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**MANAGING THE TRANSITION TOWARD A
CIRCULAR ECONOMY:
THE ROLE OF FIRMS IN REALIZING THE
TRANSFORMATION**

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Abstract

In the light of the continuously worsening climate crisis and society's increasing awareness of the severe negative effects of our current economic system on the planet's natural ecosystem, calls for a transition to a sustainable economic system have been becoming louder. Among the different approaches to realize such a transition, the concept of a circular economy has gained significant attention over the last years among practitioners, policy makers, and academics alike. A circular economy represents a fundamental departure from the prevailing linear 'take-make-waste' economic mode, as it aims to eliminate waste generation and minimize resource consumption by continuously looping materials back into the system.

Realizing a circular economy requires a paradigmatic change in the way we structure and conduct economic activity. Consequently, firms play a central role in achieving this transition. Not only do firms need to adapt their own business activities and find ways to decouple value creation from resource consumption in an economically viable manner, but they also need to collaborate with each other to jointly transform value chains and industries. Given the magnitude of change, this transformation is considerably challenging to realize. On the firm level, pursuing circular economy-oriented innovations can be cumbersome for firms as they create tensions with established organizational structures. Beyond the organization, firms need to define new ways of working together to collaboratively reconceptualize established value chains. Yet, the dynamics and challenges associated with this transformation remain poorly understood. This dissertation aims to contribute to a better understanding of these dynamics, guided by the following research question: *"How do firms engage to transform their own organizations and to collaboratively reshape economic activity within and across industries to realize the transition from a linear to a circular economy?"*

In four academic papers, this dissertation adopts different perspectives to shed light on the management of this transition. Paper I focuses on the individual firm level, adopting the lens of disruptive innovation to analyze the challenges of incumbent firms in driving circular innovations and potential responses to overcome them. Paper III further analyzes the interplay of circular innovation activities and the organizational context across the different phases of the innovation process. In each phase, the paper analyzes organization-level barriers, activities of change agents, and associated changes in the organizational context to provide a deeper understanding of the evolving organizational embedding of circular innovations. Paper II focuses on the collaboration between firms to transform a linear value chain into a circular one. Drawing on the concept of interorganizational sensemaking, the paper analyzes how interdependent stakeholders interact with each other to reach alignment on a common pathway for the circular transition of the value chain. Finally, paper IV analyzes different collaboration formats between firms, by first identifying major archetypes of interfirm collaborations in the circular economy context and then discussing their main characteristics and the dynamics of managing such collaborative endeavors.

Based on these four papers, this dissertation makes several contributions to the literature: Paper I finds that incumbents engaging in circular innovation may face an 'innovator's dilemma', as the circular ideas create tensions with the established organization tailored to the mainstream linear business, which appears economically more attractive in the short run. A

separate organizational structure can facilitate the pursuit of circular innovations, but it requires both a deliberate preparation as well as careful navigation of the relationship between the established linear and the emerging circular business and a reevaluation of existing partnerships and competencies. Paper III contributes to a deeper understanding of the influence of the organizational context on circular innovation activities. The analysis identifies five elements of organizational embedding, revealing how they evolve over time as they are shaped by and also shape the organizational barriers and the activities of change agents. Paper II provides a detailed analysis of the alignment process between firms from one value chain collaborating to transform their industry. The analysis suggests that firms engage on three levels to jointly make sense of the circular economy transition that each provide different reference frames for the sensemaking: organization, value chain, and ecosystem. Engaging on all levels is important to motivate stakeholders to engage with each other, gain a holistic understanding of the topic, and enhance their willingness to compromise. Power dynamics between stakeholders and considerations of identity influence the process but play out differently across these levels. Paper IV finally suggests a typology of interfirm collaborations, outlines typical challenges of each collaboration type, and derives relevant tasks and competencies needed to manage such collaborations.

This dissertation also provides insights for practitioners: To successfully drive circular innovation on the firm level, practitioners need to integrate it into their corporate strategy, scout for ambitious ideas both internally and externally, and create the organizational embedding that caters to the needs of the selected circular ideas. In addition, companies need to reevaluate and potentially reconfigure their core competencies and partnerships to prepare the organization for the long-term transition to a circular economy. To further advance the transition of value chains and industries, practitioners can actively support the formation of circular economy-oriented collaborations between firms by raising awareness of the topic, by supporting the creation of ties between distant stakeholders, and act as facilitator to provide tailored support to the developing collaborations.

Zusammenfassung

Angesichts der sich immer weiter verschärfenden Klimakrise und des zunehmenden gesellschaftlichen Bewusstseins für die gravierenden negativen Auswirkungen unseres derzeitigen Wirtschaftssystems auf das natürliche Ökosystem unseres Planeten werden Forderungen nach einem Übergang zu einem nachhaltigen Wirtschaftssystem immer lauter. Unter den verschiedenen Ansätzen zur Verwirklichung einer solchen Transformation hat das Konzept der Kreislaufwirtschaft in den letzten Jahren große Aufmerksamkeit bei Fachleuten aus der Wirtschaft, politischen Entscheidungsträgern und Forschern erlangt. Eine Kreislaufwirtschaft stellt eine grundlegende Abkehr von der vorherrschenden linearen „take-make-waste“ Wirtschaftsweise dar, da sie darauf abzielt, die Abfallerzeugung und den Ressourcenabbau durch die kontinuierliche Rückführung von Materialien in das System zu minimieren.

Die Verwirklichung einer Kreislaufwirtschaft erfordert einen paradigmatischen Wandel in der Art und Weise, wie wir wirtschaftliche Aktivitäten strukturieren und durchführen. Daher spielen Unternehmen eine zentrale Rolle bei der Gestaltung dieses Wandels. Unternehmen müssen nicht nur ihre eigenen Geschäftsaktivitäten adaptieren und Wege finden, ihre Wertschöpfung auf wirtschaftlich tragfähige Weise vom Ressourcenverbrauch zu entkoppeln, sondern sie müssen auch zusammenarbeiten, um gemeinsam Wertschöpfungsketten und Branchen zu transformieren.

Angesichts ihres Ausmaßes ist die Gestaltung dieser Transformation eine große Herausforderung. Auf der Unternehmensebene kann die Umsetzung kreislaufwirtschaftsorientierter Innovationen mühsam sein, da sie oft zu Spannungen mit etablierten Organisationsstrukturen führen. In der Zusammenarbeit zwischen Unternehmen müssen wirtschaftlichen Akteure neue gemeinsame Wege definieren, um etablierte Wertschöpfungsketten und Materialströme gemeinsam neu zu konzipieren. Dennoch sind die mit dieser Transformation verbundenen Dynamiken und Herausforderungen nach wie vor kaum verstanden. Ziel dieser Dissertation ist es, zu einem besseren Verständnis dieser beizutragen, geleitet von der folgenden Forschungsfrage: *„Wie engagieren sich Unternehmen, um ihre eigenen Organisationen zu transformieren und Wirtschaftsprozesse innerhalb und zwischen Industrien gemeinsam umzugestalten, um den Übergang von einer linearen zu einer zirkulären Wirtschaft zu realisieren?“*

In vier wissenschaftlichen Arbeiten nutzt diese Dissertation unterschiedliche Perspektiven, um Erkenntnisse für die Bewältigung dieses Übergangs zu entwickeln. Papier I konzentriert sich auf die Unternehmensebene und analysiert die Herausforderungen etablierter Unternehmen bei der Umsetzung zirkulärer Innovationen in Analogie zum Konzept der disruptiven Innovation. Papier III analysiert das Zusammenspiel zwischen den zirkulären Innovationsaktivitäten und dem organisatorischen Kontext in den verschiedenen Phasen des Innovationsprozesses. In jeder Phase analysiert das Papier Hindernisse auf Organisationsebene, Aktivitäten von Change Agents und damit verbundene Veränderungen im Organisationskontext, um ein tieferes Verständnis der sich entwickelnden organisatorischen Einbettung zirkulärer Innovationen zu erlangen. Paper II konzentriert sich auf die Zusammenarbeit zwischen Unternehmen, um eine lineare Wertschöpfungskette in eine

zirkuläre umzuwandeln. Basierend auf dem Konzept des interorganisationalen Sensemaking (Sinnstiftung) analysiert der Artikel, wie voneinander abhängige Unternehmen miteinander interagieren, um eine gemeinsame Orientierung und Ausrichtung für den Übergang zu einer zirkulären Wertschöpfungskette zu erreichen. Papier IV fokussiert auf unterschiedliche Arten der Zusammenarbeit zwischen Unternehmen, indem zunächst die wichtigsten Archetypen der zwischenbetrieblichen Zusammenarbeit im Kontext der Kreislaufwirtschaft identifiziert und dann ihre Hauptmerkmale und Herausforderungen erörtert werden.

Auf der Grundlage dieser vier Arbeiten leistet diese Dissertation mehrere Beiträge zur Literatur: Artikel I zeigt auf, dass etablierte Unternehmen, die sich mit zirkulären Innovationen befassen, vor einem „Innovator’s Dilemma“ stehen, da die zirkulären Ideen zu Spannungen mit der auf das lineare Kerngeschäft zugeschnittene Organisation führen, welches kurzfristig wirtschaftlich attraktiver als der neue zirkuläre Ansatz erscheint. Eine separate Organisationsstruktur kann die Entwicklung zirkulärer Innovationen erleichtern, erfordert jedoch sowohl eine bewusste Vorbereitung als auch eine sorgfältige Steuerung der Beziehung zwischen dem etablierten linearen und dem entstehenden zirkulären Geschäft sowie eine Neubewertung bestehender Partnerschaften und Kompetenzen. Papier III trägt zu einem tieferen Verständnis des Einflusses des organisatorischen Kontextes auf die zirkulären Innovationsaktivitäten bei. Die Analyse identifiziert fünf Elemente der organisatorischen Einbettung und zeigt, wie das Zusammenspiel der organisatorischen Barrieren und der Aktivitäten der Change Agents die Ausprägungen dieser Elemente im Laufe der Zeit verändert. Die detaillierte Analyse des Kollaborationsprozesses zwischen Unternehmen aus einer Wertschöpfungskette in Papier II legt nahe, dass Unternehmen auf drei Ebenen miteinander interagieren, um ein gemeinsames Verständnis des Übergangs zur Kreislaufwirtschaft zu entwickeln, wobei jede Ebene einen unterschiedlichen Bezugsrahmen bietet: Organisation, Wertschöpfungskette und Ökosystem. Ein gemeinsames Engagement auf allen Ebenen ist wichtig, um Stakeholder zu motivieren, sich in einem kollaborativen Prozess zu engagieren, ein ganzheitliches Verständnis des Themas zu erlangen und ihre Kompromissbereitschaft zu erhöhen. Machtdynamiken zwischen Stakeholdern und Reflexionen über die Identität der eigenen Organisation und der Industrie beeinflussen den Prozess, wirken sich jedoch auf diesen Ebenen unterschiedlich aus. Papier IV schlägt eine Typologie der zwischenbetrieblichen Zusammenarbeit vor, skizziert typische Herausforderungen jedes Kooperationstyps und leitet relevante Aufgaben und Kompetenzen ab, die zur Realisierung solcher Kooperationen erforderlich sind.

Diese Dissertation liefert auch Erkenntnisse für die Praxis: Um zirkuläre Innovationen auf Unternehmensebene erfolgreich voranzutreiben, ist es wichtig, diese in die Unternehmensstrategie zu integrieren, aktiv sowohl intern als auch extern nach vielversprechenden Ansätzen Ausschau zu halten und die organisatorische Einbettung so zu gestalten, dass sie den Bedürfnissen der ausgewählten Ansätze entspricht. Auch kann eine Neubewertung und Rekonfiguration der Kernkompetenzen und der Partnerschaften helfen, die Organisation auf den langfristigen Übergang zu einer Kreislaufwirtschaft vorzubereiten. Um den Wandel von Wertschöpfungsketten und Industrien weiter voranzutreiben, können Praktiker die Bildung kreislaufwirtschaftsorientierter Kooperationen zwischen Unternehmen aktiv unterstützen, indem sie das Bewusstsein für das Thema schärfen, neue Verbindungen zwischen

entfernten Akteuren schaffen und maßgeschneiderte Unterstützung für den sich entwickelnden Kooperationsstyp anbieten.

Acronyms

B2B	Business-to-Business
B2C	Business-to-Consumer
BDI CEI	Bundesverband der Deutschen Industrie – Circular Economy Initiative
C2C	Cradle-to-Cradle
CE	Circular Economy
CEFLEX	Circular Economy for Flexible Packaging
CEWI	Circular Economy als Innovationstreiber für eine klimaneutrale und ressourceneffiziente Wirtschaft
DIN	Deutsches Institut für Normung
EU	European Union
EUREFAS	European Refurbishment Association
IP	Intellectual Property
IS	Industrial Symbiosis
PACE	Platform for Accelerating the Circular Economy
R&D	Research and Development
VAT	Value-Added Tax
VCG	Value Chain Group
WEF	World Economic Forum
WWF	Worldwide Fund for Nature

1. Introduction

1.1. The Circular Economy and the Role of Firms

In the light of the continuously worsening climate crisis, awareness grows for the severe negative effects of our current economic system on the natural ecosystem of our planet. The current economic system is increasingly criticized for leading to an over-exploitation of material resources, accelerating global warming, and destroying our natural environment (IPCC, 2023; Meadows et al., 2004; Rockström et al., 2009; Stahel, 2016). Consequently, calls for a transition towards a sustainable economic system are becoming louder.

Among different approaches to realize this transition, the concept of a circular economy has gained significant attention over the last years among practitioners, policy makers, and academics alike (European Commission, 2015; Geissdoerfer et al., 2017; Ghisellini et al., 2016). A circular economy is regarded as a fundamental departure from the prevailing linear ‘take-make-waste’ economic model as it seeks to maintain the natural resource base of the planet by eliminating waste generation, minimizing material consumption, and continuously looping them back into the economic system (Ghisellini et al., 2016; Korhonen et al., 2018). A circular economy can be defined as “an industrial system that is restorative or regenerative by intention and design. It replaces the ‘end-of-life’ concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models” (Ellen MacArthur Foundation, 2015, p. 7).

Establishing a circular economy requires a paradigmatic change to the way we structure and conduct economic activity. Consequently, firms play a pivotal role in realizing this transition as they must holistically transform their way of doing business. Not only do firms need to adapt their own business activities and find ways to decouple value creation from resource consumption in an economically viable manner, but, as the associated changes transcend their individual organizations, they also need to collaborate with each other to jointly transform material flows across value chains and industries (Brown et al., 2021; Parida et al., 2019; Ruggieri et al., 2016; Suchek et al., 2021).

Many researchers and practitioners suggest that this fundamental transformation can not only bring about environmental benefits but may also provide economic advantages to the firms embracing it. In their view, adopting circular practices can not only decrease risks such as input price volatility, resource and supply chain dependency and costs but may also constitute a source of innovation and sustainable growth in the long run. Hence, a circular economy is often laid out to be an attractive proposition for firms (Ellen MacArthur Foundation, 2015; Lacy et al., 2020).

However, despite the increasing attention for the circular economy concept in the business realm, the widespread uptake is still low, suggesting that transforming economic activities according to circular principles may be challenging to realize (Geissdoerfer et al., 2017; Ghisellini et al., 2016; Henry et al., 2020). As the dynamics associated with this transformation on a firm and interfirm level remain poorly understood, researchers have recently started to focus on the managerial challenges of the transition to a circular economy.

1.2. Intrafirm and Interfirm Dynamics in the Transition Toward a Circular Economy

For the transition from linear to circular, firms need find viable ways to decouple value creation from resource consumption; that is, they need to engage in circular innovation (Bocken et al., 2016; Suchek et al., 2021). Yet, engaging in circular innovation can be cumbersome especially for incumbents, as the innovation activities may create tensions with the established organization (Kirchherr et al., 2018; Vanner et al., 2014). These tensions tempt established players to only make incremental improvements to existing products or processes which may reap efficiency gains but fall short of the fundamental changes needed. Thus, to realize ambitious circular innovations, fundamental changes to the organization itself may be required. Recent research has started analyzing the organizational context of incumbents' circular innovation endeavors, for example by differentiating organization-level drivers and barriers and identifying organization design elements playing a role in the transition (Bocken & Geradts, 2020; Centobelli et al., 2020; Eikelenboom & de Jong, 2022; Guldmann & Huulgaard, 2020; Hofmann & Jaeger-Erben, 2020). However, these studies provide only a static view of selected important organizational aspects and do not shed light on how the influence of these aspects may change over time depending on the development stage of the circular innovation endeavors. Furthermore, little is known as to how firms may address and overcome organization-level barriers and adapt their organization to successfully realize circular innovations. This thesis aims to contribute to filling the outlined gap by analyzing the innovation process and organizational context of the firm-level transition up close.

The transformative process on the firm-level is crucial for the circular transition, but individual firms cannot transform the economy on their own. To alter resource uses and flows, material flows across the industry have to be reconfigured, affecting the way firms do business and collaborate with each other. Thus, stakeholders need to engage with their partners, define new ways of working together and collaboratively reconceptualize established value chains. Given the initial stages of the transition, significant uncertainty as to its actual operationalization prevails and hence, a concrete systemic vision, future industry structure and viable transition pathways are still missing (Bocken & Geradts, 2020; Centobelli et al., 2020). Hence, economic actors need to develop a joint understanding of the change and importantly, align on a common way forward while reconciling tensions between potentially diverging views and interests (Eikelenboom & de Jong, 2022; Parida et al., 2019; Tapaninaho & Heikkinen, 2022). Furthermore, the circular economy transition may also require new collaborations between previously distant actors. Thus, firms need to develop new collaborations not only within, but also across industries to jointly develop potential alternatives to the established linear activities and implement them. Yet, in practice, there are still only few ambitious examples of such collaborations. By analyzing the engagement of firms to collaboratively reshape economic activity within and across industries from linear to circular, this dissertation also aims to contribute to a better understanding of the dynamics of interfirm collaborations in different constellations and support their realization in practice.

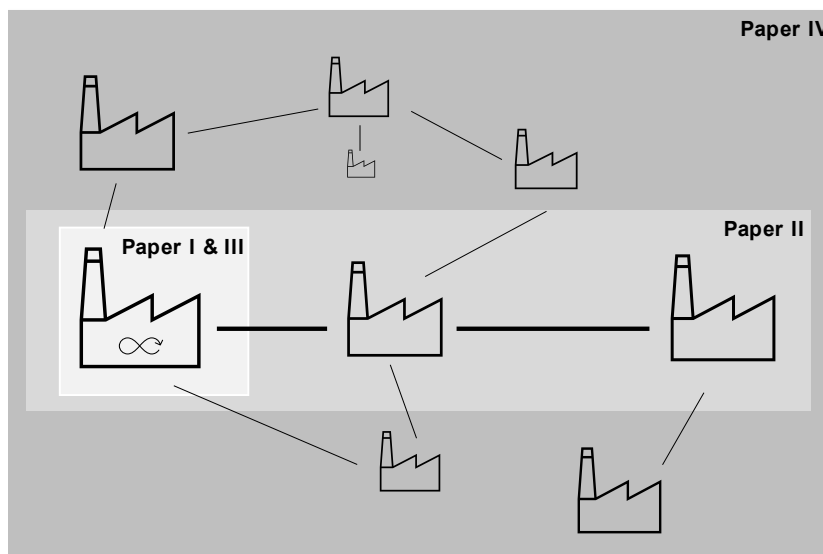
1.3. Research Question and Framework

As outlined above, this thesis focuses on the transition to a circular economy on the firm and interfirm level. The guiding research questions reads as follows:

“How do firms engage to transform their own organizations and to collaboratively reshape economic activity within and across industries to realize the transition from a linear to a circular economy?”

In four papers, this dissertation adopts different conceptual perspectives to contribute to answering this question. Figure 1-1 provides an overview of the research framework underlying this dissertation and the focus of the four papers.

Figure 1-1 Research framework



Papers I & III focus on the individual firm to provide insights into the challenges of the transformation on the organizational level and how firms may realize this transformation. Expanding from this firm-level perspective, paper II and IV focus on the dynamics of collaborations between firms in the context of the circular economy transition. Paper II focuses on the value chain level and analyzes the collaborative endeavors among firms who seek to collaborate to reconceptualize and reorganize these resource flows within one industry. But change is not only required within, but also across industries, opening up the opportunity for various kinds of collaboration of firms across industries. Paper IV therefore takes a broader perspective on collaborations between firms within and across industries.

The remainder of this dissertation is structured as follows. Chapter 2 provides the theoretical background for the research conducted. Chapter 3 presents the research objectives for the dissertation and the four papers that form part of it, while Chapter 4 outlines the methods and data used. Chapter 5 provides an overview of the individual papers and the contributions of the doctoral candidate and the co-authors for each paper. Chapter 6 summarizes the key results from each article. Chapter 7 outlines the contributions to research and implications for practitioners. In chapter 8 to 11, the original papers can be found.

2. Theoretical Background

This chapter provides further detail on the theoretical underpinnings and lenses used for the four research projects comprised in this dissertation. While chapter 2.1 provides an overview of academic discussion on managerial considerations of transition on the firm level, chapter 2.2 introduces the theoretical background for the analysis of interfirm collaborations in the circular economy.

2.1. Realizing the Circular Economy Transition on the Firm Level

For the transition to a circular economy, individual firms need to transform their current business activities according to circular principles. Numerous approaches exist to do so, ranging from reducing material input for production, extending the useful life span of products, to looping back products after the use phase to refurbish and repair them or to recover and recycle materials to reuse them in the manufacturing of new products (Bocken et al., 2016). To find such novel approaches, firms need to develop new technologies, products, services, and importantly, business models to develop and implement new circular practices—that is, they need to engage in circular innovation (Bocken et al., 2016; Geissdoerfer et al., 2017; Pieroni et al., 2019).

Recent years have seen a steep increase in academic discourse over ways to reduce, reuse and recirculate resource flows (Centobelli et al., 2020; Pieroni et al., 2019). The majority of studies has focused on proposing business models, manuals, and frameworks to outline potential ways to close material loops (Bertassini, Ometto, et al., 2021). While this research has provided valuable insights, it does not explicitly consider the organizational context of the firm seeking to implement the new activities and thus do not provide guidance for how to manage the implementation of these novel approaches (Baldassarre et al., 2020; Bocken & Geradts, 2020). Therefore, potential interconnections between the circular innovation process and the organizational context of firms have remained underexplored (Hofmann & Jaeger-Erben, 2020). In addition, studies on circular business models have primarily focused on the initial idea generation, while later phases of the innovation process, including actual implementation and scale, received less attention (Pieroni et al., 2019). This limits the evaluation of any potential interplay between innovation activities and the organizational context to the beginning of the process. Challenges in the actual realization remain underexplored.

This lack of consideration of potential resonances between the innovation activities and the organizational context is problematic as studies focusing on barriers to the circular economy increasingly point to a range of organization-level obstacles that stand in the way of realizing a circular transformation of business activities on the firm level, corroborating the crucial role the organizational context plays (Bocken & Geradts, 2020; Guldmann & Huulgaard, 2020; Kirchherr et al., 2018). Consequently, researchers have called for studies explicitly analyzing the organizational context of circular innovation activities (Bertassini, Ometto, et al., 2021; Sehnem et al., 2021). Recent studies have suggested that organizational aspects such as organization design elements and capabilities indeed resonate with the circular innovation activities of incumbents (Bocken & Geradts, 2020; Centobelli et al., 2020; Eikelenboom & de Jong, 2022; Hofmann & Jaeger-Erben, 2020). However, as these studies so far provide mainly

a static view of selected organizational aspects, they do not provide insights as to whether the influence and relevance of such aspects may change over time depending on the development phase of the innovation, and how firms may address and overcome the associated challenges and ultimately adapt their organization to successfully realize circular innovations. By analyzing the circular innovation process of incumbents in the context of the organizational environment, this dissertation aims to address this research gap and provide useful implications for practitioners.

2.2. Realizing the Transition in Collaborations between Firms

While the previous chapter has underlined the importance of individuals firms embracing the circular transition, individual actors cannot realize the changes required for the transition alone. Industry and value chain configurations may significantly change when firms shift to recycled materials, when products are leased rather than sold, when products are repaired or go into remanufacturing, and when materials are consequently collected, recycled, and looped back into the economy (Geissdoerfer et al., 2017; Ghisellini et al., 2016; Hopkinson et al., 2018). Therefore, firms need to engage in collaborations to restructure the economic activity of their industries according to circular principles (Brown et al., 2021; Parida et al., 2019). Yet, realizing such concerted activity can be difficult.

To collectively transform industries, interdependent actors need a shared vision of a circular value chain and the way to realize it. Yet, as a collective understanding of the circular economy concept is still missing, actors may have very different views on the ultimate goal and the required changes to achieve it (Eikelenboom & de Jong, 2022; Moraga et al., 2019). In addition, the perspectives of the individual actors are often limited to their own step in the value chain, which makes it difficult for them to fully understand and evaluate the potential ways to achieve circularity and the associated changes from the production of materials to their recycling, as these often span a large set of economic activities realized by many different firms (Bertassini, Zanon, et al., 2021; Brown et al., 2021). Thus, firms need to actively engage with each other to jointly make sense of the transition to a circular economy for their industry and understand its implications for their organizations. Furthermore, given the prevailing interdependencies along the value chain, it is essential for firms to collaborate with each other to align on a pathway to realize the required changes. This can prove difficult as individual firms may face conflicts of interest between the collaborative goals and their individual linear business (Eikelenboom & de Jong, 2022). Therefore, realizing concerted action to collectively transform value chains require significant efforts to reconcile diverging perspectives and interests between different stakeholders.

Furthermore, new collaborations between firms develop not only within, but also across industries. Given the breadth of change required to realize the economic transition from linear to circular, different types of collaborations are needed among economic actors (Köhler et al., 2022; Parida et al., 2019). Initiating such collaborations can be cumbersome for firms as it requires them to assess with whom to collaborate for which purpose and create the specific ties needed as such partnerships often require collaborating with previously distant actors. At the same time the economic returns are often rather uncertain, making the necessary efforts unattractive (Frishammar & Parida, 2019a; Kortmann & Piller, 2016; Zaoual & Lecocq, 2018).

Yet, while researchers frequently underline the importance of interfirm collaboration (e.g., Bertassini, Zanon, et al., 2021; Bocken & Geradts, 2020), the different types of collaborations and the interorganizational dynamics of realizing concerted action to advance the transition to a circular economy remain underexplored.

By analyzing the engagement of firms to collaboratively reshape economic activity within and across industries to transform the economy from linear to circular, this dissertation also aims to contribute to a better understanding of the dynamics of interfirm collaborations and aid their realization in practice.

3. Research Objectives

As motivated during the introduction, this thesis focuses on the role of firms in the transition to the circular economy, and more specifically, how they can transform themselves and work together to transform the economic system according to circular principles. The overall research question of this dissertation reads *“How do firms engage to transform their own organizations and to collaboratively reshape economic activity within and across industries to realize the transition from a linear to a circular economy?”*

In four papers, this dissertation adopts different conceptual perspectives to contribute to answering this question. Table 3-1 summarizes the research questions, focus, and objectives of the papers.

Table 3-1 Overview of research questions, focus and objectives of paper I - IV

Paper	Research Question	Focus	Objective
I	How do established firms approach potentially disruptive circular innovations?	Single firm	Understand how established firms can pursue circular innovations that create tensions with the existing organization
II	How do stakeholders from one value chain develop a joint understanding of the transition toward a circular economy and align on a common way forward?	Collaboration of firms along value chains	Gain insight into the social dynamics emerging between firms along value chains as they work to align on a common pathway for the transformation of the value chain
III	How do incumbent organizations drive circular innovation internally and adapt the organizational context to provide a favorable embedding?	Single firm	Understand how the organizational context of established firms shapes and is shaped by the activities change agents pursue to overcome internal barriers and develop and implement circular innovations
IV	What types of interfirm collaborations can advance the CE transition, and how should they be managed?	Collaboration of firms within and across industries	Provide clarity on different types of collaboration formats between firms in the circular economy context, their characteristics and challenges and develop recommendations for their management

Papers I & III focus on the transformation on the firm level.

Paper I sheds light on the process of driving circular innovation within established firms. As set forth in chapter 2.1, incumbents face considerable challenges when trying to scout for, explore and implement ambitious circular solutions as they seem to create tensions with the existing organization. To gain a greater understanding of these challenges and to provide potential ways to overcome them, the paper adopts the conceptual lens of disruptive innovation. The disruptive innovation concept seeks to explain why incumbents face difficulties when realizing innovations that represent a fundamental departure from the established business, and outlines suggestion for addressing them (Christensen, 2013; Christensen et al., 2015). The paper

analyzes the circular innovation activities of selected incumbents through this lens and provides insights as to how firms can successfully overcome the “innovator’s dilemma” (Christensen, 2013) in a circular economy.

Paper III sheds further light on the interplay between the circular innovation activities and the organizational context, albeit from a different perspective. The paper analyzes the process of circular innovation as it unfolds within the organizational context of incumbents up close. Inspired by the concept of management innovation (Birkinshaw et al., 2008) and with a particular focus on the role of internal change agents (Caldwell, 2003; Howell & Higgins, 1990), a structured analysis of the circular innovation process from initial motivation to invention, implementation, and institutionalization is performed. Within each phase, the paper examines the organization-level barriers encountered, the activities of change agents to overcome these barriers, and the resulting changes in the organizational context. This interplay is analyzed in depth across all phases to provide a deeper understanding of the organizational embedding as it shapes and is shaped by the evolving circular innovation process.

Expanding from the single firm perspective, papers II & IV focus on the collaboration between firms in the circular economy context.

Paper II focuses on the collaboration between firms along a particular value chain. Drawing on the concept of interorganizational sensemaking (Seidl & Werle, 2018; Weick, 1995) the paper develops insights on the alignment process of firms from one industry collaborating to deal with the transition of their value chain toward a circular economy. Based on an in-depth case study of a European consortium of more than 150 companies from the flexible packaging value chain, the paper analyzes how industry stakeholders interact with each other to make sense of this paradigmatic change, work together to develop a common understanding of potential responses and align on a common way forward. Thus, the goal of the study is to provide insights into the dynamics of the process of transforming a largely linear value chain into a circular one and how an alignment between interdependent economic actors with diverging interests can be reached.

Paper IV also focuses on interfirm collaboration, but further expands the perspective to different types of collaborations between firms within and across industries. This practitioner-oriented paper seeks to provide greater clarity on different types of interfirm collaborations needed to realize the transition to a circular economy. Drawing on extensive practitioner exchanges, practical experience, and relevant literature, the paper identifies major archetypes of interfirm collaborations in the circular economy context. and dissects differences in purpose and features between them. The paper investigates the main challenges of each of the collaboration type and provides recommendations for managing such collaborations. With the typology and practical recommendations, paper IV specifically targets practitioners seeking to successfully engage in facilitating collaboration between firms to advance the transition to the circular economy.

4. Methods and Data

4.1. Methods

Given the exploratory character of the outlined research questions and objectives, qualitative research is particularly suitable to address them. In particular, case studies are used for papers I and III and an engaged scholarship approach is followed in paper II. Article IV draws on extensive exchanges with practitioners, practical experience, desk research, and relevant literature.

Case Studies

Paper I and III adopt a case study methodology to address their respective research question. Case studies are particularly useful for generating an in-depth understanding of empirical phenomena for which little theory exists and thus allows to explore answers to “how” and “why” questions (Eisenhardt, 1989; Yin, 2009). Thus, case studies are a means to develop new hypotheses, models, and theories to advance inductive theory building in new research fields. Case studies typically rely on a variety of data sources that are collected through different means to gather diverse insights on the phenomena to be studied and allow for triangulation to substantiate the findings (Eisenhardt, 1989). While single cases can provide a rich exploration and analysis of a particular phenomenon, multiple-case studies combine insights from different observations and allow for cross-case comparisons. Thus, they can provide a stronger base for theory building backed by a wider range of empirical evidence (Eisenhardt & Graebner, 2007; Yin, 2009). In this dissertation, purposive sampling was used to select a diverse set of cases rich in information.

Engaged Scholarship

The engaged scholarship approach used in paper II is a participative form of research that allows researchers to gain deep insights into complex social processes (Van de Ven, 2007). More specifically, the insights are built from engaging in action research, which refers to “researchers working with members of an organization over a matter which is of genuine concern to them and in which there is an intent by the organizational members to take action based on the intervention” (Eden & Huxham, 1996, p. 527). Through this collaborative approach, action research can produce both practical knowledge and valuable insights to advance theorization (Eden & Huxham, 1996; Reason & Breadbury, 2001). During the research, the authors actively engaged with the stakeholders of an industry consortium and facilitated workshops with them. This approach provided the opportunity to collect personal observations of the dynamics of the social process that unfolded between the stakeholders and gather unique insights to theory building.

4.2. Data

Primary and secondary data was used in the research underlying the dissertation. Primary data was collected through semi-structured interviews and through practitioner workshops, as detailed below. Secondary data was used to complement the original data and consisted of public information of organizations’ internet presences, press releases, publications, along with

news articles, conference speeches, and presentations, as well as internal documents from the firms and the industry association shared with the authors during research.

Interview Data

Semi-structured practitioner interviews were conducted as the main source of primary data for paper I and III, and as complementary data source for paper II. Conducting practitioner interviews can be especially helpful for gaining a detailed understanding and practical knowledge in exploratory research (Yin, 2009). Given the limited understanding and available data of the social processes of the management of the transition toward a circular economy which are studied in this dissertation, such open-ended interviews were chosen with the objective to provide novel insights and aid theory building.

Between 2019 and 2021, eight semi-structured interviews were conducted for paper I, 15 interviews for paper II, and 15 interviews for paper III, either in person or via phone or a videoconferencing tool. The interviews were recorded, transcribed, and subsequently coded and analyzed with the MAXQDA analysis software.

Two authors jointly conducted all interviews to capture the breadth of insights and to avoid bias and increase confidence in the results by building hypotheses on converging observations from multiple investigators (Eisenhardt, 1989). To strengthen the robustness of the findings from the interviews, secondary data and in the case of paper II personal observations from the practitioner workshops were used to triangulate the findings from the interviews.

Data Collected through Engaged Scholarship

The main data for paper III was gathered during two 2-day workshops with 25 stakeholders of the industry association prepared and actively facilitated by the authors. All workshop sessions were recorded, transcribed, and coded in MAXQDA.

Akin to an insider-outsider approach, the research team upheld a division of roles and responsibilities during data collection and analysis (Gioia et al., 2010; Louis & Bartunek, 1992). In the data collection process, four external facilitators in addition to the author team provided valuable personal observations from the workshops but did not participate in the analysis or interpretation of the data. Within the authors' team, two authors actively facilitated the workshops and engaged with the stakeholders, while the third author primarily observed the process. In the data analysis, one author became deeply immersed in the primary data and developed preliminary insights, while the other two authors supported the theorizing and development research contributions on a more abstract level. Finally, the author team discussed the results, theoretical insights, and practical implications with the external facilitators to validate the collective insights.

5. Overview of Articles

This chapter provides an overview of the four papers and outlines the contribution of the doctoral candidate Marianne Kuhlmann for each of them. Table 5-1 details the academic articles including their title, the authors involved in their preparation, and the journals they have been published in, submitted to, or are planned to be submitted to.

Table 5-1 Overview of papers I-IV included in this dissertation

Paper	Title	Authors	Journal	Status
I	How Incumbents Realize Disruptive Circular Innovation - Overcoming the Innovator's Dilemma for a Circular Economy	Kuhlmann, M. Bening, C.R. Hoffmann, V. H.	Business Strategy and the Environment	Published
II	Interorganizational Sensemaking of the Transition Toward a Circular Value Chain	Kuhlmann, M. Meuer, J. Bening, C.R.	Organization & Environment	Published
III	Driving the Circular Economy Transformation: How Incumbents embed Circular Innovations in their Organizations	Kuhlmann, M. Meuer, J. Hoffmann, V. H.	Long Range Planning	Submitted / under review
IV	Collaborating for the Circular Economy - A Typology of Interfirm Collaborations and Recommendations for Managing them Effectively	Kuhlmann, M. Bening, C.R. Meuer, J.	California Management Review	Working paper

Chapters 1 to 7 of this dissertation were solely authored by the doctoral candidate, Marianne Kuhlmann.

Paper I presented in chapter 8 was authored by Marianne Kuhlmann (MK), Catharina R. Bening (CB) and Volker H. Hoffmann (VH). CB, VH, and MK conceptualized the idea for the paper. MK performed the literature review. MK and CB conducted the interviews, MK led the data analysis and prepared the original paper draft. VH and CB provided supervision and contributed to reviewing and editing the draft. CB acquired funding.

Paper II presented in chapter 9 was authored by MK, Johannes Meuer (JM), and CB. MK, JM, and CB conceptualized the paper. MK conducted the literature review and together with CB and JM developed the concept for the action research workshops used for data collection. CB, JM, and MK conducted the data gathering. MK analyzed the data and developed the original paper draft. The draft was reviewed and edited by CB and JM. CB acquired funding.

Paper III presented in chapter 10 was authored by MK, JM and VH. JM, VH and MK conceptualized the paper. MK conducted the literature review. MK and JM conducted 13 of the

interviews, MK and VH conducted two interviews. MK analyzed the data and developed the original paper draft. VH and JM reviewed and edited the draft and provided general supervision.

Paper IV presented in chapter 11 was authored by MK, CB and JM. MK, JM, and CB developed the idea for the paper. MK developed the concept, conducted a practical assessments and literature review, and developed the original paper draft. JM and CB contributed to reviewing and editing the draft.

MK led the submission process of papers I-III. All co-authors supported the revision of the paper and ensured the holistic incorporation of the reviewers' remarks.

6. Summary of Results

This chapter summarizes the key findings of papers I to IV that are part of this dissertation. In the following four sections, the most important results of each of the papers are discussed. For a more detailed description of the findings, the reader can consult the original papers included in this dissertation in chapters 8 to 11. The implications of the results for the literature and practitioners are discussed in chapter 7.

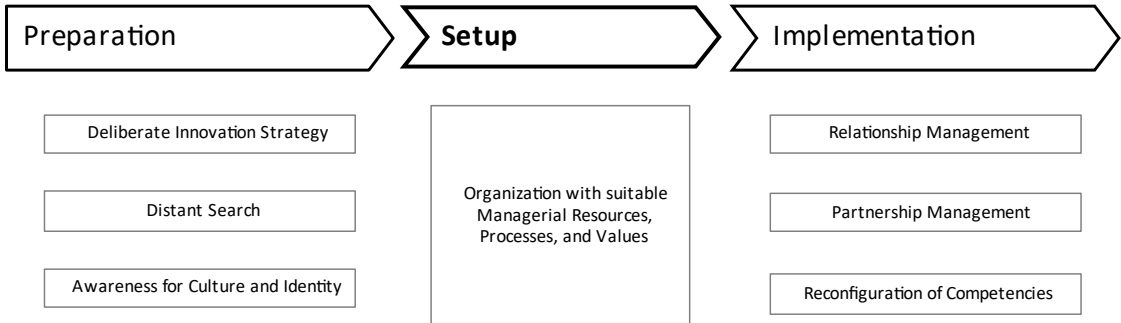
6.1. Paper I: How Incumbents Realize Disruptive Circular Innovation - Overcoming the Innovator’s Dilemma for a Circular Economy

This paper focuses on the transition to a circular economy on the level of the individual firm and sets out to provide a deeper understanding on the challenges of realizing such a circular transition and potential ways to overcome them by analyzing the circular innovation process of two incumbents through the lens of disruptive innovation.

The analysis indicates that the challenges incumbents face in the circular transition can indeed be considered akin to the “innovator’s dilemma” described by Christensen (2013). In the cases studied, firms perceived changes in their market environment connected to the circular economy transition but felt unable to respond to them within their core business as all activities were focusing on fulfilling the needs of the existing clientele with the linear offering that was considered financially more attractive than exploring the uncertain circular innovations. Additionally, the firms found it difficult to explore alternative business opportunities as their existing processes, structures and capabilities were not fit to do so. In this situation, a structural separation of the circular innovation activities from the core linear ones aided the innovation process, in line with suggestions of the disruptive innovation literature.

Importantly, the analysis further extends this notion and shows that the successful pursuit of the circular innovation was not only the outcome of a deliberate structural setup, but also of a lengthy preparatory process and a purposefully planned implementation. Figure 6-1 summarizes the key aspects of the response.

Figure 6-1 Circular Innovation Process Framework



During the preparation phase of the innovation, three main aspects played a role: First, formulating a deliberate innovation strategy provided firms with a structural base and process to engage in market trend analysis and scouting for potential new ideas. Second, engaging in

deliberate search for distant solutions independent from the linear core business raised the awareness of managers for potential ideas beyond incremental improvements of existing solutions. Third, an anticipatory consideration of potential tensions with the established company culture helped pave the way to break down cultural barriers from the outset of the innovative endeavor.

For the actual setup of the innovation activities, the incumbents actively designed a structural solution that would provide a conducive setup to the novel endeavor. The structural separation allowed them to establish processes tailored to the circular innovation rather than the linear business activity, facilitate the involvement of managerial talent with the skills needed for the circular activities, and establish organizational values that set priorities around profitability, risk and scale focused on emerging innovations rather than the established business.

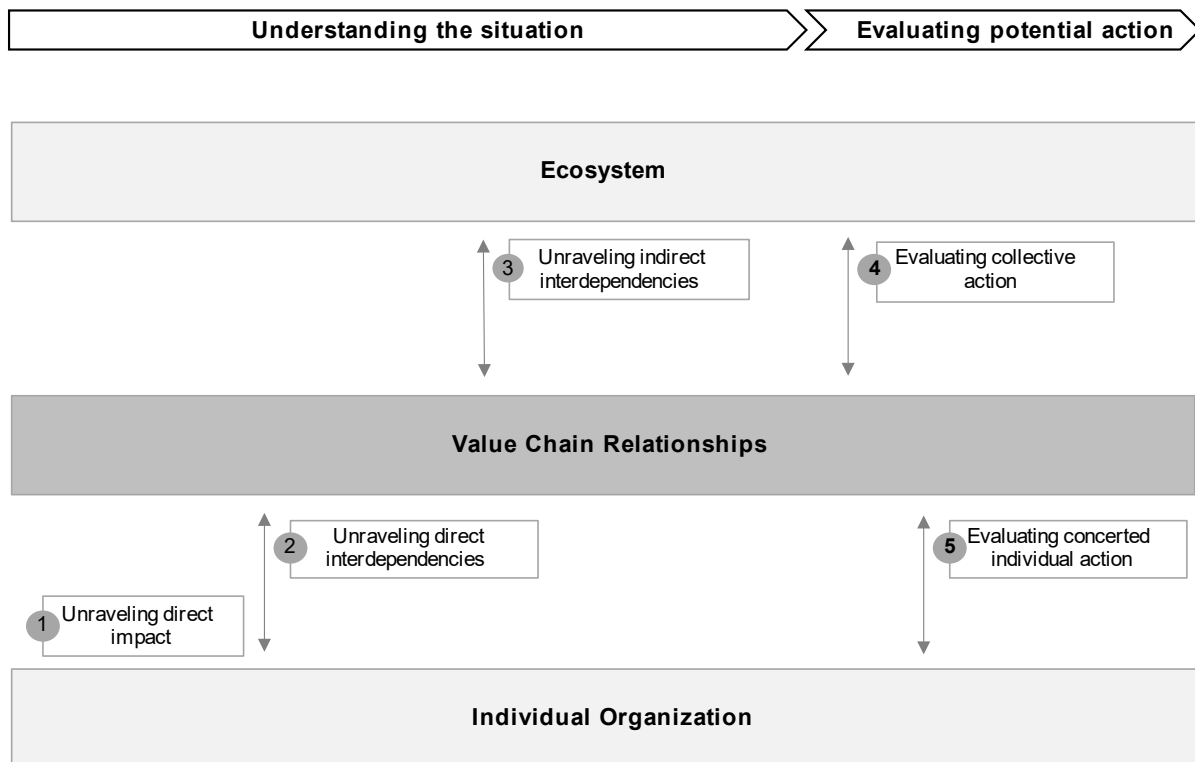
During the implementation, three key topics played a role. First, while the organizational separation aided the development of the circular innovation, the incumbents needed to actively engage in managing the relationship between the core business and the innovation project to protect the new activities from adverse influences, while also exploring potential synergies. Second, due to the circular character, the innovations also disrupted the existing value chain and required new competencies on various steps of the chain. Therefore, the implementation of the innovation also impacted the external partnerships of the incumbents and required both the setup of new ones as well as the reinterpretation of existing ones. Third, the engagement with the circular innovation also triggered a reevaluation of the incumbent's core competencies with respect to their future relevance and initiated a reconfiguration process.

6.2. Paper II: Interorganizational Sensemaking of the Transition Toward a Circular Value Chain

While paper I highlights the necessary changes on the firm level, paper II focuses on the transition on the value chain level and contributes an in-depth assessment and unraveling of the interorganizational process among firms collaborating to jointly transform their industry from linear to circular. The findings are based on an in-depth case study with a European industry association of more than 150 companies from one value chain with the goal to foster the transformation of their value chain according to circular principles. Drawing on the concept of interorganizational sensemaking (Seidl & Werle, 2018; Weick, 1995), the paper analyzes how industry stakeholders interact with each other to understand the implications of this paradigmatic change, work together to develop a common understanding of potential responses and align on a common way forward to realize the transition.

The key result is a differentiated explication of the inter-organizational sensemaking process, illustrated in Figure 6-2.

Figure 6-2 The Interorganizational Sensemaking Process



Most importantly, the findings of paper II indicate that the sensemaking process between interdependent economic actors from one value chain consists of different steps that unfold across three different levels: organization, value chain, and ecosystem. The levels provide different reference frames which influence the process. The individual organization represents the most granular level of reflection, on which participants focus on understanding how the topic and potential changes might directly impact their own organization. The value chain level represents an intermediary level of reflection, on which participants analyze direct interdependencies between stakeholders and seek to understand their implications. Finally, the ecosystem level corresponds to the broadest level of reflection, on which participants make sense of the topic and potential changes for the group of industry stakeholders in relation to the broader ecosystem which can have indirect influences on the respective stakeholders. Power dynamics between stakeholders and considerations of individual and group identity influence the sensemaking process across the different levels.

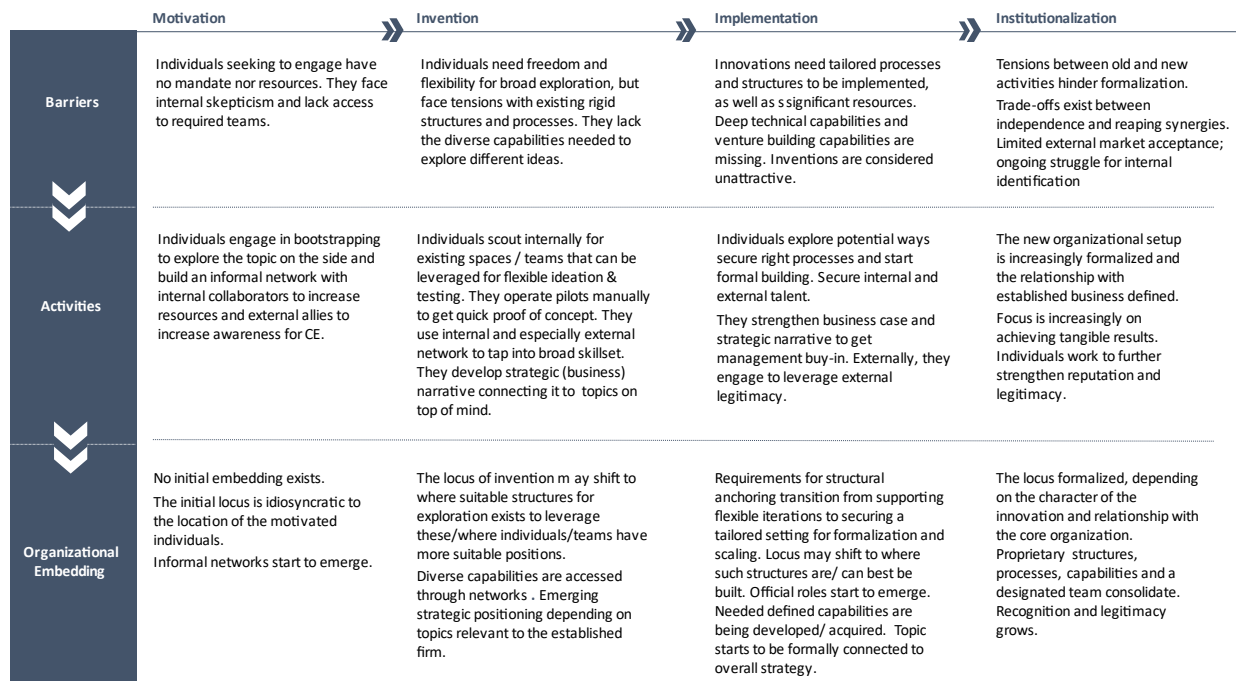
The sensemaking process between the stakeholders of the industry consortium unfolded in five subprocess steps within and across these levels. During the first three subprocesses, stakeholders engaged to achieve a holistic understanding of the selected topic. During the latter two subprocesses, stakeholders actively evaluated potential actions and ultimately aligned on a specific way forward. During the first process step, stakeholders engaged in sensemaking by contextualizing the topic from the viewpoint of their own organization. At this stage, their cognitive process was mainly shaped by their individual knowledge base and their perception of organizational identity. New information was evaluated according to its potential immediate implications for their individual organization and reality. During the second process step,

stakeholders engaged to understand the topic by setting it into the context of the value chain. They evaluated the direct interdependencies between their own organization and the other constituents of the value chain and to better understand how they could be affected by others' actions—and vice versa. At this level, power play emerged between stakeholders triggered by competing individual interests. But also, stakeholders broadened their understanding of the topic as they learned about different perspectives and gained knowledge from the interorganizational exchange, which in turn raised their awareness of the need for alignment. In the third subprocess, stakeholders interacted to make sense of the interdependencies between the group of actors as one collective industry and the broader ecosystem. They reflected on pressures put on their industry by external stakeholders and their collective scope of influence to respond to them. At this level, considerations of identity, and the sense of belonging to a collective group and sharing a common fate played a key role. The increased awareness of collective interdependencies also led to a new perspective on the value chain and organization level implications and facilitated a greater acceptance for change, thus providing fertile ground for the alignment process. During the last two subprocess, stakeholders engaged with each other to evaluate their scope of action and reach an agreement on a path forward either through concerted individual action or collective action. The increased awareness of direct and indirect interdependencies between stakeholders and a collective fate derived from the reflections on the three levels induced a willingness to compromise individual positions and opened the door for achieving alignment on joint action.

6.3. Paper III: Driving the Circular Economy Transformation: How Incumbents Embed Circular Innovations in their Organizations

Similar to paper I, paper III focuses on circular innovation activities on the firm level but deploys a different perspective to gain further insights into the interplay between the circular innovation process and the organizational context. Informed by the management innovation perspective (Birkinshaw et al., 2008), the paper focuses on the activities pursued by internal change agents to drive the innovation process and analyzes the interplay between their activities and the organizational context of the firm to gain a deeper understanding of the evolving organizational embedding. Based on a multiple case study approach, the paper provides a structured analysis of the circular innovation process dissected into four key process phases—motivation, invention, implementation, and institutionalization. For each phase, the paper identifies the organization-level barriers encountered, the activities change agents engage in to overcome them, and changes in the organizational embedding, as shown in Figure 6-3.

Figure 6-3 Overview Circular Innovation Process (Adapted Based on Birkinshaw et al, 2018)



Most importantly, the findings show that the organizational embedding evolved over time in resonance with the barriers encountered and activities pursued in each phase of the innovation process. In each phase, the change agents faced different barriers and engaged in different activities to overcome them—which, in turn, shaped the development of a specific organizational embedding.

In the first phase of the process, motivated change agents initiated the exploration of potential ideas for circular innovation. As the ideas were new to their organization, they faced internal skepticism, lacked access to required capabilities and initially had no resources or mandate to pursue them. As they therefore investigated opportunities informally and through personal relationships, internal and external networks started to emerge providing access to needed resources and capabilities. The location of the change agents became the first idiosyncratic locus of the innovation within the firm.

During the second phase of the process when the focus shifted to exploration and testing, the main barriers change agents faced were the tensions with existing rigid structures and processes as they required freedom and flexibility for iterations, as well as the lack of the diverse capabilities needed to pursue different directions. To overcome these barriers, change agents started to scout internally for existing programs and teams they could employ for flexible ideation and piloting. They leveraged internal and especially external networks to tap into broad skillsets needed to test of different ideas. At the same time, they started to develop a strategic narrative to increase the business relevance of the topic. These activities in turn implicated the organizational embedding of the innovation endeavor: Most importantly, the locus of invention shifted to locations where suitable structures for exploration existed and partnerships networks

grew to secure access to diverse capabilities and resources. The strategic topics relevant to the incumbent business shaped the emerging strategic positioning of the innovation.

As change agents moved to implementing the selected circular innovations in phase three, the need for tailored processes, structures and resources grew. In the established business, technical and venture-building capabilities were missing and difficult to build up as the early inventions were considered unattractive. Change agents thus focused on strengthening the business case and strategic narrative to increase management buy-in and engaged externally to increase legitimacy and positive feedback for the innovation. They engaged to establish the right structural setup and secure the needed talent. In response to the shift from broad exploration to focused implementation, the organizational embedding further evolved, resulting in changes in the organizational locus of the innovation activities to where suitable structures and capabilities existed or could best be built. With greater clarity as to the capabilities required, official new roles were set up to secure their availability, and the innovation became formally connected to overall strategy.

In the last phase, the institutionalization, barriers consisted mainly of tensions between old and new activities, as well as ongoing quest for broad external and internal acceptance. As a new organizational setup increasingly solidified, change agents actively engaged to define and develop the relationship with the established business and pushed to further strengthen the reputation and legitimacy of the new activities. Organizationally, the locus formalized in resonance with the character of the innovation and the relationship with the core organization as well as the character of proprietary structures, processes, and capabilities.

6.4. Paper IV: Collaborating for the Circular Economy - A Typology of Interfirm Collaborations and Recommendations for Managing them Effectively

Similar to paper II, paper IV focuses on the interfirm level, but further expands the focus from collaboration of firms along a particular value chain to collaborations between firms within and across industries and proposes a typology of private sector collaborations. The paper details the respective foci and features, outlines typical challenges for each type and provides recommendations for their management. With the typology and practical recommendations, the paper seeks to contribute greater clarity to the discussion on collaboration between firms and provide recommendations to practitioners interested in facilitating collaboration between firms to advance the transition to the circular economy. Figure 6-4 provides an overview of the six identified archetypes of interfirm collaborations in the circular economy context.

Figure 6-4 Typology of Interfirm CE Collaborations

Aim	Influencing market conditions		Exploring solution space		Implementing solutions	
Type	CE advocacy groups	CE standard-setting groups	Networks for CE innovation	Consortia for CE research	Strategic CE partnerships	Industrial symbiosis
Description	Collaboration to jointly exert influence in the political realm to break down regulatory barriers that hinder circular solutions/facilitate market creation for circular solutions	Collaboration to jointly define rules that can serve as overall orientation for industry alignment on a pathway towards CE/facilitate market creation and trade for novel applications	Loose collaborations bringing together diverse perspectives to jointly engage in ideation and exploration to advance circularity	Collaboration to jointly engage in knowledge creation and/or problem-solving to develop new circular materials, products, technologies, processes and advance their uptake in industry applications	Close collaboration between firms bundling competencies and resources to co-develop and commercialize circular products, processes, or technologies and/or set up a joint circular business model	Collaborations in which firms share or exchange by-products, materials, energy, or waste to economically reduce aggregate environmental impact
Size	Large	Large	Medium	Small to medium	Small	Small to medium
Time horizon	Short/long-term	Medium/long-term	Short/medium-term	Medium/long-term	Long-term	Long-term
Formalization	Low	Low	No/low	Low to high	High	Medium
Coordination mechanism	Shared governance	Independent orchestrator	Independent orchestrator/ focal firm	Independent orchestrator/ shared governance	Shared governance/ focal firm	Independent orchestrator/ shared governance

The first two collaboration archetypes aim to influence external market conditions that stand in the way of the circular transition. CE advocacy groups seek to collectively influence policy making to break down regulatory barriers that prevent the uptake of circular solutions. In contrast, firms engage in CE standard-setting groups to change market conditions in favor of circular solutions through voluntary rather than mandatory rules to aid industry alignment on a pathway towards CE. The second group of collaboration types focuses on exploring the solution space for potential circular innovations. Networks for CE innovation focus on bringing together diverse perspectives from a variety of stakeholders to facilitate mutual learning and engaging in joint exploration and ideation, while firms jointly engage in consortia for CE research to create novel knowledge with respect to materials, applications, technologies, and processes. The third group of collaboration types aims to implement circular solutions in practice. In dedicated strategic CE partnerships, firms bundle competencies and resources to co-develop and commercialize circular products, processes, or technologies and may set up a joint entity to run and scale a new circular business. In an industrial symbiosis, firms engage to share or exchange by-products, materials, energy, or waste to economically reduce aggregate environmental impact to redirect excess material streams from one firm to continued use at another firm.

The paper also provides insights into the challenges of the different collaboration types in the circular economy and provides suggestion for managers seeking to contribute to their success. Irrespective of the type, firms face three overarching challenges in the circular economy prior to formation: (1) finding out with whom they should engage and for which activities, (2) the distance and lack of direct ties to the potential new partners; and (3) the high risk and economic uncertainty, limiting the willingness to invest significant resources in building the necessary relationships. Managers can actively support the formation of collaborations by identifying collaboration opportunities, creating ties and trustful relationships, assuming coordination tasks and acting as neutral convener. As the collaborations evolve, further challenges may emerge depending on the collaboration type. The paper provides further

details on these challenges types and suggest key tasks and competencies needed for managing each collaboration archetype.

7. Conclusion

This chapter provides this dissertation's summary of contributions for the guiding research question. Section 7.1 summarizes the key contributions to academic literature, derived from the individual articles, while section 7.2 presents the main implications for practitioners. Section 7.3 concludes with a reflection on the limitations of this dissertation and avenues for further research.

7.1. Contributions to the Literature

While the attention for the needed transition to a circular economy is growing, the understanding of the challenges associated with the required transformation of business activities remains limited. This thesis contributes a managerial perspective to the transition to a circular economy and in particular provides valuable insights on two levels: First, it provides insights on the managerial challenges of the transformation of individual organizations according to circular principles. Second, it contributes to a better understanding of the dynamics of the transition on the interfirm level, outlining the challenges associated with the changing nature of collaborations between economic actors needed to transform value chains and industries from linear to circular.

On the individual firm level, paper I and III contribute a new perspective by analyzing the innovation activities of incumbents within its organizational context.

Paper I contributes to the literature by analyzing the circular innovation endeavor of incumbents through the lens of disruptive innovation. The findings suggest the challenges connected to circular innovations indeed are considerably similar to those described in the disruptive innovation literature and, thus, help to explain the firms' challenges, but also potential ways to overcome them. In particular, the findings indicate that an "innovator's dilemma" (Christensen, 2013) also prevails in the circular economy context: Incumbents typically focus on mainstream customers and have processes, values, and resources that are tailored to the current linear business logic. While they observe a rise of novel circular solutions in niche markets and signs of a transition in their industry, these innovations initially seem both less attractive than the established linear business and cumbersome to adopt as the linearly optimized processes, structures and values are ill-fitting. Therefore, they shy away from the changes required to implement them, although they fear that such innovations may ultimately turn the linear business obsolete. The analysis suggests that a separate organizational structure can be helpful for incumbents to engage in potentially disruptive circular innovations as a separate structure not only allows for a setup of suitable structures, process, and values, but also allows for a different organizational culture and identity to develop. Importantly, the findings suggest that even as circular innovations grow, the linear business is likely to remain relevant—at least for the near future. Thus, navigating the relationship between the established linear and the emerging circular business becomes an increasingly important task, suggesting that ambidexterity plays a significant role in the organizational transition from linear to circular.

Paper III adds to the insights into the circular transition on the firm-level by analyzing the influences of organizational context on circular innovation process in further detail. The differentiated analysis dissects the organizational barriers according to their occurrence

throughout the phases of the innovation process, analyzes the activities undertaken by change agents to overcome them in each phase, and examines how these in turn shape the organizational embedding of the innovation. The analysis suggests that the relevance of specific organizational barriers differs depending on the phase of the innovation, and change agents must hence engage in different activities to overcome them. Furthermore, paper III contributes a deeper understanding of the essential elements of organizational embedding of circular innovation endeavors in established organizations and how they evolve throughout the innovation process. The analysis suggests that five aspects of organizational embedding are particularly important for driving circular innovation: (1) Internal change agents play a crucial role in the circular innovation process. They not only actively engage in innovation activities, but also contribute to building an organizational embedding that is conducive to the innovation endeavor, as they actively shape and develop processes, structures, and strategies to further the particular innovation they pursue. The composition of the internal team and the roles they assume may change over time depending on the development stage of the innovation. (2) The management of capabilities is essential for shaping the organizational embedding. The development of circular innovations requires both technical and business-building expertise, but the necessary composition of skills also depends on the development stage of the innovation, resonating with the emerging discussion on the need for dynamic capabilities for managing circular innovations (Bertassini, Ometto, et al., 2021; Bocken & Geradts, 2020; Khan et al., 2020; Köhler et al., 2022; Santa-Maria et al., 2021). The findings of paper III further extend this research by shedding light on how change agents engage with internal and external networks to access the needed capabilities and only build them up within the organization once their long-term need is sufficiently certain. (3) How change agents strategically position the innovation also shapes the way it becomes embedded in the organization. While previous research highlights the importance of an integration the circular topic in the strategy of the company *ex ante*, the analysis of paper III reveals that in practice, such an integration also develops bottom-up as circular innovation activities evolve and change agents forge a connection between the emerging innovation and strategic topics that the company already values. (4) Structures and processes constitute an important aspect of organizational embedding, but the characteristics of the structures and processes needed changes over time. While initially, openness and flexibility are required to engage in broad exploration and iterate ideas, the need for tailored structures and processes increases as inventions become increasingly concrete. As the innovation further develops, the management of the relationship between the emerging circular and the incumbent linear business becomes a crucial task. The analysis highlights the need for different structural setups depending on the development stage and suggests ways for an established organization to provide them. Depending on the needs and challenges in the particular phase of the innovation process, it can be useful to shift the innovation activities within the company to those business units or teams that can provide the best setup or to build a separate structures to pursue innovations more independent from the core business. (5) The locus of the innovation activity within the organization may change throughout the innovation process. Ideas for circular innovation may emerge in all parts of the company wherever motivated individuals start to engage. Therefore, the initial locational anchoring of the innovation is idiosyncratic to the organization. Over time, the anchoring may change when structures, processes, and capabilities in other areas of the firm are found to be more suitable to drive the innovation process further.

Ultimately, the relationship between the circular innovation and the linear core business defines the best structural anchoring.

On the interfirm level, paper II and IV contribute insights into the role and dynamics of collaborations between firms in the transition to a circular economy.

Paper II contributes to the literature by providing a detailed analysis of the interorganizational sensemaking process evolving between interdependent firms from one value chain collaborating to transform their industry from linear to circular (Maitlis & Christianson, 2014; Seidl & Werle, 2018; Weick, 1995). The analysis of the collaborative process between industry stakeholders of a European consortium representing the entire value chain for flexible packaging provides three main contributions. First, the findings indicate that interorganizational sensemaking between interdependent actors evolves across different levels: organization, value chain, and ecosystem. Extending previous research suggesting that influences from industry on the organizational level may play a role in the sensemaking process (Cristofaro, 2022; Patvardhan et al., 2015; Stigliani & Elsbach, 2018), the findings shed further light on a dynamic interplay and the unfolding of the sensemaking process across three levels. On the organizational level, stakeholders make sense of the direct implications of the topic on their own organizations. Sensemaking on the value-chain level helps them recognize the implications resulting from direct interdependencies with other stakeholders along the value chain. Lastly, on the ecosystem level, sensemaking reveals the implications of indirect interdependencies between the industry and the broader ecosystem. Engaging on all levels is important for the overall process as it (1) helps create the relevance and seekership necessary for actors to engage in the process, (2) contributes a depth of perspectives that enables individuals to gain a holistic understanding of the topic and (c) helps to instill a willingness to compromise, which is a prerequisite for alignment. Second, the paper provides further insights on the influence of power in sensemaking. Extending Schildt's (2020) work on episodic and systemic power in sensemaking, the findings indicate that systemic power influences the sensemaking process on all levels but plays out differently on each one. The use of episodic power can be observed especially on the value-chain level, where divergent interests between interdependent stakeholders become most apparent. While stakeholders often use episodic power to protect the status quo, it can also be used to broaden the perspective, actively challenge established goals, and bring in new ideas. Third, the paper provides further insights on the influence of identity considerations on the sensemaking process. External paradigmatic changes such as the transition to a circular economy can challenge an established industry identity and may require a reconceptualization of that identity, which is both influenced by and influences the sensemaking process. Not only do stakeholders use the interorganizational sensemaking process to build a new shared identity collectively, but also, the reconceptualized industry identity influences the sensemaking process as it in turn provides a new reference frame to interpret the implications of the paradigmatic shock. Ultimately, aligning on a joint pathway for the value chain transition requires individual stakeholders to accept the same notion of a collective identity to instill a notion of a common fate shared among stakeholders and embrace compromise.

Paper IV expands the perspective from collaborations along the value chain adopted in paper II to different types of interfirm collaborations. While the paper targets practitioners, its

key insights also contribute to the literature by providing a better understanding of interfirm collaborations in the circular economy transition. Most importantly, the paper dissects differences in aims and features of different circular economy focused collaboration formats between firms and develops a typology of interfirm collaborations to provide greater clarity and structure to the discussion of interfirm collaborations for a circular economy. In particular, the paper suggests that firms engage in six types of collaborations to advance the circular economy: CE advocacy groups, CE standard-setting groups, networks for CE innovation, consortia for CE research, strategic CE partnerships, and industrial symbiosis. Additionally, by combining insights from practical work and expert discussions with insights from the literature, the paper outlines typical challenges of each of the collaboration type and derives relevant tasks and competencies needed for managing such collaborations. Challenges in the formation phase of a collaborative endeavor are similar across the types and mainly include uncertainty as to partner and topic selection, the lack of ties between potential partners and the prevailing uncertainty of economic benefits. Managers can support the initial formation of collaborations, lower the cost, and increase the attractiveness for actors to engage by fostering relationship building between partners, identifying collaboration opportunities, and acting as impartial coordinator. During the implementation of the collaboration, the challenges firms face are shaped by the specific collaboration type. While circular advocacy and standard setting groups have to coordinate large groups and reconcile diverging interests to define specific political demands or standards, consortia working on CE research need to minimize the risk of freeriding and appropriation by individual collaborators. For the proliferating networks fostering circular innovation activities, it is important that managers actively foster the development of promising ideas, ensure the participation of stakeholders with the needed competencies, and facilitate actionable ways forward to avoid frustration among participants in the light of too broad and unspecific endeavors. Strategic partnerships form to implement a specific circular solution but require significant investment and close collaboration between partners with previously distant or no ties at all. Hence, aligning the different realities, work cultures and practices can be a challenging task. Last but not least, in industrial symbioses, awareness about the potential strategic importance of previously neglected waste streams needs to be raised and suitable matches be actively established. To effectively respond to these challenges, managers need to be aware of the realities of the different collaboration types and ensure they have competencies needed for their facilitation.

7.2. Implications for Practitioners

In addition to the contributions to the literature, this dissertation also provides important implications for practitioners.

On the firm level, the research suggests that to successfully drive a circular innovation and holistically change their organizations in response to the transition to the circular economy, it is essential that practitioners embrace it as a task of strategic importance. First, given the wide-spanning changes throughout the organization required, top management support is instrumental to success. The circular economy concept needs to be engrained into the corporate strategy to anchor it in the organization, help foster an understanding of the transformation needed and pave the way for cultural change. Second, to tap into the potential of promising ideas, managers can actively engage in distant search for the exploration of novel ideas outside

of their core business realm. But also internally, managers can support the development of potential circular inventions by being open to and actively supporting innovations from all departments, fostering a culture that supports new ideas and providing flexibility for change agents to explore ideas beyond their regular job description. Third, the findings of this dissertation suggest that realizing circular innovations is often difficult for incumbents because they initially appear less promising than linear ones and may create tensions with existing processes, structures, and competences. Managers can play an active role in catering to the needs of the circular innovations to help them successfully develop. Importantly, as these needs change throughout the innovation process, it is important that practitioners are aware of these changes and engage to provide the organizational embedding that is most conducive to the endeavor in each phase of the process. In the beginning, openness and flexibility is required for broad exploration of diverse topics. In this phase, practitioners can best support the innovative endeavor by developing a business narrative around the innovation and getting early market validation of its concept. As the idea takes shape, providing tailored structures for scaling and institutionalization becomes important. At this stage, practitioners might explore the suitability of various places within the company to structurally anchor the innovation where such structures, processes and competencies seem most conducive, but also consider pursuing innovations outside the current structures to avoid tensions between the innovations and the linear business. Importantly, an organizational embedding that is conducive to a particular innovation is idiosyncratic to the specific innovation and needs to be consciously developed over time. Last but not least, as promising transition pathways for the industry and the firm emerge, companies may need to reevaluate and potentially reconfigure their core competencies and partnerships to prepare the organization for the long-term transition to a circular economy.

The dissertation also provides implications for practitioners engaged in interfirm collaborations. While such collaborations are crucial to advance the transition to a circular economy, successfully implementing them is challenging. Practitioners can actively support the formation of potential collaborations by selecting relevant stakeholders, building a network of collaborators interested in selected circular topics, and engaging in the creation of ties and trust between different stakeholders. They can identify potential opportunities for collaboration and work to raise awareness for and create interest in selected topics among stakeholders and facilitate the collaborative exploration. In addition, they can actively support the collaborative process in later stages. Furthermore, external facilitators that function as neutral mediators can help address potential conflicts of interest between different stakeholders involved and reach alignment on a common vision and pathway for the transition. But managers also need to be aware of the coordination and negotiation skills, as well as the level of technical expertise and potential long-term commitment required for this role. Importantly, the challenges that interfirm collaborations bring about can also differ, depending on the focus and characteristics of the type of collaboration which might change over time. Thus, awareness not only of the current needs of collaborating parties but also of potential directions of development of the collaboration and associated future needs is important. Last but not least, practitioners also need to keep in mind that the ultimate societal goal of such interfirm collaborations is to lower the overall environmental footprint of our collective economic activity. While the uptake by firms is essential to achieve a transformation of our economic system, facilitators can ensure that environmental goals remain the priority in the transition.

7.3. Limitations and Avenues for Future Research

This chapter summarizes the overarching limitations of the research included in this dissertation and outlines promising directions for future research.

While the circular economy concept was developed decades ago, the interest in the concept in the business realm has only recently been starting to grow and hence, the uptake by companies is still considerably low. Consequently, also academic research analyzing the strength and weaknesses of potential ways of implementing it in practice has mostly been conducted in the last few years. Most research on the managerial perspectives of the circular economy transition – including the research of this dissertation – is largely exploratory in character and often based on a small set of in-depth case studies. While such qualitative research is important to obtain a better understanding of the complex social processes evolving within and between economic actors in the circular transition, its findings might not easily be generalizable and might miss correlations and causalities that cannot be deduced from a small set of observations. As the number of firms engaging in circular economy activities grows in practice, so does the opportunity for future research to analyze a larger set of case studies and apply quantitative methods to the analysis of the circular economy transition on the firm and interfirm level. On the organizational level, this would allow for a more systematic investigation of potential linkages between particular types of circular innovations and the characteristics of a conducive organizational embedding. On the interfirm level, systematically comparing the dynamics of collaborative activities differentiated by the type of collaboration and potentially also by industry or geography could be helpful to extend our academic and practical knowledge on the best way to make such collaborations successful.

Furthermore, this dissertation has focused on the organizational realities of the circular economy transition. But as noted on several occasions, the external environment also has an important influence on the process both on the level of the individual organization and on the level of interfirm collaborations. On the organizational level, the research of this dissertation suggest that building an external network can contribute to the development of the innovation within the organization throughout all stages of the process. On the interfirm level, this dissertation hints to the importance of the way collaborators interpret changes in the environment and how they expect different stakeholders in the external environment – such as customers or policy makers – to behave. Future research can provide valuable insights by analyzing the influences of the external environment on the intrafirm and interfirm dynamics to advance the transition to a circular economy. Such research could also contribute to a better understanding of potentially different transition trajectories depending on the respective political, geographic or industry context.

8. Paper I: How Incumbents Realize Disruptive Circular Innovation - Overcoming the Innovator's Dilemma for a Circular Economy

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Abstract

Despite the promises of the circular economy to become an attractive source of innovation, many firms have so far hesitated to pursue circular innovations. Incumbents are facing a dilemma: While circular innovations may be potentially disruptive to the current profitable linear business, standing still may be dangerous, as traditional businesses may be rendered obsolete in the current changing environment. Yet, the literature has so far provided only a few insights into how firms can approach circular innovations strategically. By using the lens of disruptive innovation, we offer a strategic analysis of circular innovation challenges, and potential ways to overcome them. Based on two in-depth cases, we show how a separate organizational structure can help to implement potentially disruptive circular innovation, but some caveats exist. In addition, this structural separation should be linked with a clear innovation strategy, and the partnerships, organizational culture, and competencies needed for implementation should also be considered.

Keywords

Circular Economy, Disruptive Innovation, Circular Innovation, Ambidexterity, Dynamic Capabilities

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8.1. Introduction

The concept of a circular economy (CE) has increasingly been discussed as an alternative to the current “take-make-waste” system, which is associated with severe environmental damage (Meadows et al., 2004; Stahel, 2016). A CE can be described as a restorative system in which waste is eliminated and resource use is minimized as materials are continuously looped back into the system (Ellen MacArthur Foundation, 2015). Firms play a central role in the transition to a CE, as they must holistically transform their business activities according to circular principles (Bocken et al., 2016). Many practitioners advocate this transformation as an attractive business opportunity, but while startups exploring circular solutions are beginning to flourish, uptake by established businesses has been slow (Ghisellini et al., 2016; Henry et al., 2020). It seems that transforming incumbent organizations is more difficult than has often been assumed, as the associated changes seem both cumbersome and unattractive (Geissdoerfer et al., 2017; Rubel et al., 2018). At the same time, neglecting the trend towards circularity may be dangerous for firms, as changes in the public discourse and the regulatory landscape threaten the long-term viability of traditional products and business models, and the proliferating activity of startups means unresponsive incumbents risk becoming obsolete (European Commission, 2020; Henry et al., 2020; Wahlström et al., 2019). However, this dilemma remains poorly understood, since little research has explicitly focused on the organizational perspective of the business transition to a CE (Franco, 2017).

To fill this gap, we turn to the literature on disruptive innovation, as it offers useful insights into the difficulties incumbents face when realizing innovations that require fundamental changes, as well as ways to overcome them (Christensen, 2013; Christensen et al., 2015). The “innovator’s dilemma” (Christensen, 2013) suggests that incumbents typically focus on mainstream customers and have processes, values, and resources that are tailored to the current business logic. Since innovations often take hold in fringe markets, incumbents initially consider them unattractive, and thus shy away from the changes required to implement them. Yet, by dismissing these innovations early on, incumbents overlook their potential to improve over time and extend their appeal to mainstream customers. Ultimately, incumbents’ focus on established business practices leads to them being replaced by innovators (Christensen, 2013; Christensen et al., 2015). In this light, Christensen and colleagues suggest that incumbents should consciously embrace this threat through deliberate action and an organizational setup tailored to disruptive innovation (Christensen & Raynor, 2003; Govindarajan & Kopalle, 2006; Rafii & Kampas, 2002).

Given the perceived similarities between the challenges of circular innovation and the innovator’s dilemma, these suggestions may also prove helpful for firms seeking to engage in circular innovation. Hence, we ask: *How do established firms approach potentially disruptive circular innovations?*

To answer this question, we analyze the challenges and responses of two established firms pursuing ambitious circular innovations through the lens of the disruptive innovation concept, and assess whether the suggestions from this literature may also be helpful in the CE context.

The remainder of the paper is structured as follows: Section two provides the theoretical background, while section three outlines our methodological approach. In section four we present our findings, followed by a discussion in section five. Section six concludes.

8.2. Theoretical Background

8.2.1. On the Circular Economy

In recent years, the concept of a CE has gained widespread attention in the business realm. Nevertheless, actual uptake by established firms has been slow (Ghisellini et al., 2016; Henry et al., 2020). For the CE to unfold, firms must find ways to decouple value creation from resource consumption (Bocken et al., 2016). In essence, firms need to develop new technologies, products, or ways of doing business to transform their current practices from linear to circular—that is, they have to engage in circular innovation. However, this can be harder than it looks, and there is no guarantee that a circular solution is actually more sustainable than its linear equivalent (Blum et al., 2020). For incumbents, the problem seems to be twofold. First, circular innovations seem cumbersome to implement, as they create tensions with the current business reality (Centobelli et al., 2020; Geissdoerfer et al., 2017; Kirchherr et al., 2018; Werning & Spinler, 2020). However, many circular innovations also seem less attractive financially than the established business. Given their early stage of development, they are often either worse-performing or more costly than established solutions and, thus, may have less appeal for mainstream customers (Guldmann & Huulgaard, 2020; Kirchherr et al., 2018; Vanner et al., 2014). While circular products can offer an additional benefit due to a superior environmental sustainability as a product attribute, many firms are concerned that mainstream customers are not willing to sacrifice affordability and perceived performance to buy a more environmentally sustainable product (Kronthal-Sacco et al., 2020; Luchs & Kumar, 2017; Mai et al., 2019). In addition, given limited successful cases and experience, many new circular business models seem overly risky (Bocken & Geradts, 2020; Linder & Williander, 2017; Werning & Spinler, 2020).

In this situation, incumbents tend to focus on incremental innovations to reap efficiency gains, which fall short of the fundamental changes required (Centobelli et al., 2020; Geissdoerfer et al., 2018; Rubel et al., 2018). Potentially disruptive circular innovations are often left unexplored.

The challenges involved in building a CE business remain poorly understood, as little research has explicitly focused on the organizational perspective (Franco, 2017). On the firm level, many researchers have focused on circular business models in the last years (Geissdoerfer et al., 2020; Lüdeke-Freund et al., 2019; Urbinati et al., 2017). While this research provides valuable insights, it often focuses on activities for looping materials, without considering how these new activities resonate with existing ones, and how the transition can be managed (Baldassarre et al., 2020; Bocken & Geradts, 2020). Henry et al (2020) only touch upon this topic, as they propose that startups, due to their flexible nature, might be more suitable to introducing circular solutions.

At the same time, recent studies indicate that the lack of a deliberate, organizationally embedded strategy for circular innovation is a key barrier to implementation. For example,

Guldmann and Huulgard (2020) identify lack of incentives, resources, knowledge, and competencies as organizational barriers to a CE. However, they do not discuss the resulting underlying challenges for firms, nor do they suggest a strategy to overcome them. Pieroni et al (2019) find that most research on circular business models focuses on idea generation and, to a lesser extent, experimentation, while actual implementation has received less attention. While this gap exists in the CE literature, the literature on disruptive innovation has analyzed the difficulties incumbents face when realizing innovations that require fundamental changes, and therefore might offer interesting insights into how to address these challenges (Christensen, 2013; R. M. Henderson & Clark, 1990).

8.2.2. On Disruptive Innovation

The disruptive innovation concept seeks to explain why realizing innovations often proves difficult for incumbents, and why successful players are sometimes replaced by new entrants (Bower & Christensen, 1995). The theory suggests that incumbents are often overly focused on the current, most demanding, and profitable customers, and thus only pursue innovations that focus on incremental improvements to existing solutions. Hence, they neglect the needs of customers in fringe markets, leaving an opening for new entrants who target those segments with an offering adapted to their needs (Christensen et al., 2015). Since the new offering is initially not well suited to the mainstream, incumbents do not immediately consider it a threat. However, as the new solution develops, it also starts to attract mainstream customers. Lacking experience with the new offering, and locked into old structures, incumbents find it difficult to switch solutions and catch up, and are ultimately replaced by the new entrant (Christensen et al., 2015). Take-up may be accelerated when mainstream customer preferences are simultaneously shifting towards the fringe (R. Henderson, 2006).

Christensen and Raynor (2003) point out that the disruptive nature of the innovation is rooted in a different way of doing business, which erodes the prevailing dominant design. Thus, even if the incumbent initially develops similar ideas, they find it difficult to pursue them, as they often require costly fundamental changes to their core business logic, and are sometimes inconsistent—or even incompatible—with the current business model. More specifically, the authors point out three sources of conflict for incumbents: *First*, established companies often lack the required managerial resources. While incumbent managers are generally highly skilled to run a stable business, they lack the experience to explore potentially disruptive innovations, which requires operating under uncertainty and growing a venture from scratch. *Second*, as the established processes have been shaped to perform efficiently in the prevailing stable context, they are ill suited to operating an insecure and still-forming business. *Third*, the organizational values—that is, the standards by which employees set priorities and assess new ideas—are shaped by the current business. Since many disruptive innovations start off small, they do not seem large or lucrative enough compared to the existing business. Therefore, they are starved of attention by day-to-day business (Christensen et al., 2015; Kapoor & Klueter, 2015). Similarly, researchers have pointed to differences in an organization’s architecture, as well as its partnership network and ecosystem, which make it difficult for incumbents to pursue disruptive innovations (e.g., Amit & Zott, 2012; R. M. Henderson & Clark, 1990; Kumaraswamy et al., 2018; Snihur et al., 2018). In addition, the incumbent’s established culture

might prevent them from engaging in a potentially disruptive innovation (Anthony & Tripsas, 2016; Kammerlander et al., 2018).

Nevertheless, it is possible for incumbents to formulate a strategic response. Christensen and colleagues suggest that in order to overcome the potential conflict with the established business, incumbents can engage in structural separation and build an autonomous organization to develop the new solutions with tailored resources, values, and processes independent from the existing structures (Christensen, 2013; Christensen & Raynor, 2003). In a similar vein, the ambidexterity literature suggests that firms should structurally separate the exploration of new innovations from the established business when these innovations require different competencies, incentives, processes, and cultures (O'Reilly & Tushman, 2013; Ossenbrink et al., 2019). In addition, researchers have suggested that incumbents need to engage in distant search, focusing on new customers to develop potentially disruptive innovations (Danneels, 2002; R. Henderson, 2006; Levinthal & March, 1993). Since these changes require strategic intent, as well as potentially redefining organizational values and culture, management leadership is key (Gilbert, 2005; Govindarajan & Kopalle, 2006; O'Reilly & Tushman, 2013; Rafii & Kampas, 2002). Below, we explore how the concept of disruptive innovation can relate to the CE.

8.3. Methods

To investigate how firms can approach potentially disruptive circular innovations, we followed a case study approach, which is useful for generating an in-depth understanding of empirical phenomena for which little theory exists (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Siggelkow, 2007).

We developed a comparative case study with two companies selected through theoretical sampling, that is, we chose the cases based on theoretical considerations in accordance with our emerging theory (Eisenhardt & Graebner, 2007; Glaser & Strauss, 2017).

We chose the case study companies based on two criteria: (1) the character of their business and (2) their progress in terms of CE activities. Regarding (1), we chose large, established companies in accordance with the focus of the disruptive innovation literature on incumbents (Christensen et al., 2018). As for (2), we selected companies that had already undertaken far-reaching strategic actions, in line with our focus on studying circular implementation rather than intentions. The two chosen firms had made clear strategic choices, and implemented them by establishing a new corporate entity and by investing in an external startup, respectively, to develop a specific innovation.

For each of the two companies, we then scrutinized their innovations with respect to (1) their actual circularity and (2) their disruptiveness. Regarding (1), there is currently no common definition for the circularity of an innovation (Kirchherr et al., 2017). Therefore, we first scrutinized public statements of the companies about their innovation from talks, conference presentations and written documents (see comments on data collection below). We then assessed both innovations with respect to the stated objective, that is, whether they strive to eliminate waste, minimize finite resource use and loop back materials into the economy (Ellen MacArthur Foundation, 2015; Kirchherr et al., 2017; Potting et al., 2017). While the assessment of the circular character thus may be subjective as long as no commonly accepted definition

and measurement system exist, we deemed the circular objective of the innovations adequate for our interest in researching the innovation *process* that the companies undertook for deliberately engaging in circularity. As for (2), we relied on the same public sources as mentioned above. We compared the disruptive character of the innovations with the definition by Christensen et al (2015, p. 4) and in particular analyzed any potential tensions with respect to the nature of the business in terms of processes, values and resources (Christensen et al., 2018). Based on this comparison, we assessed both innovations to have the potential to be disruptive in the sense of Christensen.¹ We corroborated our view of both innovations as circular and disruptive in several discussions with other researchers on the circular economy and in the discussions with our interviewees which provided us with additional information on the innovations and the companies' plans.

We started our investigation with wide-ranging desk research of publicly available material. Both firms' innovations were publicly known, and both received considerable public attention. Hence, we reviewed web pages, blog posts, and press releases from both incumbents, as well as from potential customers and competitors, and news articles from outlets such as packagingeurope.com and greenbiz.com. Given the potentially limited reliability of such sources, we used this secondary data merely to develop a broad understanding of the innovations and an initial case description. We also prepared for our in-depth interviews by identifying focus areas and knowledge gaps.

As the main source of data, we conducted semi-structured, in-depth interviews with key stakeholders from both companies. All interviews were conducted by two of the authors, so we could compare personal impressions and avoid bias. We conducted eight interviews, each of which lasted 50–90 minutes and was audio-recorded and subsequently transcribed. A list of interviewees can be found in Table 8-1.

¹ This can only be objectively analyzed in hindsight once markets have indeed been changed, but this would have entailed a much longer time lag for our analysis and would not have allowed us to collect interview statements as long as experiences were fresh in the interviewees' minds.

Table 8-1 List of Interview Partners

Case company	Role of interviewee	Company	Duration (min)	Date of interview
PlastiCo	Start-up CEO	Start-up acquired by incumbent	50	16 June 2020
PlastiCo	Innovation Manager	Incumbent	90	17 June 2020
PlastiCo	R&D Manager	Incumbent	60	18 June 2020
PlastiCo	Sustainability Manager	Incumbent	60	26 November 2020
PlastiCo	Managing Director, Venture Unit	Raw material producer / Venture partner	60	22 June 2020
ApplianceCo	Sustainability Manager (central unit)	Incumbent	60	10 November 2020
ApplianceCo	Innovation Manager	Incumbent	55	4 September 2020
ApplianceCo	Regional Retail Manager	Incumbent	70	6 November 2020

For each case individually, we followed a three-step approach of data analysis, and then engaged in cross-case analysis to develop our final results.

Starting with our first incumbent, in step 1, we analyzed individual interview transcripts to systematically work out the initial challenges and the firm's response. We compared our findings to the challenges and propositions described in the disruptive innovation literature, and developed a first set of relevant insights. In step 2, we triangulated the insights from the different interviews to refine those themes that seemed relevant to the decision to implement circular innovation and the actual setup, or those that seemed important beyond the mere organizational structure (Eisenhardt, 1989). In step 3, we synthesized these findings and developed a first thematic structure of the most important elements of the chosen strategy, as we saw them. We then performed the in-depth analysis for our other incumbent following the same stepwise approach. Finally, we performed a cross-case analysis to compare our findings from the individual cases and continuously went back and forth between our emerging model and the data to refine it until we arrived at our final framework, which is illustrated below (Eisenhardt, 1989; Yin, 2009).

8.4. Findings

We have structured our findings as follows: In 8.4.1, we focus on the initial situation and show that the preconditions for disruptive innovations are present in both cases. In 8.4.2, we turn to the incumbents' strategic response, and set out how structural separation helped them to overcome the challenges identified. In sections 8.4.2.1 to 8.4.2.3, we take a more abstract view and show that deliberate preparation, as well as ongoing management for realization, was vital for circular innovations.

8.4.1. Initial Situation and Disruption Challenge

PlastiCo, our first incumbent, is a leading firm in the plastic packaging industry in Europe, with annual sales exceeding one billion euros. Since its foundation, it has produced packaging based on a variety of plastic polymers. PlastiCo has a large R&D department that works on optimizing its packaging solutions and high-volume processing. It builds its own packaging machines, and is known for its global network and large-scale process expertise in this field. PlastiCo sells into an efficient, commoditized market where price—given a certain standard of quality—is the central attribute. Its clients are large, established companies from diverse food and non-food industries, such as fast-moving consumer goods, who order high volumes of standardized packaging.

The mainstream packaging market does not currently value sustainability over price or quality. However, while PlastiCo's core business was strong, managers sensed that change was in the air, as public awareness of environmental problems and regulatory pressure were increasing. As the Innovation Manager recalled: *“At that time, a [EU] directive appeared on the horizon. [...] It stated that certain products would disappear [...]. And then you start asking yourself whether [our product] might also be among those [disappearing] at some point.”* In addition, managers noticed that customers and citizens were becoming increasingly concerned about sustainability—concerns that could not be easily addressed with PlastiCo's existing products. In this light, a potential opening for new competitors arose, as one interviewee admitted: *“If somebody realizes that a blank space or a vacuum is developing, which can be filled, then why wouldn't they?”*

Although PlastiCo's managers noticed the emerging threat, they found it difficult to respond from inside the established company. From day to day, they were fully focused on current customers, who always took priority. But even when they began actually considering new, potentially disruptive innovations, it was difficult to act—for several reasons.

First, managerial resources represented a hurdle. Executives were not trained in managing uncertain, potentially high-growth projects, and the prevailing incentive system made employees hesitant to bet on innovations, as the Innovation Manager pointed out: *“Of course, there's also an enormous risk associated for all the people involved because, ultimately, jobs depend on it.”* Second, organizational processes were inadequate to realize such an innovation, since they were designed around the company's stable business. Comparing PlastiCo to an independent innovation team, the R&D Manager commented, *“I don't think we would be able to make this type of progress, simply in terms of agility, decision-making, etc.”* Third, organizational values—that is, the established standards of profitability and size against which new projects were evaluated—meant that an early-stage innovation could not compete with other internal projects. *“These are projects that have no relevance to us in terms of size,”* explained the Innovation Manager. In addition, the prevailing uncertainty meant that such innovative projects could not be evaluated according to traditional performance metrics. Thus, innovative projects that did not appeal to the existing customer base and business case were continuously deprioritized. All in all, PlastiCo's managers deemed it impossible to successfully develop a potentially disruptive circular innovation inside the core organization.

ApplianceCo, our second incumbent, is a large European player in the market for home appliances, with annual sales surpassing ten billion euros. It offers a broad range of home appliances, which it traditionally sells in bulk to leading retailers. ApplianceCo offers maintenance services to consumers, and employs a large service team for this purpose. It develops and manufactures its machines in-house, and places an emphasis on continuously improving its machines and manufacturing processes. As in PlastiCo, ApplianceCo managers noticed new market trends emerging. They realized that consumers increasingly valued digital features such as managing connected appliances through smartphones, and direct-to-consumer services such as digital subscriptions. *“And then at some point we noticed [...] we were losing market share in our home market,”* explained one interviewee. *“And then we realized digitization was a trend that we’d slept through [...].”* Managers also began to realize that sustainability and circularity had become important trends—in particular when this was brought to their attention by the marketing and sales employees who were closer to the customer. As the Regional Retail Manager reflected, *“In a certain way, the aspect of sustainability and circularity [had] been a part of [our endeavors] right from the start.”* Hence, managers realized that two connected trends had emerged, and that they would have to find a way to adapt.

However, like their counterparts at PlastiCo, the managers of ApplianceCo found it difficult to formulate an internal response. Once more, managerial experience represented a hurdle. Building and scaling an innovative offering responding to evolving market trends around digitization and circularity would require fundamentally different managerial resources, such as experience in building an agile, customer-centric solution. As the Innovation Manager stressed, *“This is another set of skills that you don’t have in [the established organization].”*

In addition, managers were wary that new circular offerings that would involve serving the end user directly would demand different logistics processes. Since ApplianceCo currently sold through retailers, a direct-to-consumer offering would require switching from bulk deliveries to dispatching thousands of individual orders to individual users. In addition, important structures were missing, since ApplianceCo had no direct marketing and sales to end users, which it would need for many potential new offerings. Thus, the incumbent would have to essentially transform itself from a B2B to a B2C company, which also required new skills and extensive changes.

Last but not least, organizational values represented a hurdle, as innovation could not compete with the established business on traditional measures focused on short-term payoff, as the Sustainability Manager confirmed: *“It’s about market share, sales, and EBIT, within a time horizon of two or three years [...] and the whole management team is assessed on this.”*

In sum, ApplianceCo’s managers also considered it difficult to develop the new business inside the firm’s established structures.

Table A.1 in the Appendix provides further supporting insights from our interviews.

8.4.2. Strategic Response of the Incumbents

Despite the challenges they faced, both incumbents decided to pursue a potentially disruptive circular innovation.

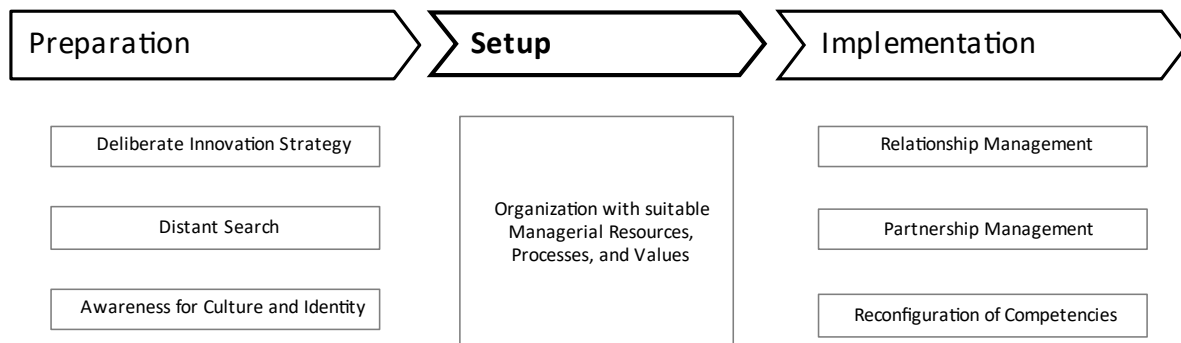
PlastiCo bet on an innovation with the goal of producing a recyclable packaging solution based entirely on paper as a renewable material. This material base differentiated the product from PlastiCo's existing portfolio of products, which were based on plastic polymers and required very different handling.

A first life cycle assessment of the new product indicated that even at this early stage of development, it had a slightly better environmental performance than the established products. However, as the production technology and exact material composition were still in development, the product's performance in terms of mainstream attributes was significantly lower (e.g., its material properties such as water impermeability were still inferior; the material was more difficult to handle; and production cost was considerably higher). Overall, the innovation was inferior to the established solution. Nevertheless, PlastiCo reckoned that the innovation had the potential to fundamentally change the market. On one hand, the performance shortfall was based on the early stage of the technology, as the Innovation Manager pointed out: *"In comparison, [the established company] has a high-performance technology [...], there is a huge gap."* Thus, there was great potential for improvement: *"The research is clearly going in a different direction and we'll hopefully be able to show something in a relatively reasonable time [...]. And then it will really be a game-changer."* On the other hand, PlastiCo believed that circularity would become important to a growing customer group, and saw indications that mainstream customer preferences were also slowly shifting. As one interviewee put it, *"Our customers also [said], [...] 'We want to reduce plastic.'"* Due to this interest, PlastiCo believed that the new solution would become successful over time, and could even become a *"product competing directly"* with conventional products.

ApplianceCo launched a product-as-a-service offering for its core products, directly targeting end users with a rental offering that combined connectivity features and life-cycle enhancing maintenance and repair services. Given their lack of direct customer relationships, the company created a new consumer brand. At the beginning, the service was expensive and inflexible, and mostly appealed to a fringe market. However, ApplianceCo was confident that the continuous improvements of the offering on the one hand, and the growing trend for circularity and digitization on the other, would grow the customer base and ultimately make the product attractive to mainstream consumers as well—even if it took a while. As the Innovation Lead pointed out, *"I do believe [it can become mainstream]. What we've seen is that the attitude towards property tends to change with the younger generation [...] and that the concept is very compatible with them."* ApplianceCo's managers were confident that, ultimately, the offering would even appeal to their core clientele, *"who just want a solid machine that works [...] That also fits with the carefree image of [the service offering]."* Thus, they believed that the new offering had huge potential.

Overall, both firms implemented solutions that could be considered disruptive in the established setting of the company. But importantly, our analysis shows that implementation of the innovation was the outcome of a lengthy preparatory process and a deliberate structural setup, followed by purposeful implementation. Figure 8-1 illustrates an indicative process model depicting the main steps and elements.

Figure 8-1 Circular Innovation Process Framework



8.4.2.1. Preparing for Innovation

In the preparation phase, three main aspects played a role: formulating a deliberate innovation strategy, searching for distant solutions, and dealing with cultural barriers.

Deliberate Innovation Strategy

Both firms initially developed a deliberate strategy to come up with a response to the observed changes in the market.

Long before getting into paper-based packaging, PlastiCo had decided to set up a team to develop an innovation strategy. This team consciously focused on market trends and innovation beyond incremental improvements of existing solutions. This structured process increased managers' awareness of societal changes, and sustainability and circularity emerged as central elements, as the R&D Manager recalled: *"[It] has already become very clear that sustainability topics in particular will be extremely important [...] for the future of [the established company]."* Therefore, PlastiCo integrated these topics into their central innovation strategy and set an ambitious growth target, as the responsible manager explained: *"The whole ambition is that we need to be competitive [...] Our vision is 'a [product] in every hand'. Inspired by Microsoft, you know, 'a computer on every desk.'"* In line with this, they accepted the threat of cannibalization and decided they would rather be the disruptor than the disrupted.

Interestingly, PlastiCo perceived that there were several potential circular pathways—all equally uncertain—and felt that they had to get involved to judge their respective potential. As the Innovation Manager explained, *"I can really only evaluate such a company and such an idea if I actually implement it. [...] You can do endless theoretical studies, [but] if I don't execute it, I don't understand the logistical complexity behind it."* PlastiCo pointed out that the alternative material was only one option and, if it didn't work out, they would try something else: *"There's never just one project. [...] There are disruptive activities of all kinds. What if we don't need any [products] at all, then the [innovation] is gone too. [...] That's not so unthinkable."* PlastiCo needed to find a way to explore options that were still too uncertain to justify larger changes in the incumbent organization.

ApplianceCo had undergone a lengthy process to set themselves up to pursue potentially disruptive innovations and, as a result, had established a digital business unit with full autonomy

and connections to top management. This unit had been set up as a strategic priority by ApplianceCo leaders, who had understood the need for a deliberate strategy to pursue innovation. The unit's team was tasked and equipped to focus exclusively on innovation, and soon homed in on circular innovations as an area of focus.

In this setup, managers could leave short-termism behind and look at the big picture. As the Sustainability Manager set forth, they could ask: *“‘How do I earn money in the long term, or actually maintain my base?’ And that’s really where the topic of the circular economy and sustainability and so on comes together, where you reflect on the time horizon. When is an investment worthwhile, or when is a business worthwhile, or how long do I want to run my business?”* Overall, ApplianceCo managers believed in the potential of the innovation.

Distant Search to Sense New Opportunities

To develop new ideas, both companies engaged in trend research and gained inspiration from the market.

After they had learned that sustainability and circularity were increasingly important trends, **PlastiCo's** managers conducted a strategic search to scout out potentially disruptive ideas outside the current core. As the R&D Manager explained, *“We identified strategic search fields for the innovations. [...] One of these search fields is called Substitution of Plastics. And that’s a tough nut to crack. Because in [the established company], we have a mission statement [...] ‘We are a plastics converter’ [...] and these are conflicting goals, of course. Nevertheless, I believe it is precisely the task of innovations to challenge these set boundaries.”* It was this strategic search that made the company's managers aware of solutions like the one ultimately developed.

The initial idea for the innovation at **ApplianceCo** had been developed by a regional marketing and sales team closely connected to the market. They had also observed the growing trends for circularity and digital services, and had started to explore options through methods such as workshops. As the regional retail manager recalled, they asked themselves: *“How can we get new business, and how does the sustainability topic really work, and how can we connect those things? And then leasing was one of the ideas.”* In the central organization, the digital business unit had been set up with the deliberate goal of engaging in open search for innovation, and turning the core organization *“upside down to digitize it and deal with new business models.”* The unit team, hired from outside the firm, scouted freely for ideas and also brought in their own new perspectives.

Awareness for Culture and Identity

Managers at both firms realized that tensions with the established culture existed that they would have to overcome to implement their innovations.

The top management of **PlastiCo** initially found it difficult to accept an innovation so distant from the current business. As the Innovation Manager recalled of the first discussion: *“The first time it was a relatively clear ‘no’ [from management]. ‘That’s not rigid plastic packaging. We don’t do that.’”* It took perseverance from the innovation team to ultimately get the go-ahead. However, skepticism prevailed throughout the organization, as the R&D Manager pointed out: *“I think the majority of them are probably laughing behind closed doors and*

saying, ‘What the hell is that? What are you doing there?’ [...] It’s kind of a joke.” The managers realized that cultural change would be a lengthy process, and a separate structure could provide a safe space for the innovation in the meantime. In addition, the potential positive experience could help lower the barriers to similar engagements in the future.

Similar attitudes were found at **ApplianceCo**, as the Sustainability Manager pointed out: “Only in [the digital unit] was it possible to gain understanding for such a topic. Everyone else said, ‘No, that won’t work.’” As the Innovation Manager highlighted, the process of cultural change would make it cumbersome to realize innovations in-house: “I think if you do it internally, then you just have to expect change management, and the mindset change on top. Because there are people who have executed a linear model for decades, and then when you need more from them, you first have to convince them and bring them around to a circular mindset. [...] If you do it externally, then you have fewer resources, awareness, scaling effects. But you don’t have the whole legacy of people [who say], ‘No, we’ve always done it this way.’ [...] You have to weigh that up.” Having a separate entity for the innovation was considered helpful, just as it was at **PlastiCo**.

Table A.2 provides further supporting insights from the interviews.

8.4.2.2. Innovation Setup

To pursue the innovations, both incumbents followed a strategy of structural separation.

PlastiCo acquired a startup working on the paper-based packaging solution. It thus effectively established a separate organization for the pursuit of the innovation, as the startup continued to act as an independent organization with its own entity and brand.

As the managers explained, this setup was better suited to the innovative project.

First, the startup was able to secure the right managerial resources by hiring external staff with the right mindset, skills, and ambition to develop and scale something new. As the innovation manager said, “*I think it would be totally wrong to only have employees from [the incumbent]. To be honest, that would be stupid. You need a certain culture here. We want to do something new [...].*” Second, they were also able to establish processes that suited the new business, as the manager underlined: “*We fought very, very hard to keep this company from becoming an integral part of [the incumbent]. That would have been a death sentence before we even started.*” Third, regarding priorities around profitability and project scale, the different size and cost structure of the startup effectively led to a different set of organizational values, and thus made the innovation attractive, as the manager explained: “*Even for [...] five million [unit sales], nobody [in the established organization] will lift a finger. [...] But we can survive even with 10,000 [sales] under certain circumstances, with our company structure, because our fixed costs and so on, [our] expected values, [all] fit together.*”

ApplianceCo opted for a separate structure to develop its rental model. Initially, the idea was developed on a small scale in a regional marketing and sales unit. Once there was a proof of concept, the firm placed the model under the auspices of the digital business unit to be scaled up.

As the interviewees explained, this setup was extremely helpful for developing the innovation, not least because the managerial resources were tailored to the new business's needs. Most people working in the digital unit had been hired externally for their experience in building new ventures from scratch: *“completely different people from other industries, who [...] have also brought in a completely different culture,”* as the sustainability manager put it.

What is more, the unit had the freedom to build whatever processes it needed, as its manager explained: *“If [our requirements] can be met by the established processes, we use them [...]. If not, we are empowered by management, and thus by [ApplianceCo], to look for other ways that we believe are more conducive to the success of the business model.”*

Last but not least, the digital business unit had been set up to develop innovations, and the uncertainty of these endeavors had been embraced by management. Thus, the acceptance of higher risks was reflected in its values, as the Sustainability Manager recalled: *“This unit had a direct line to the Managing Director at the time, who also gave it whatever it needed. Accordingly, massive amounts of money flowed into the unit and they simply did what they did, and were not questioned.”*

Overall, in both cases, the structural separation was considered instrumental to creating a setting with resources, processes, and values tailored to the needs of the innovation.

8.4.2.3. Implementing the Innovation

When it came to the actual implementation of the innovation, the key success factor was the active management of the innovation project—and, more specifically, the relationship between the incumbent and the project, partnerships, and the reconfiguration of competencies.

Managing the relationship between the incumbent and the new business

At **PlastiCo**, it was initially difficult to protect the autonomy of the new entity, as management wished to shape it according to their views. The Innovation Manager knew there were benefits to be reaped from accessing the incumbent's resources, but was careful to balance these benefits with his team's developmental freedom and speed. He stressed: *“You have to start positioning yourself so that you simply don't create any dependencies.”* However, the incumbent's competencies, such as its experience in managing large-scale production networks, could become increasingly important in the long term, as they might be instrumental to scaling the innovation.

Meanwhile, at **ApplianceCo**, there were many touchpoints between the incumbent and the new business. While business development was handled in the central digital unit, the innovation team was connected to the incumbent's local units for day-to-day work. Indeed, service delivery was managed exclusively by ApplianceCo's aftersales team. In this collaboration, the innovation benefited from an established service fleet, while the aftersales unit could earn an additional income. As one interviewee pointed out, separation seemed more beneficial for the customer-facing side, where the new business needed to freely test and iterate the offering, while synergies could be reaped by collaborating in the backend. These interdependencies were particularly relevant for circular innovations, as the Innovation Manager explained: *“I think in the circular economy you often have these touchpoints [between*

the innovation and the core], like in our case, where you say ‘Well, we can only work within the limits defined by the product design’ [...].” In addition, ApplianceCo also received valuable user insights from the innovation team. This integral collaboration between manufacturer and service provider made it possible to optimize for circularity, which was considered the main success factor in the long run.

Partnership Management

PlastiCo partnered with a raw material producer with extensive experience in handling the alternative material, who coinvested in the startup. This collaboration was important because, due to its circular character, the innovation would “*disrupt the whole value chain*” and therefore require new competencies in various steps of the chain. The material producer’s competencies complemented PlastiCo’s own. As the Sustainability Manager admitted, “*We wouldn’t be the right organization at all to do this alone.*” The startup also had co-development agreements with selected consumer brands, as its manager explained: “*They have the task of making sure our packaging is as relevant to the market as possible.*” However, while this generated important insights and motivation for the incumbent to foster the startup, it also put more pressure on performance requirements than a niche market would have. As the R&D Manager confirmed, “*If you ask me, three of these four applications are very, very sophisticated in terms of the technological requirements. [...] If I could choose, I would get other customers, because it would be much, much easier to be successful. (...) Now we’re struggling with these expectations, which are very difficult to meet. And that puts the organization under pressure.*” But for the startup, it mattered more that the collaboration with potential large-scale customers served as insurance for sufficient demand and growth potential.

It was a different picture at **ApplianceCo**. In essence, the decision to build a B2C service could be regarded as a forward integration, where retailers were replaced with a direct sales channel. Although existing retailers were not interested in becoming an intermediary for service contracts, the new development still created some tension with them, as ApplianceCo’s Retail Director pointed out: “*It’s a threat, because retailers will definitely complain, saying, ‘This is my business. What the hell are you doing?’*” At the same time, it gave ApplianceCo more control over the various options for closing the loop within a CE model. Thus, compared to PlastiCo, partners became less important, but internal collaboration became more so.

Reconfiguring Competencies

Interestingly, the interviewees also saw engagement in the innovation as an opportunity to reevaluate the incumbent’s core competencies.

At **PlastiCo**, two aspects played a role: First, the interviewees believed that some customer segments would stick with the existing packaging solution in the long run, and reflected on how they could refine their competencies to best serve these segments. Second, they reevaluated the relevance of existing competencies for the circular solution. While their experience in material and machine manufacturing could help to set up the production of the new product at the beginning, if the circular business scaled, other competencies would become more important, as the R&D Manager explained: “*With our good customer relationships, with our network and our footprint, we could have a sweet spot.*” Hence, PlastiCo reflected on the

relative importance that their competencies would have in the future if the circular solution became dominant.

Internal shifts could also be observed at **ApplianceCo**. Perhaps most importantly, with the leasing model, the firm's aftersales unit became strategically important, and internal perceptions shifted from seeing it as a "*necessary evil*" to a competence integral to success. In addition, while ApplianceCo had previously focused on driving down production costs to compete on price in Asian markets, the leasing model renewed the firm's appreciation for their own ability to build high-quality, long-lasting machines that were more suitable for rental. Furthermore, they built new competencies for the new business through the direct customer-centric service, which were also relevant to the core business and helped further optimize machines for both rentals and sales.

On a more general level, both incumbents made considerable efforts to extend their competencies in managing potentially disruptive innovations. They understood that these were important beyond the specific project, as they would probably need to explore further options for circular innovation. Therefore, they also equipped themselves to run uncertain innovation projects repeatedly.

Table A.3 provides further supporting insights from the interviews on the implementation.

8.5. Discussion

8.5.1. Implications for the Literature

We performed our case study to understand whether the suggestions from the disruptive innovation literature could help fill a void in the CE literature. By looking through the lens of disruption, our study provides a deeper understanding of the challenges that incumbents face when engaging in circular innovations, and how to overcome them.

Overall, our findings indicate that the many challenges associated with circular innovations may indeed be quite similar to those described in the disruptive innovation literature and, thus, help to explain the incumbents' hesitance to engage. This inaction may be dangerous in the long run, in the light of the growing trend towards circularity and the resulting growth in fringe markets—which all interviewees observed—but also because of simultaneously shifting customer preferences in the mainstream market, which could accelerate the disruption process in the CE context. Thus, the "innovator's dilemma" is just as challenging in the novel context of circular innovation.

On a more detailed level, our analysis highlights four important aspects.

First, our findings corroborate the importance of cultural barriers (e.g., Kirchherr et al., 2018) and shed light on their role at various stages. It required cultural openness on the part of top managers to take the decision to engage in circular innovation in the first place, and a deliberate new setup with its own culture to overcome the skepticism in the wider organization to enable the innovation. Furthermore, our findings suggest that these cultural barriers have different facets. On one hand, managers were struggling to build an agile and growth-oriented mindset, and thus struggled more generally with realizing innovation within an established

business setup. On the other hand, they doubted whether circular innovations would have relevant potential, and whether their previous linear way of doing business was potentially becoming obsolete. Regarding the latter, the findings indicate that identity played an important role. Managers were reluctant to engage in circular innovation because they felt it was at odds with the understanding they had about the role and domain of their company in a linear economy. This also resonates with findings from Kammerlander et al (2018), and others from the innovation literature who underline the importance of culture and identity (Anthony & Tripsas, 2016).

Second, our findings highlight the importance of changes in competencies in the circular innovation context. As circular innovations often have implications that extend beyond the individual company and affect the value chain at large, they may require a different set of competencies from those that incumbents currently possess. Consequently, incumbents need to think about how they can secure such skills, either by building them up internally or by partnering with external entities. In our case study, ApplianceCo sought to extend its competencies to close the loop itself, while PlastiCo cooperated with new partners.

Relatedly, the reevaluation of competencies and the assessment of their relative relevance in a (more) circular future seem important. For example, PlastiCo's managers saw their large-scale process experience and worldwide production network as a competence that might be even more relevant in a circular future, while the handling of seemingly less sustainable polymers might become less important. At ApplianceCo, meanwhile, the largest shifts were the growing regard for customer service and the firm's renewed appreciation of its competence for building high-quality, long-lasting machines.

At the same time, our findings demonstrate that even as circular innovations grow, the linear business is expected to remain relevant—at least for the foreseeable future. Hence, navigating competencies in the transition process may be an important ongoing task due to the need to balance the requirements of the old and new businesses. These findings resonate with the notion of the role of dynamic capabilities for innovation (Teece, 2009; Teece & Pisano, 1994). As Teece sets forth, dynamic capabilities refer to “the sensing, seizing and reconfiguring skills that a business enterprise needs if it is to stay in synch with changing markets” (2010, p. 190). Our findings on the importance of distant search resonate with the sensing skill advanced by Teece, and our findings on the need to reevaluate existing competencies and to build or secure access to new competencies underline the importance of reconfiguring skills. We thus contribute an additional perspective on the challenges of circular innovation to the literature.

Third, our findings suggest that a separate organizational structure can be helpful for incumbents to engage in potentially disruptive circular innovations. Such a construct can provide a tailored setting where a different organizational culture and identity can develop. Connected to the discussion on dynamic capabilities above, a separate structure can be a way for companies to evaluate which competencies are needed for circular innovations, and how competencies can be reconfigured to remain competitive in a (more) circular future. This line of reasoning also connects back to O'Reilly and Tushman (2008), who argue that ambidexterity can function as a dynamic capability that helps companies reconfigure assets and capabilities to stay competitive in the future.

With respect to ambidexterity, the environmental context and the perceived uncertainty of the innovation also play a role. As circularity approaches were rather new, and several different options seemed worth exploring, a separate approach was especially helpful to test ideas before making cumbersome changes in the core organization. This also resonates with Ossenbrink et al (2019), who argue that either a more separate or a more integrative approach to ambidexterity can be worthwhile, depending on the perceived environmental uncertainty and the distance of the innovation from the organization's current culture and capabilities. In line with this, it is possible that as circular innovations mature, a few dominant circular strategies will emerge, and that this may reduce the need for broad exploration.

However, for circular innovations in particular, there could be more interdependencies between the established business and the innovation, as well as with external partners, due to the need for competencies throughout the value chain. Thus, the degree of separation from the core needs to be carefully balanced.

Related to this is the fact that managing the relationship between the core and the separate unit may not be easy. Indeed, O'Reilly and Tushman call the need for the exploratory unit to secure the resources it needs without being overwhelmed by the established business a "delicate balance" (2008, p. 198). In our analysis, it seems that this may be especially relevant for circular innovations. At ApplianceCo, interviewees believed that collaboration with the core and the active use of its competencies were the main success factors. While the new business could use its ability to freely pivot to iterate its customer-facing service, competencies around the entire circle were needed in order for the circular advantage to materialize. The real advantage, therefore, was based on the core organization's strong customer service competencies and its control over the whole production process, which allowed appliances to be adapted as required to optimize the customer offering in the long run.

Overall, we see that a separate structure can indeed have advantages in the beginning, as it helps to overcome cultural and structural barriers and to speed up the innovation process. However, in the context of circular innovations in particular, it may be worthwhile managing a closer collaboration to implement the solution at a broader scale in the long run, and to be able to reap the benefits from the circular character of the innovation.

Fourth, our findings highlight the importance of a deliberate innovation strategy to realize circular innovations. In both cases, interviewees were convinced that a fundamental precondition for engagement was the deliberate decision to make circularity part of the overall innovation strategy and to encourage the ambition to achieve it. Only this decision, and the associated top management support, made it possible to openly explore distant options, accept the inherent uncertainty, overcome cultural barriers, and, ultimately, set up new organizational structures. As previous research indicates that circularity is very rarely organizationally embedded, and is seldom part of firms' corporate strategy (Guldmann & Huulgaard, 2020; Rubel et al., 2018), these missing preconditions may further explain why we see so few examples of disruptive circular innovations.

8.5.2. Implications for Practitioners

Our work offers relevant insights and recommendations for practitioners interested in pursuing circular innovations in established organizations.

First, our findings indicate that in order to overcome the challenges identified and realize a circular innovation, it is important to approach it as a task of strategic importance. In particular, it may be helpful to embed the concept in the corporate strategy and the overall innovation strategy, put it on the business development agenda, and accept the associated uncertainty that is inherent in innovation in general. In addition, consciously engaging in distant search can help to identify promising circular innovations. This central anchoring may help to increase the understanding of the transformative need for circular solutions, and also to overcome cultural barriers. In line with this, a clearly stated, far-reaching ambition to pursue circular innovation and top management support are instrumental to securing the needed resources and the freedom to freely develop novel circular solutions that represent radical departures from the business of the core.

Second, our findings suggest that it is helpful to evaluate whether the identified potential innovations are incremental, or if they have a more disruptive character, and thus will likely create significant tensions with the existing culture and set of competencies. If tensions are high, practitioners might consider initially pursuing the innovation outside the current structure. This can also be a good way for companies to explore the potential of various circular options. At the same time, as the interdependencies with the core organization seem particularly important for circular innovations, it can help to foster an ongoing exchange and work towards cultural change in the incumbent organization to enable a fruitful collaboration.

Third, on a more general level, it seems helpful for companies to reevaluate their core competencies more broadly with respect to potential circular innovations, and thus prepare the organization for the long-term transition to a CE.

8.5.3. Limitations and Future Research Directions

Our study has several limitations. Most importantly, our case study comprises only two cases, both of which are examples of structural separation. While our findings do indicate the helpfulness of separation, that is not to say that an integrational approach would not work. In addition, our case studies are still at an early stage, and while there is potential, it is not yet clear whether the innovations will actually prove disruptive. Hence, a study that more systematically compares numerous cases of both using structural separation and integration over a longer time period may be useful to further develop our findings.

Moreover, we do not explicitly address and compare the kinds of circular innovation that have been pursued. It would be interesting to more structurally analyze different types of circular innovations and assess whether it is possible to differentiate disruptive or incremental innovations from each other and, in line with this, assess more clearly what specifically makes circular innovations disruptive. Christensen argues that disruptive innovations are market-based/demand-side oriented, as they attract fringe market customers and disruption occurs through uptake by the mainstream. However, supply-side or architectural innovation has also

been widely discussed in the literature—i.e. innovation that erodes the dominant design of an organizational architecture, a partnership network, or even a whole ecosystem, but may not even be visible to the consumer (Gans, 2016; R. M. Henderson & Clark, 1990). This latter type of disruption may be especially important in the CE context, since the actual looping of materials may require wide-ranging reconfigurations within a company and along the value chain, but no corresponding changes on the customer side. It would thus be worthwhile to further explore and characterize circular innovation types in this regard. In line with this, it might also be interesting to further analyze the relevance of particular competencies in circular models, and further pursue the line of argument suggesting that the disruptive nature of an innovation can be assessed in terms of whether it is competence-enhancing or competence-destroying for an incumbent (Gatignon et al., 2002; R. Henderson, 2006).

8.6. Conclusion

This study addressed the question of how incumbents realize circular innovations that may be at odds with their current business reality. By introducing the notion of disruptive innovation to the CE, we offer a framing for the analysis of the challenges of implementing circular solutions for established firms and potential steps to overcome them. Through an in-depth study of two companies that are pursuing circular innovations, we show how structural separation of the innovation from the central organization can help to successfully implement circular innovation—but with some caveats. Our research indicates that a structural separation is closely related to the firm’s innovation strategy, which provides the basis for such a decision and points towards aspects of partnerships, organizational culture, and competencies that need to be considered for successful implementation. Our framework thus extends beyond the mere fact of structural separation to include these other aspects, and offers a holistic view of the steps incumbents must take for implementation of circular innovation.

By looking at the organizational context for implementation, our work contributes to closing the frequently observed design–implementation gap in the CE from a theoretical point of view, and thus contributes to filling a void in the literature. We see our study as one step towards better understanding organizational and strategic challenges related to circular innovation, and identifying suitable ways for incumbents to overcome them and implement such innovation.

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8.7. Appendix

Table A.1: Further Quotes Supporting the Findings in 4.1: Case Description/Initial Situation

Initial situation	
PlastiCo	<p>“No customer is willing to spend one cent more than they have to.”</p> <p>“And then we realized for the first time: ‘Uh, it’s not easy at all, you can’t get there with normal, smaller measures.’”</p> <p>“There is guaranteed to be some customer who has some need at any given moment [...] Of course, that has priority.”</p>
Values	
PlastiCo	<p>[with a focus on the innovation project]: “This is a super high-risk project. [...] The probability that it won’t work is definitely higher than the chance that it will.”</p> <p>“It’s not like we can put down a business plan and then you can show, ‘In 10 years you will earn over two billion euros.’ That is ridiculous.”</p> <p>“A sales manager [...], if he can land a big project where he knows, established technology, he gets the return [...], then that’s a very clear [decision] ... and the whole thing is following well-established processes. Everyone knows what to do. And on the other hand, he is supposed to sell an innovation project where he knows he will only get his fingers burned in the medium term.”</p>
ApplianceCo	<p>“The [product] unit did not want to deal with the topic at all, and said, ‘What you’re planning to do with renting is nonsense [...] And building that up costs x million in development costs [...] We will not do that again, and certainly not for such a small project.’”</p> <p>“Like any other company, the [incumbent] has limited resources and always has to decide: Do I invest in project A, B, or C? And the impact on the market is currently still low or not even discernible.”</p> <p>“I would also say it is niche, so it is definitely not mainstream yet.”</p>
Processes	
PlastiCo	<p>“I wonder how I should explain to a salesperson at [the incumbent] that, on the one hand he should sell [the established product], and on the other hand he’s supposed to sell the [new product]. I mean, that can’t work. He’ll have schizophrenic attacks!”</p>
ApplianceCo	<p>“You need different IT systems and new solutions, [to] do different things in Logistics. It is not one product, 120 [identical] items in a truck. It’s 120 pieces, which are all different and individual to a lot of addresses to consumers. Everything is different. It’s not one invoice per trip, but it’s an invoice per product and we are not really keen on... [...], we are simply not used to those kinds of processes. It’s fully new [...] It’s a lot of work.”</p>
Resources	
ApplianceCo	<p>“Changing a B2B company to a B2C company is intense because it costs a lot of money and it’s about change and it’s about doing new things. It’s about responsibility. And that’s a bumpy period.”</p>

Table A.2: Further Quotes Supporting the Findings in 4.2.1: Preparation of the Innovation

Innovation strategy	
PlastiCo	<p>“The Innovation [team] [...] we have broken away from normal business. [...] That took place, this separation. The commitment that you have resources, that you have the budget, explicitly for crazy things. [...] We now have an organization that can deal one hundred percent with the subject of innovations.”</p> <p>“TeamX had the task of pursuing ‘Forefront Innovation,’ i.e. everything that has a horizon that goes well beyond the next product life cycle.”</p> <p>“We developed an innovation strategy [...], so we have a five-year plan with strategic objectives [...]. Then, for the first time – and it was very unusual for [the established company]—we didn’t look directly at our customers, but actually asked, ‘Okay, what is society doing? [...] What moves a consumer and what are the real pain points?’ [...] It was in the course of this initiative that we launched that we first came into contact with trends.”</p> <p>“From my point of view, it was a purely situational, purely emotional decision [...] We are willing to provide resources [...] and say, let’s try it out and try something new.”</p> <p>“There should be growth. And I’ve always said internally, half-jokingly, that one day this will save our asses. Excuse the expression. But that means we want ... in five to 10 years... I see five to 10 locations.”</p> <p>“The [startup] is a clear competitor to [the established company]. This is how we are set up. It’s not our job to go easy on [the established company]. Strong competition.”</p> <p>“I’d rather participate with a certain percentage than not at all.”</p>
ApplianceCo	<p>“The initiative, and the reason why we want it, [is] the strong belief that it’s the core of our company or the potential core of the company in the future.”</p> <p>“[It has] far more potential than what we have today.”</p> <p>“If [the innovation] were to become cannibalizing, we’d be practically ready. Of course, you can take it up earlier than some competitors, or at least on an equal footing.”</p>
Awareness for culture and identity	
PlastiCo	<p>“It would have been unthinkable if we hadn’t done it that way, because, as I said, our company, our identity is plastic [...] When you talk about circularity and talk about sustainability, recycling is the first answer. But for our activities, these set boundaries have been moved.”</p> <p>“Our people have hearts of plastic.”</p> <p>“You get laughed at by [the established company] too—it’s not like everyone says, ‘Wow, so cool that you’re doing this!’”</p> <p>“I definitely see change there, especially in the innovation area, in the mindset [...] well, for fundamentally different things, so it could be the next [big] thing. It may not be called [startup name] and may not be [the renewable material], but who knows what is bio-based, biodegradable.”</p> <p>“This is of course a good example to change this mindset in the area of innovation or in the area of business opportunities in general. If you have something that is implemented and not just basic research and then it disappears into a drawer and nothing shows up on the market.”</p>
ApplianceCo	<p>“You can’t do that in such a large organization, in such a short time, to re-educate the people there, so to speak. [...] They can’t handle it.”</p> <p>“I think you have to see where you stand as an organization, and what you want to try out now, and what is the best structure for that.”</p>

Table A.3: Further Quotes Supporting the Findings in 4.2.3: Implementation of the Innovation

Relationship between the incumbent and the new business	
PlastiCo	<p>“At the beginning, we experienced a kind of travel mentality, where the incumbent owners would come here and look at it for 10 minutes and explain how it should work.”</p> <p>“Of course, when it really comes down to core competencies, you fall back on them. But to have a machine developed by [the established company], although we are a huge mechanical engineering company and very close to us, that will never work. The machine wouldn’t be ready in two years.”</p> <p>“You have to be able to manage it financially and in terms of decision-making.”</p>
ApplianceCo	<p>“We need to be attached to the market. [...] The core team is definitely [the digital business unit], of course, when it comes to finance, when it comes to logistics, we [the local organization] share those kinds of functions. So our [local] colleagues are still highly involved.”</p> <p>“Customer service has been a well-established unit for years and is also large and if you have their support, it’s quite relevant in the [core organization].”</p> <p>“From the marketing side, everything related to the front end targeted at the customer: How do I offer that? How do I build a website like that? What pricing should I use? etc., I think that can be kept separate because there you don’t have synergies with the other business of selling products. [...] Where you naturally have synergies is customer service, after-sales service.”</p> <p>“In the CE, you have a general tendency to have a higher internal value added. So, I mean with the circular economy you always somehow end up with product design or some supply-chain processes, the material flow [...]. With such a normally integrated company, I think that in the CE you often have more touchpoints.”</p> <p>“The fact that we offer everything from a single source, [...] that the manufacturer sells the contract to the end customer, that he also offers the service, the after-sales service and also builds and designs the devices himself. This is a success factor and why we think we can also hold out in the long term against other competitors who offer the same.”</p> <p>“All refurbishment processes are the same [...]. So you can reuse or have an effective and efficient reuse of parts, you also have a specific entry [point] to the factories for the return of parts, it’s easier the more you standardize the process to your factories.”</p> <p>“This is now also coming in via Eco Design, which means it’s coming from both sides. And then of course people begin to understand: We always thought at the beginning, we’re not doing this for just a small customer group of 10, 20 percent who lease machines... No, in terms of product design, we actually need to do this for all customers now.”</p>
Partnership management	
PlastiCo	<p>“I think [the startup] would never have come as far as they have without the involvement of [the raw material company].”</p> <p>“The competencies complete each other. We bring totally different things to the table.”</p> <p>“We wouldn’t be the right person at all to do it alone. And of course, we’re happy that they want to do this with us being a big converter.”</p> <p>“For this industry [it is] a radical innovation [...] And maybe not because it's a bottle, that's maybe not radical, but it's how we kind of this new product affects the value chain [...] It disrupts the whole value chain from how you process and make it, to logistics, to filling, to how you recycle it, to how the consumer will perceive it and use it and so on.”</p> <p>“This is, of course, the big challenge we have, that it is affecting the whole value chain. And that’s also why you see these collaborations across the value chain. It’s too hard to do on your own. You need expertise from all... [for] sectors to come together.”</p>

“We understood that we need to have the commercial viewpoint and get the potential customers involved very early in order to test things and to learn from them, get their input and so on.”

“They are in a co-development agreement. And so they have a task to make sure our packaging is as relevant to the market and consumer as possible once we know we are ready to launch.”

“I mean, with [brand name] you are already leading [...] They start exactly the same discussion as with the [core product] and basically want the product for the same price.”

Reconfiguration of competencies

PlastiCo “I think there are products that simply cannot be replaced anytime soon [...]. But there is a relatively large area where one might just think that a solution [like that of the startup] will result in a viable substance.”

“PlastiCo brings value to this startup—technology, know-how. Actually, it’s a reflection of our business model, just with a different material [...] We have good contributions to make.”

“Even on a small scale, we now have a huge amount of knowledge, which, of course, relates to production know-how or machines and so on.”

“That means we can build machines. [...] We can set up production. We can build a plant from the ground up in six months and produce 100 million, 200 million [products]. We are used to that. This is one of our core competencies.”

ApplianceCo “Customer service, if it only deals with the issue of warranty, the guarantee phase, so everything required by law, and becomes active there, then it is always an appendage, a necessary evil to deal with that.”

9. Paper II: Interorganizational Sensemaking of the Transition Toward a Circular Value Chain

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Abstract

The transition towards the circular economy requires stakeholders to collaborate along value chains. Yet, such collaborations are considerably challenging. Given the paradigmatic change, stakeholders face high levels of uncertainty, and also need to align on a common way forward. We extend research on interorganizational sensemaking and the circular economy by exploring the process of interorganizational alignment in a European consortium of 150 companies representing the value chain for flexible packaging with the objective to transform the value chain from linear to circular. We find that the interorganizational sensemaking process unfolds across three levels: organization, value chain, and ecosystem, which provide different reference frames for the process. We provide insights into how these frames, power dynamics and identity considerations influence this process. Our findings highlight the importance of considering interdependencies between stakeholders and a collective reconceptualization of the established value chain to successfully transition towards a circular one.

Keywords

Case Studies, Ethnographic and Action Research, Circular Economies, Sensemaking, Identity

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9.1. Introduction

In the light of the continuously worsening climate crisis, the concept of a circular economy is gaining attention as an alternative to the established economic “take-make-waste” system that has been criticized for leading to the over-exploitation of material resources and the destruction of our natural environment (Meadows et al., 2004; Stahel, 2016). The transition from a linear to a circular economy is a paradigmatic shift that requires a fundamental restructuring of economic activities along value chains (Korhonen et al., 2018; Ruggieri et al., 2016). Individual actors cannot implement the associated changes alone, as they require the collaboration of other actors whose activities are interdependent with theirs (Brown et al., 2021; Parida et al., 2019).

Collaborative initiatives between stakeholders have therefore gained importance as a powerful tool for achieving such concerted action. Yet, such collaborations often face considerable challenges as the transition towards a circular economy involves considerable uncertainty (Korhonen et al., 2018). The restructuring of economic activities is associated with fundamental changes in production and consumption patterns, including the development of new products and services, processes, technologies, and overall business models (Bocken & Geradts, 2020; Eikelenboom & de Jong, 2022; Tapaninaho & Heikkinen, 2022). More importantly, actors often lack a common understanding of the concept of a circular economy and its ultimate goals (Kirchherr et al., 2017; Moraga et al., 2019). Managers therefore face considerable uncertainty when evaluating different potential approaches to applying the circular concept to their business (Bocken & Geradts, 2020; Centobelli et al., 2020; Werning & Spinler, 2020). These challenges are exacerbated by the need to implement changes across the value chain in collaboration with interdependent stakeholders (Bocken & Geradts, 2020; Eikelenboom & de Jong, 2022).

Thus, to successfully transition towards a more circular structure, stakeholders must develop a joint understanding of the change and its implications for both individual organizations and the overall industry, and importantly, align on a common way forward, while accommodating potential tensions between individual and collective interests (Eikelenboom & de Jong, 2022; Parida et al., 2019; Tapaninaho & Heikkinen, 2022).

However, as most research has focused on the outcome of such endeavors rather than the interaction between stakeholders, little is known about the dynamic process of interorganizational alignment (Pieroni et al., 2019; Seidl & Werle, 2018; Selsky & Parker, 2005). Thus, researchers have begun to call for immersive studies to reveal the complex social process of circular economy transitions (e.g., Bertassini, Ometto, et al., 2021). We adopt such an approach to help fill this gap. We ask: *How do stakeholders from one value chain develop a joint understanding of the transition towards a circular economy and align on a common way forward?*

To address this question, we adopt the lens of interorganizational sensemaking (Maitlis & Christianson, 2014; Seidl & Werle, 2018; Weick, 1995). Interorganizational sensemaking refers to the processes that unfold between organizations as they collectively engage with each other to make sense of changes in the external environment, thereby constructing a shared meaning that helps them to reduce ambiguity and act accordingly (Maitlis & Christianson, 2014; Seidl & Werle, 2018). The sensemaking lens provides a useful frame for analyzing the

alignment process of a group of organizations collaborating to deal with a major change such as the transition towards a circular economy.

Our analysis is based on an in-depth case study of a European consortium of more than 150 companies representing the entire value chain for flexible packaging, with the goal of transforming the value chain from linear to circular. Between September 2019 and December 2020, we supported the consortium to identify topics that stakeholders considered essential for the successful circular transformation but had diverging opinions on, and to facilitate the stakeholders' alignment process to reach a common position. By observing and analyzing these intense negotiations, we show how the complex sensemaking process between organizations unfolds across three levels: organization, value chain, and ecosystem. Additionally, we identify five key subprocess steps and shed light on the dynamics that shape them. In so doing, we contribute to the literature on interorganizational sensemaking and provide insights for circular economy research and practice by revealing the interorganizational dynamics of the transformation from a linear to a circular value chain.

The remainder of the article is structured as follows: Section two provides the theoretical background, while section three outlines our methodological approach. Section four presents our findings, followed by a discussion in section five. Section six concludes.

9.2. Theoretical Background

9.2.1. Organizational and Interorganizational Sensemaking

Sensemaking refers to the process through which actors attempt to understand issues, events, or actions that are novel, ambiguous, unexpected, or confusing (Maitlis, 2005; Weick, 1995). There are various triggers for sensemaking, such as external shocks and crises, threats to identity, and also planned organizational interventions (Maitlis & Christianson, 2014; Weick, 1995). Actors perceive these triggers as disrupting their established understanding of their environment and are uncertain how they should act, so they seek to make sense of them. Sensemaking can be considered a social process, during which actors extract and interpret cues from their environment and engage in dialogues to construct a shared meaning that helps them understand the cues and act collectively (Maitlis & Christianson, 2014; Seidl & Werle, 2018; Weick, 1995).

However, sensemaking can be difficult. As a social process, the collaborative endeavor is influenced by differences in the interests and knowledge of the actors involved, as well as social dynamics that may emerge between them. Not only may actors consider different cues important, and hence engage differently in a collaborative sensemaking process (Maitlis, 2005; Schildt et al., 2020; Seidl & Werle, 2018). They may also use different frames for interpretation based on their particular knowledge structure and past experiences. While such diversity is helpful for making sense of complex changes, it can also create tensions, as stakeholders must ultimately align on a certain interpretation schema. Indeed, the collaborative sensemaking process can be subject to power dynamics between actors, as they try to influence its outcome in their own favor (Clegg, 1989; Fleming & Spicer, 2014; Schildt et al., 2020).

Power plays can be open and direct, as actors deliberately try to coerce, influence, or manipulate others (Clegg, 1989; Schildt et al., 2020). Sensebreaking and sensegiving are important aspects of such episodic power play. Individuals may engage in sensebreaking—"the destruction or breaking down of meaning" (M. G. Pratt, 2000, p. 464)—to disrupt and invalidate the established understanding and sense of self of others and create a void of meaning that motivates them to search for a new meaning (M. G. Pratt, 2000; Schildt et al., 2020). Individuals, and leaders in particular, may take advantage of this void by engaging in sensegiving, that is, the "process of attempting to influence the sensemaking and meaning construction of others toward a preferred redefinition of organizational reality" (Gioia & Chittipeddi, 1991, p. 442) to shape the collective sensemaking process. This can also lead to "framing contests" (Kaplan, 2008) between actors, as they try to make their individually preferred frame dominate collective sensemaking. Sensebreaking is often a precursor to sensegiving, as successful sensebreaking induces seekership for new meaning and thus a greater receptiveness to sensegiving (Schildt et al., 2020). However, attempts at sensebreaking and sensegiving may also fail and lead to disidentification from the group as actors reaffirm the established sense or reject the imposed one (M. G. Pratt, 2000).

In addition to direct power used by individuals, the structural context also shapes actors' sensemaking activities through its systemic power. Systemic power refers to established knowledge structures and identity perceptions that shape the way actors see the world and act (Clegg, 1989; Lawrence et al., 2012; Schildt et al., 2020). Similar to episodic power, systemic power can have different effects on the way actors make sense of a situation. It can have a conservative influence and lead to narrow sensemaking in which the broader setting is not questioned, but it can also open up the solution space by "drawing attention to the inadequacy of present actions as plausible solutions to the issues at hand" (Schildt et al., 2020, p. 253). In particular, an increase in diversity of knowledge can lead actors to question prior beliefs and induce a change in evaluation criteria (Schildt et al., 2020). Systemic power can also be instrumentalized by individual actors to alter the structural frame and influence the sensemaking process indirectly (Maitlis, 2005; Schildt et al., 2020).

Actors' sensemaking is connected to their perception of identity—that is, members' understanding of "who we are as an organization" (Gioia et al., 2013, p. 123). While previous research has mostly focused on how identity is constructed through sensemaking (Maitlis & Sonenshein, 2010; Sandberg & Tsoukas, 2015), actors' perception of identity may also influence sensemaking, as who people think they are also shapes how they interpret novel events. According to Schildt (2020, p. 253), "Identity is a particularly strong driver for committed sensemaking because there is hardly anything that feels as plausible and certain to actors as their own established identities." Thus, identity can be considered a conduit of systemic power that influences the sensemaking process. Indeed, external changes may create a conflict with one's established identity that can become a potent source of doubt and lead to a search for entirely new understandings (Christianson et al., 2009; Schildt et al., 2020). As Weick (1995, p. 23) points out, "Intentional sensemaking is triggered by a failure to confirm one's self." That is, the contradiction of identity can lead to deeper and broader sensemaking in the active search for renewed coherence. Thus, sensemaking may ultimately also lead to changes in the perception of identity (Christianson et al., 2009; Dutton & Dukerich, 1991; Maitlis & Christianson, 2014). As Weick postulates: "What the situation means is defined by

who I become while dealing with it” (Weick, 1995, p. 24). Given the importance of individual and collective perceptions of identity, they may also become subject to powerplay in interorganizational sensemaking, as actors try to influence others’ perceptions of identity and stir up identity conflict (Schildt et al., 2020).

Research on sensemaking has largely focused on sensemaking within organizations. Yet, sensemaking also happens when actors from different organizations engage in interorganizational sensemaking (Seidl & Werle, 2018). The different perspectives of the collaborators increase the diversity of schemata to interpret interrelated aspects and thus help actors develop a more comprehensive understanding (Maitlis & Christianson, 2014; Seidl & Werle, 2018; Weick, 1995).

So far, however, little research has specifically focused on the interorganizational sensemaking process and the relationship dynamics that may unfold between diverse actors. Seidl and Werle (2018) analyze the interorganizational process as a way for individual actors to access a greater variety of frames in their own sensemaking. However, their study is limited to individual understanding and does not analyze relationship and power dynamics, nor how actors may actually align on a common position. Yet, such dynamics are crucial in the context of interdependent actors who participate in collaborative sensemaking to align on a common way forward. If such interdependencies exist, actors may require not only knowledge and interpretation schemata from others, but also, a mutually agreed interpretation as a basis concerted joint action.

Also, little is known about any potential interplay of sensemaking processes at the organizational and industry levels. Cristofaro (2022) suggests that supra-organizational aspects such as the actors’ perception of industry identity influence the sensemaking process on the organizational level. However, potential conflicts between the actors’ interests and perceptions of changing industry dynamics are not addressed. Equally, Stigliani and Elsbach’s (2018) research on identity formation and Patvardhan et al.’s (2015) research on a meta-level identity crisis hint at such an interplay of sensemaking at the organizational and industry levels. However, they focus on identity formation rather than the broader sensemaking process; whether and how the interorganizational sensemaking process may unfold across different levels remains underexplored.

Given these limited insights, researchers have called for more studies that explore the interplay of sensemaking across organizations, particularly tensions and dynamics (Maitlis & Christianson, 2014; Seidl & Werle, 2018). Such insights can be especially valuable for the growing number of collaborative endeavors seeking to address complex changes that shake up entire industries—such as the transition towards the circular economy. Such paradigmatic shifts put pressure on established structures, relationships between actors, and ways of doing things, and require holistic adaptations. Given the interdependencies of actors along value chains, interorganizational sensemaking of such shifts is essential to align on concerted action. This paper aims to offer new insights into this process.

9.2.2. Collaborating for a Circular Economy

For a circular economy to unfold, economic activities along the value chain must be fundamentally restructured (Bocken et al., 2016; Ruggieri et al., 2016). These changes cannot be realized by individual firms alone but require the collaboration of interdependent stakeholders along the value chain (Brown et al., 2021; Parida et al., 2019).

Yet such concerted engagements often face considerable challenges. Stakeholders may hold different conceptualizations of the transition towards a circular economy, as it entails considerable uncertainty and challenges established structures (Eikelenboom & de Jong, 2022; Kirchherr et al., 2018; Korhonen et al., 2018). A common understanding of the concept of a circular economy, including of its goals and systems of measurement, is still missing (Kirchherr et al., 2017; Moraga et al., 2019). Additionally, a fundamental restructuring of economic activities along the value chain is required to allow for the continuous reuse, recycling, and looping of materials back into the economy. This restructuring is associated with fundamental changes in production and consumption patterns, including the development of new products and services, processes, and technologies, as well as overall business models (Eikelenboom & de Jong, 2022; Tapaninaho & Heikkinen, 2022). Given the relatively recent uptake of the concept in the business realm, the success of the different approaches remains uncertain. Managers therefore need to consider many different potential methods for applying the circular concept to their business (Bocken & Geradts, 2020; Centobelli et al., 2020; Werning & Spinler, 2020). Also, because the transition to a circular system centers around altering physical material flows throughout the economy, it is difficult for individual economic actors to understand and evaluate the feasibility of specific solutions and required changes from the production of materials to their recycling, as these often span a broad set of economic activities realized by many different actors whose activities are interdependent (Bertassini, Zanon, et al., 2021; Brown et al., 2021). Thus, to transition from a linear to circular model, managers must actively engage with other stakeholders to interpret what circularity really means, and to determine its concrete implications for their organization.

In addition, given the interdependencies along the value chain, stakeholders must also agree on how they should collectively adapt. This can be difficult for individual stakeholders because the required adaptations may interfere with the current linear reality of their business and create conflicts of interest (Eikelenboom & de Jong, 2022). Significant efforts are therefore often required to align diverging perspectives and interests of different stakeholders and achieve concerted action (Bening et al., 2021; Bridoux & Stoelhorst, 2022). Accordingly, scholars frequently emphasize the importance of interfirm collaboration (e.g., Bertassini, Zanon, et al., 2021; Bocken & Geradts, 2020). However, while research has started to explicitly focus on the organizational perspective of the transition to a circular economy (Bocken & Geradts, 2020; Brown et al., 2021; Centobelli et al., 2020; Eikelenboom & de Jong, 2022; Pieroni et al., 2019), studies have so far mostly focused on the organizational dynamics of individual firms; the interorganizational dynamics of realizing collaborations along a value chain thus remain underexplored. Therefore, we have only limited insight into how stakeholders engage to reduce perceived ambiguity, understand the implications for their own organizations, and agree on a response. Accordingly, researchers have called for immersive research on the complex social process of circular economy transitions (Bertassini, Ometto, et al., 2021).

By analyzing the interorganizational sensemaking process between stakeholders working to collectively transform a largely linear value chain into a circular one, we thus provide valuable insights for circular economy researchers and practitioners.

9.3. Method

9.3.1. Research Setting

Our analysis is based on an in-depth case study of CEFLEX, a European industry consortium comprising over 150 companies and representing the entire value chain for flexible packaging, with the mission to transform the value chain from linear to circular. Packaging represents an ideal setting for the study of collaborative efforts towards circular transformation. It is a large established industry that has come under significant public and regulatory pressure due to its current lack of sustainability (European Commission, 2020), prompting an intense search for circular solutions. Given the need for concerted action to realize changes across the value chain, industry stakeholders have started to look for ways to collaborate to formulate collective responses.

The stakeholders of CEFLEX are medium to large companies involved in the production, use, and after-use/recovery and recycling of flexible packaging. CEFLEX is organized into five groups representing the steps of the value chain: (1) material producers, who transform raw inputs such as crude oil, natural gas, or bio-based sources into monomers and polymers, resins, adhesives, inks, coatings, and additives; (2) film producers and flexible packaging converters, who manufacture inputs from material producers into intermediate or final packaging products such as films or foils; (3) brand owners and retailers, who use these inputs to wrap their products and ship them to the point of sale, where they pass to the consumer, who discards the packaging after use; (4) collectors, sorters, and recyclers, who collect, sort, and recycle the discarded packaging to produce input for new (recycled) packaging; and (5) suppliers of sorting and recycling machinery and other industry stakeholders, such as extended producer responsibility associations. As a consortium of industry stakeholders spanning the entire value chain of flexible packaging, it can be considered a specific form of multi-stakeholder initiative that brings together a group of diverse stakeholders with a wide variety of views and interests.

CEFLEX's stated goal is "to make all flexible packaging in Europe circular by 2025" (CEFLEX, 2020, p. 8). Its mission is to increase recycling rates of flexible packaging, and more specifically, achieve the "collection of all flexible packaging and over 80% of the recycled materials channeled into valuable new markets and applications to substitute virgin materials" (CEFLEX, 2020, p. 9). The consortium is governed by a steering committee that includes representatives of all five stakeholder groups.

CEFLEX offers a unique opportunity to study the process of interorganizational sensemaking. The transition towards the circular economy represents a paradigmatic change that challenges the established structures, relationships, and logics of the industry. While packaging has already come under significant scrutiny, demands for more circularity in other industries are growing too, and with it also initiatives to foster collaboration. Hence, the insights from the collaborative efforts of CEFLEX will also be valuable for other industries.

9.3.2. Research Process

We followed an engaged scholarship approach (Van de Ven, 2007) to study the social dynamics of the alignment process up close. This approach allowed us to generate practical knowledge for the consortium and to valuably contribute to research on interorganizational sensemaking and the circular economy. As we actively engaged with stakeholders, we separated roles and responsibilities among the research team during data collection and analysis, a strategy akin to an insider-outsider approach (Gioia et al., 2010; Louis & Bartunek, 1992). First, during the data collection, four external facilitators (in addition to the author team) assisted during the workshops. Their personal observations provided important input, but the facilitators were not involved during the analysis or the interpretation of the results. Moreover, while two of the authors assumed an explicit insider role actively shaping and facilitating the process of developing a common position, another author adopted an outsider role, primarily observing the process, collecting, and analyzing relevant data to develop our research contributions. Second, during the data analysis, one author became deeply immersed in the data analysis and actively supported CEFLEX in translating the workshop results in practical knowledge. The other two authors were primarily involved in theorizing on the results and outlining the research contributions. Third, we repeatedly discussed the results, theoretical insights, and practical implications with the external facilitators to validate our collective insights.

Our engagement with CEFLEX started in 2019 with the goal of identifying crucial topics on which consortium stakeholders held diverging opinions. The central element of our research was two two-day interactive workshops with CEFLEX stakeholders during which they formulated aligned positions for two selected topics.

Preparation/Scoping

To identify the two topics for the alignment process, we organized a full-day workshop with 25 consortium stakeholders equally representing the five value-chain groups (VCGs). During the workshop, participants reflected on the current linear and prospective circular value chain for flexible packaging and discussed the required changes and implications for industry players to realize the transformation. Based on this reflection, they identified aspects they considered to be contested among stakeholders, leading to a list of 12 salient topics. When we asked participants to choose two topics, two considerations emerged that shaped the dynamics of the discussion: the difference between the topics with regard to the magnitude of disagreement and differences regarding the consortium's perceived scope of influence. We evaluated all topics along these two dimensions and, after consultation with the Steering Committee, selected two topics that differed substantially both dimensions.

The first topic concerned “material preferences for flexible packaging” and whether the consortium should formulate a preference for mono-material packaging over multi-material packaging. The topic was heavily discussed throughout the industry and there was a high level of perceived disagreement among CEFLEX stakeholders. Individual stakeholders were considered to have a strong direct influence on this topic.

The second topic concerned “collection systems for flexible packaging” and whether the consortium should state a preference for collecting post-consumer flexible packaging in a

separate stream, or via a mixed collection. Overall, disagreement was less pronounced, and many stakeholders considered their scope of influence rather limited.

Comparing the sensemaking process for these two sharply contrasting topics yielded deeper insights into the sensemaking dynamics. The comparison in terms of degree of disagreement allowed us to reveal potential reasons for different levels of engagement and investigate the influence of perception of relevance. The differentiation according to the perceived scope of influence allowed us to dig deeper into the motivation of stakeholders to adapt to achieve change and whom they considered to be driving the change. Selecting two topics for which the interorganizational sensemaking process differed substantially thus allowed us to develop a more robust overarching framework.

Central Focus/Topic Workshops

As the central element of our research, we organized two two-day workshops for each of the two selected topics, attended by 25 CEFLEX stakeholders equally representing the five VCGs. During each workshop, we facilitated the negotiation of a joint position statement on the specific topic. We prepared with extensive desk research and six to nine preliminary interviews with stakeholders and industry experts (see Appendix A). We kicked off both workshops with a short presentation on the topic and then broke into five small groups, each including one participant from each VCG. Supported by a facilitator, the participants reflected on the topic, discussed open questions, and negotiated a draft position statement. At the end of the day, we consolidated the five drafts. On the second day, the stakeholders negotiated each element of the new draft position statement in plenum until they reached an agreement. After the workshop, we submitted the position statements to the steering committee who presented them at the General Meeting of all stakeholders and subsequently published them (see Appendix C).

Data Analysis and Theory Building

Throughout the groundwork and intervention phases, we compiled a rich database including interview data, archival material (confidential documents from CEFLEX, corporate presentations, press statements, etc.), workshop documentation, video and audio recordings, and personal notes. Table 9-1 provides an overview.

Table 9-1 List of Data Sources

Data Source	Type	Amount/ length (Scoping)	Amount/ length (Topic 1)	Amount/ length (Topic 2)	
Interviews	Semi-structured interviews with workshop participants and other CEFLEX stakeholders	5	6	9	Ø 51 min
Session Recordings	Audio/video recordings of workshops (1.5 days per workshop, plenary and 2*5 parallel breakout groups per workshop)	7	13	13	Ø 75 min per interview
Archival Material	Internal memos, guidelines, meeting minutes, presentations, emails, other material	5	5	4	Ø 15 pages
Observations	Field notes from six researchers and facilitators from meetings and workshops	15	12	10	pages
Miscellaneous	Workshop documents, photographs from workshops, flipchart drawings, other	80	40	35	Ø 1 page

We focused our analysis on the two topic workshops. We transcribed and coded the interviews and all individual workshop sessions of the phase in MAXQDA. In the analysis, we followed an iterative approach, going back and forth between our empirical data, our forming interpretations, and the sensemaking literature (Eisenhardt, 1989; Yin, 2009). We analyzed the data in three steps: First, for each topic individually, we started with open coding in MAXQDA to structure the data according to the actors involved, the value-chain steps they belonged to, and the type of arguments used. This helped us to identify interesting dynamics in collaborative sensemaking, and we sketched out our first insights as potential themes for further analysis. Second, we compared the processes for the two topics and identified themes and dynamics that had emerged in each one. This allowed us to identify similarities between the processes and to establish general patterns. We focused on the major emerging themes and connected them to the existing literature to work towards a deeper understanding of the process. In particular, we noted that stakeholders used different referencing frames when trying to understand the implications of arguments during the discussions. This observation drew us to map the sensemaking process across different levels—namely, the organization, the value chain, and the ecosystem. In addition, we observed that in both cases, discussions proceeded in various subprocesses within the overall processes. Based on these insights, we developed a general model of the process, differentiating subprocess steps and levels. Also, we noted that the dynamics of collaborative sensemaking and the engagement of individuals to influence the collective process differed substantially between the two topics. As a third step, we went back to the individual topics and re-analyzed them again based on this emerging multi-layer, multi-step process. We then compared the two cases to work out similarities and differences. This comparison allowed us to analyze the characteristics of the topics and conditions causing the sensemaking process to play out differently. Appendix B provides a list of quotes for each topic. Ultimately, our analysis resulted in a general process model, illustrating how the individual

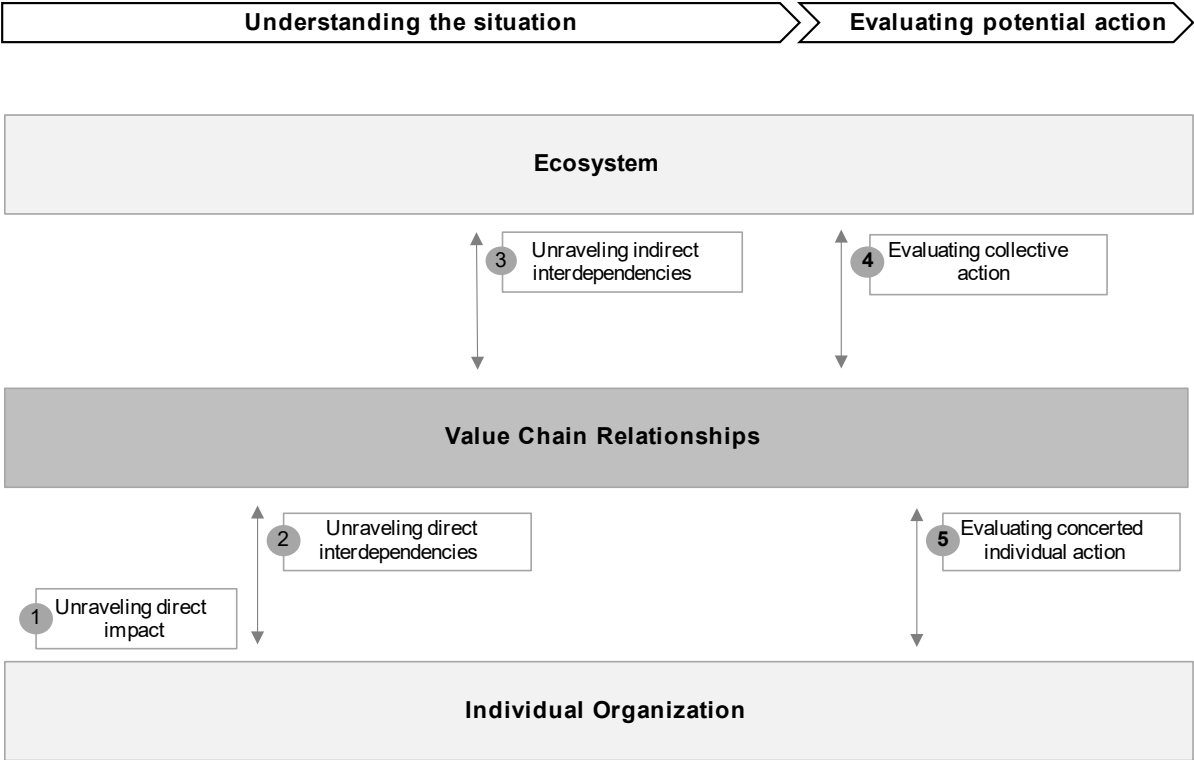
subprocesses evolve within and between the different levels of sensemaking, and an application of this model to the two topics, highlighting the differences in sensemaking dynamics within these process steps. To further validate our findings, we also discussed them with the CEFLEX management.

To limit potential bias due to personal involvement in the alignment process, we used three strategies. First, we triangulated our insights from the workshops with findings from the 20 interviews, our document review, and personal notes. Second, we discussed our observations with the neutral facilitators to ensure a breadth of perceptions. Third, we reflected on our involvement, both individually and as a group.

9.4. Findings

Based on our analysis, we developed a general model of the interorganizational sensemaking process, depicted in Figure 9-1. Within this generalized process, different dynamics of sensemaking unfold, depending on the characteristics of the topics chosen for sensemaking.

Figure 9-1 The Interorganizational Sensemaking Process



Our general model differentiates three levels across which the sensemaking process unfolds: organization, value chain, and ecosystem. The organizational level represents the most granular level of reflection, on which participants seek to understand how the topic and any potential collective position directly affects their own organization. The ecosystem level represents the broadest level of reflection, on which participants make sense of the topic and the implications of potential collective positions for the group of industry stakeholders with respect to its ecosystem. Between these two levels, value-chain relationships represent an

intermediate level of reflection, on which participants unravel direct interdependencies between the stakeholders and make sense of their implications. The overall process unfolds across these levels through five subprocesses. The first three subprocesses focus on achieving a holistic understanding of the topic, while the fourth and fifth involve evaluating and aligning on potential actions. Stakeholders go through these subprocesses iteratively, moving back and forth as their understanding broadens until alignment is achieved.

In the first subprocess, participants engage in sensemaking by contextualizing the topic from the perspective of their own organization. The sensemaking is shaped by the participants' individual knowledge base and organizational identity and reality. Participants are triggered to engage in sensemaking if they perceive the topic to be directly impacting their organization or creating conflict with their evaluation system. Participants evaluate newly acquired information based on its potential immediate implications for their organization and strive for coherence with this evaluation system. These reflections often shape their first opinion and how they initially engage with others.

In the second subprocess, participants make sense of the topic in the context of their relationships with other organizations along the value chain. They reflect on interdependencies between organizations and gain a deeper understanding of how their own organization could be affected by others' actions. Competing interests can lead to power play between participants. At the same time, knowledge-sharing increases the variety of perspectives and broadens participants' understanding, raising awareness of the need for alignment.

During the third subprocess, participants unravel interdependencies between the collective industry and its ecosystem. Reflecting on external pressures and industry players' scope of influence vis-à-vis external stakeholders—especially regulators and consumers—broadens their perspective and highlights potential lack of coherence with established narrow views from lower levels. Industry and group identity plays an important role by providing structural context for the process that shapes collective sensemaking—but is also shaped by the process. Increased knowledge and awareness of interdependencies facilitates a broader collective understanding of the topic and greater acceptance for change, thus paving the way for alignment.

During the fourth and fifth subprocesses, participants engage to evaluate potential actions and align on an overall collective position. Evaluating the scope of individual and collective actions leads to an agreement on concerted individual or collective action on behalf of the group. These reflections may in turn trigger new iterations of previous subprocesses as the scope of potential actions is connected to the participants' considerations of identity and common fate. These considerations ultimately lead either to consent with the collective opinion or disidentification.

9.4.1. Sensemaking for Topic 1: “Material Preferences”

During the first workshop, the central question was whether the consortium should state a preference for mono-material packaging over multi-material packaging. Mono-material packaging contains predominantly one type of material and is therefore easier to recycle. In contrast, multi-material packaging blends materials to provide favorable properties such as high

product protection and resource efficiency, but its recyclability is limited. While technological innovations might enable the recycling of multi-material packaging in the future, it remains unclear when and indeed whether they might become commercially and ecologically attractive. Material composition plays a crucial role in boosting recycling rates in the short term, which is a central goal of CEFLEX. The participants considered CEFLEX stakeholders to have a strong influence on material choice but held very different views about the right solution.

During the first subprocess, participants initially reflected mainly on the direct implications for their own organizations. They saw the direct relevance of the topic, but while their knowledge was substantial, it was largely limited to their own stage of the value chain. This isolated knowledge shaped a silo mentality and rather narrow sensemaking focused on achieving coherence with their immediate business interest. Accordingly, participants highlighted their own direct interests in the discussion. For example, brand owners argued for a preference for mono-materials to meet consumer demands: *“Some customers are already demanding these things and want to see change”* (Brand Owner, VCG 3). While multi-material producers highlighted the superior functionality of their solutions, recyclers underlined the need for mono-material input to produce better recycle.

When the discussion ascended to the value-chain level in the second subprocess, it became highly dynamic as the competing individual interests led to significant power play. Some participants tried to subtly influence the process by seeking to shape the frame of the negotiation: they engaged in framing contests as to what the overarching goal of a circular economy should be and pushed for interpretations that supported their own interests. In particular, while some participants maintained that recyclability should be the key aim, others argued that it should be resource efficiency. While these two goals are connected, privileging one over the other would have different implications for the type of material preferred, and hence for alignment activities. Other participants tried to openly coerce a specific collective outcome. For example, some brand owners threatened to terminate the collaboration altogether and switch to alternative packaging solutions: *“Unless we get some convergence around some sort of standards and focused effort, we are not going to get anywhere. And actually, what that means is we’ll end up with [products] in glass jars”* (Brand Owner, VCG 3). Given their powerful position, other participants engaged in attempts of sensegiving towards brand owners. For example, multi-material producers addressed them by highlighting the superior importance of product protection: *“You need [multi-materials for their] barrier protection; [...] without any kind of protection; you don’t meet [the demands of] your supply chain and generate lots of cost”* (Material Producer, VCG 1). They underlined how dangerous a switch to mono-materials could be: *“Are you OK with what you’re giving up? [...] Are you aware that your customers understand what they have to sacrifice?”* (Converter, VCG 2). Still, these endeavors were rather unsuccessful, given clear individual interests and a limited willingness to compromise.

At the same time, sensemaking on the value-chain level also raised awareness and understanding of the interdependence between the stakeholders and the resulting need for collective action. Initially, participants had a broad perspective of interdependencies along the value chain. As one participant stated: *“Why are we here? [...] Working as individuals doesn’t work, because as individuals you cannot solve it. You should work from an ecosystem perspective, as a value chain”* (Workshop Participant). However, the process revealed that

participants often had a severely limited understanding of how their own actions concretely influenced others and were influenced by them. For example, as a recycler complained, brand owners would always ask for high-quality recyclate for their packaging and blame recyclers for not delivering it—but failed to consider that recyclers could only process material that the brands had used in the first place, which often fell short of the quality required. Similarly, multi-material producers and converters offered no insights into how to deal with the associated recycling challenges.

Throughout the process, participants actively engaged to understand the realities of other value-chain groups, concrete interdependencies, and tradeoffs more deeply. For example, various material producers and converters were grateful to learn about the repercussions of their material choice on the downstream value chain: *“Tell me which direction I need to go, because I will go, and I don’t know”* (Material Producer, VCG 1). Similarly, while upstream stakeholders were effectively deciding the material composition of the packaging in the market, they acknowledged their dependence on brands: *“It’s up to the brand owner to determine what we need our packaging to do”* (Converter, VCG 2). Brand owners, in turn, sought guidance from downstream participants:

We used to be the ones deciding on the material. Now we need you [recyclers] to tell us what the restrictions are. [...] Before, we were the ones asking for what we want; now we need to design for you, basically [...] We are looking for guidance from you. (Brand Owner, VCG 3)

In particular, participants listened attentively to recyclers—previously considered powerless—as they spoke of the challenges posed by different materials. Yet, despite a clearer understanding of the conflicts and interdependencies, their willingness to compromise was initially low.

In the third subprocess, focused on sensemaking on the ecosystem level, many participants initially found it hard to understand how their organization could be indirectly affected by changes in the ecosystem. They argued for technological solutions on the organizational level and seldom referred to the ecosystem level, if at all. However, some actors actively engaged to challenge this narrow perspective. They highlighted the external threat of potential ecosystem changes and associated repercussions for all stakeholders and actively engaged with other participants to break their sense around individual-level solutions. As one argued: *“There is no time to wait for new technologies. Time has run out”* (Recycler, VCG 4). In particular, they highlighted the lack of coherence between the prevailing individual positions and the looming regulatory threat and pushed for better awareness of the need for change to induce a seekership for alternative interpretation schemata. As one participant stressed: *“If we have this discussion and keep all the options open, flexible packaging will just be killed by the legislator”* (Workshop Participant). That is, they invoked the higher-level goal—to secure the continued existence of the industry—to strengthen a sense of common fate among participants and persuade them to compromise their individual positions.

Yet, many participants had only a limited perception of being part of one industry grouped around a circular value chain and hence of indirect interdependencies associated with being part of this particular group. Other participants therefore also engaged in sensegiving to shape the perception of a common industry identity. To encourage group identification, they also used

CEFLEX as a reference frame. The association held significant legitimacy due to its representation of leading companies from all steps of the value chain. As one participant reasoned: *“Why do we believe that CEFLEX and the members of the workshop have the ability to take a position? Because we come from a diverse background; we come from experience”* (Workshop Participant). The participants leveraged the systemic power of CEFLEX as structural context for the debate by pushing for an understanding of the association as a *“coalition of the willing”* (Workshop Participant) that wants ambitious concerted action. In effect, some participants who would suffer heavily from a preference for mono-materials came to support such a position as they reflected on the regulatory threat and the need for preemptive action. As a converter working with multi-materials acknowledged: *“If we keep all doors open, which would be the best and easiest for [my company], we will have no credibility, and the politicians will just make the decision for us”* (Converter, VCG 2). Contrasting potential direct implications on the organizational level with indirect implications on the ecosystem level ultimately increased their willingness to compromise and paved the way for alignment on concerted action. Ultimately, the negotiations led to a majority of participants favoring mono-material solutions.

During subprocesses four and five, participants evaluated potential actions and agreed that a shift to mono-materials could be achieved through concerted organization-level changes. Hence, they saw the position statement as a guide to harmonize individual actions. The resulting statement voiced a clear preference for mono-materials. It was relatively ambitious and included a direct call to action to all CEFLEX’s stakeholders to revise their activities to align with this preference. The consortium leader presented the position statement at the following General Meeting of CEFLEX stakeholders, and it was published eight months later (see Appendix C). However, some disidentification also occurred, as some participants rejected the newly formed collective sense. Upon publication, four participants who had opposed the preference for mono-materials voiced their criticism in an open letter and sought to reopen the discussion—but did not succeed.

9.4.2. Sensemaking for Topic 2: “Collection Systems”

The second workshop focused on the question of whether CEFLEX should state a preference for collecting post-consumer flexible packaging in a separate stream, or via a mixed collection with residual waste. For CEFLEX to reach its objective of all flexible packaging being collected, the prevailing rate of collection needs to be significantly increased. While most flexible packaging is collected separately (along with other packaging) on the household level in the EU, a significant portion ends up in the residual waste and is not recycled. To increase the collection rate, alternative routes are available, from actions to improve separation at household level to switching to alternative systems such as a mixed collection of (flexible) packaging together with other waste streams and later separation at industrial sites. Examples of such post-sorting exist but are mostly in the pilot phase. Overall, the participants’ knowledge about the topic was very limited. As waste collection is regulated by local authorities in the EU, stakeholders perceived the consortium’s influence as rather limited. There was some perceived divergence of opinion among stakeholders, but overall, disagreement was less pronounced.

As for the first subprocess, participants initially engaged in very little sensemaking on the organizational level. Knowledge and even awareness of the topic and the challenges of the current collection system was very limited, apart from a few participants who were directly involved in alternative collection pilots. Much of the value chain felt completely detached from the task of collection:

Maybe in the first position workshop there were more people [...] who would be directly impacted by the outcome of the position statement. Whereas here [...] we do have a vested interest because we are all part of this process and the value chain, but no one's direct business is going to have to start processing these materials. I think this slightly changes how we approach the discussion. (Consortium Manager)

Accordingly, there was no feeling of conflict, doubt, or void that would induce a search for sense. Indeed, many participants refrained from voicing any opinion at all. As one material producer admitted, *"I suppose the different sorting and recycling companies are more expert in this than I am, because I am a producer"* (Material Producer, VCG 1). To create relevance for the sensemaking process, many devolved to relating to the topic personally, as consumers. For example, one participant pointed out how consumers might find the current collection system confusing:

If I imagine my grandma is sitting at home and has to work out: Is this plastics, paper, or glass? Or this plastic with the cheese inside, should I put it here or put it there? (Machine Producer, VCG 5)

Equally, during the second sensemaking subprocess on the value-chain level, participants initially saw no interdependencies with their direct business partners either. Consequently, they felt little conflict and little need to engage in sensemaking. As one recycler complained: *"The rest of the value chain has no insight. It seems that they all got too comfortable with the existing system"* (Recycler, VCG 4).

Also, power play was limited as no individual actor was perceived to have direct power to coerce a decision. The few participants active on the topic tried to engage in sensegiving by highlighting the limitations of the current system, but many others suspected their motives: *"Everybody has their own interests. [...] So, it's difficult to get a good view of the real best practices"* (Consortium Manager). Some participants even openly accused the active participants of being self-interested, as their *"economic interest in the position [was] crystal clear"* (Workshop Participant, VCG 5). That is, since many participants felt little need for sensemaking, they mistrusted those who were pushing for new sense. This skepticism hampered subsequent openness and learning.

In addition, many shared the perception that collection was primarily a regulatory issue, since the decisions were made by stakeholders outside the industry—namely, public-sector authorities: *"This is not down to goodwill. This is going to be set up by law"* (Workshop Participant, VCG 5). Hence, it was not the dependence among stakeholders along the value chain that mattered, but their collective dependence on the regulator. This perceived inability to influence the subject led to indifference about making sense of it.

Sensemaking only took off during the third subprocess, when a small group intensively pushed to bring the debate to the ecosystem level. They actively strengthened this broader reference frame to underline that the topic was highly relevant for all actors—albeit indirectly.

To achieve this, they particularly engaged to shape the perception of a group identity. In particular, they pushed for awareness of collective interdependence vis-à-vis a massive regulatory threat and the relevance of collection for all stakeholders. By highlighting this common fate, they sought to overcome the prevailing mistrust and instill a sense of ownership of the challenge facing the industry. As one argued: *“It the industry’s responsibility to design a well-functioning collection system”* (Workshop Participant).

These discussions triggered a reevaluation of identity and a sense of belonging that helped to induce the seekership required to engage in sensemaking. Over time, the other participants developed some connection to the topic and the discussion strengthened the perception of indirect interdependence: *“We should emphasize that the public is not responsible for a system that doesn’t work. And that we [the industry] should take responsibility”* (Workshop Participant).

However, actors were still unsure as to how they could influence this topic. In line with the consumer perspective, many participants considered the main lever to be better consumer education within the existing system, without any consideration of change in the industry. Yet, statements were often emotional or normative rather than factual: *“Everybody should be part of collection. Consumers should not be part of the problem, but part of the solution”* (Workshop Participant). In a sense, they externalized the problem by pointing towards improvements outside their scope of influence.

The limited perceived scope of influence was also connected to the widespread perception of CEFLEX’s identity as a *“technical exchange platform”* (Workshop participant). Since many participants saw the consortium’s role as organizing technical pilots and sharing data, they were slow to see how it could act on this topic. During the process, a subgroup of participants deliberately engaged to broaden this perceived scope of influence by introducing an alternative role for CEFLEX. They highlighted the possibility that CEFLEX could engage as an advocacy body in the political realm and use its voice to change the conditions in the ecosystem set by legislators. Reshaping the consortium’s identity, in turn, altered what participants considered to be legitimate activities of the group. This opened up the possibility to at least induce change indirectly, which helped hesitant participants relate to the topic. Thus, the consortium itself became an important reference frame for the sensemaking process. While many participants remained somewhat skeptical about alternative collection options to the last, the subgroup managed to enhance the relevance of the topic and importantly, evoke a feeling of empowerment by underlining a potential active role.

Given the considerations for political engagement, the evaluation of potential action during subprocesses four and five focused on collective actions on the ecosystem level. In line with the advocacy identity of CEFLEX, participants brought up the idea of publishing a statement, addressed mainly towards stakeholders external to the industry, to promote a change in the current legislative system. Interestingly, the consortium leader himself engaged heavily in this subprocess. On several occasions, he directly intervened in the discussion to stress the need to formulate a political position that would achieve systemic change: *“What we are talking about here is a policy statement that acts as a compass, that sets a direction of where we want go”* (Consortium Leader). Most current regulations would state a preference for separate collection, while other options needed to be considered: *“The way the position statement needs*

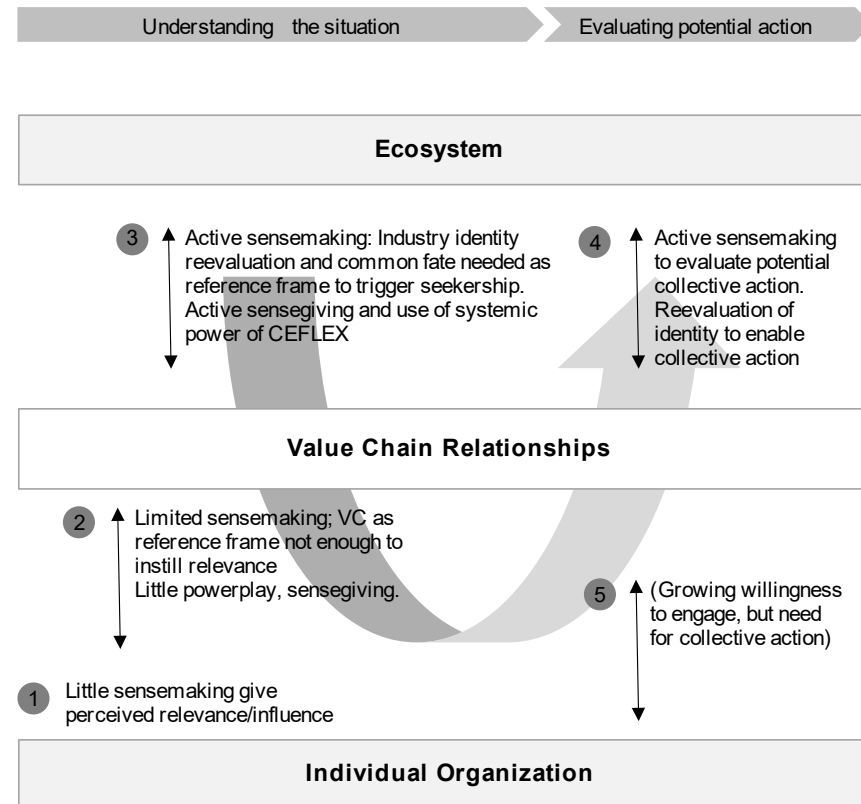
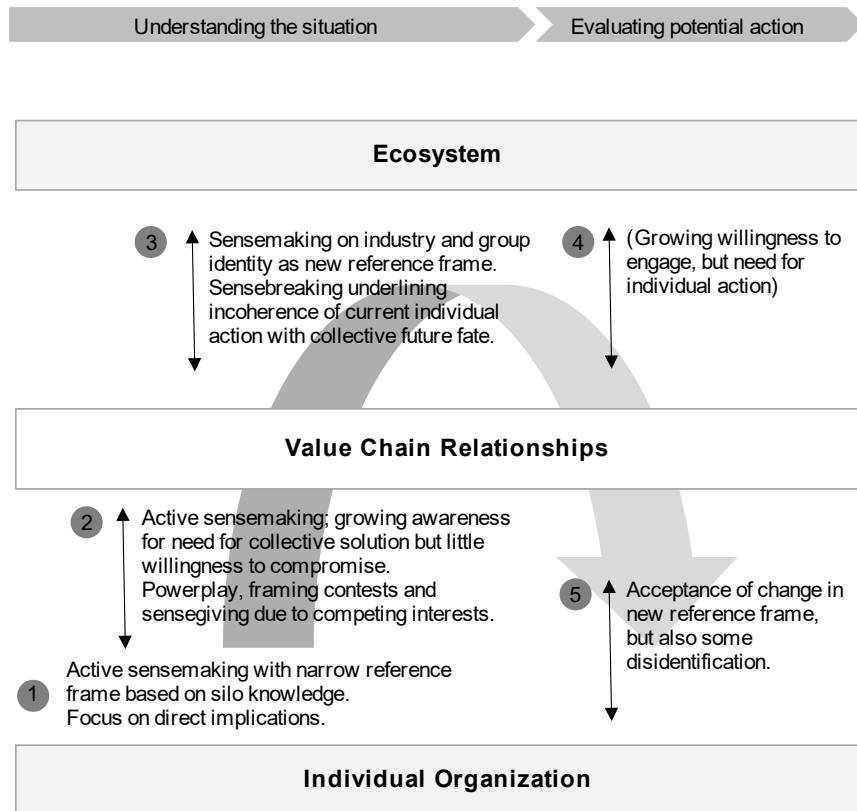
to finish today is to open the door to post-sorting of mixed waste collection—because that door is currently firmly shut” (Consortium Leader). Due to the leader’s authority as an independent manager, participants did not question his opinion as they had with those individual participants who had voiced a similar preference. This led to broader acceptance of a political statement and for CEFLEX advocating the investigation of alternative collection systems.

Towards the end of the negotiation, a consensus evolved around the need to raise awareness of insufficient collection rates and explore alternative collection options. The final position statement was careful to explain why CEFLEX was issuing a position statement on the topic in the first place, and was generally cautious, arguing for a general preference for separate collection corresponding to most current legislation, but opening the door for additional alternative options. The steering committee presented the position statement at the subsequent General Meeting and published it seven months later (see Appendix C).

9.4.3. Cross-Case Comparison

In both cases, the negotiations resulted in a position statement backed by the majority of participants. While the cases show similarities in the overarching structure of sensemaking, interesting differences can also be observed. Comparing the two allows us to elaborate on important aspects of sensemaking within our general model, as illustrated in Figure 9-2.

Figure 9-2 Comparison of Process Dynamics between Cases



In both cases, interorganizational sensemaking unfolded across the organizational, value-chain, and ecosystem levels. Sensemaking on each level was central to the overall success of the process, as each one provided a different context for the sensemaking.

However, important differences in the dynamics of the process can be observed. In particular, we saw that the processes unfolded differently across these levels depending on the participants' consideration of direct impact and influence. While both topics had been collectively chosen for their overarching relevance, when it came to the actual sensemaking process, participants differed over whether they perceived it to be relevant to their companies.

For topic 1 on material preferences, participants mostly considered the topic to be directly influential for their organizations. They were eager to engage in the interorganizational process, as they had a direct interest in understanding the topic. Therefore, sensemaking started strongly on the organizational level. Yet, this process suffered from silo knowledge and unawareness of greater interdependencies. Thus, the collective process moved up to the second and third levels to allow for broader systemic context. Sensemaking around value-chain relationships was important in helping participants understand the interdependencies between their activities. But only sensemaking on the ecosystem level and the acceptance of a common fate led to a willingness to compromise. This ultimately led to alignment for joint action on the organizational level, as participants traded off their individual short-term interests for the sake of a collective goal. That is, the overall process started and ended with strong engagement on the organizational level but required intermittent engagement on the value-chain and ecosystem levels to create an understanding of interdependencies and induce a willingness to compromise.

For topic 2 on collection systems, most participants perceived no direct impact or influence, so sensemaking was initially almost negligible at the organization and even value-chain levels. True sensemaking only really started on the ecosystem level when the process created first-time awareness of this largely neglected topic. The reflection of the collective interdependence of the group vis-à-vis external stakeholders in the ecosystem in turn induced a sense of relevance and seekership that triggered sensemaking of the repercussions of this topic on the value-chain and ultimately the organizational level, too. This played an important role in creating an understanding of the need to act. The actual search for potential joint action then played out again on the ecosystem level, as little could be done on the organizational level. However, defining potential action also required changing the perceived identity of the group. Only the acceptance of a potential advocacy role for the consortium revealed a way to actually influence the topic and ultimately led to an agreement for collective political action.

9.5. Discussion

Our analysis of how stakeholders of a value-chain consortium engage to jointly make sense of the transition from a linear to a circular value chain contributes to both the sensemaking and circular economy literatures and provides practical recommendations.

9.5.1. Contributions to Research on Sensemaking

We provide three main insights into the process dynamics of interorganizational sensemaking.

First, we show how interorganizational sensemaking between interdependent actors evolves across different levels: organization, value chain, and ecosystem. So far, research has primarily suggested that influences from industry on the organizational level matter for the sensemaking process (Cristofaro, 2022; Patvardhan et al., 2015; Stigliani & Elsbach, 2018). Our findings reveal the dynamic interplay of influences and the unfolding of the sensemaking process across three levels. On the organizational level, actors make sense of the direct implications of the issue on their own organizations. On the value-chain level, sensemaking helps them understand the implications of direct interdependencies with others. On the ecosystem level, sensemaking reveals the implications of indirect interdependencies. Engaging on all levels is important for the overall process as it serves several interconnected purposes: A) Engaging on different levels helps create the relevance and seekership necessary for actors to engage in the process. Given the efforts associated with sensemaking, actors will only engage in it if they consider the issue to be relevant to their organization (Maitlis & Christianson, 2014; M. G. Pratt, 2000). Stakeholders initially evaluate the relevance of an issue based on a narrow organizational perspective. Engagement on the value-chain and ecosystem levels helps organizations understand how they may be affected by belonging to a certain industry and through its relationships with other external stakeholders, which strengthens their perception of the topic's relevance for them. B) While Seidl and Werle (2018) highlight the value of a *breadth* of perspectives in interorganizational sensemaking, our research shows that engaging on the different levels also contributes a *depth* of perspectives that enables individuals to gain a holistic understanding of the topic. This holistic understanding helps stakeholders go beyond technical knowledge and consider interorganizational dynamics of different interests, trade-offs, and power plays, as well as the potential repercussions of interdependencies for their own organizations. C) The reflection across levels not only creates an understanding of the topic but, importantly, also helps to instill a willingness to compromise, which is a prerequisite for alignment. In particular, an understanding of direct and indirect interdependencies is essential for making participants aware of their own interdependencies and prepared to accept a common fate, which ultimately leads them to embrace necessary trade-offs.

Second, we extend Schildt's (2020) work on power in sensemaking by providing insights into the dynamics of episodic and systemic power across the different levels of sensemaking. Our findings indicate that systemic power is relevant across all levels, but plays out differently on each one, as the different levels can also be considered different reference frames or systemic contexts for the collective sensemaking process (Kaplan, 2008; Schildt et al., 2020). As the context of sensemaking changes across the levels, so does the systemic power imposed by these structural contexts on the sensemaking process. On the organizational level, the narrow context often induces conservative influences leading to committed narrow forms of sensemaking to preserve coherence with direct organizational interests. Instead, the broader reference frames on the value-chain and ecosystem levels have more reformative influences on the sensemaking process as they embrace alternative concepts and new evaluation criteria. Episodic power is used especially on the value-chain level, where direct interdependencies and direct divergent interests most prominently clash. Episodic power is often used to reinforce the status quo and established beliefs. But it can also be used in inspirational and expansive manner, to problematize established goals and provide actors with new observations and ideas that induce sensemaking on different levels and thus within different reference frames.

Third, our findings extend research on the influence of identity in the sensemaking process. Research on industry identity formation has thus far alluded to an interplay between perceptions of identity on the organizational and industry levels (Patvardhan et al., 2015; Stigliani & Elsbach, 2018). We shed further light on such interplay in the context of interorganizational sensemaking. In particular, our findings indicate that external shocks may challenge an established industry identity, and that the reconceptualization of that identity both influences and is influenced by the collective sensemaking process. Interorganizational sensemaking may be needed to jointly reestablish a shared industry identity in the light of a changing environment. Additionally, this reconceptualized industry identity influences interorganizational sensemaking, as it provides a new interpretative frame for the implications of the ecological shock on the ecosystem level and indirectly for the participating organizations. Such a reciprocal interplay underlines the importance of achieving a coherent perception of industry identity shared by all participating organizations for successful collective action as an important part of the interorganizational sensemaking process.

Ultimately, aligning on a joint pathway depends on establishing a collective identity, as this is needed for the notion of a common fate to be accepted and thus for a willingness to compromise to be instilled. Such collective identity may also be facilitated through the group structure of a stakeholder initiative, such as an industry consortium. The collectively accepted identity of a particular group or initiative may function as a conducive reference frame for the ecosystem-level sensemaking that might be more relatable for participants than the more diffuse notion of industry identity. Resonating with Lawrence et al. (2012), such a group identity may become part of the reference frame for sensemaking whose systemic power then helps to institutionalize and legitimize change.

9.5.2. Contributions to Research on the Circular Economy

Our study also contributes to the circular economy literature. While previous research has frequently called for collaboration to realize the transition to a circular economy in general and has readily pointed to the interdependencies between actors along value chains, little research so far addresses the challenges of such collaborations or suggests how an alignment between interdependent actors with diverging interests can actually be achieved (Brown et al., 2021; Centobelli et al., 2020; Eikelenboom & de Jong, 2022; Pieroni et al., 2019). We respond to calls for more research on the social processes of the collaborative transition to the circular economy by providing insight into how such collaborative initiatives may be successfully realized (Bertassini, Ometto, et al., 2021; Brown et al., 2021; Parida et al., 2019; Pieroni et al., 2019).

Our findings suggest that an alignment between interdependent stakeholders along a particular value chain requires a joint reflective process across the organization, value chain and ecosystem levels. The joint reflection across these levels is essential for creating an agreed-upon understanding of the transition. Given the lack of a common understanding of the circular economy concept and the resulting uncertainty (Kirchherr et al., 2017; Korhonen et al., 2018; Moraga et al., 2019), the collaborative process is not only important for bringing together isolated knowledge on the organizational level, but also for connecting the different realities on the value chain level, and for creating awareness about ecosystem-level influences. It also facilitates achieving a joint understanding of the overarching goal for the respective industry

and a joint vision of the circular value chain. Connecting the organizational-level implications of individual actors with the direct interdependencies on the value-chain level and the indirect interdependencies on the ecosystem level is essential for achieving alignment on a particular way forward.

Researchers have thus far highlighted the existence of interdependencies and diverging opinions, trade-offs, and power plays among actors (Bening et al., 2021; Kirchherr et al., 2018; Tapaninaho & Heikkinen, 2022). Our analysis suggests that a collaborative assessment of the direct and indirect interdependencies between organizations allows individual stakeholders to connect the direct implications for their organization with the ones resulting from these interdependencies and thus to create an understanding of the trade-offs. This reflection strengthens the sense of a common interconnected fate among stakeholders and of belonging to and identification with an industry grouped around a circular value chain. It also forges a willingness to compromise individual short-term goals, without which alignment between the diverse actors cannot be achieved.

9.5.3. Managerial Implications

Our work also offers valuable insights for the management of diverse stakeholder alliances.

First, the success of collaborative efforts that span value chains may strongly depend on the selection of participants. Including participants from the entire value chain is important for the transition towards a circular economy. However, our findings suggest that direct and indirect dependencies may play out differently depending on the specific topic to be tackled, and that stakeholders contribute differently to the alignment process. Some stakeholders are already active and understand the relevance of the given topic, while others appear more passive and distant from the topic. Thus, for achieving an actionable alignment among actors, managers of diverse stakeholder alliances should carefully curate the list of participants and may have to actively reach out to more passive but relevant stakeholders.

Second, our findings show that participants engage differently in the five subprocesses depending on the nature of the topic. For example, during the alignment process on collection systems, sensemaking efforts on the organizational and the value chain were initially rather unproductive and cumbersome, as stakeholders lacked any connection to the topic. Collective sensemaking only really kicked off at the ecosystem level once participants developed a sense of relevance, which happened when they became aware of indirect interdependencies within this broader reference frame. This relevance, in turn, also triggered active engagement on the lower levels. Thus, practitioners facilitating similar alignment processes should ensure that the focus and sequence of subprocesses are tailored to the characteristics of the chosen topics.

Third, the organizational body of stakeholder initiatives plays a conducive role in the overall alignment process. Often, such bodies enjoy considerable legitimacy and authority among participants and their representatives can provide impartial input to the negotiation. In addition, as our research indicates, the organization itself may also strengthen an ecosystem-level reference frame that helps participants better understand indirect interdependencies and consider a broader scope of potential action. Facilitators can also leverage the power and

legitimacy of the organization to strengthen a group identity—not only to attract the right participants, but also to steer a progressive process.

9.5.4. Limitations and Future Research

Our research has several limitations that indicate opportunities for future research.

First, our research focuses on a facilitated sensemaking process over a specific period. Yet, sensemaking is a dynamic concept, with the sense made connected to a temporary perception of an issue or event. In addition, the issue or event to be made sense of might be further developing over time—like the continuously worsening climate crisis, for instance. Future research that examines the temporal aspects of inter-organizational sensemaking may develop important insights into the regularity and time-sensitivity of inter-organizational sensemaking.

Second, our study is based on the collaborative efforts of a single value-chain consortium in the packaging industry, and we have only studied the collaborative efforts for two selected topics. The dynamics of direct and indirect interdependencies among actors of one value chain and requirements for concerted action to close resource loops are likely similar in other industries. Nevertheless, some of the observed challenges and dynamics might be idiosyncratic to the flexible packaging value chain, this particular consortium, or the two topics we examined. Future research in different industries or topics may clarify the transferability of our findings to other research settings.

Third, as we sought to develop insights into the dynamic process of interorganizational sensemaking, we benefitted extensively from our active involvement with the consortium. Yet, such an engaged scholarship approach (Van de Ven, 2007) also bears the risk of bias in the collection and interpretation of data. Although we have taken various steps to ensure the validity of our results, some minor bias cannot be conclusively eliminated. Given these limitations, future studies that analyze the alignment work of other stakeholder collaborations and systematically compare such efforts may be useful to further corroborate and develop our findings.

9.6. Conclusion

We have analyzed the interorganizational sensemaking process between stakeholders of a consortium from the flexible packaging industry seeking to transition from a linear to a circular value. We observed that interorganizational sensemaking unfolds in various dynamic and interconnected subprocesses on the organizational, value-chain, and ecosystem levels. The interplay of these processes helps participants broaden their perspective and embrace the implications of direct and indirect interdependencies between stakeholders. These different considerations ultimately induce a willingness to compromise and open the door for collective alignment on joint action. Our research contributes to the sensemaking literature by shedding light on the process of interorganizational sensemaking of interdependent actors and provides insights into stakeholder collaborations promoting the transition to a circular economy.

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9.7. Appendix

Appendix A: List of Interviews

No.	Value-Chain Step	CEFLEX/ external	Ground-work	Prior Workshop 1	Prior Workshop 2	Duration	Date
1	Material Producers (1)	VC Group Leader	x			60 min	18 September 2019
2	Material Producers (1)	VC Group Leader		x		55 min	15 January 2020
3	Material Producers	VC Group Leader			x	40 min	06 March 2020
4	Film producers and converters (2)	VC Group Leader	x			50 min	23 September 2019
5	Film producers and converters (2)	VC Group Leader		x		45 min	21 January 2020
6	Brands and retailers (3)	VC Group Leader	x			50 min	13 September 2019
7	Brands and retailers (3)	VC Group Leader		x		30 min	13 January 2020
8	Sorters, collectors, and recyclers (4)	VC Group Leader	x			70 min	21 September 2019
9	Sorters, collectors, and recyclers (4)	VC Group Leader		x		60 min	16 January 2020
10	Sorters, collectors, and recyclers (4)	VC Group Leader			x	70 min	26 February 2020
11	Sorters, collectors, and recyclers (4)	External expert		x		45 min	13 January 2020
12	Suppliers, end users, and others (5)	VC Group Leader	x			50 min	21 September 2019
13	Suppliers, end users, and others (5)	VC Group Leader		x		35 min	14 January 2020

14	Suppliers, end users, and others (5)	VC Group Leader			x	40min	28 February 2020
15	Suppliers, end users, and others (5)	CEFLEX Stakeholder			x	55 min	26 February 2020
16	Suppliers, end users, and others (5)	CEFLEX Stakeholder			x	45 min	06 March 2020
17	Sorters, collectors, and recyclers (4)	CEFLEX Stakeholder			x	55 min	17 March 2020
18	Sorters, collectors, and recyclers (4)	External expert			x	55 min	18 March 2020
19	Sorters, collectors, and recyclers (4)	External expert			x	60 min	25 February 2020
20	Sorters, collectors, and recyclers (4)	External expert			x	45 min	24 February 2020

Appendix B: List of Quotes

Process Step	Topic 1 (Mono. vs Multi-Materials)	Topic 2 (Collection Systems)
<p>Subprocess 1: Unraveling Direct Impact (Organization)</p>	<p>“In the end it’s the brand owner who specifies the packaging.” (Brand Owner, VCG 3).</p> <p>“[The topic is] about explaining that packaging has a serious function—to protect, not just contain—and that is not clear to everybody.” (Converter, VCG 2)</p> <p><i>“We need [multi-materials for their] barrier protection; [...] if you need something protective, it’s not just mono.”</i> (Material Producer, VCG 1)</p> <p><i>“As recyclers, we have been demanding mono fractions and improved packaging design for a long time. We just can’t influence it.”</i> (Recycler, VCG 4)</p>	<p>“I suppose the different sorting and recycling companies are more expert in this than I am because I am a producer. I can talk about this as a consumer.” (Material Producer, VCG 1)</p> <p>“Maybe in the first position workshop there were more people [...] who would be directly impacted by the outcome of the position statement. Whereas here [...] we do have a vested interest because we are all part of this process and the value chain, but no one’s direct business is going to have to start processing these materials. I think this slightly changes how we approach the discussion.” (Consortium Manager)</p> <p>“If I imagine my grandma is sitting at home and has to work out, ‘Is this plastics, paper, or glass? Or this plastic with the cheese inside, should I put it here or put it there?’” (Machine Producer, VCG 5)</p> <p>„I need to tell you; I haven’t thought much about this until now.” (Material Producer, VCG 1)</p> <p>“From my POV we are still on a journey, and we don’t fully understand what quality is actually needed.” (Brand Owner, VCG 3)</p> <p>“In my opinion, the whole topic of collection is being pushed by [companies involved in trials with alternative collection systems]. But I am interested to see whether there are more stakeholders thinking into this direction.” (Recycler, VCG 4)</p> <p>[In response to being asked what influence the topic would have on the organization]: “I am not sure whether it would have any influence.” (Material Producer, VCG 1)</p>
<p>Subprocess 2: Unraveling Direct Interdependencies (Organization - Value Chain)</p>	<p>“I am thrilled that we have now reached a point where the various groups in this value chain are talking to each other—which wasn’t the case in the past—and an understanding of problems across value chains is finding its way into CEFLEX and the economy.” (Recycler, VCG 4)</p> <p>“It’s up to the brand owner to determine what we need our packaging to do.” (Converter, VCG 2)</p> <p>“We used to be the ones deciding on the material. Now we need you [recyclers] to tell us what the restrictions are. [...] Before, we were the ones asking for what we want; now we need to design for you,</p>	<p>“A lot of knowledge is out there, but I don’t believe it is well connected.” (Consortium Manager)</p> <p>“The rest of the value chain has no insight. It seems that they all got too comfortable with the existing system.” (Recycler, VCG 4)</p> <p>“Everybody has their own interests. [...] So, it’s difficult to get a good view of the real best practices.” (Consortium Manager)</p> <p>“The economic interest [of machine producers] in the position is crystal clear.” (Workshop Participant)</p> <p>“As for the brand owners, I would assume that they are not so much involved in the</p>


	<p>basically [...] We are looking for guidance from you.” (Brand Owner, VCG 3)</p> <p>“You need barrier protection. you can't say ‘it is not critical’, say ‘just use PO’ without any kind of protection; you don't meet [the demands of] your supply chain and generate lots of cost.” (Converter, VCG 2)</p> <p>“We need to explain to our customers and the value chain why we should in some cases use multi-materials; why mono-materials are not fitting their needs. This means working with the brand owners and the retailers but also with the producers.” (Converter, VCG 2)</p> <p>“Are you OK with what you’re giving up [when switching to mono-material]? [...] Are you aware that your customers understand what they have to sacrifice?” (Converter, VCG 2)</p> <p>“[A clear preference for mono-materials] sounds too revolutionary. The wording is too harsh. [...] Brand owners—for them, visual marketing and visual design is a very important sales and marketing tool they can’t live without.” (Material Producer, VCG 1)</p> <p>“It’s about shared responsibility along the value chain.” (Workshop Participant).</p>	<p>waste issue as to have a well-founded opinion on it.” (Recycler, VCG 4)</p> <p>I know from [a brand owner] that they have started to calculate how such [collection] systems work along the whole value chain [...] and they have started to ask: Can we as [a brand] not influence these structures?” (Recycler, VCG 4)</p>
<p>Subprocess 3: Unraveling Indirect Interdependencies (Value Chain - Ecosystem)</p>	<p>“There is no time to wait for new technologies. Time has run out.” (Recycler, VCG 4)</p> <p>“If we don’t do anything, we will lose our license to operate.” (Workshop Participant)</p> <p>“If we keep all doors open, which would be the best and easiest for [my company], we will have no credibility, and the politicians will just make the decision for us.” (Converter, VCG 2)</p> <p>“Some customers are already demanding these things and want to see change.” (Brand Owner, VCG 3)</p> <p>“The regulator becomes more and more uncontrollable because the regulator feels the pressure from the street.” (Recycler, VCG 4)</p> <p>“What is [the regulator’s] priority? It’s appealing to their electorate.” (Recycler, VCG 4)</p> <p>“If we have this discussion and keep all the options open, flexible packaging will</p>	<p>“This is not down to goodwill. This is going to be set up by law.” (Workshop Participant, VCG 5)</p> <p>“When talking about collection, there is a huge influence of the first part of the chain which is consumers.” (Converter, VCG 2)</p> <p>“As an industry, we are entering an area which is not our home turf. We are entering the discussion with municipalities.” (Brand Owner, VCG 3)</p> <p>“If I was a brand owner, I would say, we are doing a lot of effort to make the plastics packaging circular and we are doing it because if not, we feel we are going to lose our consumers (...). So, this is because the public reaction to the perceived lack of circularity of plastics packaging is at the source of all the efforts we are making.” (Workshop Participant)</p> <p>“Even after 30 years of separate collection, we see that citizens do not always do what they are asked to do. That's a reality we need</p>

	<p>just be killed by the legislator.” (Workshop Participant)</p> <p>“Why are we here? [...] Working as individuals doesn’t work, because as individuals you cannot solve it. You should work from an ecosystem perspective.” (Workshop Participant)</p> <p>“We can't bet everything on the future.” (Brand Owner, VCG 3)</p> <p>“[Some stakeholders] keep abusing CEFLEX as an alibi event, following the motto ‘Let’s talk a little about packaging design, and then we’ve done our duty, and the world will be a better place.’ [...] I have the impression that several participants do not want to see that we need a paradigm shift here.” (Recycler, VCG 4)</p>	<p>to take into perspective also for our future planning.” (Workshop Participant)</p>
<p>Subprocess 4: Evaluating Collective Action (Value Chain – Ecosystem)</p>	<p>“We said we are not [an] advocacy [body] so we cannot use words like ‘oppose’ because that is advocacy.” (Workshop participant)</p> <p>“A key pillar of the work of CEFLEX is to work on advanced recycling solutions also for multi-materials. (...) If we focus here only on existing technologies for mono-materials then there is no future-oriented perspective.” (Material Producer, VCG 1)</p> <p>“If you want to actively address this issue, then you should indeed make political statements now as a signal to society and a signal to the regulator.” (Recycler, VCG 4)</p> <p>“We are at the beginning of a long journey. It requires to completely redesign 20 years of packaging solutions. And in CEFLEX, with the power we have in terms of R&D and research and influence, we need to focus all the power and money here.” (Workshop Participant)</p> <p>“We want to be a technical information platform.” (Workshop Participant)</p>	<p>“Everybody should be part of collection. Consumers should not be part of the problem, but part of the solution.” (Workshop Participant)</p> <p>“If we just send the message to consumers that it is fine to stick it all in one bin and we will sort it out for you, it doesn't place any kind of ownership on them.” (Brand Owner, VCG 3)</p> <p>“I see much too much focus on this stupid customer who doesn't do the right thing and I totally disagree with that. [...] The system should be so simple that you can hardly make any mistakes. If you are relying on the consumer, then we are doing the wrong things.” (Workshop Participant)</p> <p>“We should emphasize that the public is not responsible for a system that doesn’t work. And that we [the industry] should take responsibility.” (Workshop Participant)</p> <p>“It is the industry's responsibility to design a well-functioning collection system.” (Workshop Participant)</p> <p>“If CEFLEX just puts out you just have to sort the separately collected and everything is fine and then the quotes will not be achieved because everyone is relying on that, then the public outcry might be just as big as it is right now, and I want to reduce that as fast as possible.” (Machine Producer, VCG 5)</p> <p>"The way the PS needs to finish today is to open the door to post sorting of mixed waste collection because that door is currently firmly shut. The way I would like the PS to end up is to say: ‘We prefer separate sorting, we need it (...) but we acknowledge that</p>

		<p>sometimes it needs alternative solutions.’.” (Consortium Leader)</p> <p>“We want to do as much segregated separation as possible and only where that is practically impossible, would we do post[-sorting]. And I am saying that as an organization who is actually picking up the bill for this by the way, so I think we need to be clear about who is paying for what.” (Brand Owner, VCG 3)</p> <p>“It is not a politically correct thing to say that you are going to need to use post-sorted materials as a collection system, but it is increasingly a reality in certain situations.” (Consortium Leader)</p>
<p>Subprocess 5: Evaluating Concerted Individual Action (Organization – Value Chain)</p>	<p>“CEFLEX is not an industry association. It's a coalition of the willing. And anyone who is not happy with that should get out.” (Workshop Participant)</p> <p>“It's about guidelines, the star on the horizon, and chasing that and giving the inspiration to R&D to work for the solutions.” (Material Producer, VCG 1)</p> <p>“Unless we get some convergence around some sort of standards and focused effort, we are not going to get anywhere. And actually, what that means is we'll end up with [products] in glass jars.” (Brand Owner, VCG 3)</p> <p>“I want to go, because my company wants to help the world, sustainability... Tell me which direction I need to go, because I will go, and I don't know.” (Material Producer, VCG 1)</p> <p>“Why do we believe that CEFLEX and the members of the workshop have the ability to take a position? Because we come from a diverse background; we come from experience.” (Workshop Participant)</p> <p>“Mechanical recycling is currently the only industrially viable way to do recycling. Because it is urgent, we have to develop that, and we need the recyclable mono-materials to increase the yield.” (Material Producer, VCG 1)</p>	<p>“What we are talking about here is a policy statement that kind of acts as a compass, that sets a direction of where we want go.” (Consortium Leader)</p> <p>“Having a CEFLEX position gives an industry agreed position. So, we are all coming from the same angle, the same point of view, rather than being disjointed.” (Workshop Participant)</p> <p>“We are talking about huge investments, and we need to have a long-term plan for the companies of the whole value chain how to work with this and where are we going.” (Workshop Participant)</p>

Appendix C: CEFLEX Position Statements as Negotiated in the Workshops

Position Statement for Topic 1 “Material Preferences for Flexible Packaging”



CEFLEX Position Statement

Accelerating the circular economy for flexible packaging – a recommendation for recyclable mono-materials

- Given the current best-practice technologies established in Europe, CEFLEX strongly recommends the use of flexible packaging made from recyclable mono-materials. CEFLEX closely monitors any development in technology, recycling infrastructure and materials that may affect this recommendation.
- Material choices in flexible packaging should always be made according to circular economy and environmental impact considerations.
- CEFLEX stakeholders are encouraged to re-evaluate functional requirements of packaging and, when possible, to redesign existing packaging to a recyclable mono-material. Essential product protection should not be compromised to meet recyclability requirements.
- The use of non-recyclable materials primarily for marketing and visual design purposes is not in line with this CEFLEX position.

<https://ceflex.eu/first-position-paper-points-to-collaborative-effort-towards-a-circular-economy/>

Position Statement for Topic 2 “Collection Systems for Flexible Packaging”

POSITION STATEMENT



FEBRUARY 2021

Collection Systems for Flexible Packaging in a Circular Economy



- In a circular economy, all flexible packaging needs to be collected so that it is available for sorting and recycling*. This requires a significant increase in the collection of flexible packaging across Europe. Given differences in population density, geography and system legacy, viable solutions may differ depending on the local context.
- To maximise the recycling quality of all materials (incl. plastic), organic waste, paper/cardboard and glass should always be collected separately from plastics, other recyclables and remaining waste. To aid consumers and sorting, this approach should be harmonized across Europe.
- Separate collection of flexible packaging at source is preferred. Flexible packaging can be combined with other packaging, including rigid plastics, metal and beverage cartons.
- Since a relevant proportion of flexible packaging may remain in the mixed solid waste stream, the additional sorting of flexible packaging from the mixed waste is necessary to maximize recovery and enable circularity.**
- If separate collection is not viable, mixed waste collection and sorting flexible packaging from mixed waste is an alternative collection option.
- A well functioning collection system for recycling flexible packaging requires the collaboration of industry, legislators, local authorities and consumers. As public awareness and acceptance is a key component, ongoing consumer engagement is critical.
- CEFLEX closely monitors developments in collection, sorting and recycling technology and infrastructure that may affect this position.

* Flexible packaging is already collected in all countries but not always such that it is available to be sorted/recycled.

** With the appropriate infrastructure, existing practice shows that these materials can deliver comparable quality recyclate.

Value chain alignment on key issues

The Circular Economy for Flexible Packaging (CEFLEX) initiative is a collaboration of over 170 European companies, associations and organisations representing the entire value chain of flexible packaging. Together, we work to make all flexible packaging in Europe circular by 2025.

To support CEFLEX's vision and help the entire value chain move forward as one, a facilitated alignment process tackles key issues. Information exchange, analysis, and interviews support participative workshops which create considered positions on each topic so that these can guide transformation to a circular economy.

ceflex.eu

<https://ceflex.eu/position-paper-collection-systems-for-flexible-packaging-in-a-circular-economy/>

10. Paper III: Driving the Circular Economy Transformation: How Incumbents embed Circular Innovations in their Organizations

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Abstract

To achieve a transition from linear to circular, firms need to transform their way of doing business and engage in circular innovation. Research highlights the importance of the organizational context in hindering or advancing circular innovation endeavors, yet we know little about how such influence may change in resonance with the development phases of the innovation endeavor. Using a multiple case study approach, we investigate how circular innovations in incumbents become organizationally embedded. We provide a structured analysis of the circular innovation process from initial motivation to invention, implementation, and institutionalization, and connect the organization-level barriers encountered in each phase, the activities performed by internal change agents to overcome them, and the emerging organizational embedding. We find that organizational embedding evolves over time in resonance with the barriers encountered and activities pursued in each phase. While the resulting form of organizational embedding is idiosyncratic to the individual company, there are overarching similarities. Five aspects are particularly important: the internal change agents and the roles they assume, the setup of structures and processes, a strategic vision, the management of capabilities, and the organizational locus of the innovation activity within the organization.

Keywords

Case Studies, Change Agents, Circular Economy, Management Innovation, Organization Design

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10.1. Introduction

The circular economy has gained much attention in the business world in recent years as a potential route towards a more sustainable economic system (Bocken & Ritala, 2022; Geissdoerfer et al., 2017). A circular economy can be defined as a restorative system that maintains the resource base of the planet by minimizing material extraction and continuously looping material back into the system (Ghisellini et al., 2016; Korhonen et al., 2018). To achieve a transition from linear to circular, firms need to transform their organizations according to circular principles and find viable ways to decouple their value creation from resource consumption; that is, they need to engage in circular innovation (Bocken et al., 2016; Korhonen et al., 2018; Suchek et al., 2021).

Yet, engaging in circular innovation can be challenging, especially for established firms, as it may require substantial changes to their current way of doing business and create tensions within the organization (Bertassini, Ometto, et al., 2021; Bocken & Geradts, 2020; Centobelli et al., 2020; Eikelenboom & de Jong, 2022; Hofmann & Jaeger-Erben, 2020). Consequently, research has highlighted the need to analyze the organizational context of incumbents' circular innovation endeavors more explicitly (Bertassini, Ometto, et al., 2021; Sehnem et al., 2021). A few studies have started to do so—for example, by identifying organization-level barriers to engaging in circular innovation and considering organization design aspects in their analysis (Bocken & Geradts, 2020; Centobelli et al., 2020; Eikelenboom & de Jong, 2022; Guldmann & Huulgaard, 2020; Hofmann & Jaeger-Erben, 2020; Kirchherr et al., 2018). Yet, while this research provides valuable insights, important gaps remain.

In particular, existing research thus far provides only a static list of selected important organizational aspects and does not consider how they can be actively built up. Additionally, most research only looks at the idea-development stage of circular innovation endeavors and thus neglects potentially important aspects that might arise during implementation and scale (Bertassini, Ometto, et al., 2021; Pieroni et al., 2019). Consequently, little is known as to how organization-level requirements may change from ideation to implementation and scale, who needs to undertake which activities to overcome the different barriers at each stage, and how these activities shape—and are shaped by—the organizational context of the firm. Given the proliferating interest in the circular economy within industry on the one hand and the limited existing activities on the other, such deeper insights could be valuable to drive the much-needed economic transition further.

To fill this gap, we focus on the process of circular innovation as it unfolds in the organizational context of incumbents. In particular, we focus on the activities that internal change agents undertake in response to organization-level barriers encountered in each phase of the innovation process and how they contribute to shaping the organizational embedding of circular innovations. We refer to organizational embedding as the shaping of the organizational context in resonance with the innovation endeavor. In particular, organizational embedding encompasses the anchoring of the circular innovation within the overall organization and the shaping of structures, processes, strategies, people, and capabilities in connection with the circular innovation (Bocken & Geradts, 2020; Burton et al., 2006; Eikelenboom & de Jong, 2022; Galbraith, 1995; Hofmann & Jaeger-Erben, 2020). Our research question reads:

How do incumbent organizations drive circular innovation internally and adapt the organizational context to achieve favorable embedding?

To answer this research question, we conducted a multiple case study with three incumbents who engaged in circular innovation. We analyze the innovation process across different development phases within the organizational context of the firm. Within each phase, we examine the organization-level barriers encountered, the activities of internal change agents driving the innovation process to overcome these barriers, and, in particular, the resulting organizational embedding as it evolves along the innovation process. The remainder of the paper is structured as follows: Section two provides the theoretical background for our analysis, while section three outlines our methodological approach. In section four, we set forth our findings and discuss our results in section five. Section six concludes the paper.

10.2. Theoretical Background

10.2.1. On the Circular Economy

To realize the transition towards a circular economy, firms need to engage in circular innovation and find viable ways to decouple value creation from resource consumption (Bocken et al., 2016; Korhonen et al., 2018; Suchek et al., 2021). Firms' organizational context plays an important role in this transformative endeavor, as they may have to make substantial changes to their current business model and organizational setup (Bocken & Geradts, 2020; Centobelli et al., 2020; Eikelenboom & de Jong, 2022; Fjeldstad & Snow, 2018; Guldmann & Huulgaard, 2020; Kuhlmann et al., 2022). Hence, over recent years, research has started to investigate organization-level aspects of circular innovation in established organizations.

On the one hand, research has started to focus specifically on identifying organization-level barriers to realizing circular innovation, such as cultural resistance; a lack of incentives, resources, knowledge, and competencies; and risk avoidance and short-term financial goals, as well as rigid processes and structures (Bocken & Geradts, 2020; Centobelli et al., 2020; Guldmann & Huulgaard, 2020; Kirchherr et al., 2018). On the other hand, a few studies have started to explicitly consider some aspects of the organizational context in their analysis of circular innovation—for example, the capabilities of a firm, the mindsets of its members, and organization design elements (Bocken & Geradts, 2020; Eikelenboom & de Jong, 2022; Hofmann & Jaeger-Erben, 2020). Yet, research thus far only provides a largely static view of selected important organizational barriers. It does not consider organizational embedding as it evolves with innovation, and thus does not provide insights into whether specific organizational barriers may play out differently depending on the development phase of the circular innovation process, whether the relevance of aspects of organizational embedding might be different in each phase, and how such aspects could be actively shaped. As Bertassini et al. (2021, p. 12) observe in their literature review: “The majority of these analyzed studies propose a framework or a manual that provides directions for ‘what’ is required to be changed, but not necessarily guidance on ‘how’ to do it.” Relatedly, most research only looks at the idea-development stage. For example, in their literature review on circular economy-oriented (business-model) innovation, Pieroni et al. (2019) find that 80% of the identified approaches focus on understanding the opportunity or translating it into a business-model concept. Only 20% of the

approaches touch upon what the authors call the “transforming” stage, including piloting. That is, important aspects of implementation and scale remain neglected. Consequently, we know little about which organizational barriers need to be overcome *at what point in time*, or who is working to overcome them and how—or thus, ultimately, how organizational embedding that is conducive to circular innovation is achieved over time. Given the limited existing circular innovation endeavors and the increasing awareness of the important role of the organizational context, such deeper insights could be valuable to drive the transition towards a circular economy.

10.2.2. On the Innovation Process, Change Agents, and the Organizational Context

To shed light on the development of a circular innovation in the broader organizational context, it is useful to analyze the activities of internal individuals driving its development during different stages of the innovation process. Such individuals or teams, often referred to as change agents, initiate, lead, direct, or take direct responsibility for making change happen (Caldwell, 2003; Howell & Higgins, 1990). Research has frequently highlighted the importance of change agents for driving transformations within established organizations (Caldwell, 2003). They can interpret changes in the firm’s external environment, bring new ideas into the company, and help to translate changing requirements (Grewatsch & Kleindienst, 2018; Su et al., 2022). Within the company, they can drive ideas further, which makes their activities a major impetus for innovation—especially in the absence of formal structures (Caldwell, 2003; Siebenhüner & Arnold, 2007). Thus, analyzing the activities of change agents and their repercussions in the organizational setup can provide useful insights into how organizational embedding that is conducive to circular innovation can be achieved.

To understand how organizational embedding develops, it is useful to distinguish different stages of the innovation process. An innovation process can be understood as a series of activities that are performed by change agents in an organization and realized across different phases (Birkinshaw et al., 2008; Siebenhüner & Arnold, 2007). There are various innovation process frameworks that distinguish several phases of development with different foci, from the initial motivation to engage in innovation to the implementation and institutionalization of the innovation (Birkinshaw et al., 2008; Kennedy & Bocken, 2019; Pieroni et al., 2019; Siebenhüner & Arnold, 2007; Teece, 2010). We follow Birkinshaw et al.’s (2008) framework for management innovation, as it explicitly embeds the activities that internal change agents pursue during the various phases in the broader organizational and environmental context and thus provides a useful framing for the analysis of circular innovations in the context of the associated restructuring of the organizational setup.

Birkinshaw et al. (2008) depict internal change agents’ activities across four different phases: In the first phase, individuals develop an interest in a new topic and become motivated to search for potential responses, often sparked by external impulses or encountering a novel problem. In the second phase, they start to explore potential ideas by engaging in problem-driven search and trial-and error experimentation. In the third phase, the ideas evolve into operational solutions. Change agents refine them based on growing experience and push to develop a holistic concept or new practice to anchor the innovation. In the final phase, the

solution is retained and institutionalized within the organization. Throughout the process, change agents actively interact with the larger organization and its environment to facilitate the adoption of the new solution (Birkinshaw et al., 2008; Damanpour, 2014; Vaccaro et al., 2012). The success of an innovation process ultimately depends on whether the agents can achieve internal acceptance and establish a conducive embedding in the broader organizational context (Birkinshaw et al., 2008). Stimuli from the environmental context can help or hinder the internal innovation process in each phase; for example, external agents can provide inspiration, input, and feedback and later also legitimization and recognition (Eikelenboom & de Jong, 2022; Siebenhüner & Arnold, 2007; Vaccaro et al., 2012). By adopting this innovation process perspective for circular innovation endeavors, we provide a deeper understanding of organizational embedding as it evolves and is formalized as a consequence of the organizational barriers encountered and the activities pursued to overcome them.

10.3. Methodology

We chose a multiple case study research design for our study. The in-depth analysis allowed us to gain a deep understanding of an empirical phenomenon for which little theory exists (Eisenhardt, 1989). We selected three firms through purposive sampling based on two criteria. First, we selected large, established companies in line with our focus on innovation activities by incumbents. Second, we selected firms that had pursued circular innovations for a considerable amount of time and had undertaken significant observable activities to drive innovation, in line with our goal to analyze organizational embedding in different phases of the innovation process. The three selected firms **IngredientCo**, **ConstructCo**, and **ApplianceCo** (pseudonyms) are incumbents that had undertaken extensive activities to pursue circular innovation for several years.

IngredientCo is an incumbent from the food and beverages sector with annual sales exceeding 50 billion euros. The company has grown its portfolio of beverage brands both by acquiring existing companies and by developing new offerings in-house. It produces its products largely in proprietary facilities and thus processes extensive amounts of raw materials. The circular innovation process in focus was started by a procurement manager who assessed opportunities linked to the raw materials and assets used at the firm. His activities were focused on making better use of by-products generated by the main business. To develop his initial ideas further, he engaged in collaboration with peers from the company's R&D division and other motivated individuals throughout the company. For the idea development and testing, the team made extensive use of the existing company-wide incubation program. Over time, a dedicated team grew to develop the emerging solutions further. Ultimately, the company set up a new business entity, separate from the core business, focused solely on commercializing these by-products.

ConstructCo is a family-owned supplier of a broad range of products such as fasteners, tools, and machinery for mostly B2B customers in the construction, wood- and metal-crafting, and automotive sectors with annual sales exceeding 10 billion euros. The case study focuses on the Cradle to Cradle (C2C) certification process of a particular product for the construction industry. It was the first product to be certified and widely regarded as the company's first concrete step towards a circular economy. The initial push to engage in circular innovation

came from a regional sales agent who teamed up with peers from the central organization, and in particular the quality management team, to drive the ideas further. The quality manager took over the project lead and engaged external partners to gain the C2C certification, which subsequently sparked wider sustainability activities. The activities induced internal organizational changes that ultimately led to the creation of an official sustainability manager role and team.

ApplianceCo is an incumbent active in the market for home appliances, with more than 10 billion euros in annual sales. It offers a broad range of home appliances, which it traditionally sells in bulk to wholesalers. ApplianceCo develops and manufactures its own machines and provides service and maintenance to end consumers. The push for circular economy was strongly driven by two sustainability managers in the central technology unit. From initial broad explorations, the concept of a subscription offering targeted directly at end consumers emerged. A first offering was piloted in a regional sales unit. After initial proof, the project was transferred to the digital business-building unit at corporate headquarters, whose team developed the pilot further and rolled out the offering internationally.

For our study, we collected data from primary and secondary data sources. We started by collecting and analyzing publicly available material on all three companies to develop a first description of their circular innovation approaches. All innovations were publicly known and had received considerable attention. We analyzed the firms' public internet presence, press releases, and publications, along with news articles, conference speeches, and award considerations. As the main source of data, we collected primary data through semi-structured interviews. For each case, we conducted five semi-structured in-depth interviews with key stakeholders within the companies who had been involved in the circular innovation process. During the interviews, we discussed the circular innovation process from initiation to the current state with each interviewee according to their personal perception and regarding their personal role in each phase of the process to gain different insights into how the process developed over time. The questions focused on the idea itself, barriers encountered, and activities pursued, as well as aspects of the organizational context and its relevance for the innovation process. Interviews lasted 60–90 minutes and were conducted in the summer and fall of 2019, with two exceptions conducted in 2020. All interviews were conducted by two authors to limit potential bias and allow for the comparison of personal impressions. All interviews were recorded, transcribed, and—if not conducted in English—translated. Table 10-1 provides a list of interviews.

Table 10-1 List of Interview Partners

Interview No	Case Company	Role of Interviewee	Duration
1	ConstructCo	Quality Manager (later Sustainability Manger)	60 min
2	ConstructCo	Regional Sales Manager	75 min
3	ConstructCo	Digital Project Manager	60 min
4	ConstructCo	Board Member	60 min
5	ConstructCo	Head of Quality Management	60 min
6	ApplianceCo	Sustainability Manager 1 (central unit)	75 min
7	ApplianceCo	Sustainability Manager 2 (central unit)	60 min
8	ApplianceCo	Packaging Manager	90 min
9	ApplianceCo	Innovation Manager	76 min
10	ApplianceCo	Regional Retail Manager	60 min
11	IngredientCo	R&D Manager	60 min
12	IngredientCo	Procurement Manager	90 min
13	IngredientCo	Business Development Manager 1	75 min
14	IngredientCo	Project Manager	80 min
15	IngredientCo	Business Development Manager 2	60 min

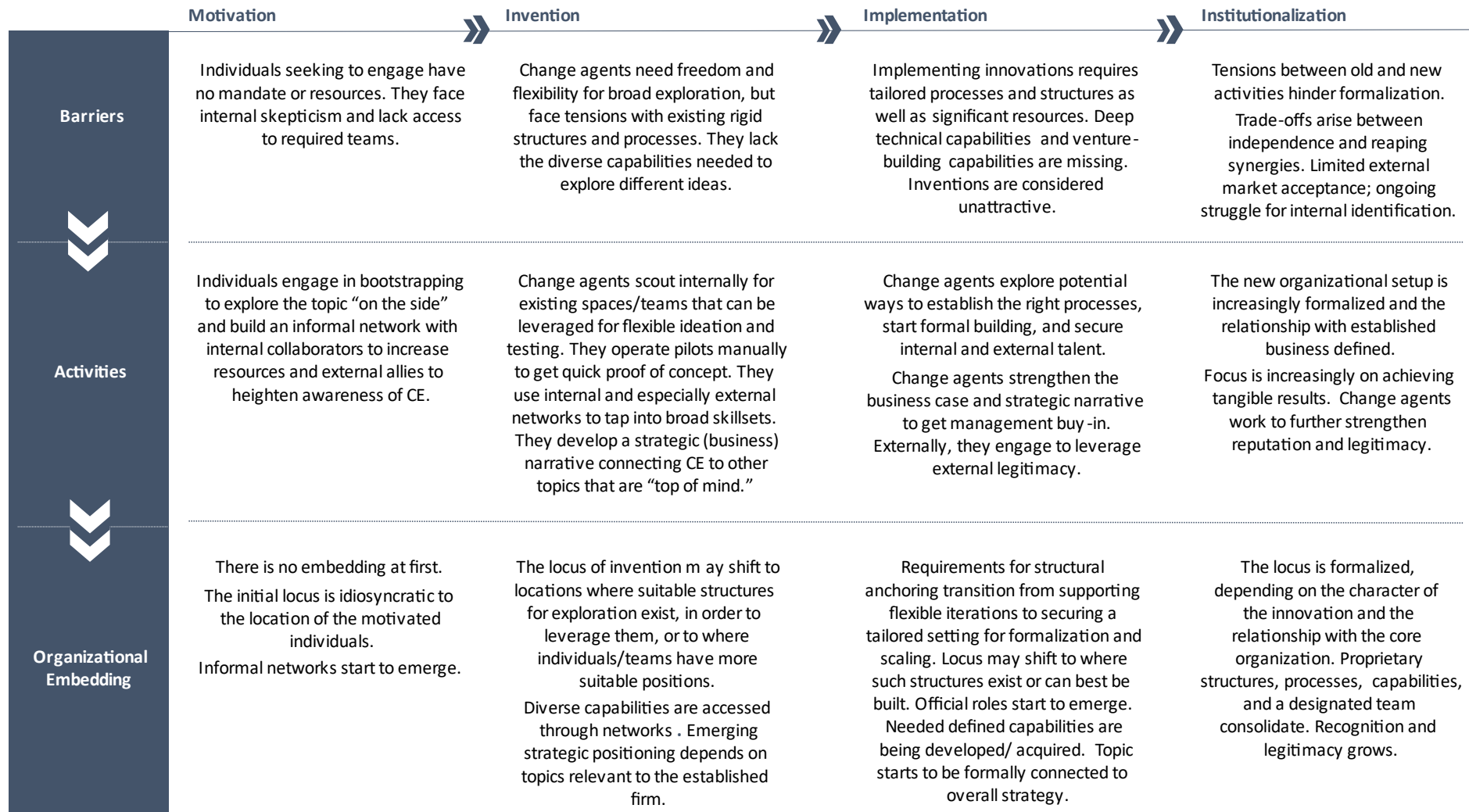
For the data analysis, we used MAXQDA. For each case, we followed three steps. First, we analyzed the individual interview transcripts, highlighting barriers encountered, activities pursued, and aspects concerning the organizational context. We further coded the highlighted aspects in response to the respective phase of the innovation process, following the four phases of Birkinshaw et al.'s (2008) framework. Second, we combined the insights from the individual interviews for each case and triangulated the findings against the initial outside-in case description. Third, we synthesized the findings in a detailed case study for each company, highlighting the barriers encountered, people involved, and activities realized, and elements of organizational embedding identified across the different phases. After concluding these steps for all cases individually, we compared the findings for each case to gain a greater understanding of the processes and identify common patterns in barriers, activities, and elements of organizational embedding and ultimately arrived at our findings, which are set forth below.

10.4. Findings

Our analysis shows that the requirements for organizational embedding conducive to circular innovation differed depending on the phase of the innovation. In each phase, the change agents encountered different barriers and engaged in different activities to overcome them—which, in turn, shaped the development of a specific organizational embedding over time. As the circular innovation process evolved, the organizational embedding transformed, shaped by the barriers encountered in each phase and the activities pursued. In the following, we detail the barriers,

activities, and resulting organizational embedding throughout the four phases. We use the term “institutionalization” to refer to the fourth stage of innovation.

Figure 10-1 Overview of the circular innovation process (adapted based on Birkinshaw et al., 2018)



10.4.1. Phase 1: Motivation

In all organizations, the innovation process was initiated by motivated individual employees who took a personal interest in the concept of a circular economy. They started to explore the topic “on the side,” engaging in search and idea-linking according to their personal viewpoints.

Barriers

At the start of the innovation process, the barriers encountered were mostly connected to the novelty of the topic to the organizations.

First, there was little awareness of the topic in the organizations and change agents faced significant skepticism over its relevance to the organization overall. For example, at ApplianceCo, the sustainability managers who initiated the search saw circular innovation as a potential game-changer for the company. However, the strategic teams were occupied with other major shifts in the market affecting the current business reality. Skepticism was particularly deep regarding the business potential of any circular innovation. As the procurement manager of IngredientCo recalled: *“I had a chief tell me right to my face, ‘You are wasting your time [with this topic]. It’s nothing but a waste of time.’”*

Second, given the limited awareness and prevailing skepticism, no extra financial or time resources were available to dig into the topic and evaluate its potential. As the ApplianceCo sustainability manager explained: *“As it was just a hypothesis of ours [...], we got little to no extra funding for it.”*

Third, none of the change agents initially had any mandate to engage in the topic. As they were beginning to explore the topic purely out of personal motivation, they had no choice but to start from their specific location in the company, which did not necessarily provide a conducive organizational setup. For example, at ApplianceCo, the sustainability managers were convinced that any new offering had to be developed as a new business. However, as members of the technical unit at headquarters, they had no direct market connection and were not tasked with developing new business offerings. As one of them explained: *“As an employee in the environmental protection department, I can’t knock on the door of the management board and say, ‘I have a great idea, we want to implement it.’”* At ConstructCo, the initial impulse came from a regional sales agent located outside headquarters. While he was very enthusiastic about driving the topic, he felt that he had only limited options to do so. Since fundamental changes would be required in the production and business model of the company, colleagues at headquarters would be in a better position to take the lead.

Activities

In the light of these barriers, the change agents engaged in bootstrapping—that is, they explored the topic on their own account, with minimal resources. As the procurement manager of IngredientCo explained: *“I said: ‘OK, I’ll take that risk, because I’m doing this in my evenings.’”* He went on: *“In the first year, we all worked on it in addition to our normal responsibilities. We just felt it was the right thing to do.”*

However, individuals also engaged in internal networking to find allies who could provide additional resources and capabilities. For example, as the procurement manager at IngredientCo

sought to understand potential applications for different by-products, he started to engage with a motivated manager from the global R&D unit who could investigate technical feasibility. At ConstructCo, the sales agent actively engaged to find internal allies from the core organization and started to collaborate with a colleague from the central quality management team. Additionally, external networking played an important role in enhancing individuals' understanding of potential avenues. For example, the ApplianceCo sustainability managers engaged with universities to have students explore potential business models. At ConstructCo, the sales manager engaged with external C2C experts to understand how C2C certification could contribute to a strategic pathway towards circularity for the firm and invited the experts to give talks at the firm.

Organizational Embedding

Initially, no organizational embedding existed, as the topic was new to the firms. The activities were started by individuals out of personal motivation, irrespective of their function or responsibility in the company. For example, at IngredientCo, as the change agent was located in central procurement, he started to explore ideas based on by-products that were at the heart of his daily business. Hence the initial locus of the innovation activities was idiosyncratic, resonating with that of the change agent themselves. In the absence of any structures, process, or resources, the agents engaged with the topic “hands-on” and “on the side.” Their own locus at the outset also had some influence on the type of approaches that they considered.

While the initial impulse came from individuals, in the course of the activities and positioning, informal teams in the organization started to develop. At IngredientCo, ties formed between procurement and the R&D department, while at ApplianceCo, the sustainability manager in the central technology unit reached out to sales teams. At ConstructCo, the sales agent teamed up with a quality manager to gain access to the core technical units. External networks also played a role in enhancing the understanding of the circular economy paradigm and increasing buy-in.

In summary, in the motivation phase, circular innovation processes were not embedded in the organizations at all. As individuals brought the idea into the organization, the initial locus was idiosyncratic to the location of the change agents themselves. In the absence of any resources or mandate, change agents explored opportunities “on the side” and built internal and external networks to access resources and capabilities.

10.4.2. Phase 2: Invention

During the invention phase, the change agents engaged in exploration and ideation to develop potential solutions and iteratively developed, selected, and refined them.

Barriers

Barriers in the invention phase were connected to the exploratory and uncertain status of the innovation. First, it proved difficult for the change agents to freely explore novel ideas within existing internal structures. As the business development manager at IngredientCo underlined, they needed to try out completely different approaches: *“Circular economy sits in the world of disruptive innovation. To be successful [...], you have to look at the problem in a completely*

different way, and your customer may also be different.” Yet, efficient processes optimized for the existing business made it difficult to find the freedom and flexibility needed to explore new angles. As the ConstructCo sales manager underlined: *“That is actually the crux, that [change agents] then fail because of daily business processes [...].”* As he further reflected: *“The day-to-day operations eat up the vision.”*

Second, the individuals who started the exploration often lacked the diverse capabilities required to develop concrete solutions. To some extent, this was connected to their structural anchor in the company. For example, at ApplianceCo, the sustainability manager’s team had a technical focus on product development that they were convinced would be detrimental to the innovation: *“[Here] you always get stuck at the level of minimum legal requirements.”* They stressed the importance of having a business offering but lacked the experience to develop it themselves: *“There has to be a marketing concept behind it. And of course, we can't develop that as a technical department. [...] We are all engineers [...] We are not salespeople.”* Moreover, many of the ideas required expertise outside the firm’s core competences, which was difficult to find anywhere within the firm. For example, IngredientCo had limited knowledge about the nutritional value and technical processing of the by-products it had previously just discarded or sold on.

Third, change agents faced cultural resistance. For example, ApplianceCo’s sustainability managers pointed out that the company was considerably tech-driven. Hence, many colleagues believed that change could only come from the core technology unit, while the sustainability managers wanted to push the development of new business models. Similarly, the procurement manager at IngredientCo faced strong headwinds: *“It was frustrating getting internal buy-in [...]. There’s an inertia within a business to say anything that’s foreign [to the core business] tends to get, like, killed.”*

Activities

A key strategy for the change agents to address internal skepticism was to build a rapid proof of concept while broadly exploring the solution space. At IngredientCo, the team focused on potential use cases close to the existing product with little technical sophistication. One of the first ideas was a new beverage made from by-products that they introduced in a single local market under an independent brand. As the project manager pointed out: *“[The beverage was] the first success story that we championed internally for a long time to showcase.”* The early commercial success helped him get funding to build a small team for further exploration. Similarly, the managers at ApplianceCo started to develop a small end-customer-facing pilot to test their idea of a product-as-a-service offering. The team at ConstructCo sought to obtain a proof of concept for the technical feasibility of making one of their products circular by design; they chose a relatively simple product and achieved a C2C certification for it.

To develop such pilots, the change agents scanned the organization to leverage existing structures that could provide the capabilities, mindset, and flexibility they needed. At IngredientCo, the procurement manager gave the idea to an existing internal business incubation program, designed for a small team of new hires and students to explore new business ideas for three months. At ApplianceCo, the sustainability managers engaged with the manager of a regional sales organization, whose team agreed to run a small pilot with local customers. As no

processes existed for direct rental to customers, they limited the size of the pilot and operated it manually, outside of existing processes. At ConstructCo, the team transferred project leadership to the quality manager, who had deep links into the technical teams and used them to advance the pilot.

To secure the capabilities needed to explore uncertain ideas, the change agents actively networked with external supporters. For example, the production of the new beverage at IngredientCo was handled by a specialized external operator. For the exploration of technically more sophisticated options, they collaborated with universities, technical consultancies, and startups. Similarly, ConstructCo hired an expert consultancy to realize the C2C certification.

Last, the individuals started to develop a narrative for the topic that would resonate with their organization. For example, IngredientCo's procurement manager considered the company to be extremely commercially driven but struggling with a stagnating core market. Hence, he focused on building a story around new sources of accelerated growth. At ConstructCo, the regional sales manager emphasized resource overconsumption and the need to secure long-term access, resonating with the growing internal focus on transitioning from wholesaler to manufacturer. As he argued: *"It is simply about raw materials and resources. And if we waste them, we are simply stupid economically."* This resource-focused story was also supported by the external C2C experts, focusing on optimizing material circulation.

Organizational Embedding

During the activities of the invention phase, organizational embedding developed most visibly in the shifting organizational locus in response to exploration needs and, relatedly, the strategic positioning of the innovation.

First, as the change agents looked for existing programs or units that they could leverage internally for their idea development and testing, the internal locus and anchoring of the innovation activities transformed. At ApplianceCo, the pilot was realized in the regional sales unit, as this local team had ties to the market and experience of running market tests—plus its culture and mindset were more customer-oriented than the central unit's. At IngredientCo, the procurement manager passed the idea to the existing incubator program, which could offer the flexibility and resources to achieve quick market validation. At ConstructCo, project leadership passed to the quality manager.

To strengthen strategic positioning, the change agents emphasized connecting the circular innovation approach to topics that were strategically important to the organization. At ApplianceCo, they underlined that the circular innovation would help address the accelerating trend of digitalization in the industry and the internal aspiration to increase direct B2C activities. This aspiration, in turn, strengthened the focus on engaging circular innovation with a digital customer-facing business model. At IngredientCo, the innovation team framed the activities as an opportunity to unleash a new wave of accelerated growth in the light of a stagnating core market. Equally, at ConstructCo, the team sought to connect the C2C certification to strategic topics, such as digitalization. However, this proved largely unfruitful, as digitalization itself was a contested topic within the generally conservative construction industry. The change agents also underlined the commercial benefit from handling materials in an internal closed loop. But the business potential remained vague as they focused on validating technical, rather

than commercial feasibility with the aim of attaining material circularity and hence optimizing product designs.

In sum, in the invention phase, as change agents sought to broadly explore novel ideas, they faced tensions with existing rigid structures and processes and lacked resources and capabilities. They scouted for potential existing internal structures they could leverage for their purposes. Consequently, the organizational locus of the innovation also shifted. Additionally, they started to strategically position the circular innovation in a way they considered helpful to increase its internal relevance.

10.4.3. Phase 3: Implementation

During the implementation phase, the change agents narrowed down their trial and error based on experience from the experimentation and shifted their focus towards implementation.

Barriers

The barriers during the implementation phase were connected to the task of building up the selected new business activity within an established business organization. Most importantly, challenges arose due to the need for tailored processes and structures. As the IngredientCo project manager underlined, building up the new business based on by-product commercialization would be difficult with the established structures and processes being “99.9 percent fine-tuned for [the core product].” As the business development manager (2) observed: “If you have the right person following the wrong process [...] you’re not going to end up being successful.”

This struggle was connected to the need to compete with the established business to secure the significant resources required to scale. As the R&D manager of IngredientCo pointed out: “Of course, our internal resources for investments are limited [...] [and the core product] is a strong opponent. [...] [The core product] usually has a payback of two, two and a half years [...]. [If] you suddenly come up with an idea where you have realistic paybacks of five to seven years, it becomes difficult.” And the business development manager (2) warned: “Companies fail to adopt some circular innovation projects [...] as a consequence of being short-term minded and not getting the returns on a quarterly basis, even though it makes significant sense on a multi-year basis.”

Additionally, the inventions were considered risky and commercially unattractive compared to the profitable linear business. As the procurement manager at IngredientCo explained: “[People in the core business] are not the most motivated group to go look at it because they’re fat and happy on profits.” And a board member at ConstructCo admitted when recalling the first discussions: “The wish is one thing, but the reality is something else [...]. It was simply a question of whether it was [economically] sustainable, and hence I didn’t see it as a high priority.” Consequently, it was difficult to compete for internal resources and motivate people to support the new idea.

Lastly, the implementation also required significant new capabilities. On the one hand, in-depth technical capabilities were missing. For example, at IngredientCo, the new business was targeting a new industry with new products and required significant technical and market

expertise that the company did not possess. On the other hand, the initiative demanded entrepreneurial expertise in building and growing a venture that is hard to find in established organizations. As the innovation lead at ApplianceCo pointed out: *“The [regional] organization is a sales and marketing organization [...]. That means that, from a purely structural point of view, it doesn’t have the skills and employees that something like that needs.”* The IngredientCo business development manager (2) echoed these sentiments: *“You don’t want someone who is used to running the machine but doesn’t know how to scale something.”*

Activities

For implementation, the teams focused on securing or building up tailored structures and teams and on raising the profile of the innovation to get the buy-in required to do so. For example, to secure the structures, processes, and capabilities needed at ApplianceCo, responsibility for the new business was shifted to the central digital business-building unit, which was experienced in building new ventures. At ConstructCo, certifying all products one by one would have been cumbersome given the firm’s extensive portfolio. Thus, the quality manager focused on advancing internal processes and topics that would make it easy to gain certifications for all products.

Additionally, all teams engaged in strengthening the legitimacy of the invention by engaging with external stakeholders, and internally by further concretizing the business case. For example, at IngredientCo, the team built a strategic business plan and a “\$1 billion revenue story” from by-products to justify a significant investment. They also engaged with external consultancies to refine the offering and competitive advantage, as well as on defining purpose, vision, and positioning for the new venture. The quality manager at ConstructCo engaged internally by developing a circular economy training program for employees and the first company-wide sustainability report. Externally, the team pushed to gain recognition for their activities by participating in award competitions and conferences.

Organizational Embedding

As the solutions concretized, the requirements for organizational embedding transitioned from supporting flexible iterations to securing a tailored setting for formalization and scaling. The avenues chosen by the teams resonated with the different situations in their respective companies with respect to the core business, ideas pursued, and existing structural setup.

At ApplianceCo, responsibility for further developing the new business offering was shifted to another business unit, allowing its more suitable structures to be used. The digital business unit at headquarters enjoyed strategic freedom as it was specifically set up to develop novel businesses outside current activities. Due to this setup, the unit’s manager had the liberty either to use existing processes when helpful or to develop new tailored ones when that was deemed easier. The unit reported directly to the CEO and thus enjoyed considerable management attention. As the innovation manager noted: *“This increased freedom only works if you have support from top management. And you really need it from the CEO.”* This unit also differed in terms of capabilities, as many employees had been hired externally for their experience in building (digital) growth businesses. This anchoring also further strengthened the business narrative and connection to the topics of digitalization and servitization.

At IngredientCo, the team considered the innovation to be considerably different from the core business. Hence, few synergies could be reaped between the new business and the established ones. Indeed, as the logic of the new business was so different, there was potential for significant friction and potentially detrimental internal conflicts regarding optimal process design and resource allocation. Hence, the team openly searched for avenues to establish a more independent setup that would allow for more suitable investment terms, resources, and measures of success. As one team member underlined: *“A lot of projects like this ultimately succeed if [...] you’re able to quantify and understand the long-term value to a business.”* To prepare the independent setup, they started building a proper team, scouting individuals internally, and hiring external talent to secure business-building expertise.

At ConstructCo, as the activities pursued touched on many different areas of the company, it became increasingly important to have a central coordinator with a good network within the company to manage the many diverse activities. At the outset, the quality manager had supported the project as part of her established role, but now her role officially changed, and she became the firm’s first designated sustainability manager. This newly created role gave her greater legitimacy to pursue her activities: the internal and external communication and development of an overall sustainability strategy focusing on circular economy. Together with the other internal agents, she also engaged heavily externally to generate publicity and stimulate positive feedback that would also help to counter internal skepticism.

In sum, during the implementation phase, the ideas became increasingly concrete and hence the focus shifted to implementation and scale. Barriers arose from the need to set up tailored structures and processes within an established business and secure the needed capabilities and resources. As the teams worked on strengthening the business case and securing the right setup for the innovation, the structural anchoring of the innovation evolved further, depending on the idiosyncrasies of the particular innovations.

10.4.4. Phase 4: Institutionalization

Although the innovation process had not been finalized at the time of our data-gathering, we were able to observe elements of institutionalization—most importantly, the increasing formalization of the organizational setup and the emerging character of the relationship between the new business activities and the incumbent business.

Barriers

During the journey to institutionalization, the teams especially faced ongoing tensions with the core business while they sought to strike the right balance between independence and reaping potential synergies. At ApplianceCo, potential synergies could arise from collaborating with product development to optimize design for rental, while launching the new solutions under the established brand could boost market recognition. Yet, such close connections would make the subsequent development of the solution less agile. Similarly, at IngredientCo, the team had to decide whether to leverage synergies from production-process alignment and accept frictions due to ill-fitting processes and interference or build their own structures, which would confer greater independence but require significant senior management support. At ConstructCo, the lack of buy-in from managers constituted the major obstacle to further institutionalization. As

the sales manager underlined: *“We have created a lot of public momentum. [...] But it hasn’t become part of the DNA.”* Hence, the team focused on further anchoring the sustainability topic in the central organization.

Activities

To enhance institutionalization, the change agents engaged in further formalizing the solution and finding the optimal setup with respect to the core business. For example, at IngredientCo, the team focused their efforts on one particular by-product and started to negotiate major strategic deals with key potential B2B customers that would encourage longer-term investments. As for the relationship with the core, the team pushed the setup of an independent business and started to develop an independent brand. At ApplianceCo, the team scaled the business to two other countries. To increase trust in the market and allow for further expansion, they connected their new independent rental brand with the well-known brand of the parent conglomerate. In contrast to IngredientCo, they saw greater synergies with the core business, as they directly commercialized the core business products and hence internal production and service capabilities could be helpful for the new venture, too. Hence, while they continued to build their own flexible, relatively independent structures, they also started to set up clear collaborations with the established business.

All teams worked hard to boost the legitimacy of their solutions by increasing recognition internally and by engaging in external communication, conferences, and networks. At ConstructCo, the sustainability manager further institutionalized the circular economy approach by embedding it into a broader sustainability strategy and official report, framed around the move to a circular economy. She introduced international standards and made public company commitments that would raise the need for action and further pushed to ease internal technical conditions for new endeavors.

Organizational Embedding

Given that institutionalization was still ongoing, organizational embedding was still in development, but formalized structures and relationships did emerge, depending on the character of the innovation and the core organization. At ApplianceCo, the setup of the innovation as a relatively independent business in the digital business unit of the established organization emerged as a preliminary status quo. While a complete spin-off of the rental business was still an option for the future, for the time being the current structure provided flexibility while allowing for potential synergies to be analyzed in greater detail. The business could potentially benefit from the closer collaboration with manufacturing, and the core teams had also begun to look at circularity from a design perspective. Also, internal interest in engraining circularity more formally in the company as a whole was steadily growing, as the change agent confirmed: *“It’s already on the agenda and roadmaps. [...] There will be a [company] circularity strategy. [But] the mills grind slowly.”* Additionally, the co-branding of the new brand with the long-standing conglomerate brand boosted the legitimacy of the new business. In contrast, at IngredientCo, a new independent business organization with its own legal entity and brand was set up. Almost all individuals involved in the development of the new business transferred to the new entity, which thus secured a solid mix of capabilities. Additionally, the team hired new employees with expertise in the new target market. To

strengthen the reputation and legitimacy of the new solutions, the teams conducted extensive external communication and marketing. At ConstructCo, while there was no standalone venture, the sustainability team increasingly gained recognition from the company management and was able to grow. Also, external legitimacy was growing, as the sustainability manager was publicly awarded for her efforts. However, internal skepticism remained, and many employees considered circularity to be more of a compliance topic than a business opportunity. Nevertheless, the team had started implementing considerable changes within the company and thus also contributed to advancing the topic throughout the organization.

In sum, the institutionalization of the innovations was accompanied by tensions in relationships with the established business and the need to create legitimacy. Depending on the synergetic potential, different structural setups developed. The teams engaged intensively to enlist internal and external support for the innovation endeavor and thus strengthen its legitimacy.

Overall, we observe that internal change agents encounter different kinds of barriers in each phase of the innovation process, from initial motivation to institutionalization, and conduct different kinds of activities to overcome them. These activities, in turn, shape the specific organizational embedding. While organizational embedding is initially absent, as the change agents start their circular innovation endeavors without official mandate, that state of affairs evolves throughout the process. In the invention phase, teams must have flexibility and access to a broad range of capabilities with minimal investment so they can explore a range of solutions. In the implementation phase, requirements for tailored structures and processes come to the fore, with a specific setup gradually institutionalizing in the final phase.

10.5. Discussion

We conducted a multiple case study to investigate the key elements of the organizational embedding of circular innovation endeavors and how they develop over time. By analyzing the particular organizational barriers encountered, and the activities undertaken by internal change agents to overcome them in each phase of the innovation process, we provide a deeper understanding of how organizational embedding emerges and changes in response to the particular circumstances in each innovation phase.

10.5.1. Contribution to Circular Economy Research

Our work offers important contributions to the literature. First, we extend research on organization-level barriers and drivers to the circular economy by analyzing them in the context of the various phases of the innovation process. While previous studies have begun to take organization-level barriers and drivers into account (Bocken & Geradts, 2020; Centobelli et al., 2020; Guldmann & Huulgaard, 2020; Kirchherr et al., 2018; Kuhlmann et al., 2022), they primarily provide only a static account of such barriers and drivers and do not explain whether particular barriers might be more relevant in particular phases of the innovation. As a result, these studies provide little insight into effective responses to barriers during different phases. Our research suggests that such a differentiated view is vital, as specific barriers become more or less relevant depending on the phase of the innovation, and change agents must hence engage in different activities to overcome them.

Second, we provide further detail about the important elements of organizational embedding of circular innovation endeavors in established organizations. While recent research has identified a variety of organizational aspects relevant to the pursuit of circular innovation (Bocken & Geradts, 2020; Eikelenboom & de Jong, 2022; Hofmann & Jaeger-Erben, 2020), we add a temporal aspect by dissecting how they are actively shaped depending on the development stage of the innovation. In particular, we find that the barriers encountered, and the activities individuals engage in to overcome them, shape the particular organizational embedding of circular innovations. As these barriers and activities are different in each phase, the organizational embedding also changes and develops throughout the innovation process. Additionally, the evolution of the innovation process itself is the result of the reality of each particular company. Hence, the ultimate design of organizational embedding is often idiosyncratic to the individual company, as it resonates with the specific idea pursued and the established organizational setup. Nevertheless, there are overarching similarities in barriers encountered, activities pursued, and elements of organizational embedding that evolve in response. In particular, we find that five aspects of organizational embedding are particularly important for driving circular innovation: (1) the people involved and the roles they assume; (2) the management of capabilities; (3) a strategic vision; (4) the setup of structures and processes; and (5) the locus of the innovation activity within the organization.

People and Roles

First, individual people, or change agents, play a crucial role in the circular innovation process and organizational embedding, but their roles change over time. In the absence of formal structures or a strategic mandate, innovation endeavors are initiated by individual employees who become personally motivated in the topic, see it as strategically relevant to their organization, and therefore introduce it to the firm and start exploring potential innovation strategies. As they seek internal support, informal teams start to emerge and collectively advance the topic; over time, they may transition into formal roles and teams. By working to overcome the various barriers they encounter within the linear organization and finding ways to drive the innovations further, change agents also shape the overall embedding of the innovations in their respective organizations. Previous research has similarly highlighted the importance of bottom-up idea development and the crucial role of change agents in driving the circular innovation process (Bocken & Geradts, 2020; Guldman & Huulgaard, 2020; Kuhlmann et al., 2022) and, more generally, the notion that change agents can drive change in corporations in the absence of formal structures (Siebenhüner & Arnold, 2007). Our findings further extend this notion by suggesting that these individuals actually contribute to building organizational embedding, as they actively shape and develop processes, structures, and strategies to further the particular innovation they pursue. Our findings also suggest that the composition of the internal team, and the roles they assume, may change depending on the development stage of the innovation. As different capabilities, networks, structural setups, and positioning are needed throughout the innovation process, change agents may intentionally reach out to engage new members who bring specific capabilities, connections, or positions needed in the current phase. Also, change agents may engage with different external partners for different purposes depending on the requirements of the innovation endeavor in its particular stage. The innovation can also be shifted to locations with teams who possess the needed organizational aspects. Hence, even central roles may be taken by different individuals

throughout the process, and individual agents and external partners may also become less relevant and drop out when their positions, capabilities, or networks are no longer needed.

Capabilities

Second, capabilities are an important element shaping organizational embedding. For the development of circular innovations, both technical and business-building expertise are crucial, but their relevance and required breadth and depth vary throughout the process. In the early phases, a wide range of new technical knowledge is required to explore the potential of many diverse options. As the solution space narrows down, more in-depth knowledge is required to explore the selected path more deeply. During implementation and scaling, business-building expertise becomes increasingly important to drive the successful development of the new solution and negotiate the tensions with the established business. The need for incumbents to actively manage and adapt the firm's capability set to drive circular innovations also adds to the discussion on the need for dynamic capabilities for managing circular innovations (Bertassini, Ometto, et al., 2021; Bocken & Geradts, 2020; Khan et al., 2020; Köhler et al., 2022; Kuhlmann et al., 2022; Santa-Maria et al., 2021). Our findings further extend this research by shedding light on how change agents effectively engage internally and with the broader external network to secure access to the needed capabilities and build them up internally. Most importantly, change agents deliberately leverage different external networks and partners to secure access to a range of technical skills in the early phases of broad ideation, and scout for new internal agents to involve in the innovation project who can provide the right resources and skills. In the later stages, when proof of concept is obtained, the focus shifts to building up the required capability internally, often by hiring new talent. Access to required capabilities is often also a relevant factor for the locational anchoring of the innovation, as it may be helpful to transfer the project to internal teams with the most suitable skillset.

Strategic Vision

Third, organizational embedding is also shaped by how change agents strategically position the innovation inside the company. Resonating with previous research, our study corroborates the crucial importance of a strategic integration to overcome barriers, and, relatedly, the importance of a strong business narrative to facilitate the required organizational embedding (Bocken & Geradts, 2020; Centobelli et al., 2020; Eikelenboom & de Jong, 2022; Hofmann & Jaeger-Erben, 2020; Kuhlmann et al., 2022). Yet, while previous research frequently highlights the importance of integrating the circular topic in the company as a whole and developing strategy *ex ante*, our research reveals that in practice, this seldom takes place. In effect, such an integration is often built along the way as circular innovation activities evolve. This chimes with the notion of Halme (2002), who suggests that organizations need not fully understand new paradigmatic influences and engage in *a priori* change but can instead engage in new topics and effectively learn and adapt through action. Our research also sheds further light on how this strategic integration is achieved by change agents formulating a business narrative and obtaining early proofs of concept to forge a connection with the overall business strategy. Additionally, creating connections between the transition to a circular economy and other strategic topics the company already values can be extremely useful in cultivating internal relevance and finding a suitable locational anchor-point. Ultimately, the strategic integration of the circular economy concept develops both top-down and bottom-up.

Processes and Structures

Fourth, our study also extends current research on structures and processes that are conducive to realizing circular innovation by differentiating the different development stages of such innovation. Aligning with previous studies on early-stage idea development (e.g. Hofmann & Jaeger-Erben, 2020; Pieroni et al., 2019), our findings indicate that individuals initially require openness and flexibility to engage in broad exploration and iterate ideas. In line with Hofmann and Jaeger-Erben, who suggest that circular innovation endeavors can benefit from “an intra-organizational but autonomous experimental space” (Hofmann & Jaeger-Erben, 2020, p. 2784), early-stage innovation endeavors thrive in locations where such freedom is found. However, as the innovation process further develops and the concrete invention becomes increasingly distinct, there is an increasing need for tailored support structures and processes to grow the new business further. Additionally, it also becomes crucial to effectively manage the relationship with the incumbent business. This finding also resonates with research on disruptive (circular) innovations and ambidexterity that points out the tension inherent to such relationships and the need to actively manage them (Christensen et al., 2015; Hofmann & Jaeger-Erben, 2020; Kuhlmann et al., 2022; O’Reilly & Tushman, 2016; Ossenbrink et al., 2019). Our research connects these different aspects of managing circular innovations, highlighting the need for different responses depending on the development stage and how they can be provided by an established organization. In particular, understanding the different needs and challenges in each innovation phase is crucial to determining what kind of structural setup is most conducive at which point in time. Depending on these needs and challenges, it can be useful to change the anchoring of the invention and move it to those business units or teams who can provide the most fitting setup in each phase, or ultimately to externalize by building new, separate structures to pursue innovations more independently from the core business.

Locus

Fifth, and in response to the previous elements, the locus of innovation activities in incumbents may change over time. Ideas for circular innovation may emerge in the company wherever there are motivated individuals who bring the topic to the company and start to engage with it. Therefore, the locational starting point of the innovation is idiosyncratic to the particular organization and thus often differs between organizations. This starting point and the strategic narrative that the agents develop, in turn, influence the type of innovation pursued and the resulting organizational embedding needed. Over time, this locational anchoring may shift depending on suitable structures, processes, and capabilities inside the firm for each phase of the innovation process, and ultimately, the characteristics of the relationship with the core business.

In sum, circular innovation processes may start outside of any official structures at very different locations in the company. Given the diverse characteristics of individual innovations and the different needs during the idiosyncratic development process, the best organizational embedding for a specific solution can rarely be established *ex ante* but needs to resonate with the evolving requirements of the innovation at hand and be adapted accordingly.

10.5.2. Managerial Implications

Our findings also provide recommendations for managers seeking to foster circular innovation in their organization. First, our findings underline the importance of motivated individuals to initiate promising inventions in very different locations within the firm. Thus, managers can support the exploration of diverse potential circular inventions by being open to innovations from different parts of the company and fostering a culture that supports new ideas and provides some flexibility for individuals to explore ideas “on the side.”

Second, given the organizational changes required for circular innovation to thrive, it is important to acknowledge the strategic relevance of the topic and enable the needed organizational embedding in each phase of the innovation, providing support for broad exploration at the beginning while also finding and potentially building suitable structures for scaling and institutionalization later on. In turn, for motivated individuals, it is helpful to develop a business narrative for the innovation and get early market validation of its concept, and to connect the activities to the company’s strategic topics to obtain management support.

Third, for innovations to thrive within an organization, it is important to develop the organizational embedding that is conducive to the particular innovation pursued in the context of the organizational reality of the specific organization. Often, the optimal setup cannot be built *ex ante*, but practitioners need to consider what is conducive to the particular innovation at which moment in time, be aware of the needs for organizational changes, and find ways to build the environment that the innovation needs, while being mindful of potential frictions with established business activities.

10.5.3. Limitations and Avenues for Future Research

Our study has several limitations that indicate potential directions for future research. First, our findings are based on a small set of cases. It may be that further aspects not considered also influence the type of organizational embedding that evolves. For example, it may be that such embedding depends on a certain type of business model. Future research could investigate more systematically the link between a particular type of business model implemented and the characteristics of evolving organizational embedding to investigate how organizational embedding can be more consciously shaped to aid a specific business model. Future research can provide further evidence for our findings by researching a larger set of case studies. Also, it would be interesting to broaden the scope of organizations beyond incumbents to also consider how organizational embedding may be built up in smaller companies or even startups.

Second, we have focused in particular on the activities of internal change agents to analyze in detail the organizational context and the important elements of organizational embedding for circular innovations. While our findings suggest that engagement with the external network and external change agents also influences the innovation endeavor, we have not focused on the external change agents explicitly. It would be interesting for future research to explicitly analyze the influence of external actors on the internal circular innovation process and in particular on the shaping of the organizational embedding at each point in time.

Third, even though the circular innovation processes at the companies had been going on for several years, they were still continuing to evolve at the time of the analysis. Therefore, the success and institutionalization of the innovations was not yet secure. While our study contributes to broadening the current focus in academia on ideation for the circular economy by explicitly considering later stages of development, we still lack insight into the long-term success of circular economy strategies or what sort of managerial practices will turn circular innovation endeavors into profit drivers that are enshrined at the very heart of the business.

10.6. Conclusion

We conducted our research to understand how circular innovations in established organizations become organizationally embedded. We provided a structured analysis of the circular innovation process along four phases from initial motivation to invention, implementation, and ultimately institutionalization and shed light on the barriers encountered and activities performed by internal change agents to overcome them in each phase, connecting them to emerging organizational embedding. Through a multiple case study with three incumbents, our study reveals that barriers and activities, and the resulting requirements for organizational embedding, change profoundly between the different phases. We find that change agents and their roles, structures and processes, strategic vision, capabilities, and the organizational locus are all important throughout the innovation process but fulfill different functions and change in character over time. Overall, our research suggests that suitable organizational embedding is idiosyncratic to the firm and develops as a consequence of the innovation's characteristics. Hence, it must be consciously managed if circular innovation in established companies is to succeed. By focusing on the development of organizational embedding, our research contributes to the emerging literature underlining the importance of organizational aspects for incumbents' successful circular transformations and provides guidance for practitioners on how to successfully implement circular innovations.

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11. Paper IV: Collaborating for the Circular Economy: A Typology of Interfirm Collaborations and Recommendations for Managing them Effectively

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As the paper will be submitted to California Management Review, endnotes have been used according to the styleguide of the journal.

11.1. Introduction

“Coming together is a beginning, staying together is progress, and working together is success.” While this famous quote attributed to Henry Ford dates from the Industrial Revolution, it is more relevant than ever in today’s discussion about climate change and the urgent need to find practical and collective responses to keep it at bay.

One potential response is the concept of the circular economy (CE). In recent years, CE has been vigorously advocated as a viable alternative to the current “take-make-waste” economic system, which is criticized for the severe environmental damages it brings.¹ Government plans dedicated to promoting CE are being drawn up, such as the EU Circular Economy Action Plan or California’s recently enacted Circular Economy bills. The World Economic Forum (WEF) has initiated several strategic programs to address the “Circular Economy Imperative”.² Moreover, many practitioners advocate CE as an opportunity to secure long-term sustainable growths.³

If we are to realize a CE, collaboration will be critical. The transition from linear to circular requires a fundamental restructuring of economic activities and altering the uses and flows of materials along value chains and across industries. Hence, individual firms cannot implement the associated changes alone, but must work with others to understand the changes required, develop potential alternatives to established linear activities, and implement them.⁴ Consequently, firms are increasingly seeking to collaborate to achieve the concerted action required to advance the CE, and collaborative endeavors of every size are unfolding within and across many different industries. A few examples follow. The industry consortium CEFLEX (Circular Economy for FLEXible Packaging) brings together 180+ companies from the flexible packaging industry to promote the transition of their value chain;⁵ the CBI Innovation Booster program connects firms to jointly develop circular solutions for the Swiss construction industry;⁶ three companies have joined forces to develop circular packaging alternatives at Paboco;⁷ and many different industry representatives come together globally on the Platform for Accelerating the Circular Economy (PACE) to engage in the transition.⁸

While the many efforts to promote CE collaboration are certainly to be welcomed, their proliferation also risks the diffusion of effort and a blurring of focus. The current discussion about the need to collaborate lacks differentiation, as practitioners and researchers often use the term “collaboration” so broadly that it can denote any joint activity involving firms in the CE context. However, in practice, there are different formats in which firms can collaborate, depending on the aspired purpose and focus, which require different activities to be carried out within the partnership. Thus, vagueness around the different types of collaboration may lead to poorly designed collaborative formats that are ill suited to their creators’ aspirations.

Furthermore, a lack of differentiation between collaboration types can also undermine the purposeful management of the collaboration, as the respective characteristics of different collaborations require different tasks and competencies. Different strands of management research focus on the challenges and success factors of various forms of interfirm collaborations.⁹ However, while collaborations between economic actors are ubiquitous in the linear economy, successful collaborative endeavors focused on circularity are still hard to come by. Therefore, the lack of consideration paid to collaboration types in the current CE debate

also translates into limited awareness of the challenges associated with managing such collaborations—and, consequently, potentially suboptimal management. In practice, this often leads to considerable frustration when collaborations become cumbersome, leading to conflicts instead of the desired results. This means not only that firms may miss out on the economic potential of the CE, but also that we neglect a vital lever to combat climate change.

With this article, we address this lack of clarity concerning the different forms of collaborations and the implications for their management by asking: “*What types of interfirm collaborations can advance the CE transition, and how should they be managed?*”

To address this question, we engaged in an approach inspired by abductive theorizing.¹⁰ In an iterative process, we developed our core concepts based on our extensive practical experience in resonance with relevant literature and refined through discussions with practitioners. Our practice insights are based on our engagement with a range of interfirm collaborations, either in an active management role or as researchers. As managers, we ran several multi-year initiatives to facilitate industry collaborations with a CE focus. For example, we conceptualized and implemented a multi-year program dedicated to increasing circularity in the construction sector, a program focused on industry collaborations in the consumer electronics industry, and a project to promote joint reverse supply chain activities in the automotive sector. Additionally, we acted as evaluators for a multi-year initiative promoting interfirm collaborations in the automotive and construction industries to help them develop best practices for facilitating CE-focused interfirm collaborations.¹¹ Furthermore, we realized numerous practitioner workshops, working groups, and roundtables in a variety of industries over the last years.¹² As researchers, we worked with several small- and large-scale collaborative projects. For example, over the course of one year, we accompanied a European industry consortium focusing on forging collaboration in the packaging industry. Additionally, we contributed to a variety of international CE-focused research projects that the corresponding academic institutes have joined as official research partners.

We developed our typology of inter-firm collaborations in CE in several steps. We first compiled a list of inter-firm collaborations from our personal interactions and from further research on CE-focused collaborations in practice and reflected on their characteristics to create a first overview of potentially relevant features with various attributes. Based on this list, we developed a first potential range of types of collaborations based on different combinations of the features that resonated with the collaborations on our list and aided their characterization, and discussed our perceptions amongst the team of authors. Second, we scanned the CE literature to dissect further nuances on collaborations in the CE context and we researched different kind of inter-firm collaborations in the management literature to identify and reflect on relevant characteristics and features discussed in various contexts of inter-firm collaborations. Third, we combined these insights from literature with those from practice to further advance our list of features and resulting typology. At various stages, we characterized a selection of practical examples in depth to critically test whether they could be clearly assigned to one typology and whether their distinct characteristics were sufficiently reflected in the features. In addition, we engaged in discussions with managers involved in different interfirm collaborations to test the typology and gather feedback on our work.¹³ We continued to go back and forth between our emerging typology and reflections on collaborations in

practice and literature to further refine our typology until we arrived at five relevant features and six types of inter-firm collaborations that we perceived as sufficiently distinct from one another and collectively allowing to meaningfully characterize all practical examples researched in our study.

Based on this process, we suggest a typology of interfirm collaborations in the CE context and provide recommendations for managing them. We start by describing five key features that characterize and differentiate collaborative endeavors among private-sector actors in the CE realm. Building on these features, we present six archetypes of interfirm collaborations emerging in the CE field and discuss their characteristics, drawing from numerous real-world examples. Finally, we discuss the typical challenges raised by the different collaboration types and the resulting requirements for their management in order to provide recommendations for practitioners engaging in interfirm CE collaborations.

11.2. Five Features of Interfirm CE Collaborations

Aim

The transition towards a CE requires a fundamental restructuring of economic activities along value chains and substantial changes in the current way of doing business. To advance this transition, interfirm collaborations can adopt one of three different aims. First, firms can join forces to collectively influence market conditions and thereby facilitate a change in the conduct of individual firms. Second, firms may collaborate to bring together perspectives and resources needed to create new knowledge and explore novel approaches. Third, firms may collaborate to actively implement and scale up novel business models and material uses.

Size

Collaborations between firms can vary widely in size, ranging from two to three partners to more than 100.¹⁴ Given the great uncertainty involved in the CE transition, large groups have the power to collectively define a new way forward and provide orientation for various stakeholders, as they can ensure broad legitimacy and representation. Also, the greater diversity of larger groups can provide richer insights into the collaborative endeavor. Small, dedicated groups are especially suited for bringing together the competencies needed to drive the piloting and implementation of concrete solutions. Medium-sized groups seek to balance the diverse perspectives and manageable coordination often found in exploratory activities.

Time Horizon

Collaborations can be short-, medium-, or long-term.¹⁵ While short-term engagements can be enriching, especially for mutual exchange and creative sessions, some collaborations need medium-term horizons connected with a specific goal. However, long-term engagements are also needed in the transition from linear to circular to achieve systemic changes such as changing the regulatory framework or conducting groundbreaking research. Long-term collaborations are also formed to implement and scale new circular business activities, replacing or reconfiguring old collaborations along linear value chains.

Formalization

Collaborations can differ widely in terms of their degree of formalization.¹⁶ They can range from informal setups created to mutually benefit from a loose exchange to some degree of formalization, often tied to an expected active engagement or provision of funding by participants, right through to formal legal contracts. Given the inherent uncertainty of many potential solutions, many current collaborations are exploratory in nature and tend to be less formalized. As uncertainty decreases and the potential for value creation and capture grows, the need for formalization often rises.

Coordination Mechanism

Different forms of coordination mechanisms are possible depending on the nature of the collaboration.¹⁷ A single focal firm can steer the collaborative process, or multiple firms can choose to share governance among themselves. As the number of stakeholders increases, coordination becomes more complex, and some overarching orchestration may be beneficial. An independent orchestrator can also help to reconcile diverging interests between stakeholders and ensure fairness. Coordination requires significant resources, which stakeholders are only willing to provide if the expected benefit of cooperation is sufficiently high. Given the great uncertainty over the economic benefits of the transition, industry stakeholders show a keen interest in joint exploration along with a reluctance to assume the costs. In general, the more closely the focus of collaboration is tied to the interest of individual firms, the more they tend to engage in management activities.

The five features just described are often interconnected, and typical combinations of features form in practice, which result in six archetypes of collaboration. These are described in the next section.

11.3. Six Types of Interfirm CE Collaborations

Based on our insights and theoretical considerations, we propose six archetypes of collaborative endeavors that firms engage in within the CE context. The six archetypes can be divided into three groups depending on the focus of the collaboration. The first two have an external focus and seek to influence the market environment to tip the balance in favor of circular rather than linear solutions and thus influence firms' business activities indirectly. The second group focuses on knowledge creation and idea generation as the basis for new circular solutions. The third group is concerned with implementing solutions that enhance the circularity of resources in practice. Individual firms may engage in one type of collaboration only or engage in several collaborative endeavors of different types, either over time or simultaneously. Table 11-1 provides an overview of the six archetypes and their main features.

Table 11-1 Typology of Interfirm CE Collaborations

<i>Aim</i>	Influencing market conditions		Exploring solution space		Implementing solutions	
Type	CE advocacy groups	CE standard-setting groups	Networks for CE innovation	Consortia for CE research	Strategic CE partnerships	Industrial symbiosis
Description	Collaboration to jointly exert influence in the political realm to break down regulatory barriers that hinder circular solutions/ facilitate market creation for circular solutions	Collaboration to jointly define rules that can serve as overall orientation for industry alignment on a pathway towards CE/ facilitate market creation and trade for novel applications	Loose collaborations bringing together diverse perspectives to jointly engage in ideation and exploration to advance circularity	Collaboration to jointly engage in knowledge creation and/or problem-solving to develop new circular materials, products, technologies, processes and advance their uptake in industry applications	Close collaboration between firms bundling competencies and resources to co-develop and commercialize circular products, processes, or technologies and/or set up a joint circular business model	Collaborations in which firms share or exchange by-products, materials, energy, or waste to economically reduce aggregate environmental impact
Size	Large	Large	Medium	Small to medium	Small	Small to medium
Time horizon	Short/long-term	Medium/long-term	Short/medium-term	Medium/long-term	Long-term	Long-term
Formalization	Low	Low	No/low	Low to high	High	Medium
Coordination mechanism	Shared governance	Independent orchestrator	Independent orchestrator/ focal firm	Independent orchestrator/ shared governance	Shared governance/ focal firm	Independent orchestrator/ shared governance

11.3.1. Collaboration Types to Influence Market Conditions for CE

CE Advocacy Groups

In the first type of collaboration, firms seek to collectively exert influence on regulatory bodies to break down regulatory barriers that hinder the uptake of circular solutions, alter regulations that give preference to linear economic activity, or facilitate the creation of markets for circular solutions. There are various types of policy that can achieve this, from taxation (e.g., reducing VAT on repair services, including externalities in prices) to prohibitions/permission (e.g., allowing new applications for secondary materials) to legal quotas (e.g., mandatory recycling quotas) and favorable public procurement policies. Private-sector advocates can engage with regulators to provide practical input and ensure technological and economic feasibility to enhance practicability and industry support—however, they may also seek to stall the process to protect short-term business interests based on linear economic activity.

Given the focus of exerting external pressure on regulatory bodies, the power of advocacy groups and their legitimacy increases with the number of stakeholders involved. Accordingly, such collaborations tend to have many stakeholders who engage over a long period to continuously shape the ongoing process of policymaking.¹⁸ However, short-term advocacy activity can also develop in direct response to specific regulatory activity, often focusing on specific activities such as writing joint statements. Advocacy collaborations are rarely formalized, as the joint activity is focused on the external environment and firms mostly act as expert input-givers. Typically, participating firms share the administrative governance of their joint activities as they have a strong individual interest in the collective outcome and are thus prepared to assume some of the costs. Sometimes, independent facilitators may also organize a dialogue between public and private sector actors, but this mainly focuses on broad exchange and understanding rather than directly influencing individual policies.

In Germany, the Circular Economy Initiative of the German Industry Association (BDI CEI) brings together more than 50 companies from a range of industries to lobby the national government to shape the legislative context of the CE transformation. Participating companies pay a membership fee to finance the work of a secretariat that gathers input from the companies and facilitates the process of formulating joint position statements.¹⁹ Similarly, at the EU level, 18 firms have joined forces with the European Refurbishment Association (EUREFAS) to influence the EU legislation around re-commerce, particularly concerning electronic devices.²⁰

CE Standard Setting Groups

The second type of collaboration is also directed at changing market conditions in favor of circular solutions, but through voluntary rather than mandatory rules. In this type, firms collaborate to jointly define rules that can serve as overall orientation for industry alignment on a pathway towards a CE. Such rules facilitate market creation and scaling by reducing risk and transaction costs for the interfirm business activities based on novel circular materials, processes, products, and services. Some rules are voluntary, so individual companies can choose whether to follow them. However, standards can also become binding if they are embodied in contracts or the legislator makes compliance mandatory.

Like advocacy groups, standard-setting collaborations benefit from the involvement of many stakeholders, which increases the legitimacy of the standards they develop. Because diverse knowledge and competencies are essential, a wide variety of applications across industries needs to be considered. Equally, formalization tends to be rather low, as stakeholders mainly provide expert input. While such processes are often lengthy, the particular collaboration often concludes when a standard has been defined. Standardization may lead to conflicts of interest between stakeholders seeking to push technical specifications that favor their own business activities. Therefore, an independent orchestrator is often required to ensure fairness and resolve any issues related to intellectual property (IP).²¹

Many existing national or international standardization bodies have begun work on CE standardization. In Germany, the German Institute for Standardization (Deutsches Institut für Normung, DIN) has proposed a Circular Economy Standardization Roadmap to facilitate the CE transition. The roadmap provides an overview of the status quo of standardization in the field, describes the requirements and challenges for seven selected key topics, and identifies concrete action areas for future standards and specifications. While industry stakeholders typically approach DIN with a standardization idea and actively engage in the subsequent work, DIN also sets up working groups to incentivize industry stakeholders to get involved in CE standard-setting.²² However, firms have also started new efforts to establish guidelines for their own industries. For example, one of the key goals of CEFLEX, the newly established CE-focused industry consortium, was to jointly formulate design guidelines for flexible packaging in the CE and a set of common positions that would serve as an orientation for the whole industry's journey towards circularity.

11.3.2. Collaboration Types to Explore the CE Solution Space

Networks for CE Innovation

Circular innovation networks refer to collaborations between stakeholders that bring together diverse perspectives to facilitate mutual learning and engagement in joint exploration and ideation. Such networks are playing a vital role in the current early phase of shifting toward a CE, in which many firms have only recently started to explore the potential implications of the transition for their organization and face significant uncertainty with respect to potential responses. The exchange facilitated by such networks can help individual firms in their own innovation journey and extend their network. Additionally, as they play an important role in creating bonds between independent actors and narrow the scope of exploration, they are often the first step toward closer collaborations between firms.

The mostly rather loose collaborations often comprise a larger number of stakeholders to benefit from a broad variety of perspectives. However, they also need some boundaries in order to ensure meaningful exchange and convergence of focus among the actors.²³ Networking formats can be very brief, like workshops or conferences, but also curated over time to allow for various tailored activities that allow joint deeper exploration of selected issues. Given the shorter term and focus on uncertain exploration, innovation networks are often rather informal and tend to bring together stakeholders from within a limited radius for practical reasons. They can be set up by focal firms to gain access to external perspectives and explore internally defined topics but are also often arranged by independent orchestrators in the CE context.

The CBI Innovation Booster is a typical example of an innovation network. It is a program aimed at boosting joint exploration and piloting ideas to increase circularity in the construction sector, managed by independent facilitators and funded by the Swiss government. The program, which runs over four years, combines different formats to enhance collaborations. During interactive events that bring together a large group of participants from the industry, the orchestrators focus on raising awareness and understanding of the circular transition in the construction sector and on facilitating the formation of new ties between firms across the entire construction value chain. The core of the program is a six-month incubation program. Stakeholder groups can apply with a concrete idea they want to jointly explore; if accepted, they receive a grant of CHF 20,000 to develop the idea further.

Consortia for CE Research

Given that interest in CE has only emerged quite recently, many potential pathways and solutions remain unexplored. Circularity-focused research collaborations bring firms together to engage in joint knowledge creation. New knowledge is needed on novel materials, novel applications (e.g., food waste as input for new packaging material; recycled material in new applications), and novel technologies and processes (e.g., chem recycling, sorting technology, tracing technology), and feasibility and practical applicability must also be tested. Research consortia can facilitate the creation of knowledge by bringing together complementary experience, resources, and competencies.

Research consortia typically range from a small to a medium-sized group of stakeholders. If the research conducted is rather exploratory, groups tend to be bigger, to cover broader perspectives; if the focus of research has been narrowed down and is closer to feasibility testing, required competencies are more defined and hence groups are smaller. Timeframes are often finite, in line with the resources to be allocated, but can still be medium- to long-term, reflecting the time required for research. Formalization can be lower if stakeholders mostly provide expert input but are not otherwise involved, or higher if stakeholders are expected to assume active tasks in the collaborative research and bring in significant resources. As with traditional research collaborations, a high degree of formalization is also required if valuable IP is expected to be generated and could be appropriated by individual firms.²⁴ An independent orchestrator can be preferable to a shared governance mechanism even if the number of participating stakeholders is limited, in order to manage conflicts of interest and minimize unwanted behaviors such as freeriding.

In the European research project INCREASE, 19 complementary industry stakeholders and research institutes engage in joint research with the collective goal of increasing the uptake of recycled plastics in high-value applications, especially in the electronics sector. The program is funded by the EU's HORIZON program and spans a period of four years. Coordination is realized largely through shared governance, in which different participants share the leadership of eight focused work packages, while overall project coordination is assumed by a non-industry participant. Similarly, CIRCULAR FOAM is an applied research project with the goal of developing and demonstrating all the technological steps required to achieve circularity of rigid PU foams used as insulation in refrigerators and construction. The collaborative group, structured around a chemical company, brings together all actors required to close the circular value chain as well as high-profile research institutes. CIRCULAR FOAM plans to realize pilots

to test the feasibility of building regional loops for circulating PU foam in three different regions across Europe.²⁵

11.3.3. Collaboration Types to Implement CE Solutions

Strategic CE Partnerships

Firms form dedicated partnerships to actively test and implement potential solutions collaboratively. Such strategic alliances bundle competencies and resources to co-develop and commercialize circular products, processes, or technologies and/or set up a joint entity to run and scale a new circular business.²⁶ These partnerships thus play a crucial role in the actual implementation of the circular transformation of economic activity.

Given the depth of the collaboration and narrow focus on a concrete potential solution, such partnerships usually comprise only a few selected stakeholders but are set up for the long term. Formalization is high, as contractual agreements are necessary and significant investment is typically involved.²⁷ Depending on the setup, management can be assumed by one focal firm or shared.

Looper Textile, a recently founded joint venture between the fashion giant H&M and recycling company Remondis, is an example of such a strategic partnership to advance circular solutions. Looper Textile focuses on collecting used garments across Europe and providing them as feedstock to companies engaged in reuse and recycling.²⁸ Another example is Paboco, a small startup developing paper-based packaging solutions for liquids that caught the attention of ALPLA, an Austrian producer of polymer-based packaging, and BillerudKorsnäs, a Swedish pulp and paper company. The three companies decided to join forces to develop a paper-based drinking bottle by leveraging their complementary competencies. ALPLA and BillerudKorsnäs acquired the startup in a shared equity deal and are now jointly driving the further development and market testing of the alternative packaging solution.

Industrial Symbiosis

Finally, in an industrial symbiosis (IS), firms share or exchange by-products, materials, energy, or waste to reduce aggregate environmental impact in an economical way. That is, the goal of collaboration is to actively redirect material streams that would otherwise become waste at one company's site to valuable continued use in industry applications at another firm. Such collaborations have long been a strategic focus in sustainability research.²⁹

With the direct focus on physical material exchange, industrial symbiosis also focuses on implementation. IS plays a particularly important role in local eco-industrial parks where a few industry actors are co-located and thus their material streams can be locally steered. However, digital trading platforms for waste and by-products can also be considered as collaborations in the spirit of industry symbiosis. While material exchanges within physical industrial zones are set up for the long term, transactions via digital platforms may also be ad-hoc. Formalization can be focused on transactions only, but often also includes membership and participation in a larger organizing body. Once the various parties are connected, such exchanges can be managed through shared governance. In many cases, however, an independent orchestrator is involved

to identify and realize potential material exchanges, as firms often lack strategic awareness or knowledge.

The most prominent example of industry symbiosis is the Kalundborg Symbiosis in Denmark, in which 16 firms currently engage in a set of mutually beneficial exchanges of by-product streams in a local eco-industrial park. Located in a small harbor town, firms from the power, pharmaceutical, biotech, construction, waste management, and aquaculture industries engage in the exchange of steam, cooling and wastewater, gypsum, ashes, and fermentation residues that are waste streams for some members but can be taken up as valuable inputs by others. While the collaboration was initially managed through shared governance among the founding partners, later the Kalundborg Symbiosis Center was set up to take over some of the administrative tasks as an independent orchestrator.³⁰

These six archetypes describe the dominant modes of interfirm CE collaborations. We find that the six types encompass the full range of CE-oriented collaborative activities observed in practice, allowing them to be categorized. In practice, however, collaboration endeavors may be somewhat fluid—that is, a single collaboration can display the characteristics of two or more types in different areas of activity. Also, the dominant type of a specific collaboration may change over time, as one collaboration mode can lead to another. Innovation networks are often transitory in nature, as the loose collaborations within them may lead to closer collaborations of different types over time. For example, through joint exchange and exploration, an innovation network might uncover a concrete idea for a promising innovation. If participating firms find this opportunity attractive, they may subsequently form a strategic partnership to pursue it further. Equally, if a promising idea emerges but specific knowledge is missing, a joint research project may be set up. And if specific regulation is identified as the main barrier to potential circular solutions in an industry, firms may also go on to collaborate to lobby the regulator for change or set standards of their own.

The collaboration types can develop both within a single industry and across multiple industries. As the CE fundamentally alters material flows and value creation, collaborative efforts can focus on achieving new alignment and new forms of value creation along a single value chain and its connected material flows, as in the case of CEFLEX or the CBI Booster. However, they can also focus on introducing new material types or creating new applications for used materials across industries—as in the cases of Paboco and the industrial symbiosis of Kalundborg. Some endeavors also bring together firms from different industries to collaborate on industry-spanning topics, as in the BDI Circular Economy Initiative. Table 11-2 presents practice examples of the archetypes and describes them according to their particular features.

Table 11-2 Overview of Practical Examples of the Six Archetypes of Interfirm CE Collaboration

	BDI CE Initiative	EUREFAS	DIN CE Roadmap	CEFLEX	CBI Innovation Booster	CEWI
<i>Dominant type</i>	CE advocacy group	CE advocacy group	CE standard-setting group	CE standard-setting group (also advocacy, research)	Network for CE innovation	Network for CE innovation
<i>Description</i>	Formulate joint demands directed at the federal government to influence regulatory action to support the CE transition	Collectively engage to influence EU legislation around re-commerce, particularly concerning electronic devices	Define standardization roadmap for CE and develop voluntary industry standards for a variety of applications	Increase the circularity of flexible packaging by fostering alignment of stakeholders in the value chain. Engage in advocacy and feasibility testing	Facilitate the exchange and joint exploration of ideas between diverse stakeholders to increase circularity in the construction sector	Facilitate networking, exchange, and joint ideation to increase circularity in the construction and automotive sectors; facilitate working groups to drive implementation
<i>Size</i>	60+ organizations	18 organizations	500+ organizations	170+ organizations	Large network, ϕ six projects with three organizations per cohort	50+ organizations
<i>Time horizon</i>	Open-ended	Open-ended	Open-ended / finite for specific standards	Long-term	Four years overall; six months per cohort	Three years
<i>Coordination mechanism</i>	Independent secretariat (funded by membership fees)	Shared governance (funded by membership fees)	Independent secretariat (funded through DIN)	Shared governance, executed through steering committee (funded through membership fees)	ETH Zurich + six institutes as independent orchestrators (funded through govt. grant)	Independently orchestrated by WWF, Wuppertal Institute and Stiftung Klimawirtschaft (funded through govt. grant)
<i>Formalization</i>	Initiative membership	Initiative membership	Voluntary participation in working groups	Membership	Participation in six-month incubation program	No formalization

Table 11-2 Overview of Practical Examples of the Six Archetypes of Interfirm CE Collaboration – continued

	Circular Republic	INCREASE	CIRCULAR FOAM	PABOCO	Looper Textile	Kalundborg Symbiosis
<i>Dominant type</i>	Network for CE innovation	Consortium for CE research	Consortium for CE research	Strategic CE partnership	Strategic CE partnership	Industrial symbiosis
<i>Description</i>	Enable start-ups and partners through building up circular competencies, actively facilitate networking and relationship-building, and drive multi-stakeholder projects to implementation	Joint research between complementary industry partners (and scientists) to increase the uptake of recycled plastics, esp. In electronics	Research project between partners along the value chain for rigid PU foam (and scientists) to demonstrate the feasibility of circulating PU foam using chemical recycling	Pilot and scale a specific packaging solution through co-investment of complementary partners	Set up system to collect used garments across Europe and provide them as feedstock to companies engaged in reuse and recycling	Realize a set of mutually beneficial exchanges of by-product streams between partners
<i>Size</i>	Large network, 6+ partner organizations	19 organizations	22 organizations	3 organizations	2 organizations	16 organizations
<i>Time horizon</i>	Open-ended	Four years	Four years	Open-ended	Open-ended	Open-ended
<i>Coordination mechanism</i>	Orchestrated by focal team, anchored in UnternehmerTUM, the center for entrepreneurship and innovation of Technical University of Munich	Shared governance divided by work packages (funded through EU grant)	Shared governance by work packages (funded through EU grant), focal firm in lead	Direct shared governance through joint equity investment (private investment of companies)	Direct shared governance through joint equity investment (private investment of companies)	Initially, shared governance; later, establishment of Kalundborg Symbiosis Centre
<i>Formalization</i>	Partnership agreements between firms and initiative	Consortium agreement	Consortium agreement	Joint ownership / equity investment	Joint ownership / equity investment	Bilateral contracts and Kalundborg symbiosis secretariat

11.4. Management Considerations for CE Collaborations

Realizing successful collaborations between firms is often challenging. The limited number of ambitious CE-focused collaborations suggests that this holds especially true in the CE field. Therefore, managers must be mindful of potential pitfalls throughout the stages of a collaboration from formation to implementation, as set forth below.

11.4.1. Forming CE Collaborations

Across all archetypes, three overarching challenges in the formation phase of CE-oriented collaborations stand out: First, the CE transition creates significant uncertainty for firms, who must first make sense of what this transition might mean for their business and how they can best embrace this change. Thus, even if firms know that collaboration is important in general, they rarely know at the outset who they should engage with, and for which activities.³¹ Second, firms often lack the specific ties to collaborate in the CE context. Collaborative opportunities in CE are often connected to fundamental alterations to material flows and thus require collaborations among partners who share only distant ties, if any. Hence, engaging in collaboration requires building new relationships and creating trust and mutual understanding between previously unknown partners who might have very different perspectives and interests that might make it tricky to find common ground.³² Third, firms face uncertainty regarding the commercial attractiveness of potential collaborations. While practitioners often emphasize that CE can be a business opportunity for firms, the commercial attractiveness of specific potential applications remains unclear *ex ante*. This vagueness makes firms reluctant to engage and invest significant resources in building new relationships.³³

Managers may assume a variety of tasks to overcome these challenges: They can foster interest in collaborations in general, for example, through inspiring events, showcases of CE innovations, and campaigns that underline the relevance of CE in the respective industry or business line to increase awareness of the economic potential for collaboration. Furthermore, managers can support the creation of ties and the building of meaningful relationships among previously distant actors. New ties can be created by engaging in broad networking across industries, engaging in active matchmaking on specific topics, convening particular groups of firms on a specific topic, or even facilitating curated 1:1 exchanges. Creating an open atmosphere and sharing one's own experiences can foster the building of trust. Additionally, managers can aid the identification of concrete collaboration opportunities by openly sharing and discussing individual needs and wishes with potential partners. Joint ideation sessions can also be useful for exploring potential starting points for meaningful collaborations. Finally, managers can consider working with external facilitators to address potentially diverging interests and allow for collaboration between competitors. External facilitators can provide a neutral platform, reducing competitive hesitance by setting clear ground rules and acting as intermediaries and mediators, aiding a trustful collaborative process.

These different tasks can be crucial for forming all types of collaborations. But also, in later stages, management can actively support collaborations.

11.4.2. Implementing CE Collaborations

The challenges that participating firms face during implementation can differ substantially depending on the type of CE collaboration at hand. Accordingly, managerial activities need to be tailored to the situation. Table 11-3 provides an overview of the typical challenges of each collaboration type and the key tasks to overcome them.

Table 11-3 Overview of Typical Challenges and Key Tasks for the Implementation of Interfirm CE Collaborations

Aim	Influencing market conditions		Exploring solution space		Implementing solutions	
Type	CE Advocacy Groups	CE Standard-Setting Groups	Networks for CE Innovation	Consortia for CE Research	Strategic CE Partnerships	Industrial Symbiosis
<i>Typical challenges</i>	<p>Diverging individual and collective interests need to be aligned to reach goal consensus</p> <p>Conservative influences may seek to hinder progressive change / lead to hold-ups</p> <p>Complex coordination</p>	<p>Diverging individual and collective interests need to be aligned to reach goal consensus</p> <p>Individual motives to influence technical standards</p> <p>Wide variety of applications and perspectives</p> <p>Complex coordination</p>	<p>Breadth of options to explore</p> <p>High uncertainty</p> <p>No commitment</p> <p>Freeriding</p> <p>Value appropriation</p> <p>Uptake / further pursuit of ideas</p>	<p>Breadth of options to explore</p> <p>High uncertainty</p> <p>Freeriding</p> <p>Value appropriation</p> <p>Uptake / further pursuit of ideas</p> <p>(Complex coordination)</p>	<p>Specific need for compatible /complementary competencies</p> <p>Strong commitment needed</p> <p>Goal consensus needed</p> <p>Diversity increases cost / provokes challenges</p> <p>Value appropriation</p>	<p>Local confinement / limited collaboration possibilities</p> <p>Ties are frequently considerably distant</p> <p>Lack of management attention/ strategic focus</p> <p>Potentially complex coordination</p>
<i>Responses to challenges</i>	<p>Stakeholder selection</p> <p>Independent negotiation/arbitration</p> <p>Pushing for ambitious (CE) goal</p>	<p>Stakeholder selection</p> <p>Ensuring fairness and legitimacy</p> <p>Taking over orchestration</p>	<p>Topic definition</p> <p>Stakeholder matching</p> <p>Knowledge activation and brokering</p> <p>Goal specification</p> <p>Facilitation of ideation</p> <p>Translation into a commercial proposition</p>	<p>Knowledge activation and brokering</p> <p>Ensuring fairness</p> <p>Dealing with IP issues</p> <p>Translation into commercial proposition</p>	<p>Support early-stage feasibility/piloting</p> <p>Selective matchmaking and partnership scouting for focal company</p> <p>Support development of joint business case</p>	<p>Stakeholder activation</p> <p>Active identification and establishment of exchanges</p> <p>Assuming orchestration tasks</p>
<i>Management competencies needed</i>	<p>Negotiation</p> <p>Topic and political knowledge</p> <p>Coordination</p> <p>(Long-term commitment)</p>	<p>Negotiation</p> <p>Topic and technical knowledge</p> <p>Coordination</p> <p>Long-term commitment</p>	<p>Knowledge</p> <p>Facilitation of creative process</p> <p>Business competencies</p>	<p>Knowledge</p> <p>IP management (coordination)</p> <p>(Longer commitment)</p>	<p>Topic and technical knowledge</p> <p>Business competencies</p>	<p>Technical knowledge</p> <p>Coordination</p> <p>(Longer commitment)</p>

Managing CE Advocacy Groups

To engage in effective CE advocacy groups, collaborators need to define a set of common positions that they can advocate for. The CE context is particularly characterized by diverse perspectives that need to be brought together to reach a common understanding of the necessary changes. Tensions between collaborators may arise as diverging individual interests must be reconciled and compromises found. Additionally, conservative participants must be prevented from exploiting the advocacy group to maintain the status quo and continue reaping short-term benefits from linear activities. To address these challenges, managers may actively engage in scouting for particular participants to form a progressive group and ensure an open dialogue while striking the balance between ambitious but realistic goals to advance the CE. Establishing a coordinator to steer the collective process can be especially helpful for advocacy groups as they can provide neutral mediation to reconcile diverging interests. Still, achieving alignment often requires significant coordination and time.

The managers of the BDI CE Initiative learned that achieving alignment among participants can be considerably cumbersome when they set out to formulate six political demands among their members. Each demand had to be discussed and negotiated over multiple rounds among all the parties until a collectively agreed upon version could finally be released, resulting in a much longer process than initially expected.

Managing CE Standard-Setting Groups

Consensus among participants is equally vital in CE standard-setting groups. Thus, tensions may arise among participants based on diverging individual interests. Also, participants might push for specifications to advance technical solutions that favor their own business activities.³⁴ Given the early stage of the CE transition and the resulting uncertain value potential, firms might also feel that the process is too onerous, making them reluctant to invest time and resources in the collaborative activity. As with advocacy, engaging ambitious participants can help to set progressive goals and stay away from incremental adaptations to linear economic activity. Standardization efforts benefit greatly from independent orchestration to safeguard neutrality, fairness, and internal and external legitimacy. The management role generally requires considerable technical knowledge and competencies in knowledge brokering and negotiation.

For CEFLEX, a key goal was to jointly establish design guidelines for flexible packaging in the CE and formulate a set of common positions that would serve as an orientation for the transition journey towards circularity for the whole industry. During the process, the association's managers perceived such a wide divergence of opinion among their stakeholders that they decided to engage an external facilitator to manage the process of negotiating common positions on contested topics. The facilitators assumed the role of independent moderators in the negotiations to ease the tension and align the diverging positions into joint positions for CEFLEX.

Managing CE Innovation Networks

Engaging in CE innovation networks can provide excellent opportunities for firms to learn about CE opportunities and grow their network. However, while broad networking may be particularly helpful for firms that are new to the topic, frustration may grow if more experienced participants want to explore specific ideas for which goal-directed rather than serendipitous networking would be more expedient.³⁵ Managers of CE innovation networks thus need to consciously define the scope and goal of the innovation activities and either focus on the early stages and encourage broad networking to develop a diversity of ideas or focus on more advanced players and deliberately narrow the scope to allow for deeper exploration of specific topics and foster more selective matching between stakeholders with complementary competencies. Managers should also plan ahead to secure the right kind of support the emerging collaborations might need to develop further. Otherwise, early-stage collaborations emerging through innovation network activities might fade away when the networking facilitation ends.

CEWI's innovation network program brought together actors from the automotive and construction industries to support the creation of joint projects to advance the CE transition. In a collaborative workshop, participants developed ideas and formed project groups for further exploration. As the ideas developed, it became apparent that additional skills were needed that were missing in the core group. The managers thus reached out to additional potential collaborators. Furthermore, different types of collaborations started to emerge from the networking: While some focused on implementing concrete pilot projects, others engaged in political advocacy to boost the CE transition of their industries or worked on white papers supporting the definition of industry standards and tools. While the concrete pilot projects were driven largely by participants, the political and standard-setting groups required significant orchestration from the program managers.

Managing Consortia for CE Research

While the breadth of knowledge that CE research consortia bring together can be great for open exploration, it can be challenging to select specific ideas for further development. Initially, when the value creation potential remains rather uncertain, managers may need to actively motivate participating stakeholders to engage, and collaborations may suffer from a collective action fallacy. This can be a particular problem when firms participating in many different programs cannot make up their minds about which routes to circularity to pursue further. Later, when the ideas become more concrete, the potential for individual value appropriation grows and needs to be fairly managed.³⁶ Ultimately, impact is only achieved when the resulting outcome of the joint research finds its way into practice and is used by economic actors. To overcome these challenges, research consortia need knowledgeable and experienced managers and a clear way to address IP rights issues should they arise. Focusing on a clear pathway towards commercialization is vital, especially in the early stages, as collaborations may fade away if the business potential remains vague for too long.

The research consortium INCREASE brings together research institutions and companies along the plastics value chain in electronic equipment to restructure the existing (recycling) infrastructure and address accompanying challenges to achieve higher quality of recyclate. Competition prevails at the level of the recycling technology and at the level of attention paid to the various polymers, which translates into indirect competition among the

companies over the research input they get from the project and their willingness to contribute to the overall project with data and in-kind contributions. Therefore, overall project management is taken on by an independent facilitator—in this case, a research organization—who continuously engages to keep all participants focused on the overall project goal and reconcile the various interests among the stakeholders.

Managing Strategic CE Partnerships

Strategic partnerships for CE are typically managed via the commercial cooperation of the participating firms. This usually requires significant investment and legal formalization. There may be a need to reconcile divergent interests, incompatible goals, opportunistic behavior, disagreement on resource allocation, and control disputes.³⁷ In CE, things can get even more complicated: As strategic CE partnerships often bring together partners that were previously connected distantly or not at all, aligning their various realities, work cultures, and practices can be even more challenging and massively increase coordination costs. In addition, given the early stage of the transition, the emerging strategic CE partnerships often focus on verifying the technical and commercial viability of new solutions. Hence, uncertainty is still relatively high, and companies are cautious over the size of their investments. Managing strategic partnerships in CE thus requires careful consideration right from the setup phase. It is vital to select compatible companies as partners with a similar approach to circularity, similar interests and complementary resources, and a clear commitment to implementing potential solutions, and also to secure patient financial resources for the first steps of collaboration. Facilitated programs might also assist in the initial setup of partnerships.

The privately funded Circular Republic program focuses on facilitating joint technical and commercial viability testing. The managers identify concrete problems and potential solutions together with focal companies (such as commercial recycling and material recovery from used traction batteries), bring together industry stakeholders with complementary competencies, and then facilitate the management of technical testing and piloting. If attractive, a focal company can formalize the collaboration in a strategic partnership, but the program managers also consider engaging in venture building themselves and setting up a (commercial) entity to support the joint activities if an independent startup setup is better suited to running the new business.

Managing Industrial Symbiosis

The concept of industrial symbiosis has received intense attention for many years, sparked by the high-profile success stories of Kalundborg Industrial Park and others. However, the collaboration that emerged through the shared governance of a small group of firms in a Danish harbor proved harder to replicate elsewhere. First, the local confinement that comes with the direct physical material exchange limits the number of potential matches between companies and thus overall commercial viability. Moreover, the lack of strategic relevance associated with material streams that were previously considered waste also limits managerial awareness and thus willingness to engage in collaborative exploration.³⁸ In addition, while a concrete material exchange can be commercially beneficial to the companies, there is great uncertainty over whether such mutually beneficial matches can actually be found. Hence, firms might be

reluctant to engage in too much exploration. Engaging to raise awareness among potential collaborators and proactively evaluating potential exchanges can facilitate the setup of IS. However, this often requires significant resources and expertise. In such situations, collaborating with a third-party facilitator with deep technical knowledge to identify potential material streams and find viable matches can significantly lighten the burden on the individual participating firms.

While the industrial symbiosis between the firms in the Kalundborg Industrial Park was initially managed by the first members in shared governance, a need for orchestration developed over time as the collaboration further developed and the people involved changed. In 1996, the Kalundborg Symbiosis Centre was founded in 1996, not only to further orchestrate the local collaboration and nurture new ones, but also develop insights from their work and share them with academics and practitioners.³⁹

11.4.3. Considerations for Facilitating CE Collaborations

Given the societal relevance of the CE transition, many facilitators from the public and third sector are currently engaging in facilitating industry collaborations with a CE focus. Given the benefits of external facilitation for CE collaborations set out above, such actors can play an important role in supporting the development of novel collaborations. However, they must also reflect on their own part in the process. Facilitators need to be conscious of the share of the burden they want to take away from the firms involved. Helping to develop potentially environmentally beneficial ideas that would not otherwise have come to life can be essential. Still, at some point, industry needs to implement those ideas without continued support. Hence, it might be advisable to ask participating firms to assume some share of the work as a mechanism for selecting ideas with commercial potential that participants are likely to implement in the long run.

Facilitators can also help to strike the right balance between supporting the pursuit of a relatively certain but incremental idea and betting on radical, inherently riskier ideas that hold the promise of deeper transformation. External facilitators can push for more radical ideas when they are ready to offset firms' increased uncertainty by taking on more of the costs associated with exploration. However, they must also be prepared to stay on board long-term to realize the potential of such radical innovations.

Public and third-sector facilitators can also play a crucial role in securing the future environmental benefits of the aspired transformation. While the economic viability of circular activities is naturally a prime concern for the firms involved, the ultimate societal goal is to shrink the overall environmental footprint of our economic activity. This is a crucial distinction between CE-focused collaborations and traditional commercial ones. While in purely economic collaborations, the motivation of actors is often taken as given, they might have less motivation to engage in CE collaborations with uncertain commercial prospects. Facilitators can thus play an important role in increasing the commercial incentive for companies to engage—but at the same time, they need to keep environmental goals in sharp focus. Firms need a clear commercial incentive if they are to fully implement circular solutions and thus actually achieve the desired transformation of our economic system. But if environmental goals take a back seat in the

development of new ostensibly circular business models, the whole point of facilitators supporting private-sector collaboration in the first place vanishes into thin air.

11.5. Conclusion and Outlook

The last few years have seen a rapid proliferation of collaborative endeavors to advance the CE transition, both within industries and across them. In this article, we suggested a typology of such interfirm collaborations to differentiate between different forms of collaboration according to their focus and purpose. We discussed the challenges that tend to emerge in each type of collaboration, as well as potential ways to respond to these challenges.

As the CE transition has only just begun, collaborative endeavors between firms will likely develop further in the future. In particular, given the early phase of the transition, many efforts are currently focused on deepening the understanding of the complexities of the transition and exploring potential novel innovation pathways. But as collaborators' awareness and experience with CE concepts grows and viable pathways and solutions become clearer, interfirm collaborations will likely shift accordingly. We can already see signs of this in practice, especially regarding innovation network activities, where broad-based conferences on CE as an overarching topic are increasingly being supplanted by topic-, industry-, or technology-specific events that focus on exploring specific material flows in depth. Additionally, differences between geographies might emerge as local resource availability and the regulatory framework defined by local authorities motivate different development pathways. Future analyses can provide valuable insights by focusing on the differences that may arise between collaborations relating to different industries, material flows, and geographies.

Notes

¹ See for example W. R. Stahel, "The Circular Economy", *Nature* 531/7595 (2016): 435-38; M. Esposito, T. Tse, and K. Soufani, "Introducing a Circular Economy: New Thinking with New Managerial and Policy Implications", *California Management Review*, 60/3, (2018): 5-19; Ellen MacArthur Foundation. "Towards a Circular Economy - Business Rationale for an Accelerated Transition" (2015), <https://ellenmacarthurfoundation.org/towards-a-circular-economy-business-rationale-for-an-accelerated-transition>

² European Commission. "A New Circular Economy Action Plan for a Cleaner and more Competitive Europe" (2020): <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0098&from=EN>; more information on the recent regulations in California can be found at <https://calrecycle.ca.gov/Laws/Legislation/PriorityRpt/>. The World Economic Forum has defined circular economy as a strategic topic for its work with their partners and has initiated a number of activities dedicated to promoting the CE transition among industry practitioners. More information can be found on the website <https://www.weforum.org/topics/circular-economy>.

³ For example, many consultancy firms have started to propagate CE as a relevant topic for value creation and growth potential for firms, as illustrated by recent reports and books authored by practitioners from Accenture or the Boston Consulting Group (in collaboration with the World Business Council on Sustainable Development): P. Lacy, J. Long, and W. Spindler, *The Circular Economy Handbook*, London, UK: Palgrave Macmillan, (2020); H. Rubel, M. Schmidt, A. Meyer zum Felde, A. Mendiluce, A. Brown, B. Edgerton, and J. Tylor, "The New Big Circle - Achieving Growth and Business Model Innovation through Circular Economy Implementation", (2018) https://docs.wbcsd.org/2018/01/The_new_big_circle.pdf

⁴ N. Bocken and T. Geradts, "Barriers and drivers to sustainable business model innovation: Organization design and dynamic capabilities", *Long Range Planning*, 53/4 (2020): 101950; M. Eikelenboom and G. de Jong, "The impact of managers and network interactions on the integration of circularity in business strategy," *Organization & Environment*, 35/3 (2022): 365-393; Esposito, Tse, and Soufani, op. cit.; J. Frishammar and V. Parida, "Circular business model transformation: A roadmap for incumbent firms", *California Management Review*, 61/2 (2019): 5-29.

⁵ For further information on the working groups at CEFLEX, visit www.ceflex.eu

⁶ For more information on the Circular Building Industry Innovation Booster, visit www.cbi-booster.ch

⁷ For more information on Paboco, visit www.paboco.com

⁸ The Platform for Accelerating the Circular Economy is a global collaboration platform design to boost the transition towards a circular economy with a range of programs, tailored to selected industries such as food, textiles, plastics, electronics, and capital equipment. For more information, visit <https://pacecircular.org>

⁹ Managerial perspectives of various forms of collaborative efforts between firms have been discussed in the literature, see for example: M. R. Chertow, "'Uncovering' Industrial Symbiosis", *Journal of Industrial Ecology*, 11(1) (2008): 11-30; Das and Teng, op.cit; Dhanaraj and Parkhe, op. cit.; T. Doménech and M. Davies, "The Role of Embeddedness in Industrial Symbiosis Networks: Phases in the Evolution of Industrial Symbiosis Networks", *Business Strategy and the Environment*, 20/5 (2011): 281-96; Fonti, Moret and Whitbred, op.cit.; Gulati, op.cit.; Kale and Singh, op.cit; R. L. Paquin and J. Howard-Grenville, "Blind Dates and Arranged Marriages: Longitudinal Processes of Network Orchestration", *Organization Studies*, 34/11 (2013): 1623 -53; Provan and P. Kenis, op.cit. ; M. Rysman and T. Simcoe, "Patents and the Performance of Voluntary Standard-Setting Organizations", *Management Science*, 54/11 (2008): 1920-34

¹⁰ See for example A.S. Sætre and A. Van de Ven, "Generating theory by abduction", *Academy of Management Review*, 46/4 (2021): 684-701.

¹¹ The lead author has actively supported the management team of a strategic initiative to promote interfirm collaborations in the automotive and construction sector with the evaluation of the three-year program that involved over 50 industry representatives, with particular focus on the derivation of best practice and lessons learned for the facilitation of interfirm collaborations.

¹² In addition, the lead author also draws on her experience from running a professional network since 2018 focused on connecting industry practitioners and facilitating collaborations to advance the transition to a circular economy in various industries.

¹³ For example, we have been in personal exchange with representatives from the examples initiatives mentioned in the text, in particular with Circular Republic, the CE Initiative of the BDI, DIN, Circular Foam, and PaBoCo, as well as a large set of practitioners from various industries during bilateral exchanges and during organized practitioner events focused on the topic of collaboration with up to 100 participants.

¹⁴ The implications of the number of stakeholders participating in collaborations, especially with respect to the governance, resonate with considerations in network theory, for example: K. G. Provan and P. Kenis, "Modes of Network Governance: Structure, Management, and Effectiveness", *Journal of Public Administration Research and Theory*, 18/2 (2007): 229–52; and in considerations of industrial systems, see for example, Doménech and Davies, op.cit.

¹⁵ The observed time frames of circular economy collaborations resonate with similar discussions on the length and phases of collaborations in research on strategic alliances and networks, for example: P. Kale and H. Singh, "Managing Strategic Alliances: What Do We Know Now, and Where Do We Go from Here?", *Academy of Management Perspectives*, 23 (2009): 45-62

¹⁶ The considerations of the level of formalization of collaborations resonate with similar discussions in management theory, for example: R. Gulati, "Alliances and Networks," *Strategic Management Journal*, 19/4 (1998): 293–317; Kale and Singh, op.cit.; Provan and Kenis, op.cit.;

¹⁷ The different coordination mechanisms observed resonate with discussions in various types of collaborations; for example: C. Dhanaraj and A. Parkhe, "Orchestrating Innovation Networks", *Academy of Management Review*, 31/3 (2006): 659-69; Gulati, op.cit.; R. Gulati, and H. Singh, "The architecture of cooperation: Managing coordination costs and appropriation concerns in strategic alliances." *Administrative Science Quarterly* (1998); 781-814. Kale and Singh, op.cit.

¹⁸ R. D. Margerum, "A typology of collaboration efforts in environmental management", *Environmental Management*, 41 (2008): 487-500; L. Young and J. M. Everitt, *Advocacy Groups*, (Vancouver, Canada: UBC Press, Vol. 5, 2004)

¹⁹ For more information, visit <https://bdi.eu/umwelt-und-nachhaltigkeit/circular-economy>

²⁰ For more information, visit <https://www.eurefas.com/>

²¹ Rysman and Simcoe, op.cit.

²² For more information, visit <https://www.din.de/de/forschung-und-innovation/themen/circular-economy/normungsroadmap-circular-economy>

²³ Dhanaraj and Parkhe, op.cit.

²⁴ F. Fonti, M. Maoret, and R. Whitbred, "Free-Riding in Multi-Party Alliances: The Role of Perceived Alliance Effectiveness and Peers' Collaboration in a Research Consortium", *Strategic Management Journal* 38/2 (2017): 363-83.

²⁵ For more information, visit <https://circular-foam.eu/>

²⁶ These considerations resonate with similar discussions on motivation to form strategic alliances, for example: Gulati, op.cit.; K. Eisenhardt, and C. Schoonhoven, "Resource-Based View of Strategic Alliance Formation: Strategic and Social Effects in Entrepreneurial Firms." *Organization Science* 7/2 (1996): 136-150.

²⁷ T. K. Das and B. S. Teng, "A Resource-Based Theory of Strategic Alliances." *Journal of Management*, 26/1 (2000): 31–61; Gulati, op.cit. Kale and Singh, op.cit.

²⁸ The joint venture activities of HM and Remondis have started in 2023. For more information, visit <https://www.loopertextile.com/>

²⁹ M. R. Chertow, "Industrial Symbiosis: Literature and Taxonomy", *Annual Review of Energy and the Environment*, 25/1 (2000): 313-37; A. R. Zaoual and X. Lecocq, "Orchestrating Circularity within Industrial Ecosystems: Lessons from Iconic Cases in Three Different Countries", *California Management Review*, 60(3) (2018): 133-156

³⁰ For more information on the current project, visit <https://www.symbiosis.dk/en/>. The Kalundborg Industrial Symbiosis is also intensively discussed in academic literature, see for example: N. B. Jacobsen, "Industrial Symbiosis in Kalundborg, Denmark: A Quantitative Assessment of Economic and Environmental Aspects", *Journal of Industrial Ecology*, 10/1-2 (2008): 239-255; Zaoual and Lecocq, op.cit.

³¹ See also N. Bocken and T. Geradts, "Barriers and drivers to sustainable business model innovation: Organization design and dynamic capabilities", *Long Range Planning*, 53/4 (2020): 101950; Kuhlmann et al, op.cit.

³² See also C. Bening, J. Pruess and N. Blum, "Towards a circular plastics economy: Interacting barriers and contested solutions for flexible packaging recycling," *Journal of Cleaner Production* 302 (2021): 126966; Doménech and Davis, op.cit.; Eikelenboom and de Jong, op.cit.; Zaoual and Lecocq, op.cit.

³³ See also Bocken and Geradts, op.cit.; M. Linder and M. Williander, "Circular business model innovation: inherent uncertainties", *Business Strategy and the Environment*, 26/2 (2017): 182-196

³⁴ See also C. Murphy, "Voluntary standard setting: drivers and consequences", *Ethics & International Affairs* 29/4 (2015): 443-454.; Rysman and Simcoe, op.cit.

³⁵ While serendipitous networks develop opportunistically, goal-directed networks are set up with a specific purpose, either by the participants, or a third party, and further evolve largely through conscious efforts to build

coordination. For more on the discussion of such networks, see Provan and Kenis, op. cit., or M. Kilduff and W. Tsai, *Social Networks and Organizations*, London, UK; Thousand Oaks, CA: Sage, (2003)

³⁶ See also for example in Fonti et al, op.cit.

³⁷ Gulati, op. cit.; R. Gulati and H. Singh, "The Architecture of Cooperation: Managing Coordination Costs and Appropriation Concerns in Strategic Alliances", *Administrative Science Quarterly*, (1998): 781-814; Kale and Singh, op. cit.; T. K. Das and B.S. Teng, "Trust, Control, and Risk in Strategic Alliances: An Integrated Framework", *Organization Studies*, 22/2 (2001): 251-283.

³⁸ Chertow, op.cit.; Doménech and Davies, op. cit.; Zaoual and Lecocq, op. cit.

³⁹ Zaoual and Lecocq, op. cit.

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