credible sustainability promise; Sensemaking
Experimenting with different CE strategies	Approaching a plurality of CE strategies besides Circular-innovation-system	**Set of activities** Mainstream-organization	Governing intangible assets	**Set of activities** Mainstream-organization	Approaching a plurality of CE strategies besides Circular-innovation-system	Experimenting with different CE strategies
CE lobbying for generating competitive advantages; Driving socio-technical transitions	Changing proactively social conditions and rules to push CE in society (Performativity - doing transition)				Changing proactively social conditions and rules to push CE in society (Performativity - doing transition)	CE lobbying for generating competitive advantages; Driving socio-technical transitions; Ecological performativity; Knowledge transfer (performativity); Political commitment as a balancing act (can lead to loss of customers); Political performativity (as a political actor); Societal performativity
Definition of strategic alignment; Strategic decision-making with long-term implications	Strategic framing of the circular-innovation-system				Strategic framing of the circular-innovation-system	Definition of strategic alignment; Strategic decision-making with long-term implications
Sponsorship and support from top management	Mentoring for the circular-innovation-system founding team				Mentoring for the circular-innovation-system founding team	Regular evaluation and assessment of progress; Sponsorship and support from top management; Steering committee (department heads); Tolerance for failures
B-B-C; Mainstream-organization as customer; Mainstream-organization as Investor; New performance indicator sets; Relief tactics for customers' pain and frustration; User and partner journey	Managing relevant stakeholder expectations	**Set of activities** Circular-innovation-system		**Set of activities** Circular-innovation-system	Managing relevant stakeholder expectations	Communicatively processed reflection of stakeholders (not customers) opinions and experiences; Communicatively processed reflection with experts from science and practice; Creating spaces for communicative exchange and reflection with different stakeholder groups; Demonstrative and concise external sustainability communication; Elaborating of a substantiated sustainability narrative; Labelling; New performance indicator sets; Open knowledge; Sensitizing and educating customer segments; Strategic collaboration with NGO's; Strategic collaboration with social movements; Transparency
Seeking and examining new partnerships; Effective partnering; Networking; Testing new collaborations	Establishing new alliances				Establishing new alliances	Effective partnering; Seeking and examining new partnerships
Close contact with customers; Communicatively processed reflection of customer opinions and experiences to refine value creation processes and value proposition; Testing price mechanisms; Observation of consumption (use) patterns; Data protection and data security; Real-time condition monitoring	Operations management and optimization of value creation processes				Operations management and optimization of value creation processes	Close contact with customers; Communicatively processed reflection of customer opinions and experiences to refine value creation processes and value proposition; Continuous sensing for efficiency improvements; Observation of consumption (use) patterns; Product caring, maintaining, repackaging; Quality control; Testing price mechanisms; Repairing and
Attractiveness; Building customer trust; Carefree; Circular-innovation-system as a brand; Convenient and comfortable sharing; Create community; Delivering experiences for customers; Fear relief; Flexible and direct accessibility; Hygiene; Liberate from affluence; Low switching costs (transaction costs); Make everyday life more predictable; Marginality of ownership; Possession as ballast; Risk of circular washing; Simplicity; Time savings for customers	Brand building				Brand building	Affordable; Attractiveness; Authenticity; Carefree; Circular-innovation-system as a brand; Collaborative consumption; Convenience and comfort; Convey attitude to life; Delivering individual experiences for customers; Fear relief; Flexible and direct accessibility; Hygiene; Liberate from affluence; Marginality of ownership; Money saving; Natural resource conservation; Sharing; Simplicity; Space-saving; Waste of resources
Annual legitimization of operative plans; Dialogues at management level Dialogues with finance department; Dialogues with marketing and public relations; Dialogues with environmental department; Direct access to the top management; Feedback and reflection	Communicating regularly with different functional departments of mainstream-organization				Communicating regularly with different functional departments of mainstream-organization	Dialogues at management level; Dialogues with financial accounting; Dialogues with IT department; Dialogues with logistics; Dialogues with marketing and public relations; Dialogues with quality management; Dialogues with repair service department; Dialogues with sales department; Feedback and reflection; Regular communicative exchange with the sustainability council
Provision of financial capital	Financial seed capital	**Tangible resources** From mainstream-organization to circular innovation-system		**Tangible resources** From mainstream-organization to circular innovation-system	Financial seed capital	Cross-subsidization
Access to mainstream-organization products	Physical products				Machines and equipment	Sophistication and utilization of the Mainstream-organization's plant and equipment
					Physical products	Access to Mainstream-organization products
Physical distance from the headquarter of the mainstream-organization - own offices in the same city	Physical space				Physical space	Local proximity for product storage (warehouse)
Human resources	Personnel	**Intangible resources** From mainstream-organization to circular innovation-system		**Intangible resources** From mainstream-organization to circular innovation-system	Personnel	Human resources
Access to networks and distribution channels	Networks				Networks	Access to networks and distribution channels
Access to know-how	Technological know-how				Technological know-how	Access to know-how
Encouragement and trust from top management	Encouragement and trust				Encouragement and trust	Encouragement and trust from top management
Time to understand new value creation logics	Time				Time	High effort for product care (resource intense); Intrusiond and tedious integration process of the Circular-innovation-system
Close link to Mainstream-organization in external communication	Reputation				Reputation	Close link to Mainstream-organization in external communication
Business case for sustainability; Circular-innovation-system as a credible sustainability promise; Circular-innovation-system is not a CSR project;	Legitimacy and identity	**Intangible resource** From circular-innovation-system to mainstream-organization		**Intangible resource** From circular-innovation-system to mainstream-organization	Legitimacy and identity	Business case for sustainability; Circular-innovation-system as a credible sustainability promise; Sensemaking
Expanded the partnership network (cross-sectoral alliances)	New strategic alliances				New strategic alliances	Expanded the partnership network (also cross-sectoral alliances)
Growth of customer base; Price sensitive user; Sales promotion	New customer segment				New customer segment	Growth of customer base; Price sensitive users; Sales promotion
Customer loyalty; New customer channels	Knowledge about new customer segments				Knowledge about new customer segments	Customer loyalty; New customer channels
Changing cash flow structures; Changing cost structures; Spatially fixed assets	Knowledge about new finance structures				Knowledge about new finance structures	Changing cash flow structures; Changing cost structures
Obtain an understanding of new value creation modes	Knowledge about new value creation modes				Knowledge about new value creation modes	Infrastructure; Obtain an understanding of new value creation modes
Adaptation of product design to CBM (long-term); No adaptation of the product design to CBM (short term); Simplification of product design and functions; Incremental product improvements	Knowledge for future product-service-system development				Knowledge for future product-service-system development	Adaptation of product design to circular-innovation-system (long-term); Durable and robust product design; Incremental product improvements; No adaptation of the product design to Circular-innovation-system (short term); Simplification of product design and functions

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