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Orchestrating Circular Ecosystems

A Systematic Literature Review

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ABSTRACT:

The aim of the circular economy is to improve resource efficiency, extend the use of materials, and minimize waste. It requires a shift from linear production and consumption models toward closed-loop systems, where value is maintained for as long as possible. This transition emphasizes collaboration between different actors and makes the ecosystem perspective increasingly important. At the same time, managing ecosystems becomes more important, but also more challenging.

This study examines ecosystem orchestration, particularly in the context of the circular economy. As the business environment becomes more networked and involves multiple actors, value creation increasingly relies on collaboration and the alignment of resources between actors. Although the ecosystem concept has become central in business research, the management of ecosystems remain partly unclear. The concept of orchestration helps to address this issue. The aim of this study is to clarify how ecosystem orchestration is understood in the literature and how this understanding changes in circular ecosystems.

The study adopts a systematic literature review (SLR) approach. The data consists of peer-reviewed academic articles collected from the Web of Science and Scopus databases. The final dataset includes 25 selected studies in which ecosystem orchestration plays a central role. The data is analyzed by focusing on three key dimensions: who orchestrates, what is orchestrated, and how orchestration is carried out.

The findings show that ecosystem orchestration is not the responsibility of a single actor. Instead, it is carried out by different actors, such as focal firms, multiple actors, and public or neutral organizations. Orchestration targets both networks and resources, but also extends to system-level elements such as value propositions and institutional structures. In addition, orchestration logic often appears as a hybrid, combining deliberate direction with continuous adaptation and interaction. In circular economy ecosystems, orchestration is more distributed, more dynamic, and more dependent on the alignment of multiple actors than in traditional ecosystems. This suggests that existing orchestration theories should be further developed to better reflect the complex and cross-sectoral nature of circular economy environments.

This study contributes to the theoretical understanding of ecosystem orchestration by structuring the concept through clear dimensions and by extending this understanding to the context of circular economy ecosystems.

KEYWORDS: orchestration, ecosystem management, circular economy, ecosystem orchestration, ecosystem

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TIIVISTELMÄ:

Kiertotalouden tavoitteena on resurssien käytön tehostaminen, materiaalien kierron pidentäminen sekä jätteen syntymisen minimointi. Se edellyttää siirtymää lineaarisista tuotanto- ja kulutusmalleista kohti suljettuja kiertoja, joissa arvo säilyy mahdollisimman pitkään. Tällainen muutos korostaa eri toimijoiden välistä yhteistyötä ja tekee ekosysteeminäkökulmasta keskeisen. Samalla ekosysteemien johtaminen muodostuu entistä tärkeämmäksi, mutta myös haastavammaksi.

Tässä tutkimuksessa tarkastellaan ekosysteemien orkestrointia erityisesti kiertotalouden kontekstissa. Liiketoimintaympäristön muuttuessa yhä verkostomaisemmaksi ja monitoimijaisemmaksi, arvontuonti perustuu yhä enemmän eri toimijoiden väliseen yhteistyöhön ja näiden resurssien yhteensovittamiseen. Vaikka ekosysteemien käsitteestä on muodostunut keskeinen näkökulma liiketoiminnan tutkimuksessa, niiden johtaminen on edelleen osittain epäselvää. Orkestroinnin käsite auttaa selittämään tätä. Tutkimuksen tavoitteena on selkeyttää, miten ekosysteemien orkestrointi ymmärretään kirjallisuudessa sekä miten tämä ymmärrys muuttuu kiertotalouden ekosysteemeissä.

Tutkimuksen metodina on systemaattinen kirjallisuuskatsaus, jossa analysoidaan vertaisarvioituja tieteellisiä artikkeleita Web of Science ja Scopus tietokannoista. Lopullinen aineisto koostuu 25 valikoidusta tutkimuksesta, joissa ekosysteemien orkestrointi on keskeisessä roolissa. Aineiston analyysi perustuu sisällönanalyysiin, jossa tutkimuksia tarkastellaan kolmen keskeisen ulottuvuuden kautta: kuka orkestroii, mitä orkestroidaan ja miten orkestrointi toteutuu.

Tulokset osoittavat, että ekosysteemien orkestrointi ei ole yhden toimijan vastuulla, vaan sitä toteuttavat erilaiset toimijat, kuten keskeiset yritykset, usean toimijan yhteenliittymät sekä julkiset tai neutraalit organisaatiot. Orkestrointi kohdistuu sekä toimijaverkostoihin että resursseihin, mutta myös laajemmin systeemitason elementteihin, kuten arvolupauksiin ja institutionaalisiin rakenteisiin. Lisäksi orkestrointi näyttäytyy usein hybridisenä ilmiönä, jossa suunnitelmallinen ohjaus yhdistyy jatkuvaan sopeutumiseen ja vuorovaikutukseen. Kiertotalouden ekosysteemeissä orkestrointi on luonteeltaan hajautuneempaa, dynamisempaa ja riippuvaisempaa eri toimijoiden välisestä yhteensovittamisesta kuin perinteisissä ekosysteemeissä. Tämä viittaa siihen, että olemassa olevia orkestrointiteorioita tulisi kehittää vastaamaan paremmin kiertotalouden monimutkaisia toimintaympäristöjä.

Tutkimus edistää ekosysteemien orkestroinnin teoreettista ymmärrystä jäsentämällä käsitettä selkeiden ulottuvuuksien kautta. Lisäksi se tuo esiin kiertotalouden ekosysteemien erityispiirteet, jotka haastavat perinteisiä käsityksiä ekosysteemien orkestroinnista.

AVAINSANAT: orchestration, ecosystem management, circular economy, ecosystem orchestration, ecosystem

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1 Introduction

Climate change is widely recognized as one of the main challenges of our time, requiring a transition towards more sustainable economic systems (Pietrulla, 2022). In this context, the circular economy has gained increasing attention as a key approach to addressing environmental challenges (Marques-McEwan et al., 2023). The transition to a circular economy is an important objective for both society and businesses, and it has emerged as a leading concept and industrial practice aimed at reducing environmental impacts and improving resource efficiency (Parida et al., 2019). The circular economy is supported at multiple levels: governments promote it through regulatory and policy frameworks, companies increasingly report their circularity efforts, and academic research continues to develop and refine the concept (Pietrulla, 2022).

Built on the principle of *make–remake–use–return*, circular economy challenges the traditional linear model of *take–make–use–dispose* by promoting the reduction, reuse, and recycling of resources across the economy (MacArthur, 2013). This shift is crucial in the context of current consumption habits, which are strongly tied to convenience, affordability, and frequent product replacement. Such models have led to increased material use and growing waste volumes, particularly in sectors where product lifecycles are short, and the volume of single-use packaging is high (Jain & Hudnurkar, 2022).

Collaboration with stakeholders, such as suppliers, distributors, and consumers, can promote the transition toward circularity by sharing responsibility and creating scalable solutions (Garcia-Ortega et al., 2025; Marques-McEwan et al., 2023). Although integration can be challenging its environmental and economic benefits make it attractive direction and successful actors can quickly positions themselves as industry leaders in evolving markets (Nwabekee et al., 2024).

However, as Bryson et al. (2015) argue, sustainability challenges are too complex for any single actor or sector to address alone. Effective circular transitions therefore depend on cross-sector collaboration, where public, private, and nonprofit actors coordinate their

resources, expertise, and goals to create shared value and enable long-term systemic change (Aryee et al., 2025; Battistella & Attanasio, 2026).

In this study, such coordinated and interdependent collaboration is understood through the concept of an ecosystem. According to Adner (2017), an ecosystem consists of multiple connected actors whose roles, activities, and resources must be aligned to deliver a shared value proposition. This perspective highlights the importance of coordination, mutual dependence, and shared value creation in achieving sustainable innovation and circular transitions. As pointed by Aarikka-Stenroos et al. (2021) to create value in ecosystems both resources and independent heterogeneous actors must be combined. Divito et al. (2025) add that this requires close coordination and collaboration with the ecosystem actors.

Building on this, ecosystem orchestration has been identified as a mechanism that enables such management (Addo, 2022; Foss et al., 2023). Since ecosystems are formed by independent actors who contribute voluntarily without formal contracts or central control, value creation depends on aligning their actions toward a shared goal. This requires active orchestration to guide participants in supporting the common ecosystem vision (Autio, 2022).

1.1 Research gap

Circular ecosystems have gained increasing attention in recent years to address sustainability challenges (Aryee et al., 2025). However, the concept is still relatively new and not yet clearly defined, and it remains unclear how such ecosystems should be managed in practice (Aarikka-Stenroos et al., 2021; Geissdoerfer et al., 2025). Circular ecosystems involve multiple independent but interdependent actors from different sectors, complex resource flows, and system-level sustainability goals, which makes their management particularly challenging (Gomes et al., 2023; Langley et al., 2023).

At the same time, the management of ecosystems has been studied in prior research, especially in the ecosystem types such as innovation, industrial, and platform (Aagaard, 2026; Addo, 2022; Autio, 2022). Within this literature, ecosystem orchestration has emerged as a key approach for aligning actors, resources, and activities in non-hierarchical settings (Autio, 2022; Dhanaraj & Parkhe, 2006; Santos et al., 2023). Even though orchestration has been studied, the concept itself is still not fully clear or consistently defined, and different studies emphasize different aspects, such as networks or resources, as well as different types of orchestrators (Santos et al., 2023; Shen et al., 2024).

Thus, these insights have not been systematically applied to circular economy ecosystems. While circular ecosystems share some similarities with other ecosystem types, they also involve specific challenges related to material flows, sustainability goals, and cross-sector collaboration (Konietzko et al., 2020). This suggests that existing knowledge on ecosystem orchestration could offer useful insights, but it is not yet clear how well it applies to circular contexts. What is missing is a structured understanding of how ecosystem orchestration has been conceptualized and how these insights can be applied to circular economy ecosystems.

1.2 Research aim and objectives

The purpose of this thesis is to develop a clearer understanding of ecosystem orchestration by synthesizing insights from prior ecosystem literature and reflecting these insights in the context of circular economy ecosystems.

To achieve this aim, the study pursues three objectives:

1. To synthesize how ecosystem orchestration is conceptualized in prior ecosystem research
2. To examine how ecosystem orchestration is understood in the context of circular economy ecosystems

3. To reflect and interpret insights from prior ecosystem orchestration literature in the circular economy context to identify context-specific characteristics and challenges

By addressing these objectives, the study provides a structured overview of ecosystem orchestration and highlights how existing orchestration insights can be applied to circular economy ecosystems. In doing so, it connects two research areas that are often studied separately and offers a clearer understanding of how orchestration supports circular ecosystem development.

This study aims to add value to the existing literature in the field. It offers a conceptual examination of ecosystem orchestration and helps to clarify its fragmentation. Furthermore, this study expands the understanding of circular ecosystem orchestration and provides insights into how that context can change the way orchestration works.

1.3 Structure

This thesis is structured as follows. Chapter 1 introduces the research topic, presents the research gap, defines the research aims and objectives, and explains the key concepts. Chapter 2 presents the theoretical framework, including ecosystems, circular ecosystems, and ecosystem orchestration. Chapter 3 describes the research methodology and explains how the systematic literature review was conducted, as well as presenting an overview of the reviewed articles. Chapter 4 reports the main findings of the study. Chapter 5 discusses the findings in relation to existing literature and highlights their theoretical implications. In addition, it provides a critical evaluation of the study, outlines the use of artificial intelligence in the research process, and presents suggestions for future research.

1.4 Key concepts

This study has four key concepts, which are circular economy, ecosystem, circular ecosystem, and ecosystem orchestration. This subsection briefly outlines these concepts to provide a clearer understanding of the study's theoretical foundation and context.

Circular Economy (CE)

The circular economy is an economic model that seeks to minimize waste generation and resource loss while preserving the value of products, materials, and resources in the economy for as long as possible. It differs from the traditional linear model (take–make–use–dispose) by emphasizing reuse, recycling, repair, and new business models that extend the lifecycle of materials (Geissdoerfer et al., 2017).

Ecosystem

According to Adner (2017), an ecosystem is a system of several partners or organizations that must work together so that a certain product, service, or the value proposition can happen. It is not just about who is connected to whom, but how their activities and goals are aligned to make that shared value possible.

Circular ecosystems

A circular ecosystem refers to a group of different actors often from different sectors, such as companies and governments, who work together to create circular solutions. These actors are connected through flows of materials, information, and money, and their goal is to reduce waste and keep resources in use for as long as possible. Even though the actors are independent, they depend on each other and have different roles in the system. Together, they create value that no single actor could achieve alone (Geissdoerfer et al., 2025).

Ecosystem Orchestration

Ecosystem orchestration refers to the deliberate actions through which an ecosystem leader, or a group of leaders, aligns autonomous actors and their contributions to enable a coherent system-level value proposition (Addo, 2022; Autio, 2022; Shen et al., 2024).

2 Theoretical Framework

Chapter 2 first explains what ecosystems are and why they are important for understanding value creation. After this, different types of ecosystems and their key differences are described. The concept of circular economy is then introduced to demonstrate why an ecosystem perspective is needed and what the characteristics of circular economy ecosystems are, which is the most relevant ecosystem type for this study. This is followed by a review of various ways to manage ecosystem and an explanation of why orchestration is a useful perspective. Lastly, ecosystem orchestration is introduced.

2.1 Ecosystems

In today's business environment, the focus of value creation has shifted from individual organizations to networks, platforms, and ecosystems, making management increasingly complex (Adner, 2017). As a result, success depends on collaboration and value co-creation with multiple partners within interconnected networks (Nambisan & Sawhney, 2011).

2.1.1 Concept of ecosystem

The concept of an ecosystem is borrowed from biology and refers to a group of actors whose activities are interdependent (Jacobides et al., 2018). The idea of ecosystems in the business field began with Moore (1993), who described markets as dynamic communities of interacting organizations rather than isolated firms. In his view, firms co-evolve over time, influenced by each other by the broader environment, in a way that resembles a biological ecosystem. This ecological metaphor shifted attention away from individual firms and two-sided relationships toward a broader network of actors that together share value creation, competition, and innovation.

Since then, the concept of the ecosystem has gained popularity in business and management field (Adner, 2017; Jacobides et al., 2018; Suominen et al., 2019). Firms are increasingly seen as embedded in dynamic and collaborative ecosystems, where economic activity arises from the interaction of many actors (Cobben et al., 2022; Thomas & Autio, 2022). In this perspective, value is co-created among a broad set of stakeholders, such as firms, suppliers, customers, partners, regulators, communities, and other societal actors, rather than being produced by a single firm for end customers alone. Value is also seen more broadly than profits or customer needs, and firms are expected to act responsibly toward all stakeholders (Möller et al., 2020).

Adner (2017) offers an influential definition of ecosystems as the group of partners who must work together for a value proposition to succeed. He suggests that ecosystems can be understood through two complementary lenses. The ecosystem-as-affiliation view focuses on the actors and their relationships, while the ecosystem-as-structure view focuses on the activities needed to create value and on how these activities must align. In simple terms, one view shows who is involved, and the other shows what needs to happen. Together, these lenses highlight that an ecosystem is not only about who is connected to whom, but also about how interdependent activities are coordinated over time.

This aligns well with Jacobides et al. (2018), who emphasize the actor side of ecosystems and describe them as “a set of actors with multilateral, nongeneric complementarities that are not fully hierarchically controlled.” This means that actors provide different but complementary contributions, depend on each other, and coordinate through shared rules and mutual adjustment rather than hierarchy. According to Aarikka-Stenroos et al. (2021), ecosystem actors rely on one another’s inputs, meaning their actions are shaped not only by their own goals but also by the roles they hold in the ecosystem. These roles determine the material, knowledge, or value they contribute. As a result, actors have different levels of agency in the ecosystem, and the ecosystem’s overall success depends on how well essential contributions and interdependent activities are aligned.

The concept of an ecosystem is often compared to supply chains, networks, and business models, but ecosystems are governed differently and produce different types of outcomes (Thomas & Autio, 2020). Jacobides et al. (2018) argue that ecosystems differ from business models because they operate at the system level, focusing on how multiple autonomous actors together create value rather than how a single firm captures it. They also differ from networks because management in ecosystems is not based on bilateral relationships but on standardized roles, rules, and interfaces that structure interaction among participants.

2.1.2 Types of ecosystems

The ecosystem literature uses a wide range of terms, including industrial, platform, entrepreneurial, knowledge, service, business, and innovation ecosystems (Autio, 2022; Cobben et al., 2022; Suominen et al., 2019; Thomas & Autio, 2020; Jacobides et al., 2018). This diversity of terminology makes comparison across studies difficult and creates conceptual confusion, which complicates the interpretation and integration of research findings (Autio, 2022). Thus, there is a need to identify common patterns and differences across these ecosystem types to build a more general understanding of ecosystems.

Several authors have addressed this conceptual diversity by proposing different ways to describe and group ecosystem types. Jacobides et al. (2018) identify three main ecosystem perspectives: business ecosystems, which focus on firms and their environments; innovation ecosystems, which focus on a focal innovation; and platform ecosystems, which are organized around a technological platform. Thomas and Autio (2020) propose a broader classification based on ecosystem outputs and distinguish between innovation, entrepreneurial, and knowledge ecosystems. In their view, business and platform ecosystems can be seen as specific forms of innovation ecosystems. Cobben et al. (2022) also discuss commonly used ecosystem types, business, innovation, entrepreneurial, and knowledge ecosystems, but do not propose a single new classification. Instead, they argue that ecosystems can be described using several parallel

dimensions, such as ecosystem goals, the level of governance centralization, the role of an orchestrator, geographical scope, and the balance between value creation and value capture.

Suominen et al. (2019) identify five commonly used ecosystem types in the literature: business, innovation, platform, entrepreneurial, and knowledge ecosystems. They explain that these types have developed in different research fields, which helps explain why they differ from each other. At the same time, they emphasize that ecosystem types are not clearly separate, as many studies discuss more than one type at the same time. Rather than offering one correct way to classify ecosystems, they explain why several ecosystem concepts exist and why ecosystem research is conceptually fragmented.

To clarify the differences between commonly discussed ecosystem types, Table 1 summarizes each ecosystem type based on outcome, value creation focus, and key references based on the existing literature.

Table 1. Summary of ecosystem types

<i>Ecosystem type</i>	<i>Outcome</i>	<i>Value creation focus</i>	<i>Key references</i>
<i>Business</i>	Competitive advantage	Firm-level value capture	Moore (1993) Jacobides et al. (2018) Suominen et al. (2019)
<i>Innovation</i>	Products & services	Customer value creation	Adner (2017) Jacobides et al. (2018) Thomas & Autio (2020)
<i>Platform</i>	Complements	Multi-sided value creation	Jacobides et al. (2018) Suominen et al. (2019)
<i>Entrepreneurial</i>	New ventures & models	Opportunity	Autio (2018) Thomas & Autio (2020) Suominen et al. (2019)
<i>Knowledge</i>	New knowledge	Knowledge	Thomas & Autio (2020) Cobben et al. (2022)

Despite these differences shown in Table 1, Thomas and Autio (2020) note that all ecosystems share one important feature: they create system-level outcomes that no single actor could achieve alone. They also identify four common elements found in all ecosystems: the involvement of diverse actors, a shared goal or outcome, mutual dependence between participants, and coordination through rules and governance instead of strict hierarchy. Together, these elements allow ecosystems to produce outcomes that go beyond the capabilities of individual actors.

In summary, the ecosystem concept provides a way to understand how heterogeneous and interdependent actors jointly contribute to system-level outcomes that no single firm could achieve alone. While the literature introduces multiple ecosystem types and classifications, these differences largely reflect variation in ecosystem outcomes rather than entirely distinct phenomena. Therefore, rather than focusing on strict categories, this study aims to identify common elements and key differences across ecosystem types to support a more generalizable understanding

2.2 Circular economy and ecosystems

Although ecosystem types share common characteristics, previous section shows that they differ from one another. This indicates that ecosystem dynamics cannot be fully understood through a single, general perspective, but rather require a context-specific analysis. In this study, the focus is on circular ecosystems. Therefore, although this study is based on a general understanding of ecosystems, it focuses more specifically on circular ecosystems and their specific characteristics. This section discusses the characteristics of circular economy and argues why an ecosystem perspective is needed.

2.2.1 The concept of circular economy

The concept of circular economy emerged from the sustainability literature (Pietrulla, 2022) and has become an important approach to sustainable development (Aarikka-Stenroos et al., 2021). One widely cited definition describes the circular economy as "*an*

industrial economy that is restorative by intention and design" (Macarthur, 2013). The goal of the circular economy is to keep materials in use for as long as possible, reduce waste and emissions, and separate economic growth from the consumption of natural resources (Konietzko et al., 2020; Parida et al., 2019). Circular economy strategies include sustainable product design, digitalization, service-based and sharing solutions, as well as practices such as maintenance, repair, reuse, remanufacturing, and recycling (Geissdoerfer et al., 2020). Due to its broad potential to address environmental, social, and economic challenges, the circular economy has gained strong interest from businesses, policymakers, and researchers (Geissdoerfer et al., 2025).

Early circular economy research often focused on how individual firms and their closest value chain partners could implement circular practices (Pietrulla, 2022). However, this firm-centric perspective has been increasingly criticized for its limited ability to support complex and large-scale circular activities, as it overlooks the interdependencies, coordination mechanisms, and collective action required to achieve circular economy goals (Geissdoerfer et al., 2025; Kanda et al., 2021). While circular business models remain important enablers of circularity, implementing the circular economy requires more than incremental technological improvements or firm-level business model adjustments. Instead, it calls for a fundamental rethinking of value creation and capture at the system level, emphasizing long-term resource circulation and collaboration among multiple actors such as diverse organizations, consumers, and municipalities beyond firm boundaries (Geissdoerfer et al., 2025; Konietzko et al., 2020; Pietrulla, 2022; Trevisan et al., 2023).

Accordingly, the transition to a circular economy is widely described as systemic and disruptive, requiring extensive cooperation and sometimes competition among economic actors, value networks, and societal institutions (Geissdoerfer et al., 2025). The systemic nature of the circular economy implies that circularity cannot be achieved in isolation by individual organizations (Geissdoerfer et al., 2025; Konietzko et al., 2020). Instead, collaboration enables the creation of synergistic value that exceeds what

individual actors could achieve alone (Thomas & Autio, 2020). For these reasons, the ecosystem perspective has become a central focus in circular economy research.

2.2.2 Circular ecosystems

The circular economy and ecosystem concepts are well established and clearly defined as separate streams of research; however, their integration in the form of *circular economy ecosystems or circular ecosystems* remains fragmented and inconsistently defined in the academic literature (Aarikka-Stenroos et al., 2021; Aryee et al., 2025; Geissdoerfer et al., 2025; Konietzko et al., 2020; Pietrulla, 2022; Trevisan et al., 2023). Pietrulla (2022) finds that the circular ecosystem concept has emerged primarily from circular economy research rather than from traditional ecosystem studies, with the term gaining prominence only around 2018. The concept is therefore still in a formative stage, although its use is expected to increase as circular economy research continues to adopt more systemic and multi-actor perspectives.

The circular ecosystem literature uses a variety of related terms to describe different forms of multi-actor collaboration for circular economy implementation. Several studies employ more specific concepts such as circular innovation ecosystem, circular industrial ecosystem, and circular business ecosystem to highlight different analytical focuses (Pietrulla, 2022). For example, Geissdoerfer et al. (2025) identify multiple sub-categories of circular ecosystems, including industrial, innovation, entrepreneurial, knowledge, service and business ecosystems, all of which share a common foundation in interdependent actors and circular resource flows. Similarly, Aarikka-Stenroos et al. (2021) conceptualize circular economy ecosystems as a broad category encompassing different ecosystem types that vary in their interactions, flows and outcomes. Studies focusing on innovation processes often use the term circular innovation ecosystem to emphasize experimentation and collaboration among multiple actors, as shown by Konietzko et al. (2020). In contrast, research on industrial production networks frequently refers to circular industrial ecosystems or circular business ecosystems to stress material flows and coordinated value propositions (e.g., Trevisan et al., 2023).

Based on this literature, this study adopts circular ecosystem as an umbrella term that captures these related but differently focused concepts.

The concept of circular economy ecosystems does not have a single, established definition in the literature. Instead, it has developed through different research perspectives and remains an evolving concept. A foundational contribution is provided by Aarikka-Stenroos et al. (2021), who define circular ecosystems as systems of hierarchically independent but interdependent actors that collectively generate system-level circular outcomes. They also introduce a typology that distinguishes ecosystems based on dominant material, knowledge, and value flows.

Circular ecosystems can take various forms and differ in their structural and functional characteristics, which contributes to the conceptual complexity of the field (Pietrulla, 2022). Traditional ecosystem concepts such as innovation, entrepreneurial, and business ecosystems, have been adopted into the circular economy context to describe different modes of interaction and value creation (Aarikka-Stenroos et al., 2021; Geissdoerfer et al., 2025). However, a key distinguishing feature of circular economy ecosystems is their compelling system-level goal related to resource circulation and sustainability, which goes beyond firm-level innovation or economic value creation alone (Aarikka-Stenroos et al., 2021; Geissdoerfer et al., 2025). This shared systemic objective links otherwise diverse ecosystem forms and supports the view of circular economy ecosystems as an overarching framework that integrates multiple ecosystem types within a common circular logic.

Further studies extend this perspective by focusing on how circular economy ecosystems are organized and function in practice. Trevisan et al. (2023) emphasize shared circular value propositions, coordination mechanisms, and governance structures that align actors across organizational and sectoral boundaries. In contrast, Konietzko et al. (2020) highlight the dynamic and processual nature of circular economy ecosystems, identifying

collaboration, experimentation, and platformization as key principles through which ecosystems enable circularity.

More recent reviews synthesize these earlier contributions. Aryee et al. (2025) describe circular economy ecosystems as non-hierarchical and co-evolutionary systems of autonomous but interdependent actors who create circular value through collaboration and, at times, competition. Similarly, Geissdoerfer et al. (2025) show that most definitions converge on interactions among independent actors and coordinated resource flows that enable system-level circular outcomes, while also recognizing multiple ecosystem sub-types. In general, there is a growing common understanding of circular ecosystems as multi-actor systems that enable circular outcomes beyond the capabilities of individual organizations.

While recent literature increasingly shares understanding of circular ecosystems, less is known about how ecosystems are managed, highlighting the need for further research on ecosystem orchestration (Geissdoerfer et al., 2025).

2.3 Ecosystem management

Although the literature agrees on what ecosystems and increasingly what circular ecosystems are, less is known about how such ecosystems are managed. Research has paid limited attention to management in non-hierarchical, multi-actor settings (Aarikka-Stenroos et al., 2021; Konietzko et al., 2020; Trevisan et al., 2023).

Managing ecosystems is particularly challenging because they do not rely on formal bilateral agreements and cannot be governed through traditional “command and control” approaches (Gomes et al., 2026). Instead, management is based on attracting and persuading voluntary contributions (Thomas & Autio, 2020) and on shared rules and roles rather than direct hierarchical control (Jacobides et al., 2018). As a result, aligning diverse actors, coordinating interdependent activities, and maintaining collective direction becomes complex in ecosystem settings.

Concepts of coordination, governance, and orchestration are closely related in ecosystem management but differ in their underlying logic and operating mechanisms (Autio, 2022; Shen et al., 2024). In this study, orchestration is understood as a broader and more integrative perspective that builds on and extends both coordination and governance. To clarify these differences, this section reviews these three concepts and examines how they contribute to understanding ecosystem management.

2.3.1 Coordination

Coordination is commonly understood as an operational-level activity that focuses on organizing, allocating, and adjusting tasks and activities (Prabowo et al., 2025). This means creating new ways of working and structures for performing tasks. Shen et al. (2024) further clarify that coordination is often ego-centric in nature, as it primarily serves the objectives and interests of the actor performing the coordinating role rather than the collective goals of the ecosystem. While such coordination can improve efficiency and task alignment for individual actors, it does not necessarily ensure system-level alignment or long-term collective outcomes (Mukhopadhyay & Bouwman, 2019).

As a result, managing coordination challenges in ecosystems often requires going beyond aligning tasks or activities. It also involves aligning expectations, interpretations, and commitments, as well as supporting learning and adaptation as the ecosystem evolves (Gupta et al., 2020). These limitations of coordination as a primarily operational and often ego-centric mechanism highlight the need for broader approaches that can provide more stable and system-level alignment. This has led ecosystem management research to increasingly focus on governance and orchestration perspectives.

2.3.2 Governance

One way to examine ecosystem management is through governance. Ecosystem governance refers to the rules, structures, and decision-making arrangements that shape

how actors participate in and interact within an ecosystem (Mukhopadhyay & Bouwman, 2019). In platform and digital ecosystems, governance is often described as a design task in which ecosystem leaders balance openness and control through mechanisms such as access rules, standards, and value appropriation arrangements (Mukhopadhyay & Bouwman, 2019; Autio, 2022). Through these mechanisms, governance creates a shared framework that guides interaction among autonomous actors. While this supports coordination, it does not fully explain how alignment is actively created in dynamic ecosystem settings.

Governance helps explain how coordination can be supported in the absence of hierarchy by providing shared rules and standards that reduce uncertainty and guide actor behavior (Shen et al., 2024). However, it also has clear limitations. Many studies focus on relatively stable and bounded settings. In large and open ecosystems, actors are typically not formally contracted and cannot be easily controlled, which limits the effectiveness of governance mechanisms based on formal control alone (Mukhopadhyay & Bouwman, 2019). Another limitation is that governance is often treated as static, focusing on rules defined in advance rather than on how alignment evolves over time. While governance defines the conditions for interaction, it does not fully explain how actors are motivated, how conflicts are resolved, or how shared direction develops (Autio, 2022; Kindermann et al., 2022).

Overall, governance provides the structural conditions for interaction but does not fully explain how alignment is actively created and maintained in dynamic ecosystems. This highlights the need for a more integrative perspective that not only defines the rules of interaction but also actively aligns and motivates actors.

2.3.3 Orchestration

The orchestration perspective addresses the limitations of coordination and governance by focusing on the active work of steering ecosystems (Autio, 2022; Shen et al., 2024). It integrates both structural and operational elements of ecosystem management into a

dynamic, system-level approach. In ecosystems, governance often takes the form of orchestration, as coordination relies mainly on informal relationships, trust, and relational mechanisms rather than formal enforcement (Santos et al., 2023; Harima et al., 2024).

Orchestration refers to the deliberate actions through which an ecosystem leader, or a group of leaders, aligns autonomous actors and their contributions to enable a coherent system-level value proposition (Addo, 2022; Autio, 2022; Shen et al., 2024). In this sense, orchestration reflects the idea that the core of ecosystem strategy lies in achieving alignment rather than merely coordinating activities (Adner, 2017). While governance sets the structural conditions for interaction, orchestration represents an active process that builds momentum and generativity within the ecosystem (Autio, 2022). Addo (2022) highlights that orchestration is dynamic and processual. Orchestrators face different challenges during ecosystem initiation, stabilization, and expansion, and must continuously balance strategic direction with flexibility.

Orchestration is particularly important in situations where actors' individual goals are not naturally aligned. In such contexts, shared direction and collective commitment cannot be taken for granted but must be actively constructed through interaction and engagement (Addo, 2022). Shen et al. (2024) describe orchestration as eco-centric in nature, meaning that its primary aim is to align independent actors around a shared vision and mutual benefits at the ecosystem level, rather than serving the interests of a single focal actor. This perspective also emphasizes that, in dynamic environments, ecosystem management must shift from managing static structures to continuously shaping processes and relationships, which lies at the core of orchestration (Möller et al., 2020).

2.3.4 Summary of ecosystem management

Taken together, coordination, governance, and orchestration represent related but distinct approaches to ecosystem management. Coordination focuses on operational

task alignment, while governance defines the structural rules and conditions for interaction among actors. While both perspectives are necessary, they address only partial aspects of ecosystem management and are insufficient on their own to explain how collective action is sustained in dynamic, non-hierarchical ecosystems.

Orchestration builds on these perspectives by integrating both coordination and governance elements and extending them. It recognizes that ecosystems cannot be managed through hierarchical control or formal rules alone, but instead require continuous interaction, persuasion, and the alignment of diverse interests around a shared vision. As such, orchestration provides the most comprehensive perspective for understanding how ecosystems are steered in practice, particularly in complex and evolving contexts. The following section therefore examines how orchestration is conceptualized across ecosystem research.

Figure 1 illustrates how different ecosystem types form the broader context for ecosystem management, and how orchestration is embedded within this management through coordination and governance. It shows that ecosystems can take different forms (e.g., business, innovation, entrepreneurial, platform, and circular), and that managing these ecosystems involves coordination and governance, which together constitute ecosystem orchestration. It is important to note that these ecosystem types are not mutually exclusive. For example, innovation or industrial ecosystems may also incorporate circular economy objectives and thus have characteristics of circular ecosystems. However, for the purpose of clarity and analytical focus, this study treats circular ecosystems as a distinct ecosystem type.

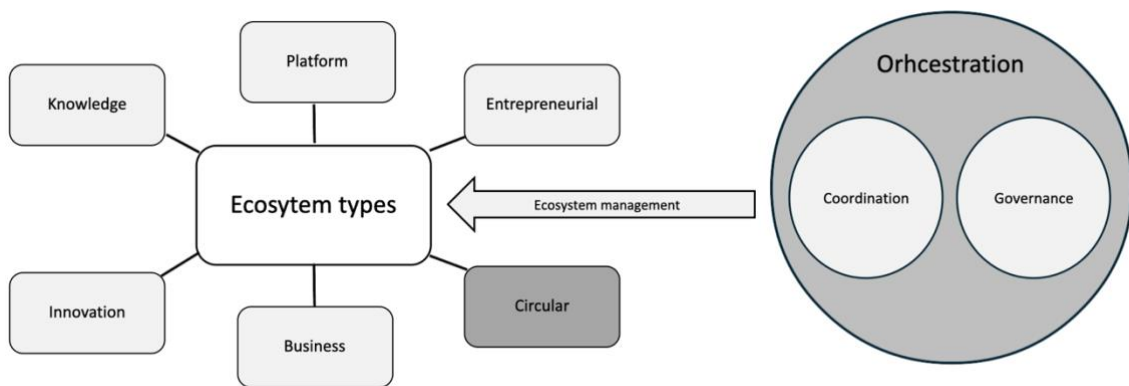


Figure 1: Theoretical framework

The purpose of Figure 1 is to clarify the overall theoretical structure of the study. It demonstrates how the study builds on prior ecosystem literature while focusing specifically on circular ecosystems, and positions orchestration as a key approach to managing ecosystems.

2.4 Ecosystem orchestration

This section lays the foundation for the next chapter, Chapter 3, in which the concept of ecosystem orchestration will be studied. Although orchestration is widely used in ecosystem research, it has not been conceptualized in a consistent manner, and existing models are often broad conceptual approaches that offer little practical insight (Autio, 2022; Lingens et al., 2022). Studies refer to different aspects of orchestration. These include, for example, different type of orchestrators, targets of orchestration, and forms of orchestration, which makes it difficult to compare across contexts. To address this fragmentation, a few core dimensions can be identified that capture the main aspects of ecosystem orchestration.

Orchestration can be broadly understood as *“the deliberate development and coordination of interdependent—yet independent—actors, resources, information, processes, and services within an ecosystem in order to create, co-create, and appropriate value”* (Hewett et al., 2022). At the same time, it remains unclear how

ecosystem management is organized in practice, who takes responsibility for orchestration, and how actors' interests are aligned over time (Aryee et al., 2025; Geissdoerfer et al., 2025). For this reason, a more structured way of examining orchestration is needed.

To address this fragmentation, this study examines ecosystem orchestration through three analytical dimensions: who orchestrates, what is orchestrated, and how orchestration is carried out. These dimensions provide a simplified way to compare how orchestration is conceptualized across the literature. Rather than assuming a single fixed model of orchestration, they make it possible to identify recurring patterns and differences across ecosystem studies.

The first dimension concerns who orchestrates. Research shows that ecosystem orchestration can be performed by different types of actors. These include focal firms (Autio, 2022), platform leaders (Valkokari et al., 2017), public actors (Harima et al., 2024), combinations of actors (Reypens et al., 2021), and in some cases even individuals (Machado et al., 2025). This suggests that orchestration is not necessarily tied to a single dominant actor, but may also be shared, distributed, or context dependent.

Regarding the second dimension, what is orchestrated, two main perspectives have been identified in the literature: network orchestration (Dhanaraj & Parkhe, 2006) and resource orchestration (Sirmon et al., 2011). Network orchestration focuses on coordinating relationships and interactions between actors (Dessaigne & Pardo, 2020), while resource orchestration focuses on how fragmented resources and capabilities are structured and mobilized for value creation (Baert et al., 2016; Batterink et al., 2010). Traditionally, these perspectives have been examined primarily from a firm-level perspective rather than an ecosystem-level perspective (Chadwick et al., 2015; Perks et al., 2017).

Harima et al. (2024) emphasize that in ecosystem orchestration cannot be understood by focusing on either resources or networks alone. They argue that resource

orchestration and network orchestration should be examined together, as they represent interdependent and complementary dimensions of ecosystem-level orchestration. They add that network orchestration creates the structural conditions that enable resource orchestration, while the development and mobilization of resources, in turn, support the expansion and evolution of networks. This perspective is supported by Adner (2017), who highlights that ecosystems consist of interdependent roles, activities, and resources that must be aligned for an ecosystem to function.

Regarding the third dimension, ecosystem orchestration also differs in terms of how it is carried out. Prior literature does not provide a single, consistent classification, but it broadly distinguishes between more intentional and planned forms of orchestration and more gradual, interaction-driven forms that develop over time. These differences are often described using concepts such as top-down versus bottom-up or deliberate versus emergent orchestration (Autio, 2022; Reypens et al., 2021; Shen et al., 2024). This distinction forms the third key dimension of ecosystem orchestration, which focuses on how ecosystems are orchestrated and the underlying logic of deliberate and emergent.

In addition to the three highlighted dimensions, ecosystem management varies depending on the context and maturity of the ecosystem. More structured ecosystems (e.g., business and innovation ecosystems) are often managed in a more centralized and directive way, while more open and evolving ecosystems (e.g., knowledge and entrepreneurship ecosystems) rely on decentralized and facilitative governance (Cobben et al., 2022). In line with this, this study seeks to understand how differences in ecosystem context influence ecosystem orchestration.

To develop this understanding, the study first draws on findings from the broader ecosystem literature, where orchestration logics have been examined in greater depth. These findings form the basis for conceptualizing orchestration across different ecosystem types.

The three described dimensions are particularly relevant in the context of circular ecosystems. Circular ecosystems involve diverse actors from different sectors, strong interdependencies, and system-level sustainability goals, which increase the need for alignment across organizational and sectoral boundaries (Oskam et al., 2021). At the same time, prior research suggests that the management of circular economy ecosystems remains insufficiently understood. (Geissdoerfer et al., 2025). Examining who orchestrates, what is orchestrated, and how orchestration is carried out therefore provides a useful analytical lens for understanding how orchestration is conceptualized in circular ecosystem research.

Accordingly, this study uses these three dimensions to analyze how ecosystem orchestration is described in the literature. In doing so, it aims to provide a more structured understanding of ecosystem orchestration and to examine how insights from prior ecosystem research can be applied to the context of circular economy ecosystems, using more traditional ecosystem literature as a foundation.

3 Methodology and Data

Chapter 3 describes the research method used in this study. It explains why a systematic literature review (SLR) was chosen and how the review was conducted. Also, the role of literature reviews as a research method is discussed. It then explains the main principles of a systematic literature review. Next, the steps followed in this study are described, including the search strategy, selection criteria, and data analysis method. Finally, the quality of the selected method and data is evaluated. The aim of this chapter is to ensure the transparency, clarity, and reproducibility of the research process.

3.1 Literature review as a research method

A literature review is an important part of academic research as the gathered information is based on previous work (Salminen, 2011). It is used to identify, evaluate, and summarize existing and published information (Fink, 2010). By looking relevant literature researchers can understand what is already known about the topic, identify research gaps and assess the quality of existing knowledge (Xiao & Watson, 2019). To ensure reliability, a literature review should be systematic, precise, and repeatable (Fink, 2010; Williams et al., 2021; Salminen, 2011).

Different types of literature reviews can be identified in research. The two main types are narrative and systematic literature reviews (Salminen, 2011; Snyder, 2019; Tranfield et al., 2003; Williams et al., 2021). A narrative literature review is considered the traditional form of review and aims to provide a general overview of a topic or describe the development of a phenomenon (Salminen, 2011). It is commonly used to build a theoretical framework that justifies the research design (Snyder, 2019; Xiao & Watson, 2019). However, Tranfield et al. (2003) argue that narrative reviews often lack systematic procedures, which can lead to biased study selection and mainly descriptive analysis instead of cumulative knowledge building. A narrative literature review often does not meet the requirements of independent research methodology in the same way as, for example, a systematic review (Williams et al., 2021).

Instead, a systematic literature review (SLR) follows a clear and structured process. SLR is not just a summary of previous studies, but a systematic way of collecting, evaluating, and combining existing research (Salminen, 2011; Snyder, 2019; Tranfield et al., 2003). The researcher explains in detail the steps of the review process, which makes the process transparent and repeatable. To ensure this, SLR uses several academic databases, clearly defined search terms, and Boolean operators (Tranfield et al., 2003; Xiao & Watson, 2019). The goal is to identify relevant research thoroughly and reduce bias (Williams et al., 2021). When conducted carefully, an SLR helps develop clearer theoretical understanding, identify research gaps, and connect fragmented research areas (Snyder, 2019; Xiao & Watson, 2019).

The use of SLRs in management research has increased in recent years. Tranfield et al. (2003) introduced the method in the field of management in response to the growing complexity and fragmentation of the field. When research is fragmented, it is difficult to construct cumulative and structured knowledge (Salminen, 2011; Tranfield et al., 2003). A systematic approach helps to clarify key concepts, compare different perspectives, and build a coherent theoretical foundation (Snyder, 2019). Although SLR was adopted later in the field of management than, for example, in medicine, its use in management journals grew by 47% per year between 2014 and 2019 (Williams et al., 2021). This indicates a strong and growing interest in SLR as a research method in management.

Webster and Watson (2002) suggest that the approach to a literature review should be based on the maturity of the research topic. When the field of research is still developing, the aim of the review is to clarify concepts and identify key themes. In mature topics, the focus may shift to testing, refining, or integrating theories. Thus, the maturity of the topic affects the scope, structure, and potential theoretical contribution of the review. Webster and Watson (2002) also emphasize that a literature review should be concept-centric rather than author-centric. This means that the review is organized around key concepts and themes, rather than simply listing individual authors. A concept-driven

approach supports the building of cumulative knowledge and leads to stronger theoretical contributions. Literature reviews can be used either as background for empirical research or as stand-alone research methods (Xiao & Watson, 2019). In this thesis, the literature review is conducted as a stand-alone study. The aim is not to support empirical data collection, but to combine and interpret existing research to develop clearer conceptual understanding.

Research on ecosystem orchestration in the context of the circular economy is still developing. Key concepts are used in different ways, and the research field is fragmented. Therefore, following Webster and Watson (2002), this study adopts a concept-centric, theory-building systematic literature review. The focus is on clarifying concepts, structuring the research field, and identifying essential themes to systematically build understanding of the field. As ecosystem orchestration is still a relatively developing research topic, it makes systematic literature review an appropriate and well-justified approach for this study.

3.2 Systematic Literature Review

Now that the choice of a systematic literature review as the research method has been justified, this section explains how the review is conducted. A systematic literature review is characterized by a structured and transparent process for identifying, evaluating, and synthesizing relevant research evidence (Tranfield et al., 2003; Xiao & Watson, 2019).

This review is guided by three key principles: transparency, reproducibility, and minimization of bias. Transparency means that every step of the process is clearly described. Reproducibility means that other researchers could follow the same procedure and arrive at similar results. Minimizing bias is achieved by using clear inclusion and exclusion criteria as well as systematic search strategies (Fink, 2010; Tranfield et al., 2003).

According to Xiao and Watson (2019), the review process is divided into three main phases: planning, conducting, and reporting (see Table 2). Each phase includes specific steps that structure the review and ensure methodological strictness. The process is iterative, meaning that earlier steps can be refined as understanding of the literature evolves.

Table 2. Systematic literature review process (adapted from Xiao & Watson, 2019)

Phase	Step	Description	Key Actions
I Planning	1.	Defines the focus and direction of the research review.	Develop clear research questions and avoid overly broad topics.
	2.	Develop and validate research protocol	Prepare a clear plan before starting the review. Define the search strategy, inclusion & exclusion criteria, and analysis approach. Validate the plan if possible.
II Conducting	3.	Literature search	Systematically identify relevant studies. Use academic databases and perform backward and forward citation searches. Document the search process.
	4.	Screening	Remove studies that are not relevant. Review titles and abstracts using predefined criteria.
	5.	Quality assessment	Evaluate the scientific quality of selected studies. Read full texts and critically assess their quality.
	6.	Extract data	Collect relevant information of selected studies. Code and record key information based on the research questions.

	7. Analysis and synthesis	Organize and combine findings.	and the	Group results into themes and connect them to the research questions.
III Reporting	8. Reporting results	Present the process and findings clearly.	Describe transparently	the method and highlight research gaps.

3.3 Search strategy

In line with the SLR process illustrated in Table 2, this study follows a planning phase consisting of two steps: formulating the research objectives and developing and validating the search protocol. In this study, the SLR planning phase involved refining the research questions, selecting databases, defining search strings, and specifying inclusion and exclusion criteria.

The research objectives were developed based on relevant literature and the research gaps identified therein. This helped highlight the fragmentation of research on ecosystem orchestration and revealed that many related concepts such as governance, coordination, leadership, and management are used across studies. It also showed that the relatively new concept of ecosystem orchestration in the context of the circular economy could benefit from insights gained from existing research. Based on this, the research questions were refined, and the scope of the study was narrowed.

The search strategy was developed and validated as part of the review. The selection of databases and the formulation of search strings should be evaluated with a professional (Salminen, 2011) and for students in particular, this validation is a critical step before conducting the actual search to ensure the quality of the research (Xiao & Watson, 2019). For this study, two databases were selected: Web of Science and Scopus, as Williams et al. (2021) note that no single database is complete and that combining databases ensures the comprehensiveness of the search. These databases were selected because

they are widely recognized and provide access to high-quality research (Xiao & Watson, 2019). In addition, a search specialist at the Tritonia Library confirmed that these two databases would be relevant to my subject area and sufficient for a systematic literature review at the master's thesis level.

The search strings were developed based on prior literature, database keyword tools, and in collaboration with the search specialist from Tritonia to ensure that the search was both comprehensive and relevant. Although ecosystem orchestration is closely linked to concepts such as coordination, governance, management, and leadership, these broader terms were not included in the final search strategy. A test search that included these terms was conducted in both the Web of Science and Scopus databases, which resulted in too many search results (over 25,000 in the Web of Science database and over 36,000 in the Scopus database). The test search showed that most of these studies were not directly related to ecosystem orchestration, but rather focused on general management or organizational processes without a clear ecosystem perspective. Including these terms would have weakened the relevance of the data and increased the screening workload without providing significant benefit to the study's objectives. As presented in the theoretical section, orchestration is a central concept in understanding ecosystem management. For this reason, the search strategy was intentionally limited to orchestration to ensure that the dataset remains clear and aligned with the study's objectives.

Two main search terms were used: "ecosystem AND orchestrat*" and "ecosystem AND orchestrat* AND circular." The first search term was used to find studies that focus specifically on the orchestration of ecosystems, while the second was added to ensure that studies focusing on circular ecosystems were not missed. The context of the circular economy was thus considered more of a complementary dimension than a mandatory requirement. Both search terms were used in both databases. In total, four searches were conducted.

Lastly, clear inclusion and exclusion criteria were defined, as they guide the selection of studies included in the review. These are presented in Table 3. Well-defined criteria are essential for ensuring the quality of the study, but they must also be logically justified (Snyder, 2019). The first set of criteria relates to practical limitations, such as publication year, language, publication type, and subject area (Snyder, 2019). The second set of criteria relates to content of the articles. In this study, the third criterion was complementary and related to circular ecosystems.

Although the concept of ecosystems was introduced earlier (Moore, 1993), it has been more widely studied since the 2010s, when clearer theoretical and conceptual foundations were developed (Autio, 2022). In addition, preliminary searches on ecosystem orchestration show that most studies have been published since around 2015, suggesting that the topic is still relatively new. Based on this, only articles published between 2016 and 2026 were included. A ten-year period was considered appropriate because it covers the most up-to-date research while avoiding the inclusion of earlier studies that may not necessarily reflect current conceptual developments in the field. This supports both the relevance and coherence of the analysis.

Only English-language publications were included, as English is the dominant language in academic research and most leading international journals publish in English (Salminen, 2011). In addition, only peer-reviewed journal articles were included in this study. Scientific articles go through a strict peer-review process, which makes them more reliable than sources such as reports or websites (Xiao & Watson, 2019). Peer-reviewed articles are considered “white literature”, meaning that they represent high-quality and validated research (Williams et al., 2021). To ensure the relevance of the research fields, subject area filters in Scopus and Web of Science were used to focus on business and management research.

After applying the practical criteria, attention shifts to the content of the articles. The purpose of these criteria is to ensure that the selected studies are relevant to the

research. Only studies in which ecosystems were the primary unit of analysis were included. Studies that did not clearly address ecosystems but instead focused on related topics, such as networks, or business models without an ecosystem perspective, were excluded. In addition, the studies had to focus on ecosystem orchestration or closely related concepts as a central theme. Articles were excluded if orchestration was not addressed or if it was only a small part of the study. Lastly, the included studies had to clearly explain or analyze ecosystem orchestration. This means that the studies had to describe what orchestration is or how it functions in ecosystems. Articles that only mentioned orchestration without a more detailed explanation were excluded because they did not help answer the research questions of this study.

The final criterion was complementary. The circular economy context was considered as an additional criterion, but not a mandatory one. Studies focusing on circular economy ecosystems were included when relevant, but the absence of a circular economy context was not grounds for excluding a study. This approach was chosen to support the study's objectives. It allows the review to first establish a general understanding of ecosystem orchestration and then examine how these insights apply to circular economy ecosystems. All inclusion and exclusion criteria used in this study are summarized in Table 3 below.

Table 3. Inclusion and exclusion criteria

Type	Inclusion	Exclusion
Practical criteria	Peer-reviewed journal articles	Conference papers, book chapters or reports
	Articles in English	Articles in other languages
	Published between 2016-2026	Published outside the time range

	Business and Management research	Articles from purely ecology, technical or engineering journal
Content-related criteria	Focus on ecosystems	Not focused on ecosystems
	Focus on ecosystem orchestration	Not focused on orchestration
	Provides explanation or analysis of orchestration	Only mentions orchestration without explanation
Additional (context)	Circular economy context included when relevant	Not excluded if circular economy is not addressed

3.4 Search results and screening

Following the planning phase, Xiao and Watson (2019) describe the conducting phase of a systematic literature review as a process that involves systematically identifying relevant studies, screening them based on predefined criteria, and assessing their scientific quality through full-text evaluation.

The first search term (ecosystem AND orchestrat*) yielded 821 results in the Web of Science database and 1,074 results in the Scopus database. Practical criteria were applied: publication years 2016–2026, article type, language (English), and subject area focused on management publications. This narrowed the search results to 154 in Web of Science and 212 in Scopus. After removing duplicates, 276 distinct articles remained. The second search term (ecosystem AND orchestrat* AND circular) yielded 35 hits in the Scopus database and 13 in the Web of Science database. All results from the Web of Science database were duplicates, and after removing the results that overlapped with the first search term (10), 25 new unique articles were found related to circular context in ecosystem orchestration. The results from both search terms were then combined. This resulted in total of 301 articles, which formed the basis for the screening process that is presented in Figure 2 in form of PRISMA flow diagram.

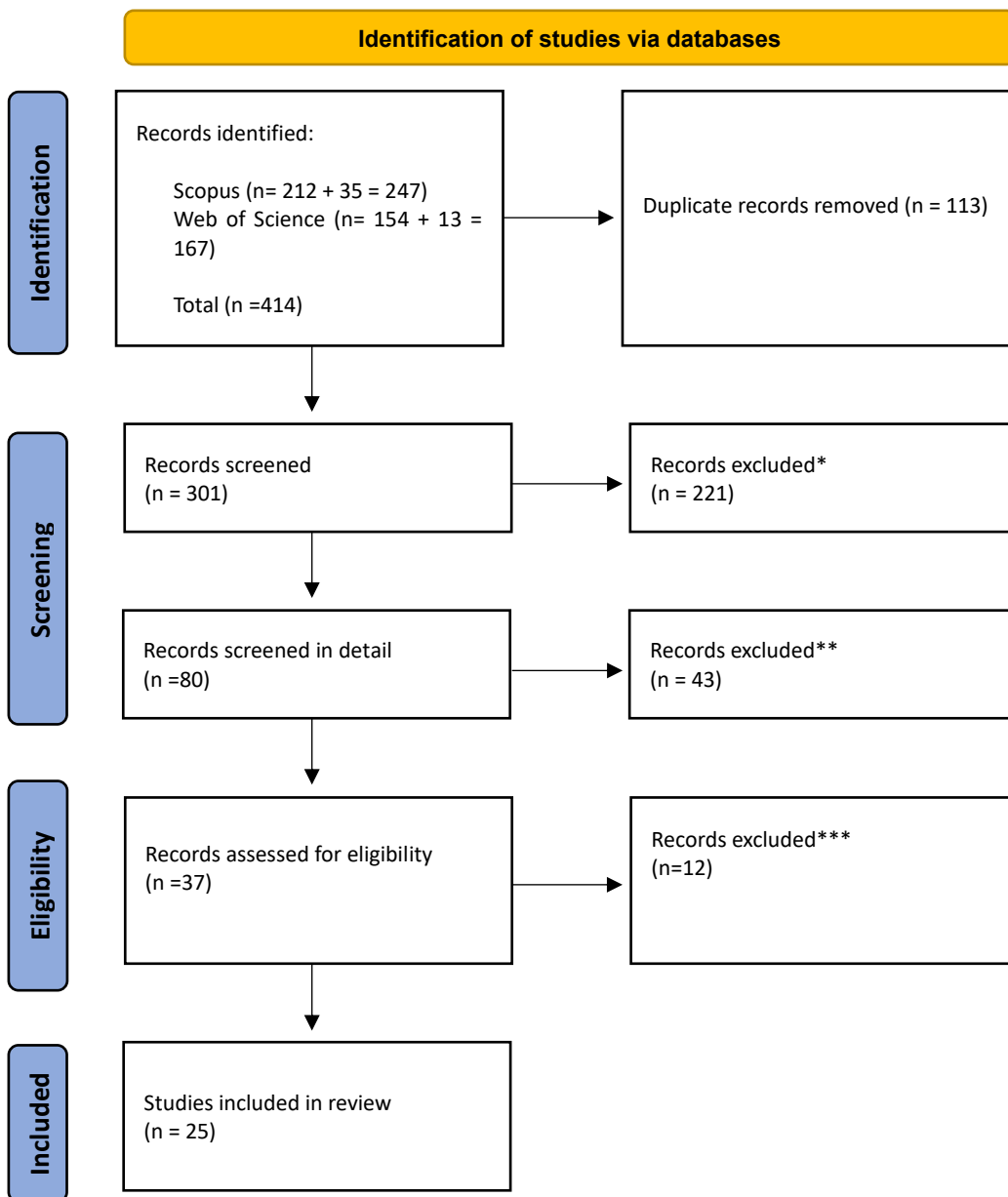
The figure follows the PRISMA flow diagram and shows the main steps of the review process. Using PRISMA helps the researcher report each step clearly, so the reader can assess the reliability of the results and, in principle, repeat the study (Snyder, 2019). Snyder (2019) also notes that PRISMA is a widely used standard for evaluating the quality of literature reviews. In addition, Xiao and Watson (2019) recommend using a flow diagram to report the search, screening, and quality assessment process. The figure shows how the data is gradually reduced: it starts with all identified articles and shows step by step how many were removed at each stage and why, ending with the final set of articles included in the review.

The screening process was carried out in three stages to ensure both the relevance of the topics and their conceptual depth. In the first stage, the screening of 301 articles focused on their overall nature based on titles, keywords, and publication channels. In addition, abstracts were briefly reviewed as needed. Articles were selected if they were clearly related to ecosystems and dealt with orchestration or closely related concepts. Studies that did not focus on ecosystems or did not address the orchestration of ecosystems were excluded. As a result of this stage, 221 articles were removed, leaving 80 articles for further screening.

In the second stage, the remaining 80 articles were examined more closely by reading their abstracts and, where necessary, their introductions and conclusions. The purpose of this stage was to assess whether ecosystem orchestration was the central theme of the research. Articles were rejected if orchestration was not their main theme or if it was mentioned only superficially. As a result, 43 articles were rejected, leaving 37 articles whose full text was evaluated.

All 37 articles selected for full-text review were systematically organized into an Excel. The table included columns describing the content, such as authors, year of publication, and journal, as well as journal quality metrics, such as the AJG ranking and impact factor.

In addition, the table included content-related information, such as the research context and ecosystem type. Each article was also evaluated based on its relevance to ecosystem orchestration, including the role of orchestration in the research and its conceptual depth. Particular attention was paid to whether the article clearly defined and explained ecosystem orchestration or merely mentioned it without deeper analysis. Following this final stage, 25 articles were included in the dataset for analysis. 17 of these studies focused on more traditional ecosystem orchestration, while the remaining 8 examined ecosystem orchestration in the context of the circular economy.



*Not focused on ecosystems, from technical or non-business fields, or not related to orchestration or closely related concepts

** Ecosystem not the main unit of analysis or orchestration not a central focus

*** Lacked clear conceptual explanation of ecosystem orchestration, overly descriptive, or limited contribution to understanding orchestration

Figure 2. PRISMA flow diagram (adapted from PRISMA, 2024)

3.5 Data analysis and data description

The following subsections describe how the data were analyzed and provide an overview of the final dataset. In line with the final stages of the conducting phase outlined by Xiao and Watson (2019), the analysis proceeds from a structured description of the data towards a more in-depth conceptual examination. First, the analysis approach is presented, explaining how the data was organized and examined. This is followed by a description of the dataset, which provides an overview of the selected studies. Finally, the quality of the method and selected data is assessed to ensure the reliability and validity of the findings.

3.5.1 Analysis approach

Before reporting the findings and conducting the synthesis, a content analysis was performed, as suggested by Vilkkä (2023). This involves describing each article in a simple and structured way to understand the key ideas, concepts, and patterns in the selected data. Providing a clear overview of the dataset is an important step in systematic literature reviews, as it helps to structure the analysis, improve transparency, and enable comparison across studies (Tranfield et al., 2003; Xiao and Watson, 2019). This follows the two-stage reporting logic suggested by Tranfield et al. (2003), where the analysis moves from a descriptive overview of the data to a more in-depth thematic examination. In addition, such a structured description supports the transition from a descriptive overview to a more conceptually focused analysis.

In the descriptive stage, the data were organised into a table to provide an overview of the selected studies. The table contained information such as the article reference, ecosystem type, research context, research method, the centrality of the concept orchestration, the conceptual depth of orchestration, contribution type, and key contribution. These dimensions were selected because they directly support the objectives of the study. Understanding the ecosystem type and research context helps to identify how orchestration is studied across different settings. Examining the role and conceptual depth of orchestration ensures that the selected articles have a clear and meaningful focus on the concept itself. In addition, analysing the type and key contribution of each study enables systematic comparison between articles and supports the comparison between prior ecosystem research and circular economy contexts. This table is presented in Appendix 1.

The thematic stage of the analysis was a more in-depth examination of ecosystem orchestration using a structured classification that was presented in Chapter 2. The focus was on extracting conceptual insights rather than comparing methods or empirical results, as the aim was theoretical clarification. The classifications were derived from the research objectives and prior literature. For each article, the following key dimensions were analysed:

- who orchestrates
- what is orchestrated (networks or resources)
- how orchestration is conducted (i.e., the underlying logic, deliberate, or emergent)

The dimensions were further refined during the analysis, as reading the articles helped to identify the most important aspects in the literature. At the same time, the analysis remained open to new themes emerging from the data. Thus, this study combines both deductive and inductive approaches to data analysis. The initial framework was based on the research objectives and prior literature, reflecting a deductive approach. At the same time, the framework was refined during the analysis as new themes and patterns

emerged from the data, reflecting an inductive element. This iterative process is consistent with Xiao and Watson (2019), who highlight that coding in systematic literature reviews often develops as the researcher gains a deeper understanding of the data.

The extracted data from the thematic stage was organized into two tables: one for traditional ecosystem literature (see Table 4) and one for circular ecosystem literature (see Table 5). The data were grouped in this way to use traditional ecosystem research as a foundation for understanding ecosystem orchestration, and to examine how these insights are reflected in the context of circular economy ecosystems. This approach enables the identification of how existing orchestration knowledge can be applied in circular settings and what additional context-specific features may emerge. The results of this thematic analysis are presented in the following Findings section.

3.5.2 Data description

The dataset consists of a total of 25 articles, 17 of which were classified as studies on “traditional” ecosystems. These represent a variety of ecosystem types, including innovation, business, platform, and entrepreneurial ecosystems without circular context. The remaining 8 articles dealt with orchestration in the context of the circular economy. Articles are described more in-depth in Appendix 1.

The context setting of the studies covered a wide range of industries, such as manufacturing, digital platforms, maritime transportation, fashion, higher education, smart cities, and regional development. This diversity highlights the applicability of ecosystem orchestration across different sectors and environments. In terms of methodology, the dataset is mostly qualitative. Most of the studies are based on case study approaches, specifically, multiple case studies, but also include single case studies, a couple of longitudinal case studies and meta-analyses. There were also a few conceptual studies among them that focused on theory building. This implicates that

ecosystem orchestration relies heavily on in-depth analysis with specific contexts, complemented by conceptual development.

Across the dataset, orchestration is primarily treated as the main concept. Most of the studies use orchestration to explain how ecosystems are managed. Only a few articles treat orchestration an important but not central concept. The conceptual depth of the studies is generally high, as most articles provide clear definitions, frameworks, or analytical explanations of ecosystem orchestration. The most common key contribution of the articles was a theoretical frameworks or models explaining ecosystem orchestration. Many studies also provide empirical insights as a secondary contribution and smaller number contribute with theory-building or typology development.

The dataset can be considered recent, as it mainly consists of studies published between 2019 and 2026. This reflects the still evolving nature of ecosystem orchestration research. As the field remains fragmented and diverse, it was important to ensure that the data consisted of publications recognized within the academic field.

3.6 Quality assessment

The quality assessment of articles selected for a review involves the concepts of validity, reliability, applicability, transferability, and generalizability (Vilka, 2023). The quality of a literature review can be assessed based on the search protocol, the extent of the search and the selection process, the quality of the data, and the transparency of the analysis (Tranfield et al., 2003; Xiao & Watson, 2019; Williams et al., 2021). In this study, quality was guided by a predefined search protocol, designed to reduce the researcher's subjective bias, and ensure that the review clearly aligns with the research objectives (Williams et al., 2021). Xiao and Watson (2019) note that it is important for a master's student to validate the protocol with a supervisor or specialist. In this thesis, both the supervisor and a Tritonia Library information specialist assisted in validating the plan.

The quality of the search and selection process was ensured by using multiple databases and clear, well-justified inclusion and exclusion criteria (Xiao & Watson, 2019). These criteria were presented earlier in this chapter in Table 3. It was ensured that only reliable studies, namely peer-reviewed articles were included as Vilkkä (2023) points out that it is particularly problematic if the data for a literature review consists solely of gray literature. In addition, the language, time period, and field of study were restricted to ensure that the data were consistent and comparable.

Vilkkä (2023) further suggests that both external and internal quality factors of selected studies should be assessed for quality. In this study, external quality was evaluated based on the publication channels, while internal quality was assessed by examining key elements of the individual articles, such as their purpose, theoretical framework, and relevance to research objectives.

The quality of the publication channels was assessed using the Academic Journal Guide (AJG) ranking and journal impact factors. The AJG is based on expert evaluations and journal reputation, using a scale from 1 to 4/4*, where level 1 represents a basic level and level 4 the highest level of academic quality. Thus, the AJG reflects the recognition and quality of the publication channel. The impact factor indicates how frequently articles published in a journal are cited and can therefore be used to assess the journal's influence within the research field. These metrics were not used as exclusion criteria, but rather to support the overall quality assessment of the dataset.

A detailed overview of the publication channels and their quality is presented in Table 4. The quality of the data can be considered high, as most of the articles have been published in established journals with an AJG ranking of 2–4. The impact factors are also generally moderate or high, indicating that the journals are widely cited and influential.

Table 4. External quality assessment

Journal	Articles (n)	Impact Factor ≈	AJG
Technovation	3	~11	3
Journal of Business Research	2	~10	3
Business Strategy and the Environment	2	~13	3
Journal of Management Studies	1	~6	4
Entrepreneurship Theory and Practice	1	~8	4
Review of Managerial Science	1	~10	2
European Management Journal	1	~7	2
Innovation: Organization & Management	1	~4	2
Industrial Marketing Management	1	~8	3
California Management Review	1	~7	3
Long Range Planning	1	~6	3
Organization & Environment	1	~7	2
Journal of Cleaner Production	1	~10	3
Technological Forecasting and Social Change	2	~13	3
Journal of Business Logistics	1	~7	3
Industry and Innovation	1	~4	3
Growth and Change	1	~2	2
Industrial Management & Data Systems	1	~5	2
R&D Management	1	~6	3
International Journal of Production Economics	1	~10	3

The quality of the selected studies was also assessed internally, that is, by examining how the studies were conducted and how well they addressed the research question (Vilkka, 2023). Internal validity ensures that conclusions are based on the best possible evidence (Tranfield et al., 2003; Williams et al., 2021). The examination of how selected studies were conducted, used a simplified scale adapted from Vilkka's (2023) checklist. It focused on four areas: purpose, theoretical framework, limitations, and conclusions. These were selected because they reflect the conceptual clarity and transparency of the studies, which are particularly important in this theory-building literature review. The

purpose was used to ensure that the study's objectives were clearly stated. The theoretical framework is central because the aim of this study is to clarify the concept of ecosystem orchestration. Limitations were examined to see how the studies addressed their own weaknesses. The conclusions were used to ensure that the key findings of the studies were presented clearly.

Based on the internal quality assessment in Table 5, the articles reviewed are generally of high quality. All studies clearly define their purpose, theoretical framework, and conclusions. The greatest differences are evident in the presentation of limitations. Although most articles acknowledge the limitations of the research, some studies address them only briefly or in less detail. This suggests that, while the field has strong theoretical and empirical achievements, critical reflection on the limits of research has not been developed as coherently.

Table 5. Internal quality assessment (adapted from Vilkkä, 2023)

Scale:	Purp	Framework	Limitations	Conclusio
Y= Yes, N= Not reported W= Weak	ose	k		ns
Aagaard et al. (2026)	Y	Y	W	Y
Autio (2022)	Y	Y	W	Y
Battistella & Attanasio (2026)	Y	Y	Y	Y
Chirumalla et al. (2025)	Y	Y	Y	Y
Cui et al. (2022)	Y	Y	Y	Y
De Keyser & Vandenbempt (2025)	Y	Y	Y	Y
Foss et al. (2023)	Y	Y	Y	Y
Gomes et al. (2023)	Y	Y	Y	Y
DiVito et al. (2025)	Y	Y	Y	Y
Garcia Ortega et al. (2025)	Y	Y	Y	Y
Kanda et al. (2025)	Y	Y	W	Y
Marques-McEwan et al. (2023)	Y	Y	W	Y

Parida et al. (2019)	Y	Y	Y	Y
Lingens et al. (2022)	Y	Y	Y	Y
Gomes et al. (2026)	Y	Y	Y	Y
Harima et al. (2024)	Y	Y	Y	Y
Linde et al. (2021)	Y	Y	Y	Y
Munch et al. (2025)	Y	Y	Y	Y
Poblete et al. (2022)	Y	Y	Y	Y
Santos et al. (2023)	Y	Y	Y	Y
Shen et al. (2024)	Y	Y	Y	Y
Tsytsyna & Valminen (2024)	Y	Y	Y	Y
Sjödín et al. (2024)	Y	Y	Y	Y
Sjödín et al. (2022)	Y	Y	W	Y
Thomas et al. (2021)	Y	Y	Y	Y

In addition, the internal assessment also examined how well the selected studies address the research objective of this thesis. As the aim is to clarify the concept of ecosystem orchestration, it was important to ensure that the included studies are relevant to this purpose.

The centrality of the orchestration concept was assessed. Only studies in which orchestration is a core focus were included. Articles that only mention orchestration without analyzing it in detail were excluded. This ensures that the dataset directly supports answering the research question. Furthermore, the conceptual depth of orchestration was evaluated. This refers to how clearly the concept is defined and explained in each study. Studies that provide clear definitions, identify key dimensions, or develop the concept further were considered more valuable. In contrast, studies with only a superficial or descriptive use of the concept contribute less to the research objective. This assessment ensures that the selected studies are not only of good quality but also relevant for answering the research question. A more detailed evaluation of the centrality and conceptual depth of the articles is presented in Appendix 1.

4 Findings

This chapter presents the findings of the systematic literature review. The first section outlines the findings related to prior ecosystem orchestration literature referred to as “traditional ecosystems”, followed by a section that presents the findings in the context of circular ecosystems. At the end of the chapter, these findings are synthesized to highlight key patterns and differences to explore what can be learned from the more established ecosystem literature and how these insights can be applied to the circular economy context.

4.1 Traditional ecosystems

The findings on traditional ecosystems are structured around three key dimensions of ecosystem orchestration: who orchestrates, what is orchestrated, and how orchestration is carried out. A summary of the findings is presented in Table 6.

4.1.1 Who orchestrates

The findings show that ecosystem orchestration is carried out by different types of actors, which can be grouped into four main categories: focal firms, multi-actors, neutral or public actors, and individual actors.

The findings reveal that the most common type of actor responsible for orchestration is a focal firm. In these cases, an influential firm takes on the role of leader in orchestrating the ecosystem and guiding its development. These companies can encourage others to participate in the ecosystem, manage resources, resolve coordination problems, and design interdependence structures, (e.g., Autio, 2022; Cui et al., 2022; Gomes et al., 2026). The single orchestrator model has been the traditional way of viewing ecosystem leadership, a perspective highlighted in many theoretical articles (e.g., Autio, 2022; Foss et al., 2023).

The results suggest that orchestration led by a single firm is commonly found in industrial and platform-based business ecosystems, where a large manufacturing or technology firm takes a leading role (e.g., Shen et al., 2024; Sjödin et al., 2022; Gomes et al., 2026). In these situations, the central firm often has a strong position that allows it to coordinate activities and influence the direction of the ecosystem's development. This is also typical in innovation ecosystems where a central or leading firm encourages other actors to join in and align their activities around a shared vision. In these cases, orchestration is often based on influence and persuasion rather than direct control (e.g., Autio, 2022; Foss et al., 2023; Linde et al., 2021).

However, orchestration is not always carried out by a single actor. The findings show that it can also be shared among multiple actors, especially in more complex settings where no single firm possesses all required resources or capabilities. In such cases, responsibility can be shared among key actors, such as the platform provider and the manufacturer, or tasks can be distributed among different actors based on their capabilities (Aagaard et al., 2026; Lingens et al., 2022).

Importantly, the number of orchestrators is linked to the ecosystem lifecycle. In early stages, orchestration is typically centralized and led by a focal actor, whereas in more mature ecosystems it becomes increasingly shared as responsibilities and capabilities are distributed (Harima et al., 2024; Santos et al., 2023). In competitive contexts, actors may also resist a single orchestrator, leading to more shared or neutral forms of orchestration (e.g., Santos et al., 2023; Tsytsyna & Valminen, 2023).

Findings indicate that public and neutral actors, such as universities and public intermediaries, can also serve as ecosystem orchestrators (Harima et al., 2024; Thomas et al., 2021). Neutral orchestrators are more open to different business models as they do not compete directly with others and unlike in firm-led orchestration, the goal of these actors is regional development and collective benefit. These actors often take a leading role in emerging phase of the ecosystem by mobilizing participants, attracting

resources, and creating initial structures. However, their role is typically temporary or evolving, yet still essential for the ecosystem's emergence. As the ecosystem develops, their goal is to transfer or share responsibility of orchestration with actors.

Finally, some studies show how orchestration, can take on more specialized forms at a smaller, micro level. In such cases, orchestration does not occur only between companies, but also between individuals or between internal functions within companies. For example, individual managers can act as orchestrators in uncertain or disruptive situations by influencing others through interpersonal relationships and emotions (De Keyser & Vandembemt, 2025). At the same time, orchestration can also be handled by internal organizational functions, such as supply units, which manage the interface between the company and external partners and adapt internal processes to support ecosystem collaboration (Sjödín et al., 2024). These forms differ from previous forms in that they focus on micro-level interactions and internal capabilities rather than focusing exclusively on company-level.

In summary, the findings suggest that while the focal firm remains the dominant orchestrator in many contexts, there is a clear shift toward more distributed and multi-level forms of orchestration.

4.1.2 What is orchestrated

The findings show that ecosystem orchestration most commonly targets both networks and resources. In most studies, orchestration involves simultaneously aligning actors and relationships (networks) while mobilizing and integrating capabilities, technologies, and other assets (resources). This highlights that value creation in ecosystems depends on the interaction between these two elements (e.g., Autio, 2022; Foss et al., 2023). Only a few studies focus primarily on either networks or resources. Network-focused studies emphasize relationships, roles, and coordination between actors (e.g., Tsytsyna & Valminen, 2023), while resource-focused studies highlight activities such as resource integration and reconfiguration (e.g., Cui et al., 2022).

In addition, the findings indicate that orchestration can extend beyond networks and resources to broader system-level elements. These include ecosystem rules and norms (Santos et al., 2023; Autio, 2022), the structure of interdependencies (Autio, 2022; Gomes et al., 2026), temporal coordination of processes (Poblete et al., 2022), and social dynamics among actors (De Keyser & Vandenbempt, 2025). All together, these suggest that ecosystem orchestration is not limited to managing actors or resources but involves coordinating multiple interdependent elements at the system level.

4.1.3 How orchestration is conducted

The findings show that the logic behind ecosystem orchestration can be broadly grouped into three types: deliberate, emergent, or hybrid, which means combination of deliberate and emergent logic.

In most studies, orchestration follows a deliberate logic (e.g., Santos et al., 2023; Sjödin et al., 2022). This refers to a planned and intentional approach, where an orchestrator defines goals, structures, and coordination mechanisms to guide ecosystem development. It typically involves creating a shared vision, structuring roles, and aligning resources and activities (e.g., Foss et al., 2023; Cui et al., 2022; Münch et al., 2025). Emergent orchestration is less common. In this logic, orchestration develops through interaction, adaptation, and spontaneous actions rather than planning. This is particularly visible in uncertain or disruptive contexts where existing structures no longer function (De Keyser & Vandenbempt, 2025).

A growing number of studies describe orchestration as hybrid. In this logic orchestration is neither entirely planned nor purely spontaneous but is situated somewhere in between. Although orchestration may be intentionally guided, it also develops through interaction, negotiation, and adaptation among the actors. In practice, this may involve shifting from more controlling approaches to more collaborative ones, depending on the situation. For example, Aagaard et al. (2026) describe “dual orchestration,” in which roles

and responsibilities are dynamically adapted among actors at different stages. Similarly, Shen et al. (2024) emphasize the ability to shift between different orchestration logics as ecosystems respond to changing conditions.

Harima et al. (2024) also demonstrate how orchestration can evolve over time, as the more direct orchestration of the early stages gradually shifts toward more enabling and facilitative. This suggests that orchestration logic is closely linked to the ecosystem lifecycle. In early stages, orchestration is more often deliberate, as actors actively define structures, roles, and direction. As the ecosystem matures, orchestration becomes more emergent and relational, relying increasingly on interaction and decentralized orchestration. As a result, ecosystems tend to move toward hybrid forms of orchestration, where deliberate and emergent elements coexist and evolve over time (e.g., De Keyser & Vandenbempt, 2025; Harima et al., 2024; Santos et al., 2023).

The findings show that ecosystem orchestration can follow different logics, but these are not fixed. Instead, orchestration more often combines deliberate and emergent elements and evolves over time depending on the context and development stage of the ecosystem.

Table 6. Summary of traditional ecosystem findings

Article	What is orchestrated (networks or resources)	Logic	Who orchestrates
Aagaard et al. (2026)	Both	Hybrid	Multiple
Autio (2022)	Both	Hybrid	Focal firm
Cui et al. (2022)	Resources	Deliberate	Focal firm
De Keyser & Vandenbempt (2025)	Networks	Emergent	Multiple individuals
Foss et al. (2023)	Both	Deliberate	Focal firm
Gomes et al. (2026)	Both	Deliberate	Focal firm

Harima et al. (2024)	Both	Hybrid	Public actor
Linde et al. (2021)	Both	Deliberate	Focal Firm
Lingens et al. (2022)	Both	Deliberate	Single or multiple
Münch et al. (2025)	Both	Deliberate	Focal firm
Poblete et al. (2022)	Both	Deliberate	Focal firm
Santos et al. (2023)	Both	Deliberate	Multiple actors
Shen et al. (2024)	Both	Hybrid	Focal firm
Sjödín et al. (2024)	Both	Deliberate	Internal function
Sjödín et al. (2022)	Both	Deliberate	Focal firm
Thomas et al. (2021)	Both	Hybrid	Universities
Tsytsyna & Valminen (2024)	Both	Hybrid	Multiple

Table 6 summarizes the results by showing how the selected studies address the three key dimensions of ecosystem orchestration, thereby supporting a structured interpretation of the findings.

4.2 Circular ecosystem findings

The findings of ecosystem orchestration in the circular economy context are reported in this subsection. A summary of the findings is presented in Table 7. Circular ecosystems differ from traditional ecosystems by being more complex, system-level, and distributed. While many core elements remain similar, circular economy introduces new requirements that expand the scope of orchestration.

Orchestration can take place across multiple, overlapping ecosystems, such as innovation, industrial, and entrepreneurial ecosystems (DiVito et al., 2025). This requires orchestration between different sectors and actors because orchestration takes place at an inter-ecosystem level, where different systems are combined and aligned. Also, the lifecycle of ecosystems becomes more important. Especially mature ecosystems are not stable but need to be continuously reconfigured to adapt to circular economy principles.

Existing routines, structures, and shared value propositions may need to be changed or even broken to support new circular goals (Kanda et al., 2025).

4.2.1 Who orchestrates

The findings show that the role of the orchestrator in circular economy ecosystems is more distributed compared to traditional ecosystems. Some studies still emphasize a focal firm that takes a leading role in shaping the ecosystem (e.g., Garcia-Ortega et al., 2025; Gomes et al., 2023; Parida et al., 2019). However, the findings suggest that in the circular economy context, one orchestrator is often not enough. Instead, orchestration can be shared or distributed across multiple actors. For example, Kanda et al. (2025) show that orchestration can be single or shared depending on the lifecycle, while DiVito et al. (2025) highlight the role of multiple actors and intermediaries across ecosystems. This suggests that the circular economy weakens the idea of a single dominant orchestrator. As ecosystems become more complex and cross-sectoral, orchestration becomes more distributed and involves multiple actors as orchestrators.

4.2.2 What is orchestrated

The findings show that like traditional ecosystems, orchestration circular economy ecosystems most commonly targets both resources and networks. However, the circular economy changes how resources are understood by emphasizing material flows and their circulation (e.g., Gomes et al., 2023; Kanda et al., 2025). At the same time, circular economy ecosystems involve new and more diverse actors from different sectors. This expands networks and increases interdependencies, which makes orchestration more complex (DiVito et al., 2025; Garcia-Ortega et al., 2025).

Findings strongly indicate that orchestration in the circular economy is not limited to managing networks and resources, even though these remain important. The findings suggest that orchestration also targets ecosystem's value proposition and institutional environment. The value proposition becomes a key target of orchestration. Instead of

being predefined, it is co-developed among actors and continuously shaped during ecosystem development (e.g., Battistella & Attanasio, 2026; Gomes et al., 2023). This requires aligning actors around shared goals and creating new forms of value. Also, the findings suggest that orchestration targets the institutional environment, including rules, norms, and regulation. Several studies show that transitioning to a circular economy requires changes not only in business models but also in the broader system conditions (Chirumalla et al., 2025; Garcia-Ortega et al., 2025). This expands the role of orchestration toward shaping the operating environment. Overall, the findings suggest that orchestration in circular economy ecosystems goes beyond managing networks and resources, and involves aligning value, systems, and institutional conditions.

4.2.3 How orchestration is conducted

The findings reveal that orchestration in circular economy ecosystems is mainly based on hybrid logic. While deliberate actions, such as building a shared vision and aligning actors, remain important, orchestration is rarely fully planned or controlled. Instead, it develops over time through adaptation, learning, and interaction. For example, Kanda et al. (2025) emphasize continuous adaptation, while DiVito et al. (2025) distinguish between planned and more emergent forms of ecosystem development. Garcia-Ortega et al. (2025) also show that different mechanisms often operate at the same time and reinforce each other. Orchestration in the circular economy can be described as hybrid. It combines deliberate actions with emergent processes. While intentional planning is needed to drive circular transformation, orchestration must also adapt to uncertainty, experimentation, and ongoing change.

To provide a structured overview of these findings, Table 7 summarizes how the selected studies address the key dimensions of ecosystem orchestration in the circular economy context, including who orchestrates, what is orchestrated, and how orchestration is conducted.

Table 7. Summary of circular ecosystem findings

Article	Logic	Who	What (Network / Resources)
Battistella & Attanasio (2026)	Hybrid	Focal firm	Both
Chirumalla et al. (2025)	Hybrid	Multiple	Both
DiVito et al. (2025)	Hybrid	Multiple	Both
Garcia-Ortega et al. (2025)	Hybrid	Focal firm	Both
Gomes et al. (2023)	Hybrid	Focal firm	Both
Kanda et al. (2025)	Hybrid	Multiple	Both
Marques-McEwan et al. (2023)	Hybrid	Multiple	Both
Parida et al. (2019)	Deliberate	Focal firm	Both

Table 7 highlights the overall patterns identified in the circular ecosystem literature and supports the structured interpretation of the findings presented above.

4.3 Synthesis of the findings

This subsection synthesizes the findings from traditional and circular ecosystems. Tables 6 and 7 summarize the results across the three analytical dimensions: who, what and how. Rather than providing a direct comparison, the aim is to bring together key insights across the three dimensions of ecosystem orchestration and to show how these are reflected and extended in the circular economy context.

The findings show that ecosystem orchestration involves actors, resources, and broader system-level elements. Orchestration most commonly targets both networks and resources, highlighting their strong interdependence. In the circular economy, it is necessary to consider actors from different sectors and the flow of resources, which

complicates the orchestration of resources and networks. However, the findings also indicate that orchestration extends beyond these elements to include aspects such as rules and norms, as well as the design of interdependencies between actors. In the circular economy context, this scope further expands to include new value propositions and institutional structures, reflecting the need not only to coordinate existing activities but also to reshape the broader system in which they operate. This suggests that orchestration shifts from existing elements toward shaping the broader system in which the ecosystem operates.

The role of the orchestrator evolves in the circular economy context. While focal firms often play a central role in traditional ecosystem studies often in industrial and platform contexts, the findings suggest that circular ecosystems rely more on shared and distributed forms of orchestration. This reflects the increased complexity of circular ecosystems, the involvement of multiple sectors, and the need to coordinate across ecosystem boundaries. At the same time, traditional ecosystem findings already recognizes that in more complex environments, both the number of orchestrators and the logic of orchestration may change. The findings from circular ecosystems further support and reinforce this view. While traditional ecosystem literature often emphasizes deliberate orchestration with shift toward hybrid logic, circular ecosystems more clearly highlight the importance of hybrid approaches that combine intentional direction with ongoing adaptation, learning, and interaction. This reflects the need to manage uncertainty and continuous change in circular transitions.

The role of the ecosystem lifecycle across both contexts is pointed. Orchestration tends to be more centralized and deliberate in early stages, while becoming more distributed and emergent as the ecosystem matures. In circular economy ecosystems, lifecycle dynamics are more complex. Ecosystems often build on or interact with existing systems that may be at different stages of development. As a result, orchestration must simultaneously manage multiple lifecycles and adapt to varying levels of maturity, which increases complexity and reduces the possibility of fully planned orchestration.

It is suggested by findings that circular economy ecosystems do not simply replicate existing orchestration patterns but extend and transform them. Orchestration becomes more distributed, more system-level, and more focused on enabling continuous transformation.

5 Discussion

This chapter brings together the main findings of the study and discusses them in relation to the research objectives and the theoretical framework. In addition, the chapter presents its theoretical implications, evaluates critically the reliability of the study, transparently outlines the use of artificial intelligence, reflects on its limitations, and makes suggestions for future research.

5.1 Discussion of the findings

The findings show that ecosystem orchestration is not a single, clearly defined concept, but rather a multidimensional phenomenon that is influenced by the type of ecosystem and is constantly evolving. This suggests that ecosystem orchestration should be understood as a structured and dynamic concept rather than a fixed or uniform approach. By analyzing orchestration through the dimensions of who orchestrates, what is orchestrated, and how orchestration is carried out, the findings provide a clearer and more comparable way of understanding how orchestration is conceptualized across different contexts.

The findings address the research objectives in a structured manner. Regarding objective (1), the study clarifies how ecosystem orchestration is conceptualized in prior literature by identifying three key dimensions: who orchestrates, what is orchestrated, and how orchestration is conducted. Regarding objective (2), the findings show that while circular economy ecosystems share many core elements with traditional ecosystems, they are characterized by greater complexity, broader system-level scope, and more distributed forms of orchestration. In relation to objective (3), the results demonstrate that insights from prior ecosystem literature provide a useful foundation but require extension in the circular economy context. Orchestration shifts from coordinating actors and resources toward shaping value propositions, institutional conditions, and broader system-level dynamics.

Across the literature, orchestration is most often described as being led by a focal firm, targeting networks and resources, and following a deliberate logic. However, the findings reveal a more complex reality, including distributed forms of orchestration, system-level targets, and hybrid logics that combine intentional direction with ongoing adaptation. The circular economy context further extends this understanding. Orchestration moves beyond networks and resources to include value creation processes and institutional change, while increased cross-sectoral complexity reinforces the need for distributed and adaptive, hybrid approaches. The findings also indicate that neither the number of orchestrators nor the nature of orchestration is fixed, but evolves over time as ecosystems develop, further highlighting the dynamic and context-dependent nature of ecosystem orchestration.

In relation to the theoretical framework, the findings both support and extend prior research. The view that ecosystem orchestration is a fragmented concept is reinforced, as highlighted in earlier studies (e.g., Lingens et al., 2022). The diversity of ecosystem types and research contexts makes it difficult to build a unified understanding of orchestration. However, as suggested by Autio (2022), identifying patterns and differences across ecosystems is essential for developing a more general understanding. This highlights that identifying patterns across ecosystems can be used for building a more general understanding of orchestration.

The findings also reinforce the idea that orchestration provides a broader perspective on ecosystem management than coordination and governance (e.g., Santos et al., 2023; Shen et al., 2024). While coordination focuses on tasks and governance on rules and structures, orchestration captures the active process of aligning actors, resources, and activities toward a shared system-level goal. This is particularly evident in circular economy ecosystems, where orchestration extends beyond task alignment or rule-setting to include the shaping of new value creation, actors from different sectors, material flows, and institutional conditions. This highlights that orchestration is a more

comprehensive approach for understanding ecosystem management in complex and dynamic environments.

Furthermore, the findings suggest a more integrated view of the key dimensions of orchestration. While previous literature has identified different types of orchestrators, targets of orchestration, and orchestration logics, these have often been examined mainly separately. The results indicate that these dimensions are closely interconnected. For example, the findings help explain when orchestration is more likely to be deliberate or emergent, and when it is carried out by a single actor or shared among multiple actors. In addition, ecosystem literature has typically treated resource orchestration and network orchestration as separate perspectives (Dhanaraj & Parkhe, 2006; Sirmon et al., 2011). In line with Harima et al. (2024), the findings confirm that both are central targets of orchestration, while also highlighting their interdependence and the need to examine them together.

Moreover, orchestration appears to extend beyond networks and resources to broader system-level elements. This finding can be linked to Adner (2017), who emphasizes the importance of ecosystem structure in shaping value creation. While prior literature often focuses on orchestrating networks and resources, the findings of this study suggest that orchestration also needs to target the ecosystem structure itself. This means that orchestration is not only about managing actors and resources, but also about shaping how activities are organized and aligned within the ecosystem.

Lastly the theoretical framework suggests that circular ecosystems are systemic, cross-sectoral, and difficult to manage (Aarikka-Stenroos et al., 2021; Geissdoerfer et al., 2025.) The findings demonstrate how this complexity translates into orchestration practices. Circular ecosystems require broader and more adaptive orchestration, where alignment must occur not only across actors and resources, but also across material flows, value creation processes, and institutional conditions. This explains why circular ecosystem orchestration is more distributed, more system-level, and more strongly characterized

by hybrid logic than orchestration in traditional ecosystems. Importantly the findings highlight that, circular ecosystems do not replace existing knowledge on ecosystem orchestration but extend it.

5.2 Theoretical implications

This study contributes to the theoretical understanding of ecosystem orchestration in several ways, by clarifying its core dimensions, extending its scope, and examining its application in the context of circular economy ecosystems.

Ecosystem orchestration should be viewed as a structured and multi-dimensional phenomenon rather than a broad and loosely defined concept. This highlights the importance of analyzing orchestration through clear dimensions instead of treating it as a general management activity. This study challenges the traditional firm-centered view of orchestration. Ecosystem management should be understood as a relational and context-dependent process rather than as the role of a focal firm. Rather than being purely deliberate and planned, orchestration appears to be hybrid, combining intentional direction with ongoing adaptation. This highlights the dynamic nature of ecosystem management, particularly in complex and changing environments.

The findings further extend the scope of orchestration beyond networks and resources. Orchestration also involves shaping value propositions and institutional conditions, indicating a shift from orchestrating activities toward influencing entire systems. Lastly, the results highlight the importance of context in shaping ecosystem orchestration. In circular economy ecosystems, orchestration becomes more distributed, more system-level, and more dynamic. This suggests that existing orchestration theories should be adapted to better account for complex, cross-sectoral, and sustainability-oriented environments. Overall, this study provides a clearer basis for analyzing ecosystem orchestration in future research.

5.3 Critical evaluation

The quality of the data was assessed in detail in Chapter 3. The final dataset consisted of 25 articles, which is appropriate given the scope of a master's thesis, although a larger sample could have provided a more comprehensive overview of the field. Particular attention was paid to data quality by selecting only peer-reviewed journal articles and by ensuring that the included studies focused on ecosystem orchestration as a central concept rather than merely mentioning it. In addition, both external and internal quality criteria were applied. External criteria focused on the quality of the publication channels, while internal criteria were used to evaluate how the studies were conducted and how well they addressed the research objectives of this thesis. This supports the reliability of the dataset and ensures that the findings are based on relevant studies.

Despite these strengths, it is important to acknowledge several limitations that are inherent in all research and that, when highlighted, enhance the study's reliability. The study was conducted by a single researcher, which may have influenced the search process, the decisions regarding article screening, and the final selection. Although the search strategy was carefully designed and its accuracy verified with the supervisor and a library specialist, and this was transparently reported, it is possible that some relevant studies were overlooked. The use of additional databases, alternative search terms, multiple researchers, or multiple search rounds could have led to a more comprehensive dataset. It should also be noted that the researcher's limited experience with systematic literature reviews may have influenced certain methodological choices, which must be considered when interpreting the results.

The transparency of the study is supported by a detailed description of the data collection and analysis process. The search strategy, inclusion and exclusion criteria, and screening process are clearly documented, and the selected articles are presented in detail in Appendix 1. This improves the study's reproducibility and allows the reader to assess the quality of the data and the consistency of the analysis. At the same time, the data set includes studies from a wide variety of contexts, which made the analysis more

complex. However, this diversity is also a strength, as it reflects the fragmented nature of the literature on ecosystem orchestration. The aim of the method was to synthesize this diversity into key models, and this was achieved in the study.

Other limitations relate to the scope of the review. The study focuses solely on peer-reviewed journal articles, which may overlook relevant findings from publications aimed at professionals or from emerging research. Furthermore, ecosystem orchestration and circular economy ecosystems are still emerging fields of research, which limits the availability of studies and may affect the generalizability of the results. The dataset of circular ecosystem studies was smaller than the traditional ecosystem sample, which may affect the depth of the comparison between these two contexts, even though that was not the intention. Furthermore, the use of simplified analytical categories, such as who, what, and how, helps structure the analysis but may also reduce the complexity of the phenomenon.

5.4 Use of Artificial Intelligence

The University of Vaasa encourages the responsible use of artificial intelligence to support research. In accordance with current guidelines, this requires a transparent description of the AI tools used and how they have been applied.

In this thesis, three digital tools were used to support the research and writing process. ChatGPT was used for idea generation and for developing the research design. It also supported academic writing by improving sentence structure, clarity, and language. In addition, it was used to reflect on academic articles and to further develop ideas related to the topic. NotebookLM was used when working with sources. It supported comparing and discussing information from multiple articles and helped identify relevant sections, while allowing the original sources to be checked directly. DeepL was used to support writing, language editing, and translation.

AI tools were used only as supportive tools. All data selection, analysis, and interpretation were conducted independently by the author. The outputs provided by AI were critically reviewed and verified. The author takes full responsibility for the final content of the thesis and for the use of AI in the research process. This study complies with the university's guidelines on the use of artificial intelligence.

5.5 Future research

This study shows that the orchestration of ecosystems in the context of the circular economy is an emerging and evolving area of research. Although the topic has not yet been extensively studied in management journals, the increasing number of recent publications suggests that interest is growing and will likely expand further in the future.

This study highlights several future research directions. More empirical research is needed to better understand how the orchestration of circular ecosystems occurs in practice, as this study used previous research focused on traditional ecosystems as a point of reference. Future studies could also examine shared and decentralized forms of orchestration, as well as the roles of different orchestrators, including neutral actors, individual actors, or corporate departments. Future studies could also investigate how orchestration varies across different types of circular economy ecosystems and at different stages of the life cycle. Additionally, more research is needed on orchestration between ecosystems, as circular economy systems often cross multiple ecosystems. Lastly, the role of individual capabilities in orchestration has been studied too little, and this offers an important direction for future research.

In summary, this study highlights that the orchestration of ecosystems is becoming increasingly complex, decentralized, and system-level such as in the context of the circular economy. Although the existing literature provides a useful foundation, further research is needed to better understand how orchestration evolves in these dynamic and multidisciplinary environments.

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Appendices

Appendix 1. Overview of the dataset

Article	Ecosystem	Context	Method	Role of orchestration	Conceptual depth	Type of contribution	Key contribution
Aagaard et al. (2026)	Platform	B2B Manufacturing	Multiple case study	Central	High	Framework + empirical insights	Introduces dual orchestration as a dynamic, shared process between platform providers and manufacturers.
Autio (2022)	Innovation	General innovation	Conceptual	Central	High	Theory-building	Develops a multi-layered framework explaining how orchestration operates across technological, economic, institutional, and behavioral layers in different lifecycle stages
Battistella & Attanasio (2026)	Circular innovation	& Coffee industry	Multiple case study	Central	High	Framework	Identifies 19 orchestration routines and 3 capabilities required to navigate circular transformations
Chirumalla et al. (2025)	Circular	EV batter second life	Collaborative Management Research	Important	High	Framework	Proposes a four-stage circular ecosystem management framework, identifies 17 prerequisites and three different paths

							that companies can follow in managing ecosystems.
Cui et al. (2022)	Business	Digital platform, internet fashion brands	Case study	Important	Medium	Framework	Shows how keystones govern ecosystems through resource orchestration under resource sufficiency and scarcity conditions.
De Keyser & Vandenbempt (2025)	Business	Diamond industry-	Case study (longitudinal)	Central	High	Framework	Introduces micro-foundations of orchestration via cognitive, social, and emotional leadership pathways in disruption.
DiVito et al. (2025)	Circular	Textiles and apparel industry	Case study	Central	High	Framework + theoretical insights	Conceptualizes circular ecosystem emergence as the intersection of existing ecosystems and identifies mechanisms for inter-ecosystem orchestration.
Foss et al. (2023)	Innovation	Systemic innovation	Conceptual	Central	High	Theory-building	Conceptualizes ecosystem leadership as a dynamic capability (sensing, seizing, reconfiguring) to solve coordination and cooperation problems
Garcia-Ortega et al. (2025)	Circular	Fashion industry (fast fashion, luxury and sportswear)	Multiple case study	Central	High	Framework	Develops framework for institutional change through orchestration dimensions of

								standardizing, nurturing, negotiating, and building
Gomes et al. (2026)	Platform/Innovation	Digital services	Multiple case study	Central	High	Framework	Models orchestration work as a three-stage process (intermediation, envelopment, smartification) focused on leveraging actor interdependence over time.	
Gomes et al. (2023)	Circular	Six different ecosystems	Multiple case study	Central	High	Framework	Defines "circular ecosystem management" (CEM) as the orchestration of value propositions and configuration sub-processes like circular governance and complementarity	
Harima et al. (2024)	Entrepreneurial	Startup sector	Case study	Central	High	Framework	Develops a processual view of orchestration as evolving network and resource management by anchor organizations in nascent ecosystems	
Kanda et al. (2025)	Circular	Entrepreneurial ecosystem	Qualitative	Central	High	Framework	Identifies coordination challenges and frames the orchestrator as a change agent using dynamic capabilities to align and transform the ecosystem	

Linde et al. (2021)	Innovation	Smart city	Multiple case study	Central	High	Framework	Identifies dynamic capabilities (sensing, seizing, reconfiguring) and mechanisms enabling ecosystem orchestration in complex innovation settings.
Lingens et al. (2022)	Business	Cross-industry	Multiple case study	Central	Medium	Typology	Shows how orchestration can be distributed (single, double, multi) depending on knowledge conditions and task allocation.
Marques-McEwan et al. (2023)	Circular	Chemical manufacturing industry	Case study	Important	Medium	System rules	Unveils seven system rules governing the transition to circularity and identifies orchestrator role shifts from technology providers to product owners or market creator.
Munch et al. (2025)	Business	Manufacturing & logistics	Multiple case study	Central	High	Typology	Identifies a comprehensive set of dynamic and ordinary capabilities required for ecosystem orchestration in complex supply ecosystems.
Parida et al. (2019)	Circular	Large manufacturing companies	Multiple case study	Central	High	Process model	Develops a two-stage process model for circular transformation involving ecosystem readiness assessment and

								ecosystems transformation through 3 mechanisms (standardizing, nurturing, negotiating)
Poblete et al. (2022)	Innovation	Construction	Case study (longitudinal)	Important	Medium	Empirical insights		Shows how orchestration capabilities must manage multiple temporal logics and balance temporary and permanent structures.
Santos et al. (2023)	Entrepreneurial	Regional development	Conceptual	Central	High	Framework		Proposes an integrative framework of orchestration form (single vs. shared) and content (institutional, dynamic, and strategic).
Shen et al. (2024)	Innovation	Industrial firms	Meta-analysis	Central	High	Framework		Identifies five interrelated orchestration practices (strategic, relational, resource, technological, innovation) forming an integrative "Stirring Model" of orchestration.
Sjödin et al. (2022)	Platform	Industrial/digital	Multiple case study	Central	High	Framework		Explains how firms orchestrate ecosystems to enable value creation, delivery, and capture in digital business model innovation

Sjödín et al. (2024)	Business	Automotive & Transport	Case study	Important	High	Framework	Develops ecosystem management capabilities (foresight, integration, governance) and links orchestration to internal organizational alignment.
Thomas et al. (2021)	Knowledge	Higher education sector	Case study (longitudinal)	Central	Medium	Theory-building	Shows how non-firm actors (universities) orchestrate ecosystems through knowledge mobility, appropriability, and network stability.
Tsytsyna & Valminen (2024)	Innovation	Maritime transportation	Case study	Important	Medium	Empirical insights	The article introduces a framework explaining how orchestration balances opposing forces in ecosystems through alignment mechanisms.