Actor-Value Constellations in Circular Ecosystems

Research Paper

Linda Sagnier Eckert[1], Marcel Fassnacht[1], Daniel Heinz[1], Sebastian Alamo Alonso[1] and Gerhard Satzger[1]

[1] Karlsruhe Institute of Technology, Karlsruhe, Germany
{linda.sagnier,marcel.fassnacht,daniel.heinz,gerhard.satzger}@kit.edu,
sebastian.alonso@student.kit.edu

Abstract. In response to the growing demand for sustainable economic practices, the circular economy (CE) offers promising approaches. Achieving circularity relies on ecosystems that keep resources 'in the loop' and enable sustainable value creation. Yet, research lacks a structured understanding of actors and value exchanges defining these ecosystems. To address this, we systematically analyze 48 circular ecosystem cases using e^3-value modeling to identify recurring actor-value constellations and highlight key actors and value exchanges that facilitate circularity. We construct eight generic constellations across three dimensions—circularity-driven innovation, resource efficiency optimization, end-of-life product, and material recovery. The results reveal distinct coordination mechanisms, ranging from producer-led and service-driven innovation to decomposer-led material recovery and peer-to-peer resource exchange. By conceptualizing these patterns of interaction, this study provides theoretical insights into circular ecosystems and offers practical guidance for organizations navigating the transition to a CE.

Keywords: circular economy, circular ecosystems, actor-value constellations, e^3-value modeling, sustainability.

1 Introduction

Numerous studies indicate that unsustainable economic practices are harming our livelihoods (OECD, 2019). In response, the circular economy (CE) has emerged as a paradigm shift from traditional "take-make-dispose" models to more circular strategies (Zeiss et al., 2021). CE is increasingly recognized across multiple disciplines as a critical strategy to mitigate climate change and resource depletion by promoting regenerative economic practices (Bocken et al., 2016; Geissdoerfer et al., 2017). To operationalize this vision, organizations adopt strategies to narrow, slow, and close resource loops (Lüdeke-Freund et al., 2019; Stahel, 2013). Therefore, CE aims to decouple the use of goods and services from reliance on raw materials, thereby keeping resources in circulation (Geissdoerfer et al., 2018; Kirchherr et al., 2017). This transition is both an environmental imperative and an economic opportunity to enhance resource efficiency and create new business opportunities (Tukker, 2015).

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However, implementing CE strategies poses significant challenges. Above all, this includes the need for inter-organizational collaboration, as circularity transcends the capabilities of individual entities operating in isolation (Böttcher et al., 2023; Hoppe et al., 2024; Trevisan et al., 2022). Thereby, organizations face dual transformations: restructuring their internal business models (BM) while reshaping collaboration among ecosystem actors (Parida et al., 2019). Here, the term 'ecosystem' extends beyond conventional partnership networks; rather, it constitutes a structured configuration of complementary actors engaged in deliberate interactions that fulfill specific circular value propositions (Adner, 2017; Gomes et al., 2018). Consequently, a focus on circular ecosystems has emerged, shifting emphasis from individual organizational efforts to the broader network of involved actors that reach beyond the traditional product supply chain and, e.g., include government agencies or standardization bodies (Konietzko et al., 2020; Pietrulla, 2022; Reich et al., 2025).

This ecosystem-centric view requires rethinking traditional BMs and addressing unsolved challenges around actor incentives, risk-reward distribution, and role reconfiguration (Ixmeier et al., 2024; Parida et al., 2019). While organizations seek systematic guidance on ecosystem participation, research provides limited insights into the mechanisms of circular ecosystem development. Studies on digital platforms, data sharing, and data spaces emphasize actor-value constellations as essential design elements of such ecosystems (Azkan et al., 2022; Gieß & Möller, 2025; Jussen-Lengersdorf et al., 2024). Similar to these studies, understanding constellations in CE ecosystems is crucial to explore the potential value for organizations, a foundational goal for each organization to sustain competitiveness (Porter, 2008). The formation of CE ecosystems challenges organizations to choose from multiple approaches—such as pre-use, in-use, and post-use—each involving different actors, coordination requirements, value exchange opportunities, and organizational implications. Without this understanding, organizations risk inefficiencies, misaligned incentives, or missed opportunities for value creation (Heinz et al., 2024). Despite this, we still lack knowledge on how actors interact, exchange value, and co-create circular outcomes within circular ecosystems—an especially pressing issue given the fundamentally different collaboration models these ecosystems demand (Parida et al., 2019; Trevisan et al., 2022). Consequently, understanding potential actor-value constellations and their associated value exchanges is needed. Given its focus on socio-technical systems and technology-enabled value creation, information systems (IS) research is well-positioned to address this gap. Hence, we pose the research question: *What actor-value constellations exist in circular ecosystems?*

To answer this question, we investigate actor-value constellations in circular ecosystems using the e³-value modeling language (Gordijn & Akkermans, 2001). This approach explicitly focuses on value exchanges, provides an intuitive visual representation of inter-organizational interactions, and has proven effective in, for instance, modeling data ecosystems (Azkan et al., 2022; Jussen-Lengersdorf et al., 2024). Through a systematic analysis of 48 real-world cases, we present a concise mapping of actor-value constellations in circular ecosystems. Adapting Gioia et al.'s (2013) qualitative analysis methodology allowed us to identify and classify actor roles, value objects, and actor-value constellations, culminating in a structured framework that organizes these constellations along three CE dimensions.

2 Theoretical Background

2.1 Circular Ecosystems

The CE seeks to reduce reliance on virgin resources by *slowing, narrowing, and closing loops*, giving rise to different circular BM in this domain (Bocken et al., 2016). High-value retention strategies—reuse, repair, refurbishment, and remanufacturing is prioritized, alongside lower-value recovery methods like recycling and energy recovery (Potting et al., 2017; Vulsteke et al., 2024). These strategies optimize resource use, reduce emissions, enable closed-loop production, and incorporate renewable substitution (Böttcher et al., 2023; Lüdeke-Freund et al., 2019). Implementing them effectively requires data and knowledge sharing among diverse stakeholders, with digital technologies serving as *key enablers* for coordinating circular processes (Hoppe et al., 2024; Körppen et al., 2024; Petrik & Härer, 2024; Zeiss et al., 2021).

Transitioning to CE calls for *ecosystem-wide collaboration* that integrates innovative BM, actor engagement, and digital solutions (Adner, 2017; Konietzko et al., 2020). The complexity of product design, usage patterns, and end-of-life (EOL) conditions underscores the need for data-driven coordination (Hoppe et al., 2024). Accordingly, IS research emphasizes digital technologies and data sharing as enablers of circular supply chains (Böttcher et al., 2024; Recker et al., 2024; Wagner et al., 2023). These technologies support real-time tracking and foster trust among ecosystem actors by increasing transparency—essential prerequisites for effective collaboration across organizational boundaries (Azkan et al., 2022; Fassnacht et al., 2025; Gieß & Möller, 2025).

Circular ecosystems have thus gained momentum as interdependent actors across industries collaborate to implement CE principles and strategies (Konietzko et al., 2020; Trevisan et al., 2022). Grounded in both CE concepts and *business ecosystem theory,* they reflect a notable development in sustainable BM research (Konietzko et al., 2020; Pietrulla, 2022). Defined as "a system of interdependent and heterogeneous actors that go beyond industrial boundaries and direct the collective efforts towards a circular value proposition, providing opportunities for economic and environmental sustainability" (Trevisan et al., 2022, p.296), circular ecosystems hinge on coordinating disparate competencies often dispersed across multiple organizations (Bertassini et al., 2021; Mishra et al., 2021). Recognizing this, scholars advocate for an *ecosystem perspective* to tackle the inherent collaboration challenges (Fassnacht et al., 2024; Kanda et al., 2021). Adner & Kapoor (2010) stress their value-oriented nature, describing them as networks of interdependent actors organized around shared value propositions. Technological advancements have further enhanced ecosystem self-organization and overall performance (Mann et al., 2022; Wang, 2021). Contemporary ecosystem theory refines these ideas by focusing on *multilateral interdependence* and *actor complementarity* (Adner & Kapoor, 2010; Jacobides et al., 2018), exemplified in the flows of materials, components, and data among ecosystem participants (Autio & Thomas, 2020; Ganco et al., 2020). In circular ecosystems, these flows connect a diverse set of actors—producers, consumers, scavengers, decomposers, public institutions—working toward a shared circular value proposition. While prior research explores the these actor roles, as well as structural factors and barriers within circular ecosystems (Parida et al., 2019;

Trevisan et al., 2022), the interplay among them, particularly regarding *value creation* and *value exchange* (as opposed to mere regulatory compliance), remains underexplored. Emerging digital infrastructures, such as data platforms or digital product passports (DPP), increasingly influence these interplays by enabling actors to communicate more efficiently and tailor offerings based on shared insights (Gieß & Möller, 2025; Körppen et al., 2024). Filling this gap by examining *actor-value constellations*—recurring patterns of interaction and exchange between specific roles—can help organizations systematically engage in or establish circular ecosystems effectively.

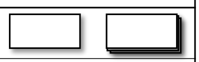
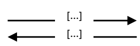
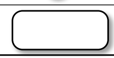
2.2 e3-Value Modeling

To analyze the structure of circular ecosystems, this study applies the e³-value modeling approach (Gordijn & Akkermans, 2001), a method specifically designed to represent value exchange in multi-actor networks. The e³-value approach focuses on visualizing how actors interact and exchange resources—whether products, data, or services—within an ecosystem, making it well suited to capture the complexity of circular ecosystems. This abstraction helps illustrate the flow of materials, data, and services among ecosystem participants, supporting the analysis of actor roles, interdependencies, and circular value propositions (Gordijn & Akkermans, 2001).

Previous IS research has successfully applied this approach to analyze multi-actor networks in contexts such as inter-organizational data sharing (Jussen-Lengersdorf et al., 2024), value co-creation in ecosystems (Azkan et al., 2022), and DPP systems (Gieß & Möller, 2025). The approach also aligns well with BM research on value creation, capture, and exchange at the ecosystem level (Teece, 2010) by structuring and analyzing actor interdependencies and value flows. In the context of circular ecosystems, e³-value is particularly suitable as it enables the representation of both physical value flows (e.g., products, materials) and digital value exchanges (e.g., data, services, insights), which are increasingly intertwined (Böttcher et al., 2024).

In e³-value models, independent economic actors perform value activities by exchanging tangible or intangible value objects (e.g., products, services, money, or data) through value ports and value interfaces (Gordijn & Wieringa, 2021). Table 1 summarizes the modeling elements and introduces their notation.

Table 1. Relevant elements of the e3-value method based on (Gordijn & Akkermans, 2001)

Element	Definition	Notation
Actor	An independent economic (and often legal) entity that generates profit or utility by performing value activities.	
Value exchange & value objects	A connection between two value ports that enables the exchange of value objects, such as services, products, money, or experiences, representing one or more potential trades where value is transferred between actors.	
Value port	A representation of an actor's intent to provide or request value objects, allowing abstraction from internal processes and focusing on external interactions.	
Value interface	A grouping of value ports that defines the conditions under which an actor exchanges value objects. The exchange at this level is atomic –all or none of the connected ports are involved.	
Value activity	A task performed by an actor to generate profit or increase utility, assigned within the business model to optimize value creation.	

3 Methodology

This study follows a sequential research approach comprising four phases to investigate actor-value constellations in circular ecosystems. First, a *data collection* phase yielded a database of 148 publicly available use cases, primarily gathered from the Ellen MacArthur Foundation's (EMA) case study library through a secondary data collection strategy (Hox & Boeije, 2005). Three inclusion criteria—alignment with Trevisan et al.'s (2022) circular ecosystem definition; sufficient detail on actors, value exchanges, and governance mechanisms; documentation in English; and publication after December 31, 2018—were applied to maintain contemporary relevance. This led to excluding 68 cases due to inadequate theoretical fit, 21 lacking sufficient detail, and 11 outdated publications, resulting in a final sample of 48 diverse cases (see Table A in the Appendix).

Next, in the *case modeling* phase, we used the e³-value modeling language (Gordijn & Akkermans, 2001) to abstractly represent actors, value exchanges, and key activities in a consistent visual format. Orchestrating actors were depicted with orange-bordered components, while regular actors used black borders, and directed arrows indicated the flow of tangible and intangible value objects such as data, materials, money, or services ('value exchanges'). For value activities, we used annotations to emphasize how actors contribute to the circular value proposition. In this process, regular team meetings were held to maintain consistency in the modeling process and resolve any discrepancies.

Subsequently, an adapted version of the Gioia methodology (Gioia et al., 2013) guided the *case analysis and constellation extraction*, supporting a rigorous abductive analysis of the qualitative data. First, an open coding procedure (Saldaña, 2013) was conducted to derive first-order concepts capturing actor roles, value objects, and relevant ecosystem elements from the modeled cases, aligned with established literature on ecosystem roles (e.g., Bertassini et al., 2021; Lüdeke-Freund et al., 2019; Tate et al., 2019). Second, we synthesized these first-order concepts into second-order themes by identifying recurring actor-value constellations. Each use case was assigned to a specific constellation if it fit the emerging pattern; otherwise, a new constellation was created. Although multiple constellations could theoretically appear in a single case, this was not observed in the dataset. Hence, while it is conceptually possible for a single use case to span all three CE phases, we did not find empirical evidence of such a constellation in the analyzed sample. This iterative process yielded eight distinct actor-value constellations. In a third step, we organized them into three overarching circular ecosystem dimensions—circularity-driven innovation, resource efficiency optimization, and EOL product and material recovery. This was informed by inductive coding based on the dominant circular value proposition of each case (e.g., supply chain innovation, lifecycle extension, resource recovery) and then aligned with established CE typologies such as slowing, narrowing, and closing loops (Bocken et al., 2016; Potting et al., 2017).

Finally, a *mixed-methods evaluation* (Davis, 1989; Wixom & Todd, 2005) assessed the practical applicability of the framework. Ten researchers and experts in CE completed an online survey, applying the framework to three use cases published by the EMA that were not part of the original dataset. They evaluated perceived completeness (extent to which all relevant circular ecosystem aspects are covered), understandability (clarity and ease of interpretation), and usefulness (value for practical application) on a five-point Likert scale (Likert, 1932), supplemented by open-ended qualitative feedback, thereby validating the framework's relevance and clarity for research and practice.

4 Actor-Value Constellations in Circular Ecosystems

The analysis of circular ecosystem use cases reveals six primary actor roles that facilitate value exchanges and resource flows: *Producers* either supply raw materials (*primary producers*) or manufacture them into finished products (*secondary producers*). *Consumers* are categorized into *primary consumers,* who purchase products for resale, and *secondary consumers*, who are end-users (Bertassini et al., 2021; Lüdeke-Freund et al., 2019). *Scavengers* collect and redistribute EOL products. *Decomposers* process EOL products into reusable materials, both playing critical roles by ensuring material recovery and redistribution (Tate et al., 2019). *Service providers* enable circularity by offering infrastructure, solutions, or consulting services, whereas *public institutions and NGOs* regulate, fund, and support sustainability initiatives. These roles are not mutually exclusive, and actors may assume multiple functions within the ecosystem.

Additionally, the study identifies value objects exchanged within circular ecosystems. Tangible value objects include *raw materials*, *finished products*, and *EOL products*, which are redistributed or processed to maintain circularity. Intangible value objects involve *scavenger* and *decomposer services*, *financial transactions* (funding, monetary compensation), *regulatory mechanisms* (legislation), and *knowledge-sharing* (data, insights, expertise). In certain cases involving sharing platforms or reverse logistics, digital value objects, including platform access, usage data, or product information, were exchanged to enable traceability, coordination, and platform-based matchmaking.

The eight identified actor-value constellations are classified into three circular ecosystem dimensions: *circularity-driven innovation*, focused on sustainable product, process, and BM innovation, *resource efficiency optimization*, extending resource use efficiency through sharing, renting, and re-commerce models, and *EOL product and material recovery*, facilitating EOL product collection, transformation, and redistribution. Figure 1 provides an overview of these dimensions and the respective actor-value constellations, indicating also how many use cases fit each constellation.

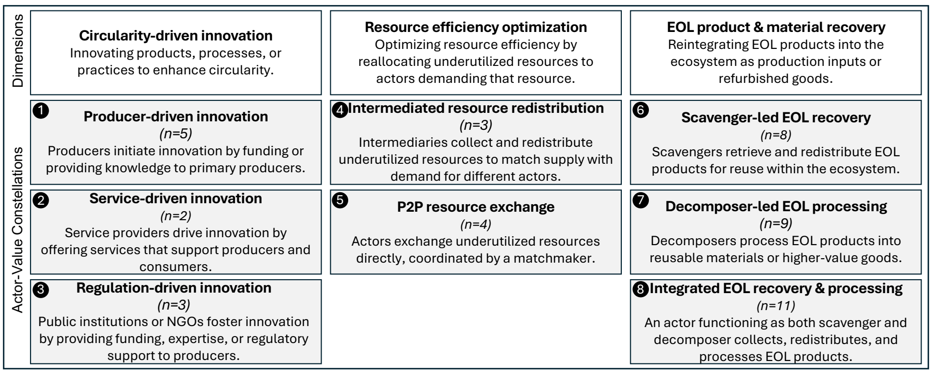


Figure 1. Eight constellations classified into three circular ecosystem dimensions

4.1 Dimension 1: Circularity-driven Innovation

This dimension (Figure 2) includes producer-driven, service-driven, and regulation-driven innovations that aim to eliminate unsustainable products, rethink material use, and reduce reliance on virgin resources, particularly in the food and fashion industries.

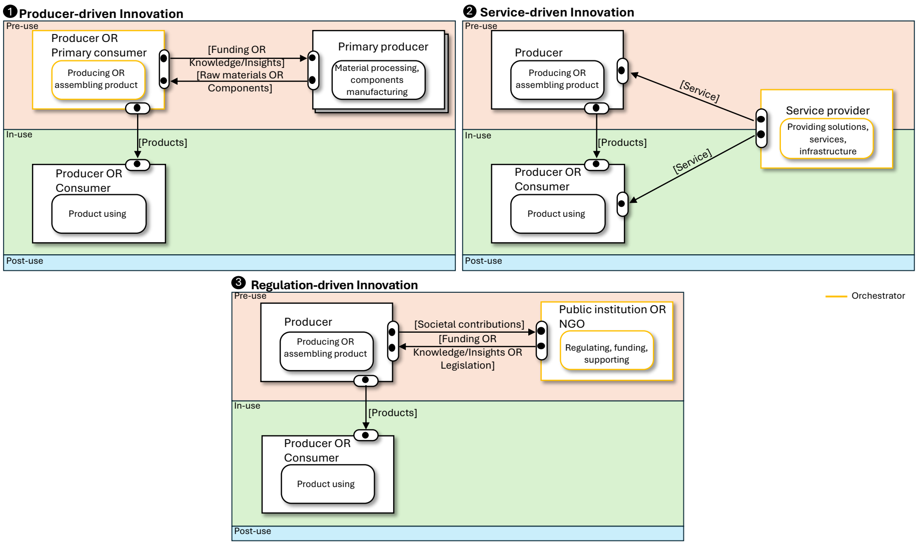


Figure 2. The three constellations within the circularity-driven innovation dimension

Producer-driven innovation. Producers take on the role of ecosystem orchestrators by providing funding or transferring technical knowledge to primary producers. In return, partners supply raw materials or partially processed goods that the producer integrates into its value activities before distributing the final product to consumers or other producers. Suntory Beverage & Food GB&I exemplifies this constellation by financing Gorgate Farm's shift to regenerative agriculture, helping decarbonize its supply chain (UC05). In other cases, such as Gabanna Foodworks and VORM, knowledge-sharing replaces financial support to foster circular practices by transferring technical expertise (UC02). This producer-led approach underscores the importance of collaborative efforts that lower financial or technical barriers for smaller actors, while ensuring that sustainability targets are clearly defined and monitored.

Service-driven innovation. Service providers offer digital or physical services, helping producers and consumers adopt sustainable BMs. These range from optimizing supply chains and reducing waste to introducing new consumption models. Kecipir, for example, connects farmers directly with consumers through an online platform, minimizing food waste and packaging (UC06). Algramo provides RFID-enabled refillable packaging, which integrates with established brands and reduces single-use plastics (UC07). In both examples, digital technologies (platforms and product identification systems) play a central role in facilitating interaction and monitoring product use. Overall, this constellation demonstrates how targeted services can streamline value chains, reduce resource usage, and encourage more responsible consumption behaviors.

Regulation-driven innovation. Public institutions or NGOs motivate producers to adopt sustainable practices by offering funding, regulatory frameworks, or technical expertise. Unlike commercial actors, these institutions generally do not seek monetary returns but expect recipients to deliver societal benefits, such as reduced environmental footprints or improved recyclability standards. For example, HNST follows The Jeans Redesign's recyclability guidelines to decrease independent R&D costs and align with broader industry benchmarks (UC10). Similarly, the "Connect the Dots" program in São Paulo provides financial incentives and training to help smallholder farmers transition to regenerative methods (UC11). By setting clear rules and expectations, regulation-driven innovation fosters widespread adoption of circular practices that would otherwise be constrained by knowledge or resource limitations.

4.2 Dimension 2: Resource Efficiency Optimization

This dimension (Figure 3) comprises intermediated resource redistribution and P2P resource exchange, aiming for maximizing resource efficiency through efficient allocation, collaborative use of resources, sharing models, and digital matchmaking platforms.

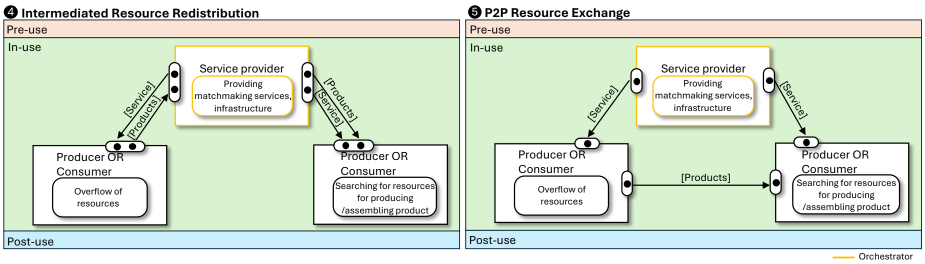


Figure 3. The two constellations within the resource efficiency optimization dimension

Intermediated resource redistribution. An intermediary actor reallocates underutilized resources by supply-demand matchmaking, particularly in industries like fashion, furniture, and technology, where circular BMs encourage temporary ownership, rental, or resale. Ralph Lauren's rental service offers customers high-end garments on a short-term basis, thereby reducing clothing waste and extending product life (UC16). Data analytics further optimizes inventory, predicts trends, and enhances the overall user experience. Thereby, digital platforms and analytics serve as essential enablers, allowing intermediaries to make informed decisions and enhance user satisfaction.

P2P resource exchange. Similar to the previous one, this constellation also focuses on redirecting underutilized resources but differs in its direct flow of resources between actors. Here, the intermediary primarily serves as a matchmaker—consistent with peer-to-peer (P2P) sharing economy principles—facilitating exchange through a digital platform. Rheaply's re-commerce platform illustrates this model by enabling organizations to redistribute surplus furniture, fixtures, and equipment, preventing items from becoming waste (UC20). The resale or reallocation of items through the platform not only supports greater circularity but also allows for comprehensive sustainability tracking. The digital infrastructure behind these constellations (platforms, dashboards, automated alerts) are crucial to enable such scalable, traceable exchanges.

4.3 EOL Product and Material Recovery

This dimension emphasizes recovering, processing, and reintegrating EOL products to retain valuable materials within the circular ecosystem. See Figure 4 for an overview.

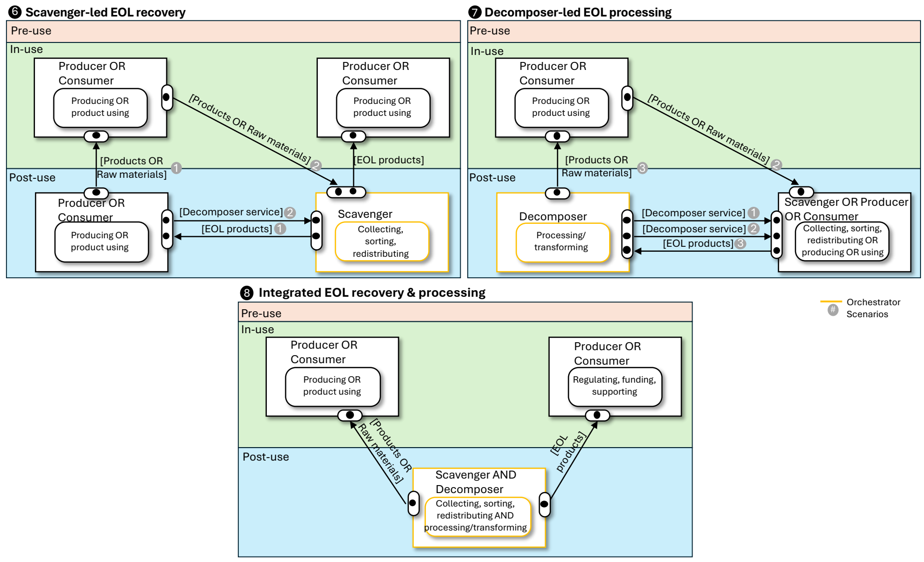


Figure 4. The three constellations within the EOL product and material recovery dimension

Scavenger-led EOL recovery. A scavenger orchestrates the collection and redistribution of EOL products by collaborating with decomposers, producers, or consumers. There are two possible flows of EOL products: the scavenger collects items and delivers them to a decomposer, which processes them into valuable resources and forwards them to other actors (often public institutions), or the scavenger can retain ownership, partner with a decomposer to extract higher-value materials, and then redistribute them (often private entities). E.g., Mazuma Mobile buys outdated mobile devices, works with refurbishing partners (decomposers) to restore them, and resells the reconditioned phones (UC22). The scavenger provides orchestration, ensuring EOL products are recovered, processed, and redistributed. Several of these constellations include digital components such as take-back portals, tracking of collected goods, or device diagnostics.

Decomposer-led EOL processing. A decomposer coordinates the circular ecosystem by transforming EOL products into new materials or goods. Engaging with a scavenger, producer, or consumer, the decomposer manages value exchange via three mechanisms: direct decomposer service (processed materials are used immediately), decomposer-facilitated exchange (materials are processed and then passed to another actor), or direct processing of EOL products for reintegration into the ecosystem. E.g., Solvay collaborates with Renault and Veolia to recover high-value metals from electric vehicle batteries, thereby lowering dependency on virgin materials (UC35). Digital technologies, such as tracking and analysis tools, may support this processing, though in the description of our use cases, there was no evidence of explicit digital orchestration.

Integrated EOL recovery and processing. The orchestrator acts as both scavenger and decomposer, collecting waste streams, converting them into new products or materials, and distributing them. Organizations may rely entirely on recovered resources (fully circular) or partially supplement production with virgin materials (supplementary circular). Danone-Evian, e.g., runs a methanization unit that processes municipal green waste into biogas and natural fertilizers, benefitting local energy grids and farms (UC48). Teemill, a T-shirt producer, collects old garments from customers through QR codes, recycling them into new shirts and using virgin cotton only as needed (UC38). This streamlines the flow of materials and highlights how organizations can integrate circular principles within a single, cohesive operational structure. Teemill's use of QR codes illustrates the potential of digital tools to enhance traceability in EOL flows.

4.4 Evaluation

Participants perceived the initial framework as a valuable tool for understanding CE use cases, noting that it offered both logical structure and practical applicability. They highlighted its approachability for newcomers despite initial concerns about cognitive overload stemming from extensive definitions and visual elements. One participant remarked, *"While the framework delivers many definitions which are difficult to grasp, you learn it in use and notice that it follows the natural cognitive thinking process of analyzing such use cases."* Quantitative results reinforced these observations, with perceived usefulness rated highest (mean: 4.45), and somewhat lower scores for understandability (3.70) and completeness (3.77). Inter-coder reliability (57%) indicated moderate consistency in mapping use cases, suggesting room for improvement in clarifying actor roles and value exchanges. Participants recommended simplifying content presentation, refining visual representations, and adding illustrative circular flow diagrams. Accordingly, the framework was revised to reduce cognitive load through more concise explanations and clearer constellation visuals. Despite initial difficulties with some terminology and diagrams, participants ultimately viewed the framework favorably. One expert stated it *"helped me to get an overview of and feeling for circular ecosystems."* The evaluation confirmed the framework's overall efficacy, guiding further refinements incorporated in the presented final version.

5 Discussion and Conclusion

This study highlights how ecosystem coordination and digital technologies can support sustainable value creation and reflects valuable insights for future studies on the specific role and utilization of IS within each constellation. Drawing on 48 real-world use cases, our framework identifies eight constellations across three dimensions. Unlike prior work emphasizing single actors or specific barriers (Parida et al., 2019; Trevisan et al., 2022), we offer a holistic view that articulates how multiple actors exchange value and orchestrate complex collaborations. Building on business ecosystems research (Adner, 2017; Jacobides et al., 2018), our findings underscore the interdependencies required for achieving circularity. By aligning with key CE typologies (Bocken et al., 2016;

Potting et al., 2017) we provide an integrated lens that captures resource and material flows and the function of digital infrastructures in connecting ecosystem participants. Further, we relate to Jussen-Lengersdorf et al., (2024) and adopt their approach to study a complex, scattered domain, CE, to develop abstracted actor-value constellations that support decision processes in finding and designing suitable CE settings. In contrast to the generic inter-organizational data sharing case synthesizing multiple concepts and an entire field of research, our constellations reflect nuanced, actionable constellations in the CE context.

Many cases prioritize EOL recovery, yet our findings reveal a parallel need for stronger upstream and mid-stream interventions to facilitate higher-value retention strategies. Systemic issues, including regulatory constraints or technical limitations, may contribute to this preference for downstream bias (Stumpf et al., 2021). By applying the e^3-value methodology in the sustainability domain, we illustrate how digital technologies enhance coordination and transparency across the ecosystem actors. Some constellations critically depend on such digital technologies (e.g., sharing or recovery platforms) and are utilized in circular ecosystems as a crucial enabler for operationalization. Others function effectively with minimal or no explicit digital technologies and coordination. The insights deepen our understanding of socio-technical systems in sustainability research by showing that technology adoption in circular ecosystems can reshape collaboration patterns, governance structures, and innovation pathways.

From a managerial and policy standpoint, the constellations serve as strategic blueprints for organizations to select partners, define value exchanges, and integrate circular principles. An organization focused on reuse might adopt the service-driven constellation, whereas one seeking post-use feedstock would choose the scavenger-led model. Technology providers can support with required data-sharing rails, and orchestrators can align cross-sector incentives. Platform solutions that facilitate shared resources, reverse logistics, and real-time data exchanges, e.g., the integration of DPP-based tracking (Gieß & Möller, 2025), can significantly improve transparency in material flows and support ecosystem-wide decision-making. Policymakers and NGOs can amplify these dynamics by offering targeted incentives, robust regulations, and standardized guidelines that encourage cross-sector collaboration and long-term commitment to circular models. Our framework also clarifies ecosystem orchestration strategies, spotlighting different lead actors that drive or shape the entire network's sustainability trajectory.

Notwithstanding these contributions, our study is limited by its reliance on secondary data, possibly constraining case variety. Reliance on a single EMA case library may narrow topical breadth and exclude the newest developments. Future work should triangulate with additional databases and primary data from interviews, surveys, or in-depth field studies across diverse sectors and regions. Researchers may explore alternative modeling approaches to capture the increasingly dynamic and multilateral interplay among ecosystem actors, especially as digital capabilities evolve. Further research on the conditions that make each constellation most effective—and the enabling digital solutions—could yield further insights for IS scholars, practitioners, and policymakers. By deepening our understanding of how circular ecosystems operate and scale, we move closer to ensuring that the CE vision delivers tangible, long-term economic and environmental benefits.

Appendix

Table A Final sample of use cases organized by dimensions and actor-value constellations

Dimension	Actor-value constellation	Use case	Use case title	Year	Access link	Last accessed
1	(1)	UC01	A regenerative supply chain alternative for palm oil	2022	https://www.ellenmacarthurfoundation.org/circular-examples/a-climate-smart-fertiliser-that-serves-each-farms-needs	28.02.2025
1	(1)	UC02	Gabanna Foodworks and VORM	2022	https://www.ellenmacarthurfoundation.org/circular-examples/a-regenerative-supply-chain-alternative-for-palm-oil	28.02.2025
1	(1)	UC03	Maritaş Denim	2021	https://www.ellenmacarthurfoundation.org/circular-examples/a-reusable-drinks-bottle-design-for-multiple-brands-universal-bottle	28.02.2025
1	(1)	UC04	Reducing food losses, increasing profits: Agricycle	2021	https://www.ellenmacarthurfoundation.org/circular-examples/an-open-access-circular-supply-chain-for-t-shirts-teemill	28.02.2025
1	(1)	UC05	Suntory Beverage & Food and Gorgate Farm	2021	https://www.ellenmacarthurfoundation.org/circular-examples/borrow-stuff-you-need-lend-stuff-you-dont	28.02.2025
1	(2)	UC06	Farm-to-fork app eliminates plastic & reduces food costs: Kecipir	2021	https://www.ellenmacarthurfoundation.org/circular-examples/brewing-beer-from-surplus-bread	28.02.2025
1	(2)	UC07	Pay for the product, not the packaging: Algramo	2021	https://www.ellenmacarthurfoundation.org/circular-examples/united-kingdom-bringing-industry-together-to-tackle-food-packaging-waste	28.02.2025
1	(3)	UC08	Bringing industry together to tackle food packaging waste	2021	https://www.ellenmacarthurfoundation.org/circular-examples/business-to-business-asset-sharing	28.02.2025
1	(3)	UC09	Cradle to Cradle carpets for city buildings: San Francisco	2021	https://www.ellenmacarthurfoundation.org/circular-examples/hirestreet	28.02.2025
1	(3)	UC10	HNST	2021	https://www.ellenmacarthurfoundation.org/circular-examples/collaborating-to-change-local-food-systems	28.02.2025
1	(3)	UC11	Regenerative agriculture around São Paulo: Connect the Dots	2021	https://www.ellenmacarthurfoundation.org/circular-examples/collection-refurbishment-and-resale-of-mobile-phone-handsets	28.02.2025
2	(4)	UC12	Clothing rental for users and retailers: Hirestreet	2021	https://www.ellenmacarthurfoundation.org/circular-examples/cradle-to-cradle-carpets-for-city-buildings-san-francisco	28.02.2025
2	(4)	UC13	Garments to be experienced by many, owned by none: GANNI	2021	https://www.ellenmacarthurfoundation.org/circular-examples/creating-a-reverse-logistics-ecosystem	28.02.2025
2	(4)	UC14	How tool sharing could become a public utility	2021	https://www.ellenmacarthurfoundation.org/circular-examples/design-and-business-model-considerations-for-heavy-machinery-remanufacturing	28.02.2025
2	(4)	UC15	Keeping clothing in use to reduce waste: thredUP	2023	https://emf.thirdlight.com/link/y4c5o411ww3o-xtyd5u/@/preview/1?o	28.02.2025
2	(4)	UC16	Rental subscription service for timeless products: Ralph Lauren	2021	https://www.ellenmacarthurfoundation.org/circular-examples/effective-organic-collection-systems	28.02.2025
2	(5)	UC17	Borrow stuff you need. Lend stuff you don’t.	2021	https://www.ellenmacarthurfoundation.org/circular-examples/clothes-doctor	28.02.2025
2	(5)	UC18	Business-to-business asset sharing	2021	https://www.ellenmacarthurfoundation.org/circular-examples/farfetch	28.02.2025
2	(5)	UC19	Driving a carbon-neutral city through mapping of resource streams & matchmaking	2024	https://www.ellenmacarthurfoundation.org/circular-examples/enhancing-the-quality-of-resale-deja-vu?sortBy=rel	28.02.2025
2	(5)	UC20	Reusing valuable resources more effectively: Rheaply	2021	https://www.ellenmacarthurfoundation.org/circular-examples/groupe-renault	28.02.2025
3	(6)	UC21	Collaborating to change local food systems: Milan	2022	https://www.ellenmacarthurfoundation.org/circular-examples/farm-by-products-increase-yields-and-sequesters-carbon-safi-organics	28.02.2025
3	(6)	UC22	Collection, refurbishment and resale of mobile phone handsets	2021	https://www.ellenmacarthurfoundation.org/circular-examples/kecipir	28.02.2025
3	(6)	UC23	Effective Organic Collection Systems	2021	https://www.ellenmacarthurfoundation.org/circular-examples/financing-the-expansion-of-circular-business-models	28.02.2025
3	(6)	UC24	How refurbishment can work	2021	https://www.ellenmacarthurfoundation.org/circular-examples/finding-a-fast-fashion-business-model-that-lasts	28.02.2025
3	(6)	UC25	Seeking solutions to keep clothes in use: Tommy Hilfiger	2024	https://www.ellenmacarthurfoundation.org/circular-examples/using-every-part-of-the-climate-friendly-sorghum-crop-gabanna-foodworks-and?sortBy=rel	28.02.2025
3	(6)	UC26	The #WearNext campaign: New York City	2021	https://www.ellenmacarthurfoundation.org/circular-examples/ganni	28.02.2025
3	(6)	UC27	The app making clothing alterations and repairs mainstream: SOJO	2023	https://www.ellenmacarthurfoundation.org/circular-examples/hnst	28.02.2025
3	(6)	UC28	Toxin-free, recyclable clothing: Napapijri Circular Series	2021	https://www.ellenmacarthurfoundation.org/circular-examples/how-refurbishment-can-work-even-when-safety-and-performance-matter-the-most	28.02.2025
3	(7)	UC29	A climate-smart fertiliser that serves each farm’s needs	2021	https://www.ellenmacarthurfoundation.org/circular-examples/how-tool-sharing-could-become-a-public-utility	28.02.2025
3	(7)	UC30	A reusable bottle design for multiple brands: Universal Bottle	2021	https://www.ellenmacarthurfoundation.org/circular-examples/keeping-clothing-in-use-to-save-us-money-and-reduce-waste-thredup	28.02.2025
3	(7)	UC31	Creating a reverse logistics ecosystem	2021	https://www.ellenmacarthurfoundation.org/circular-examples/keeping-the-molecules-and-materials-in-use-solvay	28.02.2025
3	(7)	UC32	Design and business model for heavy machinery remanufacturing	2021	https://www.ellenmacarthurfoundation.org/circular-examples/de-clique	28.02.2025
3	(7)	UC33	Empowering customers to care for their wardrobes: Clothes Doctor	2023	https://www.ellenmacarthurfoundation.org/circular-examples/maritas-denim	28.02.2025
3	(7)	UC34	Europe’s first circular economy factory for vehicles: Renault	2022	https://www.ellenmacarthurfoundation.org/circular-examples/pay-for-the-product-not-the-packaging-algramo	28.02.2025
3	(7)	UC35	Keeping the molecules and materials in use: Solvay	2023	https://www.ellenmacarthurfoundation.org/circular-examples/reboot	28.02.2025
3	(7)	UC36	Project ReBOOT	2021	https://www.ellenmacarthurfoundation.org/circular-examples/gem-china	28.02.2025
3	(7)	UC37	Protecting resources by recycling precious metals: GEM	2021	https://www.ellenmacarthurfoundation.org/circular-examples/agricycle	28.02.2025
3	(8)	UC38	An open access, circular supply chain for t-shirts: Teemill	2024	https://www.ellenmacarthurfoundation.org/circular-examples/reducing-plastic-waste-in-cosmetics-through-tech-innovation-yan-an-tang	28.02.2025
3	(8)	UC39	Brewing beer from surplus bread	2021	https://www.ellenmacarthurfoundation.org/circular-examples/connect-the-dots	28.02.2025
3	(8)	UC40	Empowering luxury shoppers to choose better: FARFETCH	2021	https://www.ellenmacarthurfoundation.org/circular-examples/ralph-lauren	28.02.2025
3	(8)	UC41	Enhancing the quality of resale: Déjà Vu	2023	https://www.ellenmacarthurfoundation.org/circular-examples/rheaply	28.02.2025
3	(8)	UC42	Farm by-products increase yields and sequesters carbon	2024	https://www.ellenmacarthurfoundation.org/circular-examples/saving-office-furniture-from-landfill-deartree	28.02.2025
3	(8)	UC43	Financing the expansion of circular business models	2021	https://www.ellenmacarthurfoundation.org/circular-examples/tommy-hilfiger	28.02.2025
3	(8)	UC44	Finding a fast fashion business model that lasts	2024	https://www.ellenmacarthurfoundation.org/circular-examples/suntory-beverage-and-food-and-gorgate-farm	28.02.2025
3	(8)	UC45	Making new products from urban organic waste streams: De Clique	2021	https://www.ellenmacarthurfoundation.org/circular-examples/the-wearnext-campaign-new-york-city	28.02.2025
3	(8)	UC46	Reducing plastic waste in cosmetics through tech innovation: Yan An Tang	2021	https://www.ellenmacarthurfoundation.org/circular-examples/sojo	28.02.2025
3	(8)	UC47	Saving office furniture from landfill: Deartree	2021	https://www.ellenmacarthurfoundation.org/circular-examples/napapijri-circular-series	28.02.2025
3	(8)	UC48	Watershed protection programme that builds value	2021	https://www.ellenmacarthurfoundation.org/circular-examples/watershed-protection-programme-that-builds-value-resilience-and-natural	28.02.2025

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