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Circular platform orchestration in B2B markets: shaping competitive dynamics and collective industry benefits

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Circular digital platforms can contribute to addressing the challenges of natural resource over-exploitation and material waste accumulation. Circular digital platforms incorporate diverse, complementary, and even competitive actors; therefore, circular platform orchestration is a crucial phenomenon yet unstudied. This study examines the conditions of circular platform orchestration in diverse actor settings leading to collective industry benefits, and changes in competitive dynamics among industry actors. We utilize a multiple-case study on circular digital B2B platforms orchestrated by public and private actors in Finland, Italy, and Lithuania. The findings identify three orchestration conditions of B2B circular platforms: incentives and motivation to participate in the platform, control and operational rules, and homogeneity/heterogeneity of actors. The findings also show that these conditions manifest differently under private versus public orchestrators, with the former more motivated by economic goals and the latter more by public good goals; yet, with industry outcomes being relatively similar. Our study provides implications to the literature of circular economy business and platform orchestration by demonstrating how circular platforms help to 'raise all boats' in the industry while reconfiguring some competitive dynamics between primary and secondary markets.

JEL Classification: L14, O33, Q53, Q55

1. Introduction

Digital platforms enable business models that mediate transactions between actors, such as networks of buyers and sellers or providers and users (McIntyre and Srinivasan, 2017; Teece, 2018). Digital platforms are changing the way traditional competition occurs and how industry actors collaborate with each other more broadly (Cennamo, 2021; Jacobides and Lianos, 2021), fostering innovation in business model design (Madanaguli et al., 2023). As such, platforms can be viewed as the new frontier of 'dynamic competition'—a situation where competition and innovation co-emerge to modify market structures, competitive advantages, and roles between different actors (Sidak and Teece, 2009; Petit and Teece,

2020; Petit and Teece, 2021). While many platform studies to date have examined dynamic competition in multisided, business-to-consumer (B2C) context (Cennamo, 2021; Gawer, 2021; Argyres et al., 2023), in industries such as video games, e-commerce, and social media (Rietveld and Schilling, 2021), we argue that digital platforms can be seen not only as a new mode of market competition by innovation but also as a governance mode for addressing societal and ecological challenges (Ritala, 2024). One such challenge for which platforms are particularly useful is the overexploitation of natural resources and material waste (Blackburn et al., 2023; Blackburn et al., 2025), a grand challenge that a circular economy (CE)[1] approach addresses in response (Patala et al., 2022). In the CE, business model innovations are based on resource sharing and reduction, recycling, and recovery of materials (Korhonen et al., 2018; Lüdeke-Freund et al., 2019). Indeed, circular digital platforms[2] can support the exchange and circular flow of resources among industrial actors to promote resource life extension, reuse, and recycling (Konietzko et al., 2019; Blackburn et al., 2023, 2025).

Although circular platforms can advance industry's transition towards the CE, circular platforms operating in business-to-business (B2B) markets have been little explored, even though these sectors often use large amounts of resources and materials. Moreover, research on platform competition in the CE context is notably absent (for review, see Blackburn et al., 2025). In this regard, we still lack a clear understanding of the role that circular platforms can play as orchestrators in B2B markets, and by doing so, driving dynamic competition in the industry. Furthermore, we do not yet understand how the orchestration by circular platforms enables collective industry benefits and shapes competitive dynamics as outcomes of such orchestration. In fact, platform orchestration in B2B markets (Springer et al., 2025) requires both innovation and dealing with the tensions of managing simultaneous collaboration and competition with platform actors, creating value in the ecosystem while at the same time appropriating some of that value (Rietveld and Schilling, 2021).

Circular platforms have been found to allow the connections between industrial actors and/or end-users, to facilitate reuse, recycling, and regeneration through the sharing or exchange of resources (Lüdeke-Freund et al., 2019; Blackburn et al., 2025). Actors on circular platforms can be both private companies seeking economic benefits and public organizations seeking broader sustainability solutions. Blackburn et al. (2023) consider circular platforms to be 'resource-centric matchmakers,' which orient these productive resources exchanges towards efficient transactions in surplus resources. Ciulli et al. (2020) theorize digital platforms as 'circularity brokers,' filling structural holes in resource and material networks. While the literature has focused more on B2C and consumer-to-consumer (C2C) platforms, an increasing number of successful digital platforms are emerging in B2B markets (Jovanovic et al., 2022; Ritala and Jovanovic, 2024), and also in the CE context (Franzò and Urbinati, 2023). These studies build our understanding of B2B circular platforms, but they do not examine in detail such platforms' orchestration conditions and how they lead to variety of outcomes. Yet, digital platforms struggle to be competitive in B2B markets, due to complex interaction processes in fragmented value chains (Cullen and Farronato, 2020; Hein et al., 2020), and due to the relatively small network and ecosystem sizes and thus lower potential network effects (Springer et al., 2025). These remain likely challenges for circular platforms in B2B markets also. Thus, understanding is needed on how circular platform orchestrators can overcome these challenges with different platform orchestration conditions, referring to mechanisms deployed by platforms to facilitate coordination and collaboration among industry actors (Blackburn et al., 2023).

In this study, therefore, we particularly focus on circular platforms operating in the B2B market and their orchestration conditions that potentially lead to collective industry benefits and competitive dynamics. The investigation of circular B2B platform orchestration is particularly relevant to understanding how they can change positions between industry actors, considering who is competing, who is collaborating and how, in the given industrial dynamic setting. This paper builds on the premise that digital platforms, as enablers of distinct forms of collaboration, can enhance the transition pathway towards the CE, help create circular value (Blackburn et al., 2023) and enhance the competitive

[1] CE is an industrial economy in which biological and technical materials are re-circulated into the economy with the ambition to close linear resource flows, minimize waste generation and pollution and use products and materials at their highest level of utility for as long as possible (Geissdoerfer et al., 2020, 2025).

[2] In the rest of this article, for simplicity, we will refer to circular digital platforms as circular platforms.

advantages of industrial companies as well as the overall collective benefits. To address the arguments mentioned above, we are interested in answering the following research question '*What are different conditions of circular platform orchestration and how do these conditions affect collective industry benefits and competitive dynamics?*' To address this question, we conduct a multiple-case study of six circular B2B platforms from different industries in Finland, Italy, and Lithuania; two orchestrated by public actors and four by private actors, to examine what circular platforms exist and their orchestration conditions. By comparing and identifying patterns across the cases, we provide empirical evidence on circular platform orchestration and its outcomes, including collective benefits and changes in competitive dynamics.

Our study contributes to platform orchestration and the CE business literature, as well as to the nascent research stream of circular platforms (Franzò and Urbinati, 2023; Blackburn et al., 2025). As our contribution, we identify and explain orchestration conditions of circular B2B platforms, namely incentives and motivation to participate in the platform, control and operational rules, and homogeneity/heterogeneity of actors. These orchestration conditions also differ whether circular B2B platform orchestrator is private or public, with the former more motivated by economic goals and the latter more by public good goals; yet, with industry outcomes being relatively similar. We find that as circular platforms mostly act as resource orchestrators, they often do not create strong competitive dynamics in the primary market, as industrial actors manage their resource waste more efficiently via the platforms that contribute to the achievement of shared goals. However, circular B2B platforms contribute to the development of the secondary market, with more intense competition for secondary resources. Our study deepens the understanding of how circular platforms create collective industry benefits and shape competitive dynamics in B2B markets, guiding managers in developing circular platforms that can address the sustainability challenges of their industry while developing new businesses and markets.

We present the rest of the paper as follows: Section 2 presents an overview of the literature on circular platform orchestration and its outcomes of circular B2B platforms. Section 3 presents the rationale for the methodology used to address the multiple-case analysis. Section 4 presents orchestration conditions, collective benefits, and competitive dynamics of circular B2B platforms. Section 5 discusses the results and implications. Section 6 concludes the paper.

2. Theoretical background

2.1 Circular platforms in B2B markets and their orchestration

Digital platforms and platform ecosystems have been mostly studied in B2C and C2C settings (for review, see Rietveld and Schilling, 2021), but recently scholars have started to examine how platforms facilitate value creation and capture in B2B markets (Springer et al., 2025; Ritala and Jovanovic, 2024). B2B platforms involve distinctive features in comparison to B2C and C2C settings, such as a smaller network size and, relatedly, a more challenging setup for achieving network effects, greater bargaining power of complementors, and the tendency to utilize industrial products and services, and related data as means for their governance (Madanaguli et al., 2023; Meier et al., 2024; Ritala and Jovanovic, 2024). While B2B platforms have their challenges, scholars have started to identify how B2B platforms could be harnessed to address industrial or cross-industrial sustainability and circularity challenges (Blackburn et al., 2023; Franzò and Urbinati, 2023; Ritala, 2024).

In this study, we focus on B2B platforms that operate according to the principles of the CE and refer them as *circular platforms*. The CE principles encourage companies to collaborate to reduce, reuse, remanufacture, and recycle residual resources (such as by-products and waste) (Patala et al., 2022), or in other words, narrow, slow, close, or even regenerate resource and material loops (Bocken and Ritala, 2022; Bocken et al., 2025). To achieve some or several of these CE principles, there is a need for various governance structures and models to engage actors and connect them with resources and materials across different value chains, industries, and ecosystems (Aarikka-Stenroos et al., 2021; Batista et al., 2023; Kaipainen et al., 2023). While the CE principles can be achieved via other governance mechanisms (such as bilateral arrangements or physical recycling infrastructures), many B2B circularity challenges benefit from a platform approach that could ideally bring scalability, incentives, and coordination

structures (Ritala, 2024; Blackburn et al., 2025). Indeed, there is increasing recognition in the literature to support that the circular platform has become a distinct form of organization to coordinate resource and materials recovery, matching, and exchange (Ciulli et al., 2020; Blackburn et al., 2023). Circular platforms are applicable to diversified forms of the CE, from recycling to reduction and from loop-closing to loop-extension (e.g. Franzò and Urbinati, 2023). However, in practice, what is circulated and how, is dependent on the capabilities of individuals, organizations, and ecosystem itself (Saari et al., 2024; Kaipainen et al., 2025) as well on characteristics of material flow within a particular institutional landscape given the regulation, policies, and norms that drive or hinder circular material flow (Ranta et al., 2018; Alkki et al., 2024).

We further conceptualize circular platforms in B2B markets as meta-organizations for connecting and circulating the resource and material flows (Blackburn et al., 2023). Meta-organizations are 'organizations of organizations' (Ahrne and Brunsson, 2005), and when operated via platform markets and ecosystems, they are typically governed to reach a joint system-level goal (Gulati et al., 2012), yet with a limited extent of control due to consisting of individual organizations. Instead, B2B platforms require setting up rules, interfaces, membership criteria, and other governance mechanisms that incentivize and motivate actor participation and contributions, which is particularly essential for circular platform growth and operation (Blackburn et al., 2023). Having explored the orchestration of circular platforms in B2B markets, we now turn to the critical competitive-collaborative dynamics that emerge within these platforms.

2.2 Competitive dynamics and collective benefits of circular platforms in B2B markets

In this section, we discuss competitive and collaborative dynamics in more detail and reflect on how they affect circular platforms and their orchestration conditions in B2B markets.

2.2.1 Competitive dynamics

The dynamic competition considers competition and innovation as co-determinant of changes in market structure and firm positions (Petit and Teece, 2021). 'Dynamic competition is a style of competition that relies on innovation to produce new products and processes and concomitant price reductions of substantial magnitude' (Sidak and Teece, 2009, p.600). Dynamic competition is indeed more intuitive and much more relevant to today's competitive activities, such as significant product differentiation or rapid response to change (Sidak and Teece, 2009; Teece, 2025). Furthermore, platform-based competition (as a form of dynamic competition) changes the rules of traditional market competition by enabling interactions as 'relational' ecology of competition (Chen and Miller, 2015, 2011), and usage of innovation (Petit and Teece, 2020; Petit and Teece, 2021). The products developed/sold on the platform are diverse and not limited to a specific industry, and the platform's market boundaries cover many (traditionally defined) product markets and even industries (Cennamo, 2021; Petit and Teece, 2021). As platforms facilitate multisided connections, network effects emerge between different platform user groups, thus increasing value for all actors as more users join (Gawer, 2021; Karhu et al., 2024). Dynamic competition in the context of B2B circular platforms implies that diverse industrial actors work both collaboratively and competitively to achieve shared ecosystem goals (such as resource circulation and reuse) through business model innovation. By generally acknowledging existing elements of dynamic competition in driving the conditions of circular platform orchestration, in this paper we focus on changes in competitive dynamics (competitive-collaborative actions and interactions of industrial actors involved in the platform) as outcomes of circular platform orchestration.

Previous studies on digital platforms (McIntyre and Srinivasan, 2017; Cennamo and Santaló, 2019) have usually analyzed competition in digital-platform-based businesses in two ways; in terms of platform market size (known as 'winner-takes-all' (Cennamo and Santalò, 2013) and platform identity, i.e. how platforms differentiate themselves from each other (Cennamo and Santalò, 2013; Karhu and Ritala, 2021). However, the arguments related to the means of competition on B2B circular platforms are less developed and differ from the competition of B2C and C2C platforms. First, for B2B circular platforms (Blackburn et al., 2023), it is not easy to *compete on the basis of platform size*, as the number of B2B

market actors tends to be smaller than in consumer markets (Ritala and Jovanovic, 2024). By applying the *competition logics of distinctiveness*, platforms can create their own market and/or technological identities (Cennamo, 2021), mostly related to the platform's technological architecture (i.e. innovation) (Argyres et al., 2023) and scalability (Tura et al., 2018). Typical platform architectures include those consisting of intercompany connections and interfaces that allow such external actors as suppliers, competitors, and complementors to join and transact on the platform (Thomas and Gann, 2014). To co-create value, B2B platform architectures are built gradually, where the focal platform must engage in resource-intensive orchestration with a limited number of complementary actors, especially when it comes to asset-heavy industrial business contexts (Madanaguli et al., 2023; Ritala and Jovanovic, 2024).

Second, B2B industrial actors and their relationships are highly heterogeneous, implying more diverse platform market dynamics (Meier et al., 2024) and position actors in complementary and competing roles within their industry and market (Bengtsson and Kock, 1999; Meier et al., 2024). Actors can be connected and positioned to each other via vertical and horizontal relationships leading to value chain positions and roles that can be complementary and mutually benefitting or competitive (see Mason et al., 2007). Therefore, we assume that multiple actors' characteristics, as well as their mutual interactions and positioning to each other, impact how *actor homogeneity* versus *heterogeneity*, and related collaboration and competition, may manifest at the platform, shaping actors' engagement and organizing at circular platforms. As the actors at circular platforms can be both private companies, motivated by short-term profit, and public organizations, such as governmental or regional development-driven cities seeking long-term sustainability solutions, also actors' goals and actions are diverse and follow very different institutional logics (Aarikka-Stenroos et al., 2021; Ingstrup et al., 2021) that direct their interests, needs, and multiple roles (Tura et al., 2018; Kaipainen et al., 2023) at circular platforms. Companies at circular B2B platforms can be positioned in one industry sector or several interlinked industries, but a platform can also integrate actors across sectors and conventional industrial value chains (Franzò and Urbinati, 2023; Soldatos et al., 2021), thereby extending the actor diversity significantly. Based on above, we assume that competitive dynamics at the circular B2B platform is dependent on whether or how actor diversity translates into complementary and mutual benefits or competition.

Third, the overall objectives of engaging in competitive dynamics encompass a variety of options, such as outcompeting rivals, *gaining a competitive advantage,* or *'raising all boats'* (Mathias et al., 2018); where the latter relates to contributing to the well-being and value creation of a wide range of industrial actors (Chen and Miller, 2011). B2B platform competition shifts the emphasis from inter-industry competition to how to create more value for industrial actors transacting and participating on the platform, which might involve multiple industries and actors (Ritala and Jovanovic, 2024).

Therefore, in the context of circular platforms, we expect platform competition to take more heterogeneous forms and develop new types of industry and competitive dynamics not fully aligned with the classic platform competition literature that has mainly focused on B2C and C2C markets (Rietveld and Schilling, 2021).

2.2.2 Collective benefits

The existing literature also provides insights into collaborative dynamics at B2B platforms, such as transaction and integration platforms to support resource circulation (Blackburn et al., 2025). Connectivity is one of the most highlighted benefits of collaboration between industrial actors participating in circular platforms. As digital platforms help to integrate and coordinate industrial actors (Kjaer et al., 2019), they are particularly suitable in the management of resources that are not under direct management or control (Chauhan et al., 2022). Thus, circular platforms are often considered as 'market intermediaries' (Thomas and Gann, 2014). For example, Ciulli et al. (2020) found that connecting has become a key role for all circular platforms in the food supply chain, facilitating food waste recovery. Circular platforms may also support the integration between collaborating partners (Chauhan et al., 2022) and elevate the value of resources as involved actors gain improved utility, flexible access and usage (Ranta et al., 2020; Sairanen et al., 2024). Digital platforms can optimize the use of resources, foster mutual learning and coordination, and generate added value along the life cycle (Kovacic et al., 2020).

Table 1 B2B and B2C/C2C platforms, their general and circular platform characteristics shaping their orchestration

Platforms	General	Circular[4]
B2B platforms	*Orchestration conditions:* limited number of complementary actors, joining the platform (Ritala and Jovanovic, 2024; Springer et al., 2025), more heterogeneous actors and their interactions (Tura et al., 2018; Franzò and Urbinati, 2023) *Competition by value creation* of industrial platform participants and platform identity (Hein et al., 2020; Cennamo, 2021; Argyres et al., 2023). *Industrial benefits:* designed with a business model for value co-creation (Madanaguli et al., 2023)	*Orchestration conditions:* tighter governance of industrial actors. Circulating products, components, materials, and scrap. More diverse resource orchestration with a focus on closing resource loops and waste recycling (Ciulli et al., 2020; Blackburn et al., 2023); B2B sharing and reuse platforms (Franzò and Urbinati, 2023) *Collective benefits:* collective goal-oriented with 'raising all boats' (Mathias et al., 2018), e.g. reducing food waste.
B2C and C2C platforms	*Orchestration conditions:* more actors joined the platform, less heterogeneous actors, usually individuals (McIntyre and Srinivasan, 2017) *Competition by platform market size* (network effects) and platform identity (Cennamo and Santalò, 2013; Cennamo, 2021; McIntyre et al., 2021)	*Orchestration conditions:* looser governance of actors (mainly individuals). Circulating mostly post-consumption products. Resource orchestration with a primary focus on narrowing and slowing loops (keeping products longer in the market), like food sharing, clothing repair (Kjaer et al., 2019; Blackburn et al., 2025) *Collective benefits*: collective goal-oriented

Circular B2B platforms have an essential role to play in orchestrating resource matchmaking (Konietzko et al., 2019; Blackburn et al., 2023) or the brokering of resources and materials (Ciulli et al., 2020) across different industries. Such platforms can enable closing (i.e. keeping products and materials in the loop), slowing (i.e. extending the use of products and materials in the market), and narrowing (i.e. increasing resource efficiency) resource loops by industrial actors (Bocken and Ritala, 2022; Franzò and Urbinati, 2023). As circular platforms facilitate a broad set of circular resource orchestration practices (e.g. from reuse to recycle) of involved actors, we argue that the higher is the number of practices a company can implement through platforms, over its competitors, higher is its competitive advantage as it comes to resources and materials efficiency, CE, and potential reputational and economic advantages resulting from that (Franzò and Urbinati, 2023). Therefore, platforms can play a critical role in coordinating the necessary financial, knowledge, and material flows in circular ecosystems (Aarikka-Stenroos et al., 2021; Geissdoerfer et al., 2025; Tabas et al., 2025). Furthermore, with a platform, industrial companies gain access to critical assets (Chen et al., 2022), such as resources and networks, competencies, and information. In addition, a recent conceptual work suggests that digital platforms can help coordinate actions, incentives and motivations, generate positive momentum across different participants, and ultimately scale up resolutions for grand socio-ecological challenges (Ritala, 2024). Table 1 summarizes the main characteristics of digital platforms (general B2B, general B2C/C2C, circular B2B, and circular B2C/C2C), and highlights the unique positioning of circular B2B platforms, our study focus, compared to other digital platforms.

This table helps to conceptualize the characteristics of a circular B2B platform, considering the diversity of actors, governance, and collective goals. However, as demonstrated by the absence of these themes in Table 1, various aspects around competitive and collaborative dynamics in circular platforms require further research.

[4] It is important to note that circular platforms have both characteristic typical of general digital platforms and specific characteristics.

3. Research methodology

3.1 Research design and multiple-case study

To understand circular B2B platform orchestration conditions and how they affect collective industry benefits and competitive dynamics, we employ a multiple-case study that enhances external validity and generalizability. We selected six platforms as cases, two from Finland, two from Italy, and two from Lithuania. For the selection of the platforms, we used a convenient sampling technique under the following criteria: (i) country; (ii) accessibility of successful cases; (iii) practices related to CE; (iv) actor diversity and orchestration; (v) B2B market orientation.

About the choice of the first criterion, the literature indicates that most studies have focused on Western economies, particularly the United States (Rietveld and Schilling, 2021). As a greater range of industries and geographic scope would enhance the robustness of the platform competition research (Rietveld and Schilling, 2021), our sampling focused on countries with advanced approaches to the CE transition[3], e.g. developing national strategies and roadmaps for the CE. As for the second criterion, for all cases, the goal was to access circular platforms that are ongoing, growing, becoming mature, and, therefore, 'successful.' We targeted circular platforms with a minimum of 5 years of business operations and a target to grow on an industrial scale. We did not select circular platform cases that had gone bankrupt as 'failure cases'. The third selection criterion is related to the circularity *per se*. As the CE involves diverse practices and circularity strategies (i.e. narrowing, slowing, closing), we sought to ensure that the selected platforms focused on at least one or more aspects of circularity. The fourth criterion was to select cases with actor diversity. Therefore, we examined platforms that connected both similar and diverse industry actors and included both public and private actors as platform orchestrators. The fifth criterion was selecting B2B platforms connecting industrial companies to enhance circular material flows. The platform literature has focused mainly on B2C and C2C examples, so the main theoretical arguments best suit the B2C context (Ritala and Jovanovic, 2024). To increase the contribution potential, we particularly focused on circular B2B platforms because B2B and B2C/C2C platforms operate as essentially different types of platform markets with different collective industry benefits and competitive dynamics. We implemented this strategy to enable cross-industry and cross-country comparisons of cases over different institutional environments.

Platform cases, their background information and data gathered are shown in Table 2.

3.2 Data collection, analytical procedure, validity, and reliability

Each case was based on primary and secondary data, as displayed in Table 2. As primary data, we conducted semi-structured interviews with the aim of understanding circular platform orchestration conditions and outcomes (competitive dynamics and collective benefits). Interview data was complemented with secondary data from diverse sources, such as company websites, reports, news, and press releases, in the spirit of data triangulation.

The interviewees were approached via cold-calling and existing research project connections. The priority was to select knowledgeable interviewees with a long-term understanding of the circular platform and its activities. Interviews followed an interview guide addressing themes that included background information and (i) circular B2B platforms orchestration conditions; (ii) orchestration outcomes such as competitive dynamics and collective benefits; and (iii) circularity strategy applied at the B2B platform. Interviews typically lasted 60 minutes, and they were recorded and transcribed.

The primary and secondary data were analyzed following an abductive reasoning process (Åsvoll, 2014), through interactive coding (Saldaña, 2013) and data categorization (Grodal et al., 2021) concerning the interview guide topics. The analysis procedure is presented in Figure 1.

[3] The countries of selected cases have supporting institutional strategic legislation in terms of CE. For example, Finland published its national roadmap to the CE as first in the world in 2016 (*Leading the cycle—Finnish road map to a circular economy 2016–2025 | European Circular Economy Stakeholder Platform (europa.eu); Finnish road map to a circular economy 2016–2025—Sitra*). Italy has issued *Towards a Circular Economy Model for Italy. Framing and strategic positioning document* (2017), updated now as *National Strategy on Circular Economy*; Lithuania developed *Roadmap for Lithuania's industrial transition to a circular economy* (2021).

Table 2 Overview of data sources in the cases

Case	B2B case information (country, age, industry, orchestrator ([public/private])	Data type	Data amount and description	
'Material market' *Enables companies across industries to standardize waste management services aligned with an updated waste management law*	Finland • Founded in 2018 • Waste management industry • Public	Primary data	Interviews (n = 4): • Founder in 2023 • Senior CE expert in 2023 • Group interview with the founder and senior expert in 2019	Data collection: • Average respondents' experience: 12,5 years • Total duration of data collection: 195 min • Total transcription length: 54 pages • Form (online/in person): online
		Secondary data	Platform websites, news/press releases from news operators, industry associations, CE institutions, theses (n = 43)	
'Soil market' *Enables construction companies to minimize waste (costs and environmental impact) by providing or acquiring land masses via the platform.*	Finland • Founded in 2006 • Construction industry • Private	Primary data	Interviews (n = 4): • 1 group interview in 2023 with a CE expert and two senior CE experts • 1 interview with a platform user/ competitor in 2020	Data collection: • Average respondents' experience: 6 years • Total duration of data collection: 90 min • Total transcription length: 30 pages • Form (online/in person): online
		Secondary data	Platform websites, social media posts, news/press releases by cities, business magazines, and other news operators, and thesis (n = 46)	
'Environmental services market' *Helps companies buy and sell production residues, waste, by-products*	Italy • Founded in 2017 • Purchase and sale of industrial waste, by-products, and secondary materials • Private	Primary data	Interviews (n = 3), workshops (n = 1), and numerous appearances as a corporate witness in executive MBA classrooms with the co-founders and collaborators from 2019 until 2023	Data collection: • Average respondents' experience: 6 • Total interview duration: 180 min • Total workshop duration: 4 hours • Form (online/in person): both
		Secondary data	Platform websites (n = 1), public releases (n = 4)	

(*Continued*)

Table 2 Continued

Case	B2B case information (country, age, industry, orchestrator ([public/private])	Data type	Data amount and description	
'Waste matching market' *Contributes to the creation of a dynamic market for secondary raw materials by encouraging the use of recycled materials in products and infrastructure*	Italy • Founded in 2015 • Services and consulting company • Private	Primary data	Interviews (n = 2), workshops (n = 2), and numerous appearances as a corporate witness in executive MBA classrooms with the founder and CEO from 2019 until 2022	Data collection: • Average respondents' experience: 8 • Total interview duration: 120 min • Total workshop duration: 8 hours • Form (online/in person): both
		Secondary data	Platform websites (n = 1), public releases (n = 3)	
'Secondary raw materials market' *Acts as the orchestrator of the used beverage deposit.*	Lithuania • Founded in 2016 • Waste management industry • Public	Primary data	Interviews (n = 7): • 1 interview with the CEO in 2023 • 4 interviews with users of the platform (main retailers) in 2019 • 2 interviews with partners (recycling companies) in 2020	Data collection: • Average respondents' experience: • Total duration of data collection (interviews): 410 minutes • Total transcription length: 67 pages • Form (online/in person): online (with CEO) & in person (with others)
		Secondary data	Platform website (n = 1) News/press releases (n = 5)	
'Refurbished electronic equipment market' *Supports companies in buying and selling refurbished electronics. Long-term & short-term rental of work and service stations for business*	Lithuania • Founded in 2010 • Refurbished (second-hand) electronic equipment industry • Private	Primary data	Interviews (n = 1): • 1 interview with the CEO in 2023 Workshops (n = 1)	Data collection: • Average respondents' experience: • Total duration of data collection (interview & workshop): 120 minutes • Total transcription length: 15 pages • Form (online/in person): in person
		Secondary data	Platform websites (n = 1), public releases (n = 3)	

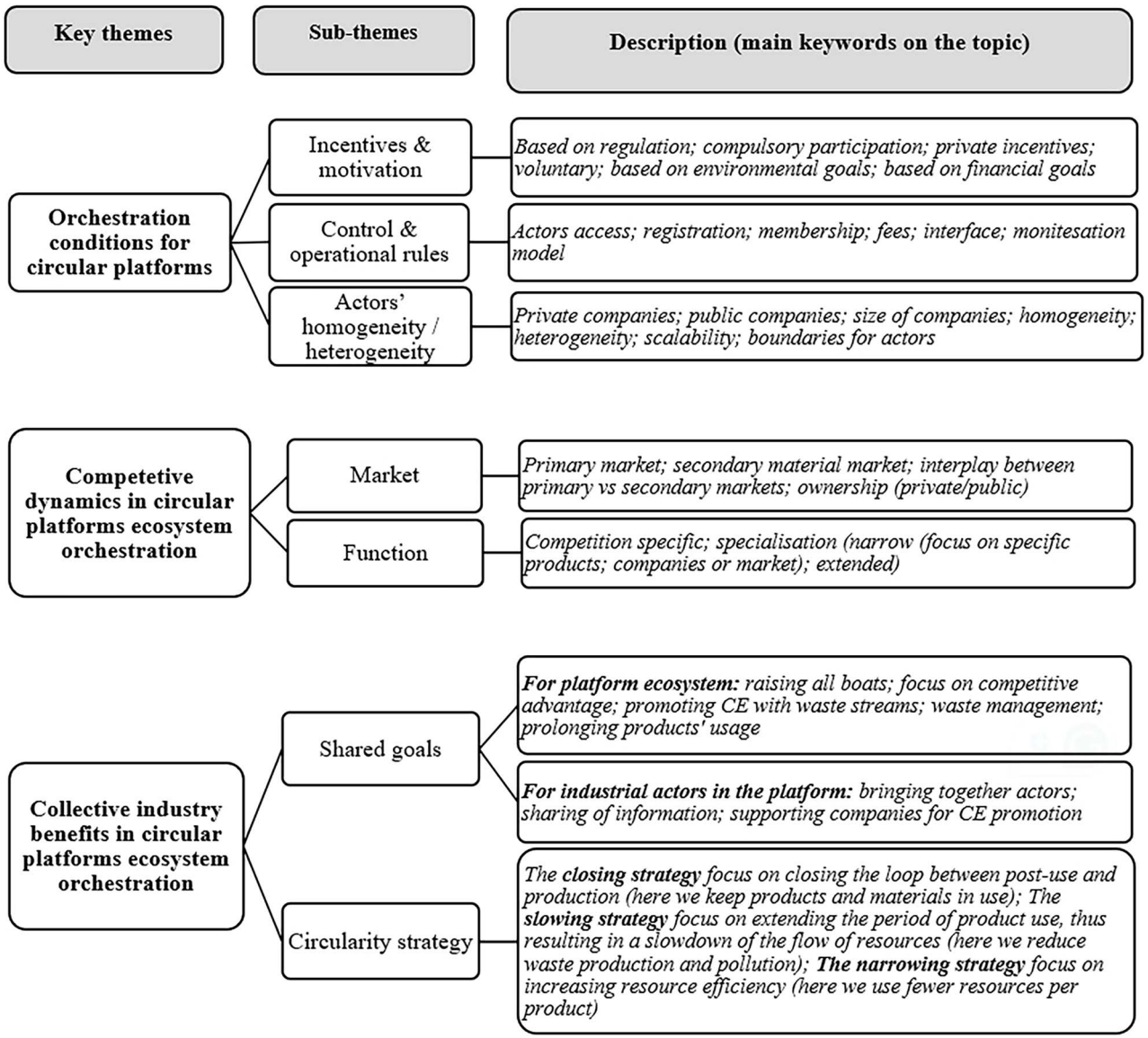

Figure 1 Analysis procedure (for description, please refer to the surrounding text)

Using a thematic approach, we conducted a data content analysis to find, examine, and present patterns and themes in the qualitative data (Braun and Clarke, 2006). Although known to actualize through different procedures and practices (Braun and Clarke, 2006), this study used thematic analysis in several iterations. The analysis began with a within-case analysis (see section 4.1), in which we identified *orchestration conditions for circular platforms*, which cover incentives and motivation, control and operational rules (more specifying actors' access, technological interface, and monetization model), and actors' uniformity (more explaining actors' homogeneity or heterogeneity in the platform). For example, the motivation was identified from quotations such as *'[...] beverage companies taking into account producers and importers, must sign an agreement with us, as it is compulsory due to the Packaging Waste Management Act to do this* [...]' (CEO, Secondary raw materials market). Later, we identified *competitive dynamics and collective industry benefits from circular platform orchestration* (see section 4.2), which covers competitive dynamics through the market and function aspects, as well as collective industry benefits through shared goals of the platform and circularity strategies. For example, collective benefits were identified from quotations such as *'[. . .] at the moment this is growing, in a way market, so that now it would be beneficial to all to just boost it up [. . .]'* (Leading CE expert, Material market). In contrast, competitive dynamics appeared from quotations like *'[. . .] for us the main competition is between new electronic equipment market, especially from China, which is cheaper and less durable, and second-hand or so-called refurbished electronics market [. . .]'* (CEO, Refurbished electronic equipment market). Later in the subsequent cross-case analysis, we compared cases. Research quality was ensured throughout the analysis process with researcher triangulation involving continuous discussions face-to-face and via Teams, where researchers utilized their contextual insights from different countries in comparing cases and interpretations, and data triangulation (i.e. comparing different types of data from interviews and company websites).

4. Results: orchestration conditions, collective industry benefits, and competitive dynamics of circular B2B platforms

Next, we discuss our multiple-case findings regarding how the circular platforms from different institutional settings (i.e. Finland, Italy, and Lithuania) orchestrate B2B markets for circularity aims. We first discuss briefly each case and examine its orchestration conditions. Each circular B2B platform facilitated the circular flow and exchange of secondary resources, but with diversified orchestration conditions—such as incentives and motivation, control and operational rules, and actors' homogeneity/heterogeneity and public/private type/public/private actor as the platform orchestrator– to balance competition and collaboration effectively. Then, we compare our platform cases, examining their orchestration, collective industry benefits and competitive aspects, to detect and highlight general patterns that emerged from cases.

4.1 Circular B2B platforms and their orchestration conditions

4.1.1 Case: 'Material market'—Finland

The platform called 'Material market' was established in 2018 for the domestic Finnish market, in response to a new waste-management law that obliged companies to standardize waste-management services, as well as to promote environmental values. Material market is a neutral platform orchestrator that engages actors from different industries to exchange their waste and side streams and access related services to close material loops. Most of the involved actors must join by law, but not all. The platform does not limit itself to a specific industry, resulting in a broad diversity of actors, from companies to public actors from different industries and sizes. The platform is free for its actors thanks to government funding, but the platform is seeking a way to turn the business model into a financially self-sustaining and scalable one for broad domestic use. Thus, fragmentation over the platform among smaller groups of actors, mostly narrowed down by industry borders, characterizes competition dynamics. Those with

only legal interests and smaller size utilize the platform with a short-term focus, while larger players have adopted the platform for the long term.

4.1.2 Case: 'Soil market'—Finland

'Soil market' was established in 2006 to match ad-hoc needs for large soil masses between construction companies, and it has gained an established and trusted position in the Finnish domestic construction industry. The general regulative and market pressures on the construction industry to reduce waste and emissions, together with possibilities to gain green, circular brand advantages, have grown the self-driven motivation of companies to engage with the platform, to advance the CE in soil and construction material circulation.

The summary of orchestration conditions of Finnish cases is presented in Table 3.

4.1.3 Case: 'Environmental services market'—Italy

'Environmental services market' was founded in 2017. The platform matchmaking helps companies from different sectors (e.g. plastics, metals, paper, building materials, wood, chemicals, cosmetics, and glass) to create a network in which selling and/or buying production waste and receive offers from environmental service providers or end-users of the material. The platform gains from the transactions and the offering of several services (e.g. CE assessment, access to various waste-management software). Among the main competitive advantages that the platform generates are economic, fiscal, and environmental benefits that actors can gain regarding the CE and industrial symbiosis; indeed, they can find waste-management partners and optimize resource use. The platform acts as an informational tool, providing case studies on the CE strategies, industrial symbiosis, and ending waste. Companies joining the platform can autonomously manage all business waste management, from the loading and unloading register to the MUD (Single Environmental Declaration Model) and deadline management. The platform simplifies the management of environmental consultants' client portfolios by accessing all waste documents quickly and in real-time from a single profile. The 'Environmental services market' platform enables the creation of a symbiotic system, within which the industrial companies, eventually competing with each other in the primary market, must collaborate to find an alternative market outlet for their production waste or by-products no longer used. In the same way, the platform supports these companies when they need certain resources or components to use in their own production process.

4.1.4 Case: 'Waste matching market'—Italy

The 'Waste matching market' was founded in 2015. First, the platform supports companies in effectively managing their waste by matching them with others that deal with waste collection, transport, and treatment. In addition, the case supports companies operating in the recycling (e.g. those dealing with waste collection or recycling) by finding the right partners to conduct their business. Actors joining the platform play an active role in setting the selling price. With a wide network of environmental engineers, IT consultants, and developers, the platform realizes highly innovative technology solutions aimed at the CE. The platform supports selling and buying from certified companies and secondary raw materials (i.e. recycled materials) at the best price. Companies search for the product and make their bid. Eventually, whoever takes the product can contact the seller. The seller uploads the products to the platform, indicating a minimum bid for each. Operating as a B2B marketplace, the platform gains a fee from each transaction between the buyer and the seller. Companies can access the commodity market of interest through the database structure and evaluate the lowest price offer. The platform also allows users to upload and view ads anonymously. Companies are certified and authorized before registering, so the process of marketing and closing supply chains occurs through a dynamic network that facilitates matching supply and demand while saving time and money.

The summary of orchestration conditions of Italian cases is presented in Table 4.

4.1.5 Case: 'Secondary raw materials market'—Lithuania

'Secondary raw materials market' was founded in 2016 and acts as the neutral orchestrator of the deposit scheme. The platform aims to collect disposable beverage packaging and create a supply for the secondary materials (glass, plastics, aluminium) market. The secondary raw materials market uses

Table 3 Circular B2B platform orchestration conditions (Finnish cases)

Circular platform cases	Orchestrator	Circular B2B platform orchestration conditions
Material Market (Finland)	**Public**	**Incentives and motivation**: • The operation of the platform is motivated by the updated national Waste Management Law that obliges companies to standardize waste-management services • Environmental values were also present since the beginning **Control and operational rules**: • *Actors access* the platform without registering to view offers, but sales and buying through the platform require a sign-in. • *Technological interface*: technological architecture is outsourced to technology providers • *Monetization model* of the platform: the platform is funded by the government to enable actors to benefit for free. However, there are plans to shift from governmental funding to sustain operations commercially. **Actors' homogeneity/heterogeneity:** • Actors are private companies from any industry (emphasis currently on waste management and construction) and public procurement organizations such as the government and healthcare organizations (*heterogeneity in size and extensive heterogeneity in industry*) • Companies may vary in size, but the smallest players are not included, as the actors are required to have a regulated need for waste management services of over 2000 € per year • In the primary market, platform actors do not compete because they are creating a shared benefit, while in the secondary market, actors are competing for resources; due to this, they are acting in the *horizontal* mode. • Services for environmental consulting are becoming a new item of exchange • *Scalability:* national operating area of the platform and no intention to scale further
Soil market (Finland)	**Private**	**Incentives and motivation:** • The operation of the platform is based on private economic and increasingly environmental incentives of the platform orchestrator **Control and operational rules**: • Actors may exchange via the platform by buying single-time transaction licenses or an annual subscription • *Technological interface*: technological architecture is outsourced. • Actors engage voluntarily to manage their ad-hoc excessive soil masses or the need for such soil, primarily to increase the easiness and avoid excessive costs to the construction projects, and only promote environmental goals **Actors' homogeneity/heterogeneity:** • The platform's main actors are large incumbent construction companies and smaller players from different parts of the construction value chains. • Actors are private companies of different sizes (*heterogeneity in size and homogeneity in industry*). • *Scalability:* industrial focus in the construction sector

Table 4 Circular B2B platform orchestration conditions (Italian cases)

Circular platform cases	Orchestrator	Circular B2B platform orchestration conditions
Environmental services market (Italy)	**Private**	**Incentives and motivation** • Approximately 11 bn tons of waste is generated worldwide each year, of which only 25% is reused or recycled. Waste becomes an operational inefficiency for companies. In addition, given the constantly rising costs of waste disposal and the disproportionate increases in raw materials, new management models for waste must be found. This is the reason why this B2B platform was born. **Control and operational rules** • *Enter business scraps for free*: actors can enter waste, production waste, by-products, secondary materials, and leftover business inventory for free, create an inventory of resources, and start earning and/or saving on the waste component • *Receive offers and find partners*: actors can find qualified partners, such as recovery and/or disposal companies and manufacturing companies, to which to sell or have waste collected, get offers from environmental service providers or end users of the material, and get support and advice from scrap experts. • *Save time with a circular enterprise network*: actors can get customized online quotes for business materials, easily create a scrap inventory, and benefit from the creation of a circular enterprise network. **Actors' homogeneity/heterogeneity** • The main *actors* of the platform are both large companies and SMEs that need to buy and sell scrap, by-products, inventories and corporate assets. • Actors are private companies of different sizes and operating in different sectors (*heterogeneity in size and in industry*). • *Scalability:* no boundaries of actors (industrial or geographical).
Waste matching market (Italy)	**Private**	**Incentives and motivation** • Debates and conversations led by stakeholders on topics such as Circular Economy and End of Waste, which were at the center of attention and agendas of the European Commission's work towards the 2020 targets. **Control and operational rules** • Actors that operate in the waste sector and in urban sanitation services, collection, transport, treatment, material recovery and recycling, waste disposal, use of secondary raw materials in the production process, can access the platform • Actors are provided with a viable tool for marketing their services, waste, and secondary raw materials, through an efficient, easily searchable, and most importantly, easily verifiable network of contacts. • Actors are subjected to verification of authorizations handled by the technical staff in the process of registration. **Actors' homogeneity/heterogeneity** • The main *actors* of the platform are companies interested in selling and buying secondary raw materials at the best price in the market, thereby contributing to the creation of a dynamic market for secondary raw materials (recycled materials) and encouraging the use of recycled materials in products and infrastructure. • Actors are private companies of different sizes and authorized to operate in the waste sector (*heterogeneity in size and homogeneity in industry*). • *Scalability:* industrial focus in the waste sector with secondary raw materials.

digital platform with the aim of bringing beverage producers and importers, retailers, and recyclers together. The main actors of the platform are private companies of different sizes (heterogeneity in size). In the primary market, due to the national boundaries for resource collection (e.g. only domestically labeled beverage packaging is collected), platform actors do not compete because they are creating a shared benefit. While there are no boundaries for actors in the secondary market for selling secondary raw materials (e.g. to export secondary raw materials a broad), due to this, actors are competing for resources. Platforms and activities reside in political decision-making. All retailers of disposable beverage packaging with some requirements for sales amount, producers, and importers must take part in the deposit scheme for disposable beverage packaging. Due to legal pressure to organize corporate waste management, all actors must register and get access to the digital platform after signing an agreement with the case. As large manufacturers and retailers must join this platform, not many new actors appear. If they do, they are very small. Therefore, the network in the digital platform is stable. The monetization model of the platform is based on subsidies, sales from collected secondary raw materials, and uncollected packaging deposits.

4.1.6 Case: 'Refurbished electronic equipment market'—Lithuania

'Refurbished electronic equipment market' was founded in 2010 in Lithuania. The case has a steady network of more than 1000 customers from all over Europe, Canada, and even Australia. Thus, there are no limits on scalability (industrial or geographical). The case acts as a B2B platform for trading and exchanging refurbished (second-hand) electronic equipment leading to product, as a service business model. The company also provides such services as short-term and long-term rental of workplaces and service stations for business, as well as buy-back service (buying computer equipment that is no longer in use and no longer needed). Apparently, the platform is evolving due to trust and being known, as ensuring reliability for the customer is very important. The main actors involved in the platform are an inclusive set of stakeholders, e.g. business suppliers (offices that obtain a lot of computer equipment), the public, and clients for refurbished and second-hand computer equipment. Actors access the platform by the membership principals, which is free. The monetization model of the platform is based on the e-commerce model, as through the database structure, it is possible to access the commodity market and evaluate the lowest price offer. Also, it is possible to rent long-term work and service stations for business, and short-term rental of workplaces. The platform seeks to ensure the economic, social, and environmental aims of the companies, allowing for significant redefinitions of industry and technological boundaries.

The summary of the orchestration conditions of the Lithuanian circular platforms is presented in Table 5.

4.2 Competitive dynamics and collective benefits from circular B2B platform orchestration

Next, we summarize our circular platform analysis (Table 6) on the identified patterns regarding the collective industry benefits and changes in the competitive dynamics when companies and public actors from one industry or several industries pursued circular material flows.

The results show that the *competitive dynamics* are differentiated (i) from a wide array of industries, leading to a broad specialization covering all types of waste, secondary materials, and side streams, and (ii) to a specific industry, leading to a narrow specific resources specialization, such as plastics or soil. The main reason for this is the diversity of the actors and whether the orchestrator is either public or private. The platforms' main actors are diverse, complementary, and competitive, from the same or very different industries, public and private industrial actors. However, competitive dynamics in circular B2B platforms differ if the public orchestrator is neutral in matching resources across actors. In Finland ('Material Market') and Lithuania ('Secondary raw materials market'), the main actors are specifically those who are required by the law to be a part of the platform itself, and the orchestrator (public entity) is neutral in terms of competition. If the platform is public-driven, and there is a regulatory imperative to collect and share a certain type of waste (e.g. glass and PET bottles), then there is typically less competition between diverse actors involved in the platform. Using the example

Table 5 Circular B2B platform orchestration conditions (Lithuanian cases)

Circular platform cases	Orchestrator	Circular B2B platform orchestration conditions
Secondary raw materials market (Lithuania)	**Public**	**Incentives and motivation**: • The operation of the platform is based on regulation, as it is a compulsory participation due to the Packaging Waste Management Act **Control and operational rules**: • *Actors access* the platform after signing an agreement with the orchestrator, after that actors must register on the platform and share data on material streams. The orchestrator manages the data flows. • *Technological interface*: technological architecture is built by the orchestrator and complementary actors have to adapt their information systems for the usage of the platform system. • *Monetization model* of the platform: 1) subsidies from beverage producers and importers are the main source of funding the platform (around 50% of total revenues); 2) sales of collected and sold secondary raw materials (around 30% of total revenue); 3) uncollected packaging deposits (around 20% of total revenue). **Actors' homogeneity/heterogeneity:** • The main *actors* of the platform are beverage companies (producers and importers), retailers and recyclers. • In the primary market, platform actors do not compete because they are creating a shared benefit, while in the secondary market, actors are competing for resources, due to this they are acting in the *horizontal* mode. • Actors are private companies of different sizes *(heterogeneity in size and homogeneity in industry).* • *Scalability:* national boundaries of actors in the primary market for resource collection (e.g. only domestically labeled beverage packaging is collected); no boundaries of actors in the secondary market for selling secondary raw materials (e.g. to export secondary raw materials a broad)
Refurbished electronic equipment market (Lithuania)	**Private**	**Incentives and motivation:** • The operation of the platform is based on private incentives as it is voluntary with the environmental and economic aim to sell and buy refurbished electronic equipment at the best price. **Control and operational rules**: • *Actors access* the platform by the membership principals, which is free. • *Technological interface*: technological architecture is built by the orchestrator by ensuring the continuous development of the platform. • The *platform's monetization model* is based on the e-commerce model. Through the database structure, it is possible to access the commodity market and evaluate the lowest price offer. Also, it is possible to rent long-term work and service stations for business and short-term workplaces. **Actors' homogeneity/heterogeneity:** • The main *actors* of the platform are business suppliers (offices that obtain much computer equipment), the public and clients for refurbished and second-hand computer equipment (*horizontal mode*). • Actors are private and public companies of different sizes *(heterogeneity in size and homogeneity in industry).* • *Scalability:* no boundaries of actors (industrial or geographical).

Table 6 Competitive dynamics and collective benefits from circular B2B platform orchestration

Circular platform cases	Competitive dynamics	Collective industry benefits
Material market (Finland, public orchestrator) *Brings together waste/resource sellers, buyers, and professionals to fulfill the requirements of the waste management law while minimizing the costs and impacts of waste.*	**Market:** • Wide array of industries, but most volumes from waste management and construction • Public procurement organizations **Function:** • The public orchestrator is neutral in enabling the matching of resources across actors • Broad specialization that covers any waste and side streams	**Shared goal of the platform:** *For the platform ecosystem:* • Narrowing down virgin resource use while obliging with the national Waste management law; • Waste management /creation of secondary materials market. *For industrial actors in the platform:* • Independent actors fulfill their regulated waste management obligations, if any • Platform enables actors to capture value and save the costs of their waste and side streams through transactions **Circularity strategy of the platform**: • Waste and side streams are exchanged with those who may use them as inputs in their processes (*closing the loop; industrial symbiosis*) or to manage their recycling (*narrowing*). This also *narrows down* the use of virgin material.
Soil market (Finland, private orchestrator) *Enables construction companies to minimize waste by providing or acquiring land masses via the platform.*	**Market:** • Specific to the construction industry **Function:** • The private orchestrator (construction consultancy) • Narrow specialization that covers a variety of soil products leads to a more intense competitive setting where the exchange of excessive materials is likely to create value for the competitors.	**Shared goal of the platform:** *For the platform ecosystem:* • Environmentally friendly and smart use of soil masses across construction sites *For industrial actors in the platform:* • Self-driven motivation of companies to engage with the platform, to advance the CE in soil and construction material circulation, to address environmental regulatory and market pressures • Individuals at construction sites prioritize easiness and cost-saving generated by the use of the platform **Circularity strategy of the platform**: • Soil streams are exchanged to *closing the loop; industrial symbiosis*. This also *narrows down* the virgin soil use.
Environmental services market (Italy, private orchestrator) *Helps companies transition to the CE, eliminating the concept of industrial waste*	**Market** • Wide array of industries, spanning from plastics, metals, paper, wood, chemicals, etc. • Private large and SME companies. **Function** • The platform facilitates different managerial practices (reusing or repurposing) and allows finding an alternative market outlet for waste or by-products that are no longer used.	**Shared goals of the platform** *For the platform ecosystem:* • Reduction of waste in landfills and the achievement of the UN Agenda 2030 goals *For industrial actors in the platform:* • Actors in the platform enter their waste resources and receive bids. **Circularity of the platform** • *Narrowing* of resource and material loops in original or different supply chains (enabling reusing) and slowing of resource and material loops in different supply chains (enabling repurposing)

(*Continued*)

Table 6 Continued

Circular platform cases	Competitive dynamics	Collective industry benefits
Waste matching market (Italy, private orchestrator) *Incentivize the use of secondary raw materials in products and infrastructure*	**Market** • Specific to waste management and secondary raw materials **Function** • The platform supports actors in the recycling value chain by finding them the right partners to conduct their business	**Shared goal of the platform** *For the platform ecosystem:* • Reduction of waste in landfills and the achievement of the UN Agenda 2030 goals *For industrial actors in the platform:* • The platform is proposed as a means of increasing business through the reliable and guaranteed network of actors, through multiple quotation requests, the platform can allow the actors to optimize the outsourcing of services and/or conferrals to third parties **Circularity of the platform** • *Closing* of resource and material loops in original or different supply chains (enabling recycling)
Secondary raw materials market (Lithuania, public orchestrator) *Enables beverage, retail, and other companies to exchange information and organize for resource recovery for sustainable packaging*	**Market:** • Specific to the beverage packaging industry and secondary raw materials • Creates the secondary materials (glass, plastics, aluminium) market. **Function:** • The public orchestrator is neutral and the orchestrator acts as a resource matchmaker or controller of the process • Narrow specialization - beverage packaging.	**The shared goal of the platform:** *For the platform ecosystem:* • Organizing the deposit scheme for beverage packaging, promoting CE with waste streams; • Waste management /development of secondary materials (glass, plastics and aluminium) market. *For industrial actors in the platform:* • Bringing together beverage producers and importers, retailers and recyclers; • Enabling beverage, retail and other companies to exchange information and organize for resource recovery for sustainable packaging. **Circularity strategy of the platform**: • Beverages deposit packing is being collected and a) part of the packing is being recycled into the same product such as glass bottles (*closing the loop*) and b) the other resources are recycled into products of the industry (*closing the loop; industrial symbiosis*).
Refurbished electronic equipment market (Lithuania, private orchestrator) *Bring buyers and sellers together who are interested in buying refurbished electronic equipment*	**Market:** • Specific to refurbished electronic market • Servitization for electronic equipment products usage **Function:** • Narrow specialization - refurbished electronics • Competition between new and second-hand (refurbished) electronics equipment market.	**The shared goal of the platform:** *For platform ecosystem:* • Enables prolonging electronic equipment use • Buying computer equipment no longer in use or needed (buy-back) *For industrial actors in the platform:* • Supporting companies in buying and selling refurbished electronic equipment • Providing long-term rental of workstations for business (product as a service) • Enables companies to minimize waste (costs and environmental impact) **Circularity strategy of the platform**: • *Slowing* strategy (by refurbishing contributes to a longer life of electronic products).

of the private platform 'Refurbished electronic equipment market' (Lithuania), we also observe the competitive dynamics between actors of secondary and primary markets from several angles. First, by competing with recyclers—recycle versus refurbish (or other ways to extend the use of a product), the competition takes place not with direct competitors (e.g. other refurbishing companies) but with recyclers. Businesses with end-of-life electronics must decide whether to sell them for refurbishment or hand them over for recycling. Interestingly, due to less bureaucracy, most companies hand over their end-of-life electronics to recyclers. This competition involves both a supply point of view and providing a 'buy-back' service. Second, refurbished products compete with new products of the particular industry. For example, the same platform enables competitive dynamics by providing refurbished computers and competing with sellers on new, cheap computers (mainly from the Chinese market).

Circular platforms act as a resource matchmaker or a coordinator of the resource recovery process. This is the essence of the CE: to take as few virgin resources as possible into the new production cycle. For example, when glass bottles are shared on the platform as post-consumer waste, the collected glass is transferred to the secondary glass market via the platform. All the analyzed platforms promote shared goals such as benefits for actors involved in the platform) and collective industrial benefits. Circular B2B platforms seeking to 'raise all boats' focus on collaboration, knowledge-sharing, and supporting other actors within the industry. For example, the 'Environmental services market' platform (Italy) promotes industrial symbiosis, generating value through B2B collaboration. The platform contributes to reaching a twofold dimension of value: the reduction of environmental impact through the lower use of resources and more effective management of materials, combined with the decrease in economic costs associated with this activity. From the point of view of the competitive dynamics, it emerges that if the waste can be valorized as a by-product through the platform, and no longer recycled or disposed, all the companies operating at the end of the value chain are indirectly challenged.

Companies joining the platform can use their waste in less linear ways, by narrowing or closing material loops, thereby gaining a competitive advantage over their competitors. The Finnish example ('Material market') underlines that by using the platform in different (parallel) roles in selling and buying the material and waste streams, actors that compete in the same business simultaneously compete and collaborate. The exchange of materials through the platform does not hurt the competitive dynamics between the companies in the same industry, as the provider does not consider the materials as competitive resources and prioritizes an easy solution for discarding them. Hence, beyond offering a platform for companies to fulfill their legal obligations, the 'Material market' gives its actors access to economic and material benefits in the spirit of 'raising all boats', implying competitive dynamics to change towards a more synergy-seeking approach within companies.

Platforms seeking to gain a competitive advantage focus on developing a unique market position that is difficult for competitors to replicate, which involves striking a balance between competitive rivalry and collaborative efforts. For example, the 'Soil market' (Finland) platform's focus leads to (i) a more intense competitive setting where the exchange of excessive materials is likely to create value for the competitors; and (ii) a need to consider the sensitivity of information-sharing on the platform when communicating possessions and needs of the excessive land masses. The sensitivity of information sharing applies not only to direct competitors but also towards the companies in the vertical value chain, to maintain competitive supplier relationships. However, in practice, these competitive aspects are often ignored in decisions on the use of the platform, as they are taken on an ad hoc basis, among individual employees who bring their companies onto the platform, primarily to save on logistics and landfill fee costs, and sometimes also due to environmental values.

In turn, the platform actor benefits from co-creating value through useful, less expensive, and environmentally friendly materials for infra-construction projects. Consequently, using the platform sets the competing companies into a mode of simultaneous collaboration and competition, where the use of the platform provides economic and material benefits for both parties. Interestingly, the platform itself (the 'Soil market') openly collaborates with competing platforms, such as the 'Material market,' for synergies and compatibility of maximal material exchange, leading with an example for the platform actors to adopt a similar mentality.

Companies that can manage secondary raw materials by joining the platform can also create economic opportunities compared to their competitors in the recycling and recovery industry by closing

resource and material loops. So, the 'Waste matching market' platform allows companies to find an alternative outlet for their secondary raw materials, for example, ground polypropylene used to produce fruit and vegetable crates. Accordingly, the platform acted as an aggregator of competing companies that may possibly continue to compete on primary products while collaborating on a secondary one and catalyzing the attention of different symbiotic systems. The opposite situation is in the 'Secondary raw materials market' (Lithuania) platform—actors collaborate in the primary market by ensuring waste collection while competing in the secondary market. Lithuanian platform ensures the collection of high-quality secondary materials (e.g. aluminium cans). It helps close the loop by recycling into the same type of beverage bottles or transferring them as secondary materials for other industries (like PET bottles becoming polyester in the textile industry). Thus, the platform provides a sort of 'dual competitive advantage' or several layers of benefits that combine both economic and socio-ecological value. Producers, importers, retailers, and (ultimately) society gain value from the efficient waste collection. Recyclers receive valuable resources to develop a market for secondary raw materials.

5. Discussion

Next, we discuss our key findings and theorize them into the integrative framework, propose the implications for orchestration of the circular B2B platform, the competitive dynamics and collective benefits, and finally summarize insights that can inform practice.

5.1 Integrative framework of circular platform orchestration

The integrative framework of circular platform orchestration (Figure 2) synthesizes the different conditions of circular platform orchestration and their impact on the competitive dynamics and the collective industry benefits in B2B markets. We found that orchestration conditions typically cover the following aspects: (i) incentives and motivation; (ii) actors' homogeneity and heterogeneity; (iii) control and operational rules such as actor access, technological interface, and monetization model.

Platform orchestrators use versatile *incentives and motivations* to encourage actors to join and stay on the platform. Often, these are a combination of regulatory, economic, and environmental value incentives. The incentive can come from industry or from national public policies to regulate the industrial sector. In orchestration, it is also important to consider the *homogeneity* and *heterogeneity* of actors regarding their size, roles, and sectors. By setting control and operational rules, as well as motivational incentives for diverse actors, circular platform orchestrators set orchestration conditions.

Even though many orchestration conditions were present in all the cases and platform orchestration led to similar competitive dynamics and collective benefits, however, depending on whether the platform orchestrator is public or private, we found relevant differences. Public orchestrators promote collective industry benefits for the platform actors and the society at large. While industrial actors continue to compete with each other for primary products, they have to cooperate on secondary products to create new competitive advantages in alternative market outlets, for example, by using waste or by-products that are no longer used. In this sense, circular platforms change the competitive dynamics between industrial companies, facilitating the creation of a new dynamic market for competing companies to cooperate on good quality secondary raw materials, such as recycled plastic or glass. Private orchestrators also create similar competitive advantages, but higher competition within industries, because industrial actors can choose other waste management options (since joining the platform is not regulated).

Circular platforms thus create collective benefits for the industry by setting shared platform goals that align business interests with sustainability and circularity imperatives. These shared goals contribute to collective industry benefits by facilitating industrial collaboration, as companies within the platform share knowledge, resources, and best practices, promoting industrial symbiosis. By participating in a well-orchestrated circular platform, companies gain competitive advantages such as cost efficiency through resource optimization and access to new revenue streams. Furthermore, industrial actors in B2B need put effort on resource closing (i.e. recycling) strategies, specifically the shift from waste in primary markets to resources in secondary markets. Our cases showcase how circular B2B platforms operate

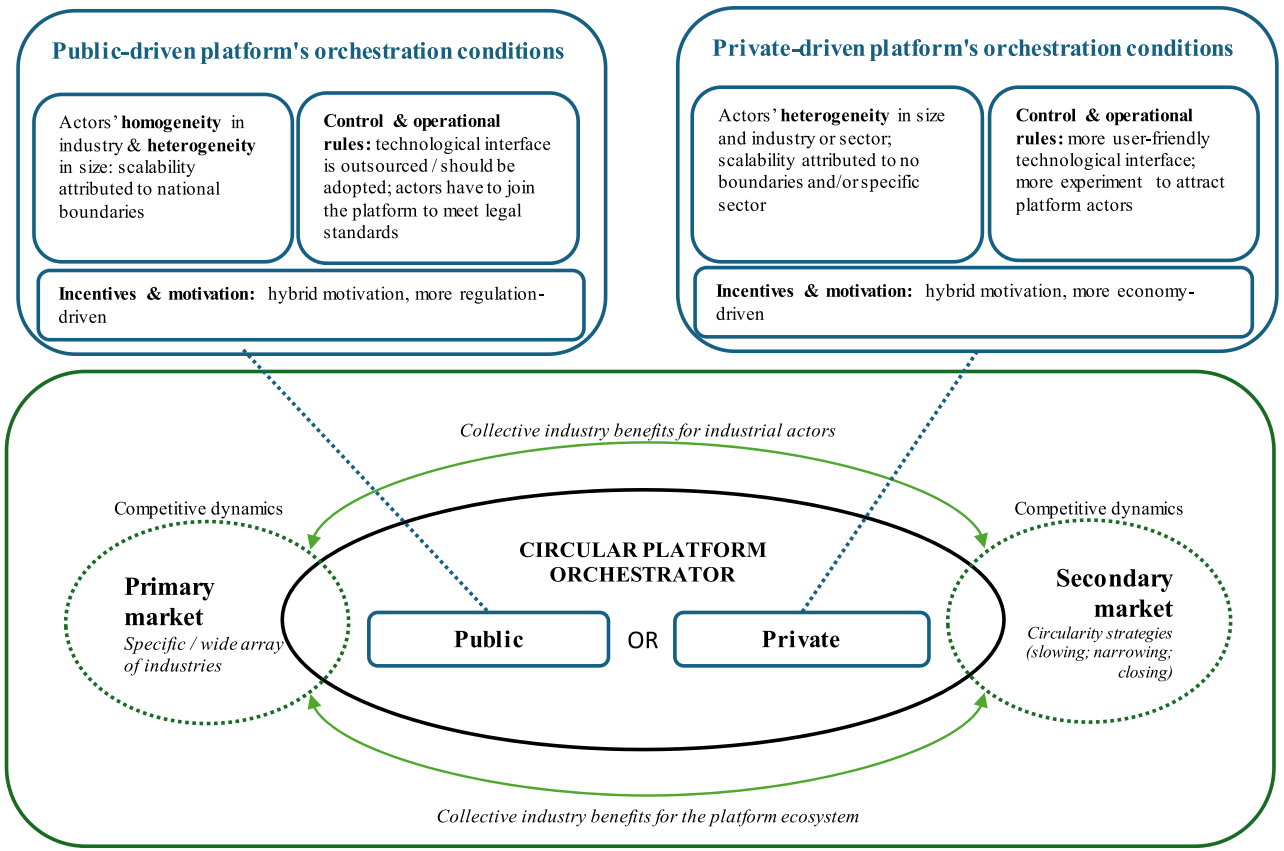

Figure 2 Integrative framework of circular B2B platform orchestration (for description, please refer to the surrounding text)

in and enable complex industrial ecosystems where resource flows need to be optimized, recovered, and reintegrated into production cycles, as B2B markets emphasize strategic resource management, industrial symbiosis, and the efficient development of secondary markets.

Building on our analysis of circular B2B platforms, we further present the broader implications of circular platform orchestration, the competitive dynamics, and the strategic considerations for collective industry benefits and coopetition strategy.

5.2 Implications for circular platform orchestration

Considering circular B2B platforms as meta-organizations of resource orchestration (Ciulli et al., 2020; Blackburn et al., 2023) that help to achieve collective circularity objectives, this study brings essential insights into increasing circular platform literature addressing to orchestration. Previous studies have reviewed the design and governance of B2B digital platforms (Madanaguli et al., 2023; Ritala and Jovanovic, 2024; Springer et al., 2025) and studied how industrial actors can engage in platform-based business models that enable recycling, reuse, and resource life extension and economic value creation from circularity (Franzò and Urbinati, 2023; Lüdeke-Freund et al., 2019; Ranta et al., 2020). We provide new knowledge on a circular platform orchestration, by elaborating orchestration conditions and conceptualizing how platform orchestrators can set the motivations and incentives, calibrate the diversity of platform actors, and adjust the control and operational rules. As such, we view platform orchestration as a mode of dynamic competition (Sidak and Teece, 2009; Petit and Teece, 2020; Petit and Teece, 2021) which is morphed via a co-emerging process of competition and innovation. Indeed, platforms in B2B markets can change the rules of the game by developing new types of governance models and technological architectures that enable new types of opportunities for collaboration and competition (Springer et al., 2025). In this study we show how circular platform orchestration acts as a catalyst for innovation (e.g. over coordination models for resource reuse and recycling) as well as competition (e.g. via establishing new types of roles for different companies).

Beyond examining the core dimensions of circular platform orchestration, we provide implications over the differences in orchestration conditions between public and private orchestrators. In cases where the *orchestrator is a public actor*, the government is often involved to some extent in the circular platform's initiation or operation, because the law compels it or because of the revenue model. Typically, companies must join such publicly orchestrated circular platforms to meet legal standards for proper waste management, making incentives and motivation more regulation-driven, accompanied by economic-driven motivation where possible. Circular public orchestrators thus need to engage with 'hybrid logics' (Ritala, 2024), initially driven by regulation, but balancing regulation and public good with economic incentives to scale up the platform. Platform actors may have more defined rules and conditions, including the need to adapt to the platform interface. Also, public platform scalability is often related to the country's boundaries, i.e. where particular regulations apply. In the case of a *private circular platforms*, platform orchestrators have to experiment more with different incentive structures and operational rules (Ritala, 2024), as well as different types of coordination and governance models (Blackburn et al., 2025), to attract platform participants and help them gain a competitive advantage by using the platform's resources. Economy-driven initiatives and motivation to join a circular platform are often linked to the potential to develop circular business models by capturing value from resource circulation (Franzò and Urbinati, 2023; Ranta et al. 2021), sourcing secondary materials from other actors on the platform, reusing them, and making 'waste valuable.' Orchestrators tend to apply user-friendly technological interfaces for the platform participants (Madanaguli et al., 2023), integration of physical and digital assets (Springer et al., 2025), to enable the creation of economic benefits by matching and brokering resources in primary and secondary markets.

5.3 Implications for competitive dynamics

We contribute to previous research on platforms as resource matchmakers (Ciulli et al., 2020; Blackburn et al., 2023; Franzò and Urbinati, 2023) by bringing new knowledge about competitive dynamics in circular B2B platform context. In the context of this study, competitive dynamics relate to how industrial

actors can create and capture value from the resource streams through the platform. Initially, the exchange of material resources through a platform becomes possible because the materials relate to waste/secondary raw material streams that are of no value to the provider, and when circulated, increase the common good (Ciulli et al., 2020; Blackburn et al., 2023). Our findings also suggest that platforms, as orchestrators of resources, are embedded in diverse market dynamics (McIntyre et al., 2021) where the competitive environment is defined by boundaries (industry-specificity), intensity, scope, and regulation. We argue that circular platforms enable competitive advantage (for their actors) more readily in industrial contexts that allow exchanging resources and materials and in industries where more value can be extracted from those resources and materials. The more companies can share resources, the more distribution channels they can access for sourcing or supplying resources and materials, thereby gaining greater advantages in the market. Platforms can enable increased circular material flows with a varying set of actors. In this regard, we show that orchestration conditions such as different levels of homogeneity and heterogeneity of actors not only affect circularity strategies but also competitive advantages in secondary markets. Indeed, if circular platform participants are more homogeneous (e.g. same industry, similar waste streams) putting them into competitive settings at the platform (see Harala et al., 2023), they can collaborate via joint circular initiatives (e.g. initiatives to increase recycling within the industry) despite their rivalry. In contrast, if circular platforms are more heterogeneous (e.g. different industries with different waste-to-resource needs), collaboration may need to focus on complementarities and synergy.

5.4 Implications for collective industry benefits and coopetition strategy

The collective benefits of circular platforms encompass 'raising all boats' and specific competitive advantages for diverse actors involved in the platform—and as such, resemble the dynamics examined in the literature of coopetition—i.e. collaboration between industry competitors (e.g. (Bengtsson and Kock, 2000; Ritala and Tidström, 2014; Mathias et al., 2018), also for the CE (Harala et al., 2023).

As our cases show, orchestrators of both private and public platforms all need to resolve the creation of collective benefits for the industry (or ecosystems) and contribute to solving systemic challenges linked to the circularity of resources and waste (Ciulli et al., 2020; Blackburn et al., 2023). To achieve the shared goal, the platform-based business models enable their participants to engage with various circular resource strategies (Bocken et al., 2025) and, depending on the platform, utilize a mix of regulatory and economic incentives. In our cases, the benefits for industry were mainly related to the circularity strategies of recycling and reuse/refurbishment. The benefits for primary market actors are proper and efficient waste management. Secondary market actors can benefit from access to more sustainable yet high-quality secondary raw materials.

A unique aspect of circular platforms is their ability to facilitate coopetition—i.e. to balance competition and cooperation among companies in settings where competitors work together to develop industry-wide solutions. In practice, we demonstrate how the competitive and complementary actors reorganize and redesign their value chains into more circular ones through circular platforms that allows them to source resources and propose, create, and deliver value. This insights adds to discussions on needed circular value chains, industrial symbiosis and other industrial arrangements enabling more sustainable resourcing and value creation of industries (Aarikka-Stenroos et al., 2022).

While the concept of coopetition at digital platforms (Ritala et al., 2014; Cohen and Zhang, 2022) and at circular platforms for industrial sustainability improvements (Harala et al., 2023) has been identified in the existing literature, thus far the evidence of coopetition strategies via circular platforms has not been elaborated. In this regard, our research adds to the studies exploring the role that digital platforms play in orchestrating industrial competitor companies in circular B2B markets, and allowing the coopetition dynamics to emerge that transcend competitive-collaborative interactions (Bengtsson and Kock, 2000; Gnyawali and Ryan Charleton, 2018).

5.5 Implications for practice

Our findings on circular B2B platforms also have practical value for private and public platform orchestrators, business and industrial actors involved in the platform, and policymakers who steer CE developments.

To sustain the circular platform for a long time in the market, orchestrators should carefully consider and elaborate what are the features of the actors in terms of heterogeneity/homogeneity, what are their main motivations for joining the platform, and what are the main incentives for staying on the platform, along with technological interface and monetization model of the platform. Public-driven orchestrators should blend regulatory alignment with non-regulatory benefits, such as sharing information and value capture from waste, to fulfill waste management. Operational rules should feature clear, lightweight entry requirements, interoperable data-sharing standards, and an accessible platform interface. Private-driven orchestrators should emphasize economic incentives, leveraging sectoral heterogeneity and an engaging interface. Incentives should deliver tangible value (revenue, cost savings, shared services) alongside meaningful non-monetary benefits. Governance should use streamlined terms, transparent data sharing and protection. Sectoral diversity can be supported with modular solutions and common interfaces to ensure interoperability. Trust requires measurable outcomes and third-party verifications, along with clear dispute resolution.

As for industrial circular platform actors, our study provides valuable insights into what collective industry benefits and competitive advantage can be created from the perspective of primary and secondary market actors. By sharing waste or surplus resources, primary market industrial actors can optimize resource use, while secondary market actors, by joining the platform, can manage secondary raw materials more effectively.

As for policy implications, we encourage policy makers to induce and support platform development as it supports a circular transition by a focal industry (such as beverage or construction) or a region (e.g. Finland, Italy, Lithuania) and, thus, enables 'raising all boats' of the national industries. Hence, despite their competition, industry actors can make their businesses more sustainable via the platform, and the whole industry sector may develop accordingly, thus stimulating policy interventions for greater platform development. Consequently, the public sector's contribution towards the development of circular platforms, particularly those related to the diversion of various wastes into secondary raw materials, can significantly contribute to the achievement of circularity objectives.

6. Limitations and future research

We acknowledge that our study also has shortcomings that point to directions for further research. Regarding the overall research design, the multiple-case approach is valuable in generating new insights firmly rooted in practice. Although we have taken steps to establish robustness, the challenge for future research to further validate our findings, for example, by applying theory-testing models, will remain. We have observed that public-driven platforms, based on regulations, can be more active in secondary resources exchange, but less directly competitive. Understanding the dynamics of privately developed platforms, especially those struggling to survive, is essential for identifying the factors influencing platform success or failure. As most B2B asset-sharing platforms are start-ups rather than incumbents, studying their development can reveal insights into market entry barriers, scaling challenges, and ecosystem orchestration. Such research can inform more resilient business models and policy interventions to support circular platform sustainability in the long run.

Our results related to the development of circularity strategies may also be applied to B2C and C2C circular platforms, as a shared goal and a wide range of circularity strategies also characterize these platforms. For example, end users can use the platforms to give away end-of-life products for recycling (e.g. furniture) or to share unwanted products (e.g. children's clothes). However, the orchestration conditions for industrial actors and individual consumers will often differ. This may be the subject of further research, as digital platforms are new business models that are likely to increase in diversity. Future research could include developing and deploying specific capabilities for circular platform orchestrators and actors.

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Conflict of interest

None declared.

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