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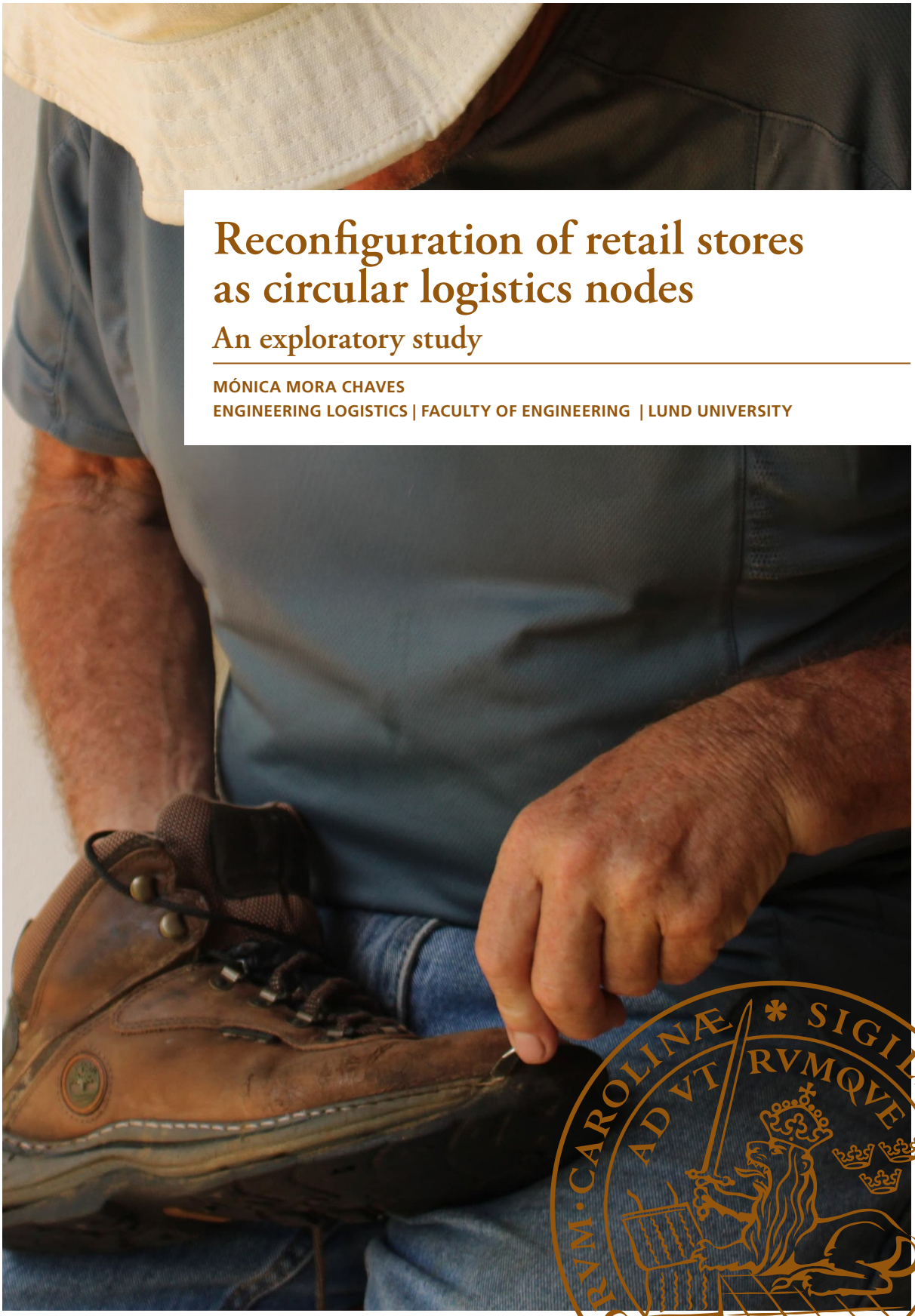
an exploratory study

Mora Chaves, Monica



Reconfiguration of retail stores as circular logistics nodes

An exploratory study

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Reconfiguration of retail stores as circular logistics nodes: an exploratory study

Reconfiguration of retail stores as circular logistics nodes: an exploratory study

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LUND
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Abstract: The transition to a circular economy is transforming retail as we know it. Circular services, such as repair and resale, are becoming an increasingly important part of retail. In this transformation, retail stores are assuming a new role as circular logistics hubs. However, retail stores, traditionally configured for standardized and efficient product flows, must now reconfigure to the new product flows, operations, and resources required to deliver circular services.

The purpose of this thesis is to explore the reconfiguration of retail stores to integrate and scale circular services and develop a broader understanding of the configuration of circular logistics nodes. To address this purpose, two interconnected studies were conducted. Study I employed an integrative literature review to synthesize insights across circular economy, retail, logistics, and service marketing research. The study established a conceptual understanding of the circular retail transformation and identified seven interconnected themes and its implications for retail stores as circular logistics nodes. Study II complemented this conceptual foundation through a multiple-case study of three retail stores in fashion, children's clothing, and furniture. The study identified the operational challenges that circular services introduce, and the mechanisms retailers employ to manage them.

Building on these findings, the thesis develops a matrix of circular logistics node configuration. The matrix employs two dimensions: the level of technical specialization required by the circular operation, and the degree to which circular operations are integrated into nodes or separated into dedicated nodes. The intersection of these dimensions proposes four configuration logics. The matrix also shows that configurations are dynamic. As volumes increase, technology develops, consumer participation matures, and the circular ecosystem expands, nodes need to reassess the suitability of their circular operations relative to their capabilities.

This thesis contributes to research in three ways. First, it conceptualizes circular retail transformation as a shift in the operational context. Second, it applies and extends service marketing theory to explain the design and coordination of circular logistics nodes. Third, it contributes to configuration theory by proposing a framework that explains how circular operations are configured within and across logistics nodes based on the alignment between operational requirements and node capabilities. The findings offer implications for researchers and practitioners seeking to understand and manage the reconfiguration of retail stores as circular logistics nodes.

Keywords: Circular economy, retail store, circular logistics node, material-handling node configuration, product life-cycle extension operations

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Abstract

The transition to a circular economy is transforming retail as we know it. Circular services, such as repair and resale, are becoming an increasingly important part of retail. In this transformation, retail stores are assuming a new role as circular logistics hubs. However, retail stores, traditionally configured for standardized and efficient product flows, must now adapt to the new product flows, operations, and resources required to deliver circular services. Circular services rely on bidirectional, consumer-driven product flows, which introduce uncertainty regarding timing, volume, and product condition, as well as variability in operations. These changes create a mismatch between the operational requirements of circular services and the configuration of retail stores. This problem raises the question of how retail stores can be reconfigured as circular logistics nodes.

The purpose of this thesis is to explore the reconfiguration of retail stores to integrate and scale circular services and develop a broader understanding of the configuration of circular logistics nodes. To address this purpose, two interconnected studies were conducted. Study I employed an integrative literature review to synthesize insights across circular economy, retail, logistics, and service marketing research. The study established a conceptual understanding of the circular retail transformation and identified seven interconnected themes and its implications for retail stores as circular logistics nodes. Study II complemented this conceptual foundation through a multiple-case study of three retail stores in fashion, children's clothing, and furniture. The study identified the operational challenges that circular services introduce and the mechanisms retailers employ to manage them.

To manage the circular service requirements, retailers reconfigure operations, layout, and resources through three mechanisms: decoupling, which separates circular processing from consumer-facing activities across space, time, or actors; buffering, which absorbs variability in consumer-driven product flows; and coordination, which aligns front-office, back-office, and external actors through standardization and mutual adjustment. As circular services scale, retailers must make configuration decisions about which operations are integrated with, or separated from, the stores.

Building on these findings, the thesis develops a matrix of circular logistics node configuration. The matrix employs two dimensions: the level of technical specialization required by the circular operation, and the degree to which circular operations are integrated into existing nodes or separated into dedicated nodes. The intersection of these dimensions proposes four configuration logics: (i) Integration requiring low technical specialization applies to operations such as collection and redistribution, where standardization of consumer input and coupling with existing routines enable integration with minimal reconfiguration. (ii) Integration requiring high technical specialization applies to operations such as repair, where space

decoupling, buffering, and mutual adjustment enable integration when economic or strategic value justifies the investment. (iii) Separation requiring low technical specialization applies when operations exceed in-store capacity, through preponement to consumers or postponement to dedicated nodes. It points towards the emergence of dedicated nodes for collection, sorting, or basic recovery. (iv) Separation requiring high technical specialization applies when advanced recovery operations require dedicated facilities or specialist dedicated nodes. The matrix also shows that configurations are dynamic. As volumes increase, technology develops, consumer participation matures, and the circular ecosystem expands, nodes need to reassess the suitability of their circular operations relative to their capabilities.

This thesis contributes to research in three ways. First, it conceptualizes circular retail transformation as a shift in the operational context. Second, it applies and extends service marketing theory to explain the design and coordination of circular logistics nodes. Third, it contributes to configuration theory by proposing a framework that explains how circular operations are configured within and across logistics nodes based on the alignment between operational requirements and node capabilities. The findings offer implications for researchers and practitioners seeking to understand and manage the reconfiguration of retail stores as circular logistics nodes.

Acknowledgements

My supervisor told me on the first day of this journey, “A PhD is a marathon, not a sprint.” While he meant to highlight the endurance, my experience has felt more like an open-water swim. The first time I swam in open water was both exciting and scary. Everybody was thrilled, the energy level was high, and it was this perfect mix of adrenaline and anticipation. But the moment I stepped into the water, everything changed. The world became quiet; the guiding lane of the pool disappeared; the water was very cold; the distance was unknown; currents and waves pushed me off course, and the dark depths below were scary. In many ways, you are on your own. Swimming in open water requires more than endurance. You plan, but things shift; you move forward, but not always in a straight line; and sometimes you have to stop, reorient, and find your direction again.

This journey has been one of self-discovery. A path of redefining my ways of working, boundaries, resilience, and when pushed off course, to find my way back. I would say that so far, more than learning about a topic, this journey has taught me about how to conduct and communicate research. Research is structured but messy and chaotic, like my dad says, “an ordered disorder.” You begin with a plan, but research is unexpected. Questions evolve, methods change, results are not always as expected, and progress isn’t linear. As a good friend of mine, Olivia, defines it: “Sometimes you feel lost in the right direction.” Writing this licentiate thesis has been an amazing opportunity to stop and pivot, to evaluate what is working and what is not, my pace and direction, and decide on the next steps: adjust strategy, goals, or focus.

As part of this journey, I would like to thank all the interview participants for opening your doors and giving me the opportunity to visit and learn more about how circular retail works in practice.

While the PhD journey can sometimes feel solitary, I have been fortunate to have two amazing supervisors who have consistently guided and supported me. Joakim and Ebba, thank you for the research and emotional support, and for being in the water, swimming next to me. More than ensuring that I don’t get lost in my swim, you have taught me to be pragmatic, to adapt, to deal with feedback, and to think about the bigger picture. In many ways, you two have taught me to swim in open waters, how to change my stroke and technique so I can prepare for what is coming.

Indeed, having the right people alongside makes all the difference. My journey so far would not have been as enjoyable without Joy and Jennimi by my side. Thank you for signing up to swim with me and always having my back. We have pulled through together. Thanks for the laughs, getting lost together, shared frustrations and celebrations, and for always being willing to bounce ideas. Your spontaneity and curiosity have pushed me to think outside the box, look for alternative explanations, and to approach problems with an open mind. You are one of a kind.

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Second, I would like to thank my friends in Sweden and in Costa Rica. To my "tribe," thank you for sharing anecdotes and for never letting distance weaken our connection. A special thanks to Naty, Tefi, and Fer, you recharge me every time we meet. To my friends in Sweden, Olivia, Maricruz, Lisa, Bianca, Charlie, Akash, Tanvi, Mark, Fabi, Yash, David, Javier, Roger, Ryo, and Simon, thank you for opening your arms, sharing special occasions, and becoming my family away from home.

Finally, Jacob, thank you for being in the good, the bad, and the in-between. You know every version of me. Thanks for listening to me patiently and calmly, and for always knowing how to make me feel better. Your support means a lot.

Mónica Mora Chaves, April 2026

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Paper I

Mora Chaves, M., Eriksson Ahre, E., and Kembro, J. (2026). "The circular retail transformation and its implications for circular logistics nodes: an integrative review". Accepted for publication (25 March 2026) in the *International Journal of Physical Distribution and Management.*

Paper II

Mora Chaves, M., Eriksson Ahre, E., and Kembro, J. (2026). "Reconfiguring linear retail stores for circular services: a service design and coordination perspective". An earlier version was presented at the Nordic logistics and supply chain management conference, NOFOMA 2024.

Contribution statement

Paper I

I contributed to all sections of this article. I was involved in the design of the literature review, the selection of relevant literature, the synthesis into themes, the development of implications for retail stores, the subsequent expansion of these implications to circular logistics nodes, and the development of a future research agenda.

Paper II

I contributed to all sections of this article. I was involved in study design, data collection, literature review, analysis, and discussion.

1 Introduction

This chapter introduces the background and develops the problem to be addressed in this thesis. It provides the foundation for the research purpose and questions. Then the purpose is connected to the included studies, and the respective research delimitations are made explicit. The chapter concludes with an overview of the thesis structure and clarifications of key concepts and definitions.

1.1 Background and problem discussion

The take-make-waste economy has led to rapid environmental degradation and resource depletion. As of 2025, seven out of nine boundaries have been crossed (e.g., climate change, novel entities, biogeochemical flows, freshwater change, land-system change, and biosphere integrity) (PBScience, 2025). One factor contributing to this degradation is the way we consume and dispose of products.

In response, more and more people and companies are pushing toward a circular economy as an alternative model for sustainable consumption. The circular economy is defined as

> '[A]n economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes. It operates at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, thus simultaneously creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations. It is enabled by novel business models and responsible consumers.' (Kirchherr *et al.*, 2017, p. 229).

To accelerate the circular economy transformation, organizations such as the European Commission, national governments, and municipalities develop and implement new policies and directives. Examples include: (i) the Extended Producer Responsibility (EPR), which makes producers responsible for their products during

their entire lifecycle (OECD, 2024); (ii) the Right to Repair, which ensures easier and more cost-efficient repair solutions (European Commission, 2023); (iii) the Ecodesign for Sustainable Products Regulation, which requires improvements in product durability and circularity (European Commission, 2024); and (iv) the Revised Waste Framework Directive, which introduces mandatory EPR for textile and footwear products and requires sorting (reusable/waste) textiles before exportation to avoid incorrect labelling of exported textiles as reusable (European Commission, 2025).

The circular transformation concerns a wide range of stakeholders, with retail representing one of the key sectors (Elg and Welinder, 2022). As consumer-facing entities, retailers are well-positioned to influence upstream and downstream actors in supply chains (Vadakkepatt *et al.*, 2021). Retailers can help reduce environmental impact by slowing the consumption of new items and offering options to extend product life (Zhang *et al.*, 2023; ILO, 2023). They can offer a range of circular services, such as repair, resale, and rental, potentially attracting new consumers or reinforcing consumer loyalty while complying with present and future regulations. To offer circular services, retailers need to execute a series of circular operations: collection, recovery, and redistribution (de Brito and Dekker, 2004; Thierry *et al.*, 1995). Circular operations can be performed by a wide range of logistics nodes. Examples include recycling stations, repair centers, central warehouses, retail stores, shopping malls, or manufacturing facilities. These nodes with new roles and responsibilities are referred to as circular logistics nodes in this licentiate thesis.

Among circular logistics nodes, retail stores are of particular interest, as these constitute retailers' direct point of contact with consumers (Trautrims *et al.*, 2010). In circular systems, consumer contact is central, since consumers are not only buyers but also potential suppliers of used products (Henninger *et al.*, 2019). In retail stores, consumers can both supply products for repair or reuse and engage directly with used products by touching and examining them, thereby influencing and normalizing more sustainable consumption practices (Abdulla *et al.*, 2024; Hultberg and Pal, 2023) and increasing foot traffic (Do Vale *et al.*, 2025). For this reason, retailers begin their circular journey in their stores, using them as testing grounds to experiment with services before scaling (cf. Bocken *et al.*, 2018; Hultberg, 2025). Retail stores thus become mini-circular hubs (Do Vale *et al.*, 2025). As mini-circular hubs, stores can take on diverse roles such as (i) collection nodes, (ii) gatekeeping and sorting nodes in charge of deciding the products entering the reuse and repair cycles, (iii) recovery nodes offering services such as repairs and spare parts, or (iv) reselling nodes that provide used products.

Retail stores then need to handle and coordinate material, information, and financial flows to and from consumers, and undertake a range of new operations to enable repair and reuse. This includes new operations, such as collection, grading, sorting, gatekeeping, cleaning, repairing, and reselling (Gróf and Netland, 2025; de Brito and Dekker, 2004; Thierry *et al.*, 1995). In addition, retail stores need to manage

services characterized by being heterogeneous (i.e., each served unit is unique), simultaneous (i.e., services can be produced and consumed simultaneously; demand comes before production), perishable (i.e., the capacity to produce the service is time-sensitive), and requiring consumer inputs (Sampson, 2006). Service marketing literature explains that services experience consumer-input uncertainty, which Larsson and Bowen (1989, p. 217) defined as:

> '[T]he organization's incomplete information about what, where, when, and how customer input is going to be processed to produce desired outcomes'

Retail stores then experience consumer-input uncertainty, driven by unpredictable supply flows dependent on consumer behavior and item condition. As inflow is uncertain and depends on item condition, operations are typically time-consuming and have variable processing times (Tibben-Lembke and Rogers 2002). This means that circular services require what Wemmerlöv (1990) describes as fluid processes or processes that are flexible, adaptable, and loosely standardized, allowing tasks and workflows to vary depending on the specific case (e.g., product) or consumer need. Retailers then need to embed such fluid processes within linear, highly standardized environments (rigid) and balance the coexistence of rigid and fluid processes within a capacity-constrained node. These new operational requirements challenge linear retail store configurations. As a result, retailers must reconfigure their stores (through operations, design, and resources) to integrate circular services, address capacity constraints, and accommodate new consumer and product interactions (Gróf and Netland, 2025).

The circular retail transformation introduces new opportunities and challenges for retail stores, particularly in how retailers reconfigure linear retail stores to integrate and scale circular services. To explore the circular retail transformation and implications, this thesis employs "linear retail stores integrating circular services" as the study system. Using retail stores as the study system enables a deeper understanding of how their roles and configurations evolve. By understanding how retail stores are impacted and reconfigured, it is possible to understand a broader range of circular logistics nodes.

Figure 1.1 illustrates the system under study, in which the retail store serves as the focal node positioned between consumers. These retail stores function within an established retail logistics network. Consumers play a dual role as buyers of products and as suppliers of used items, generating forward and reverse flows into linear and circular processes. Within the store, linear operations (e.g., selling new products) coexist with circular operations such as collection, sorting, repair, and resale. Retail stores, as representative nodes, provide the basis for extending insights to other circular logistics nodes. In this thesis, circular logistics nodes refer to physical nodes that are configured (through operations, design, and resources) to

enable circular economy principles by collecting, processing (e.g., gatekeeping, grading, pricing, sorting, cleaning, repairing, remanufacturing), and redistributing products (Mora Chaves *et al.*, 2026). Within a circular ecosystem, multiple circular logistics nodes can be found, all with various roles and responsibilities (e.g., recycling centers, resale warehouses, retail stores, manufacturing facilities).

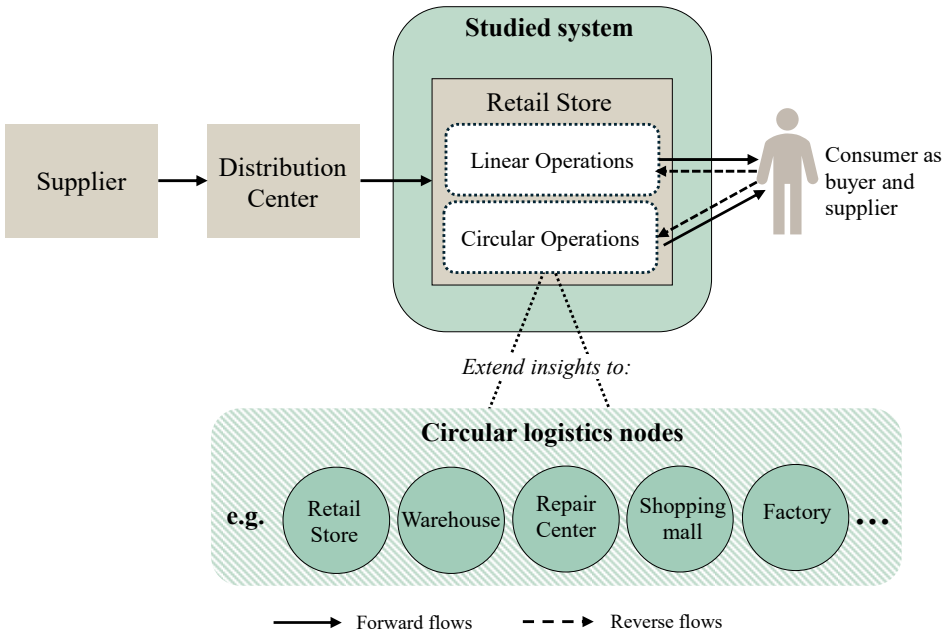

Figure 1.1 The studied system (retail stores integrating circular services).

1.2 Advances in research and remaining gaps

Existing research has highlighted the retail stores as pivotal in advancing the circular economy, primarily mentioning their position in influencing sustainable consumption patterns (see, e.g., Farahani *et al.*, 2022; Vadakkepatt *et al.*, 2021), the store's role in facilitating item collection (see, e.g., Kant Hvass and Pedersen, 2019; Stål and Corvellec, 2018), facilitating repairs (see e.g., Mont *et al.*, 2006), or as mini-circular hubs (e.g., Do Vale *et al.*, 2025). In addition, relevant research has explored the integration of circular business models in retail organizations (e.g., Hultberg and Pal, 2023; Bocken and Konietzko, 2022), challenges and opportunities of circular services (see, e.g., Bressanelli *et al.*, 2019; Kanda *et al.*, 2024), the strategic relevance of retail reverse logistics (Bernon *et al.*, 2018), circular supply chains and reverse networks (Rogers *et al.*, 2025), and consumer preferences (Abdulla *et al.*, 2024; Murtas and Pedeliento, 2025; Tangri and Yu, 2023) providing

valuable insights into how retailers can design and manage circular systems. Despite these advancements, knowledge about the circular retail transformation and the implications for retail stores exists but remains fragmented across multiple research domains.

In general, researchers have made clear the importance of implementing circular services (Bocken *et al.*, 2016) and the potential for retail stores to serve as mini-circular hubs (Do Vale *et al.*, 2025). However, there is limited understanding of how retail stores designed for standardized and efficient linear operations are reconfigured to integrate and scale circular services. Without a clear understanding of the circular retail requirements and need for reconfiguration, retailers may struggle to move beyond pilot services. Normally, retailers start their journey at retail stores (cf. Bocken *et al.*, 2018; Hultberg, 2025), as a side business (Stål and Corvellec, 2018). As circular services scale, circular operations start competing with linear operations for limited in-store space, staff, and time. Given that circular services are often less profitable and require more labor-intensive operations (Tibben-Lembke and Rogers, 2002), their expansion pressures resource and space allocation (Bressanelli *et al.*, 2019; Kanda *et al.*, 2024). Understanding how retail stores are reconfigured to manage these pressures is therefore critical for enabling the scaling of circular services.

Service marketing and configuration literature provide a foundation for exploring the reconfiguration of retail stores as circular logistics nodes. Service marketing literature offers a basis for understanding service characteristics, including consumer participation, input uncertainty, and heterogeneous processing (Larsson and Bowen, 1989; Sampson, 2006; Wemmerlöv, 1990). These characteristics explain the variability and complexity introduced by circular services. To cope with such complexity, research emphasizes mechanisms such as decoupling, coupling, buffering, and coordination (Chase, 1981; Chase and Tansik, 1983; Larsson and Bowen, 1989). Configuration literature provides a lens to analyze how retail stores adapt to circular service requirements. It focuses on how operations, layout design, and resources are organized (Kembro *et al.*, 2018; Kembro and Norrman, 2020). Prior research (e.g., Stål and Corvellec, 2022) highlights that circular operations are separated from core operations due to tensions and efficiency gaps between circular services and linear operations. However, there is a lack of understanding of how retail stores are reconfigured to integrate and scale circular services. Combining service configuration and marketing perspectives allows linking the characteristics and design of services with retail store configurations.

1.3 Research purpose and research questions

The purpose of this research is to *explore the reconfiguration of retail stores to integrate and scale circular services and develop a broader understanding of the configuration of circular logistics nodes.* To address this purpose, two research questions are formulated:

> *RQ1: How can circular retail transformation be understood, and what are the implications for retail stores as circular logistics nodes?*
>
> *RQ2: What configurations of circular logistics nodes emerge from the integration and scaling of circular services in retail stores?*

First, circular retail transformation is inherently interdisciplinary. It is a transformation that crosses domains such as sustainability, logistics and supply chain, and marketing. While there is existing knowledge on this subject, it is fragmented across multiple research streams with a limited understanding of how circular services affect retail stores. Through an integrative review of existing academic research, the aim is to synthesize insights and develop an understanding of circular retail transformation and its implications for retail stores serving as circular logistics nodes. RQ1 then establishes a conceptual foundation for understanding how retail stores take on new roles, responsibilities, operations, and evolve from nodes that sell products into nodes that also offer services and enable circular services.

Building on this conceptual foundation, the second research question aims to develop an understanding of the different reconfigurations of retail stores as they integrate and scale circular service. The integration and scaling of circular services introduces new operational requirements (e.g., service characteristics, consumer involvement, regulatory pressures) that challenge existing retail configurations, particularly in terms of variability and capacity constraints. For example, services require retail stores to handle and coordinate operations with different levels of consumer interaction and an uncertain supply of heterogeneous products. RQ2 explores how retail stores reconfigure operations, layout design, and resources to integrate new services. Building on configuration and service marketing literature, this thesis explores how retail stores organize and structure operations across front-office, back-office, and external actors (e.g., consumers, recovery partners, repair shops), using mechanisms such as decoupling, buffering, and coordination. These mechanisms guide design decisions, including whether circular operations can be integrated into existing linear retail stores or require separation into dedicated spaces or external nodes, as well as the level of technical specialization required for the different circular operations. Through this analysis, the thesis identifies configuration patterns in how circular operations are integrated or separated from linear retail stores, contributing to a broader understanding of circular logistics node configurations.

1.4 Connecting the overall purpose with studies and publications

The thesis is based on two interconnected studies, one theoretical and one empirical. Study I addresses RQ1 through an integrative literature review. The study synthesizes insights from sustainability, marketing, operations management, and logistics and supply chain management to develop a conceptual understanding of circular retail transformation and its implications for retail stores. It emphasizes that circular services introduce new operational requirements that affect retail stores' roles, responsibilities, and configurations. The study extends the insights and lessons learned from the retail store to a broader range of circular logistics nodes, their networks, and resources. Paper 1 is then derived from this study.

Study II complements this conceptual understanding by empirically examining how these changes unfold in retail stores and addresses RQ2 through a qualitative multiple-case study of three retail stores that integrate and scale circular services. It builds on the conceptual insights from Study 1 and examines how retail stores reconfigure their operations, layout design, and resources in response to the requirements of circular services. Elaborating on material-handling node configuration and service marketing literature, the study analyzes how retailers organize operations across front-office, back-office, and external actors, employing mechanisms such as decoupling, buffering, and coordination to manage variability and capacity constraints. Study II develops a configuration matrix that explains how retail stores organize circular operations within existing facilities and across external actors (e.g., consumers, recovery partners, repair providers). The matrix captures how retailers integrate, decouple, or separate activities to manage variability, capacity constraints, and service requirements as they scale circular services. Paper 2 is then derived from this study

This thesis combines insights from Study I and Study II to further abstract and analytically extend the configuration matrix from the retail store to circular logistics nodes. Figure 1.2 depicts the two interrelated studies and the connections between the overall purpose, research questions, and publications.

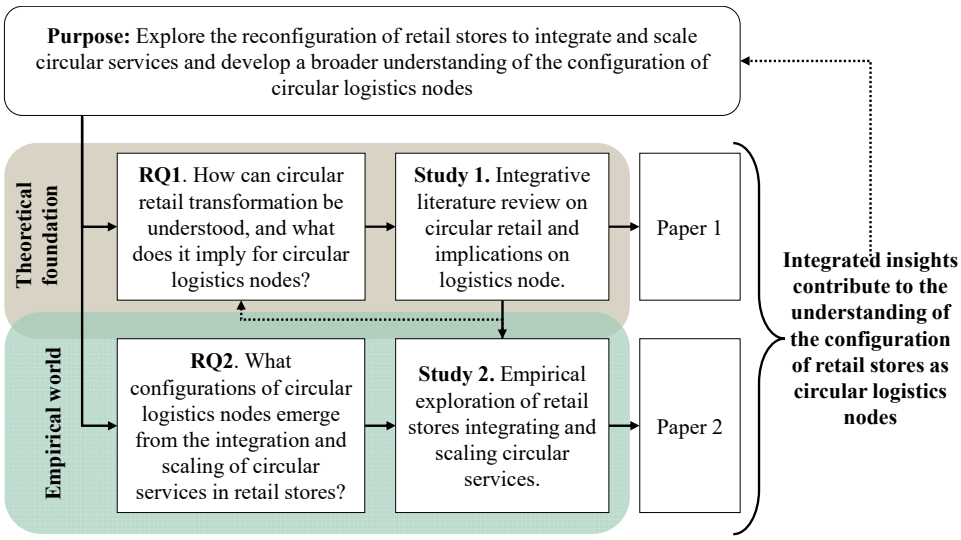

Figure 1.2 Connection between purpose, studies, and publications

1.5 Delimitations

This study is delimited to ensure a focused scope. First, the thesis explores retail stores as representative nodes in circular logistics. The selection of retail stores as the study system is (i) due to their ability to take on a range of roles and responsibilities, including collection, sorting, recovery, or redistribution, as found in practice; (ii) retailers begin their circular journey in retail stores through small local initiatives, using them as entry point to experiment with and further scale circular services while building the business case; (iii) retail stores require simultaneous management of product flows and consumer interactions, both central elements of circular systems; and (iv) retail stores operate under space and resource constraints, making configuration decisions key to balance efficiency and flexibility.

Second, the research is limited to retail stores operating within existing linear networks. This delimitation sets the boundary for exploring retailers reconfiguring their linear stores to integrate and scale circular services. Independent retail stores (e.g., thrift shops or repair shops) are typically designed for circular operations from the beginning and might not face the same reconfiguration challenges associated with integrating circular services into linear environments. Such stores often operate on a smaller scale and with different organizational structures and decision-making processes.

Third, the thesis focuses on circular service that prolongs product lifecycles, such as resale and repair. While rental represents another important circular service, rental offerings from linear stores are relatively nascent and scarce. Other circular practices that extend beyond the store's physical boundaries (e.g., remanufacturing, recycling, circular product design) or do not require reconfiguration (e.g., reduce) are acknowledged but out of scope.

Fourth, circularity can be practiced in the technical or biological cycle. However, this study focuses on non-perishable items (e.g., furniture, electronics, textiles, toys, sports equipment) within the technical cycle. These products are relevant because they have longer lifecycles and may require circular services, such as resale and repair, multiple times. In addition, non-perishable items position consumers as suppliers within the system, requiring retail stores to account for new consumer interactions and operational complexity.

Finally, the empirical data is collected in Swedish retail stores. This geographical delimitation enables the study to focus on a market where circular consumption is gaining momentum and that requires retailers to scale circular services (Svensk Handel, 2026). At the same time, the studied retailers operate large international retail networks. Aspects such as the retail network, policies, product design, and circular business model design are acknowledged as factors influencing store configuration, yet the main emphasis is on store-level adaptations related to roles and configuration. The purpose of the research is not to develop country-specific insights but to generate generalizable insights into the configuration of circular logistics nodes across different contexts.

1.6 Thesis outline

The thesis comprises six chapters. Chapter 1 introduces the phenomenon of interest, the research purpose, and the research questions, establishing the foundation for the investigation. Chapter 2 provides the frame of reference, outlining the theoretical perspectives and literature relevant to the study. Chapter 3 presents the methodology, including a reflection on my philosophical point of departure and its implications for the research design and method selection. Chapter 4 summarizes the findings from the appended articles. Chapter 5 delves deeper into the findings and discussion in relation to the research purpose and questions. Finally, Chapter 6 answers the research questions, provides theoretical and practical contributions, and identifies limitations and avenues for future research.

1.7 Key definitions and concepts

Below, I provide the different definitions and concepts relevant to this thesis.

Logistics node

Bucklin (1970) defines logistics nodes as locations where operations are carried out. Carter *et al.* (2015, p. 90) define a node as *"an establishment which is an agent that has the ability to make decisions and maximize its own gains within the parameters in which it operates (e.g., manufacturers, warehouses, transportation carriers, and financial institutions)"*. In this thesis, I distinguish between the node, as a system, and the agent, as the decision-making entity. Following Kembro *et al.* (2018), I understand logistics nodes as systems consisting of space and resources (staff and equipment) (cf. Kembro *et al.*, 2018) where materials are managed, processed, moved, or stored (e.g., distribution centers, retail stores). These nodes are designed and operated by decision-making actors/agents. For example, in the context of retail stores as logistics nodes, the retailer acts as the agent, setting objectives and making decisions that are then carried out through retail stores.

Circular services

Among the principles to achieve a circular economy, the 9R framework differentiates recover, recycle, repurpose, remanufacture, refurbish, repair, reuse, reduce, rethink, refuse (Potting *et al.*, 2016). I refer to circular service as services aligned with circular economy principles (ISO 59004:2024). I focus on circular services that allow for the preservation and extension of product lifecycles without downcycling, including repair, reuse (rental and resale).

Circular logistics node

As per the background section, circular logistics nodes refer to physical nodes that are configured (through operations, design, and resources) to enable circular economy principles by collecting, processing (e.g., gatekeeping, grading, pricing, sorting, cleaning, repairing, remanufacturing), and redistributing products (Mora Chaves *et al.*, 2026). Within a circular ecosystem, multiple circular logistics nodes can be found, all with various roles and responsibilities (e.g., recycling centers, resale warehouses, retail stores, manufacturing facilities).

Logistics node configuration

Based on the material handling configuration definition. In this dissertation, logistics node configuration refers to the operations, design, and resources required for the correct functioning of the node (see, conceptualization of material handling node configuration, Kembro *et al.* (2018) and Eriksson *et al.* (2019)). It includes (i) operations, such as those needed for collecting, recovery, and redistributing, (ii) design and resources, such as layout design, equipment, automation, technologies, and labor needed to carry out operations.

2 Frame of reference

This chapter establishes the conceptual foundation of this thesis. It introduces the key constructs to address the research purpose and research questions. The chapter begins with a review of the circular retail transformation, the new circular flows, operations, and structural requirements for retail stores (as a representative example of circular logistics nodes). To support the analysis of how such nodes are configured to integrate and scale circular services, the chapter then presents research on material-handling node configuration and service marketing literature. These two perspectives establish the baseline for linking the characteristics of circular services to the reconfiguration of retail stores as circular logistics nodes. The chapter structure is illustrated in Figure 2.1

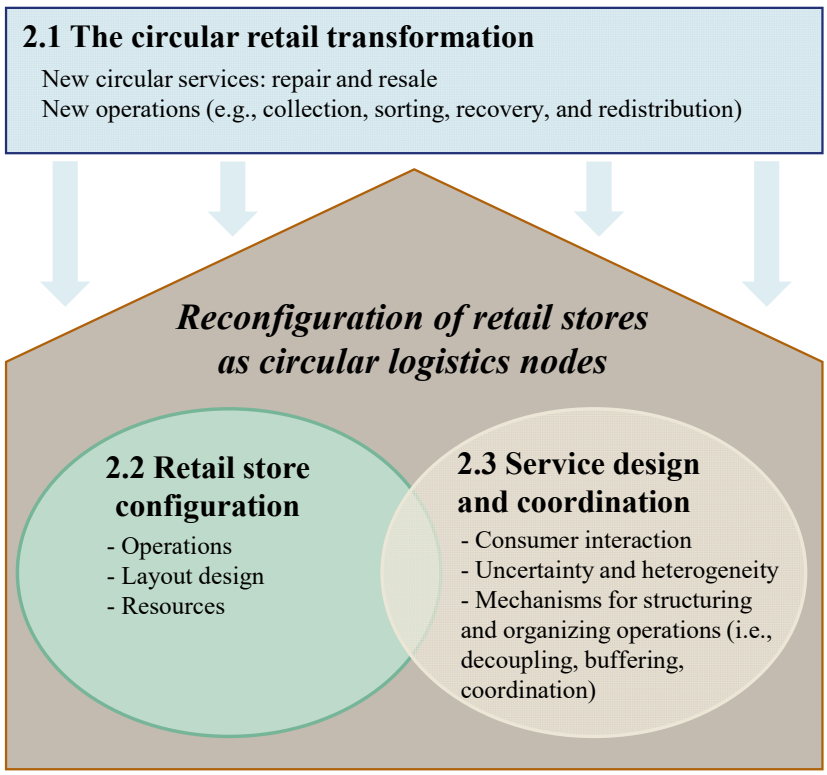

Figure 2.1 Overview of the chapter's structure

2.1 The circular retail transformation

The circular retail transformation refers to the transition from linear retail systems toward systems that enable circular economy principles such as reuse and repair. The transformation is driven by regulatory and market incentives (Do Vale *et al.*, 2025; Stål and Corvellec, 2022). Policies such as extended producer responsibility, the right to repair, and digital product passports require retailers to take responsibility for products after consumption (Richter *et al.*, 2022; D'Adamo *et al.*, 2025). At the same time, retailers respond to a growing market seeking sustainable consumption (Murtas and Pedeliento, 2025) and to the opportunity to strengthen brand image (Bressanelli *et al.*, 2019) and consumer loyalty (Sandberg, 2023). In circular retail, retailers offer consumers opportunities to extend product lifecycles through circular services such as repair and/or reuse. Circular retail can then be understood as a new operational context for retail stores.

2.1.1 Circular services and product flows

Circular service refers to services aligned with circular economy principles (ISO 59004:2024). In this thesis, the focus is on circular services that extend product lifecycles, including repair and reuse (cf. Gróf and Netland, 2025). Through resale and repair services, retailers help slow the consumption of new items and reduce waste by keeping products in circulation longer (Bocken and Konietzko, 2022; Centobelli *et al.*, 2022). Repair services aim to restore product functionality, while resale services allow products to be reintroduced to the market. These services can be offered by retailers or in collaboration with external partners (Wilson and Goffnett, 2022; Pal, 2017) through different channels (e.g., in-store, digital platforms, repair stations) (Güsser-Fachbach *et al.*, 2023; Dissanayake *et al.*, 2026).

Circular services extend the scope of retail activities beyond the point of sale, focusing on the post-purchase phase of the product lifecycle (Vadakkepatt *et al.*, 2021). As emphasized by Sampson (2006, p. 112), *'services are production processes wherein each customer supplies one or more input components for that customer's unit of production.'* Consumers then assume the role of product suppliers, shifting product flows from geographically dispersed consumers to retailers (Henninger *et al.*, 2019; Arevalo-Ascanio *et al.*, 2025). Consumers engage in different ways: some act as buyers of used products, others as suppliers, or both (Pellegrino *et al.*, 2025). The decentralized nature of supply in circular retail requires the involvement of multiple actors (e.g., consumers, retailers, third-party partners, waste management actors, municipalities) (Mallick *et al.*, 2023; Perotti *et al.*, 2025). These new actors and dynamics create new forms of interaction between consumers, retailers, and external partners, changing the direction and structure of product flows, making them more decentralized and dependent on consumer

behavior (de Brito and Dekker, 2004). Therefore, it is important to consider the system's influence and the organizational structures that enable or hinder decision-making at the node to adapt to local requirements (Timoumi *et al.*, 2021; Pal *et al.*, 2019; Bryson *et al.*, 2024).

Figure 2.2 illustrates the product flows in traditional and circular retail, where the store provides circular services. While reverse flows exist in traditional retail (e.g., returns of unwanted or damaged products), they are not depicted since the aim is to clarify the linear vs. bidirectional flow structure of the systems.

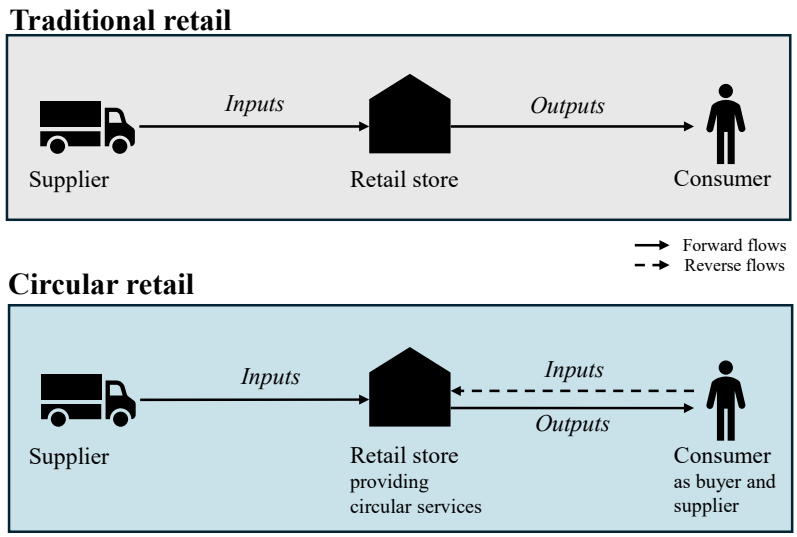

Figure 2.2 Input/Output model for traditional and circular retail, adapted from Sampson (2006)

Like in circular retail, service literature emphasizes that service product flows are bidirectional (Sampson, 2000). In circular services, products move forward to consumers and reverse back into the system for reuse, repair, or redistribution (Gatenholm, 2021; Beh *et al.*, 2016; Bernon *et al.*, 2018). Reverse logistics plays a key role in enabling reverse flows by facilitating the collection and processing of returned products (Butt *et al.*, 2024; de Brito and Dekker, 2004). However, as highlighted by Tibben-Lembke and Rogers (2002), reverse logistics differs from forward logistics. First, products and packaging in reverse flows are often non-uniform and vary in physical condition. Second, demand and return volumes are difficult to forecast, as they depend on customer behavior. Third, product flows shift from one-to-many distribution to many-to-one collection. Fourth, operations move from standardized processes toward exception-driven handling. Finally, costs and processing times become more variable due to the heterogeneous nature of returned products. Circular services with unpredictable, heterogeneous, and complex reverse

flows (Bressanelli *et al.*, 2019; Jayaraman and Luo, 2007) become difficult to manage within nodes designed for forward, standardized flows.

2.1.2 Circular operations

Circular services are often introduced as small-scale pilots, such as in-store repair or resale initiatives, which allow retailers to experiment (Hultberg, 2025; Bocken and Konietzko, 2022). Implementing circular services requires retailers to integrate new operations, such as collection, grading, sorting, cleaning, or repairing (Wilson and Goffnett, 2022; Mallick *et al.*, 2023; de Brito and Dekker, 2004). Thierry *et al.* (1995) established that product recovery involved collection, recovery, and redistribution. Figure 2.3 illustrates the consumer as both a supplier and a buyer of products and services, as well as the operations required to provide circular services.

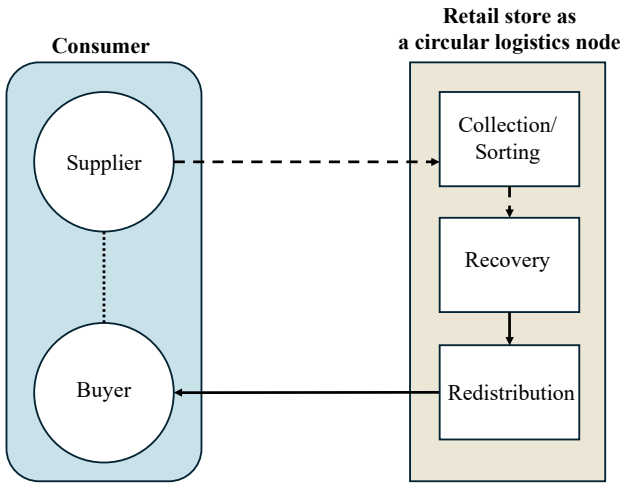

Figure 2.3 Circular product flows and operations to deliver circular services, adapted from de Brito and Dekker (2004).

Collection. Retailers depend on various sourcing channels, for example: donations, consumer returns, recycling streams, and third-party organizations (Paras *et al.*, 2019, Parker and Weber, 2013, Beh *et al.*, 2016). Therefore, retailers employ various methods, such as curbside collections, home pickup, drop-off points, or issuing vouchers to incentivize consumer participation (Fiori *et al.*, 2023; Dukovska-Popovska *et al.*, 2025). Roussat *et al.* (2023) emphasized the need for additional operations to collection, such as product authenticity checks and quality evaluation during this process.

Sorting. Once the items are collected, sorting and grading emerge as trade secrets in circular services (Paras *et al.*, 2019; Sandberg *et al.*, 2018). Sorting can be executed at

different points in the process. Researchers highlight that retailers sort using parameters such as trend and demand to better align product assortments with customer preferences and market dynamics (Beh *et al.*, 2016; Pal, 2017). Effective item selection in collection operations and sorting can ensure that only the most suitable items enter circular flows (Wilson and Goffnett, 2022; Appelgren, 2019; Farahani *et al.*, 2022). In circular services, each item is unique. Therefore, each item must be individually assessed, graded, categorized, sorted, and tracked to determine the disposition route.

Recovery. De Brito and Dekker (2004) differentiated between direct recovery (direct reuse or resale) and process recovery (items needing cleaning, repair, remanufacturing, or recycling), which require more resources and operations. Process recovery operations can be resource-intensive, especially when material-handling nodes lack the necessary equipment and capabilities (Kanda *et al.*, 2024; Mont *et al.*, 2006). Due to a lack of process standardization, operational efficiency is often compromised (Pal and Sandberg, 2023).

Redistribution. To make the items available to consumers, retailers employ online and offline channels (Hultberg and Pal, 2023). Offline outlets, such as retail stores, allow consumers to physically interact with second-hand and refurbished items, thereby increasing product valuation (Abdulla *et al.*, 2024).

The circular operations are illustrated in detail in Figure 2.4. The figure maps the sequence of operations required to collect, sort, recover, and redistribute products.

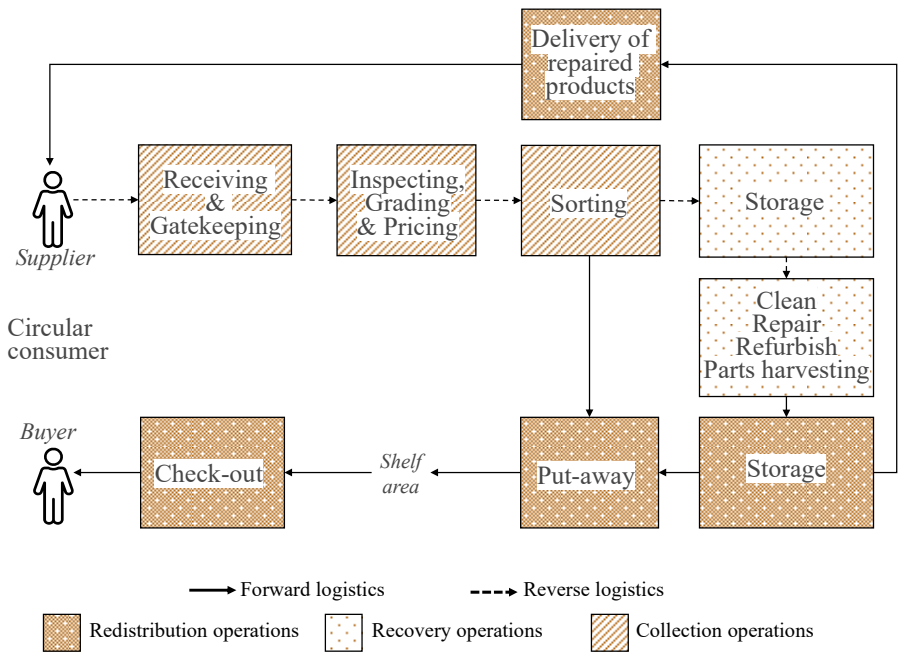

Figure 2.4 Circular operations to deliver circular services

2.2 Retail stores configuration

As a foundation for retail store reconfiguration, literature on material-handling configuration is employed. With its origins in organizational design and strategic management, configuration theory holds that performance depends on the internal consistency, or "fit," among multiple elements of a system (Mintzberg, 1979; Miller, 1986). Kembro and Norrman (2020) propose three dimensions that influence warehouse configuration: operations, design aspects, and resources. The focus is to identify the set of operations, design, and resources required to handle product flows in a given context (Kembro *et al.*, 2018). In configuration theory, there is no single optimal node configuration applicable across all contexts, suggesting a contingency approach in which node configurations depend on contextual factors, including product characteristics, demand profiles, assortments, volume, or consumer characteristics (Eriksson *et al.*, 2019; Kembro and Norrman, 2021).

In retail stores, the **operations** encompass two main product flows: forward and reverse (Kotzab and Teller, 2005). The forward flow includes i) inbound: receiving shipments, storing, replenishing, sorting, and stocking shelves; and ii) outbound: movement of goods from store to consumer through offline sales or online offering additional services such as home delivery or click-and-collect (Gammelgaard *et al.*, 2016; Mou *et al.*, 2018; Hübner *et al.*, 2022). The reverse flow involves gatekeeping, collection, sorting, and disposition. (Trautrims *et al.*, 2010). In circular retail, retail stores integrate (in addition to the existing ones) all or some of the operations described in section 2.1.2 and depicted in Figure 2.4. These traditional and new operations create requirements for layout design and resources within the store.

The **design** refers to the layout planning. A well-planned layout should enable customers to navigate and locate products effortlessly (Bouzaabia *et al.*, 2013). At the same time, the layout should consider product flows and logistics operations in the different areas (de Borba *et al.*, 2021). The retail store layout distinguishes between the shopfloor and the backroom. The shopfloor is where the retailer and consumer interact to commercialize products, whereas the backroom serves as inventory holding spaces to balance limited retail shelf space (Mou *et al.*, 2018; Sternbeck and Kuhn, 2014). The **resources** include staff, skills, equipment, and systems. As retail logistics become increasingly complex, there is a growing need for skilled labor (Esbjerg *et al.*, 2010). Insufficient staffing or a lack of appropriate skills can result in customer dissatisfaction or lost sales (Fisher, 2004). Equipment such as forklifts, pallet trucks, and shelving units support staff to handle and store goods efficiently. Additionally, handheld scanners, mobile devices, price scanners, the Internet of Things, artificial intelligence, and RFID technologies allow staff to quickly access real-time inventory data, process orders, track shipments, and streamline operations (Shankar *et al.*, 2021; Grewal *et al.*, 2023). To integrate circular operations, retailers require developing resources. Retailers must invest in new resources, including staff skills and technologies to support circular operations.

Research indicates the difficulty of recruiting and training staff for circular operations (Engzell and Kambanou, 2024; Beulque *et al.*, 2023) and the infancy of technologies that could support the implementation and efficiency of circular operations (e.g., AI, RFID, Robots, Scanners). Figure 2.5 depicts the different dimensions of retail store configuration, operations for traditional retail and circular services, design and resources.

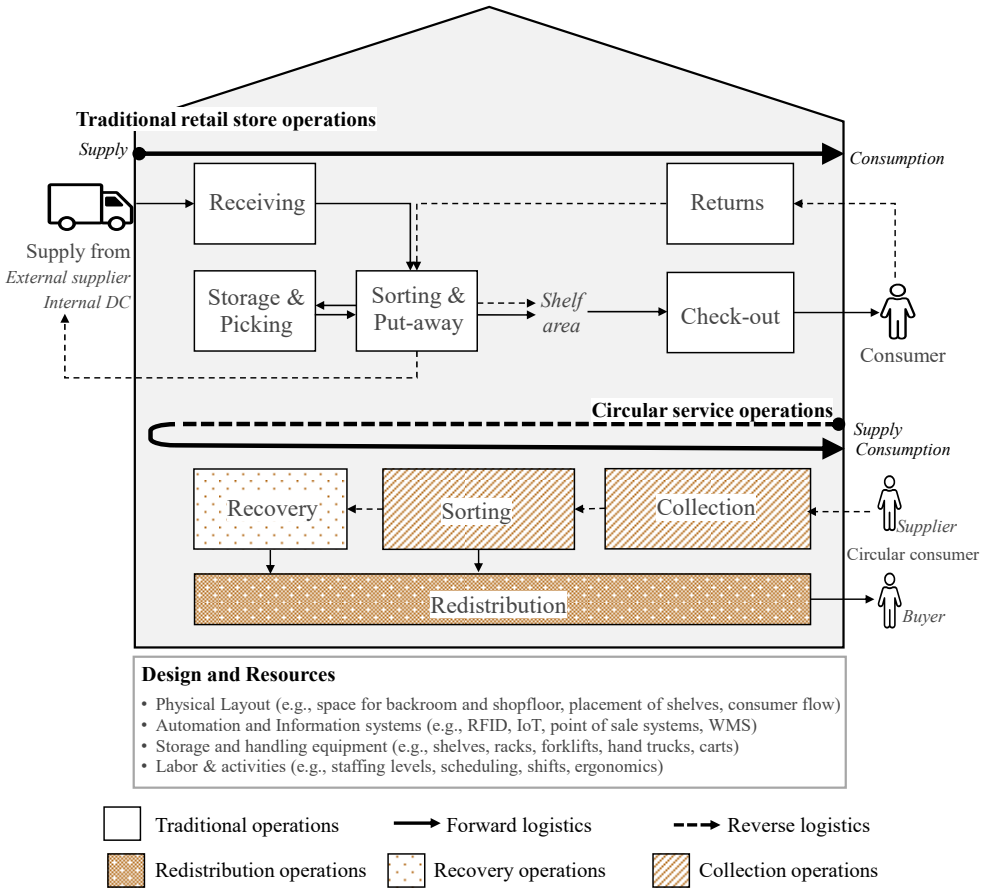

Figure 2.5 Material-handling node configuration adapted to retail store configuration from Kembro *et al.* (2018) and Kembro and Norrman (2020; 2021)

From a contingency approach, the configuration of material-handling nodes affects and is affected by their performance (Gammelgaard *et al.*, 2016). Traditional retail store performance is measured based on sales per square meter, inventory turnover, gross margin, efficiency, or service level (Levy *et al.*, 2018). In circular services, traditional performance metrics based on sales and efficiency may need to align to measure value creation, environmental impact, and circular performance (Zhang *et al.*, 2023).

In circular economy research, Prosman and Cagliano (2022) have examined the alignment between manufacturing configuration and supply characteristics. Their results suggest that the adoption of circular services requires a balance between flexibility and improving the homogeneity of the inputs. Although developed in a manufacturing context, this insight emphasizes the need for retail stores to reconfigure operations, layout, and resources to balance flexibility and efficiency when integrating circular services.

2.3 Service design and coordination

Service marketing literature can serve as a foundation for understanding service system design and coordination. Service marketing literature arises from the rapid development of the U.S. service-sector economy and the misfit between the frameworks and constructs of packaged-goods marketing and the reality of services (Berry and Parasuraman, 1993). One of the main premises is that services are not something a company delivers; services are produced through the interaction with the system. To capture the idea of service production, Eiglier and Langeard (1977) proposed the servuction model. The model proposes that in services: (i) production and consumption occur at the same time, (ii) the consumer is present in the system, and (iii) consumers can participate in creating the service.

The servuction model (Figure 2.6) from Eiglier and Langeard (1977) refers to the organization of all elements needed to produce a service, including people (e.g., consumers and employees), physical support, and the system. The service emerges from the interaction of all elements, which are split into visible and invisible. The visible part includes what consumers experience: consumers, front-office employees, the physical environment (e.g., space, layout, atmosphere), and other consumers using the service at the same time. The invisible part includes internal processes, back-office operations, and employees, rules, IT systems, and management structures; those elements that consumers don't see but affect their experience.

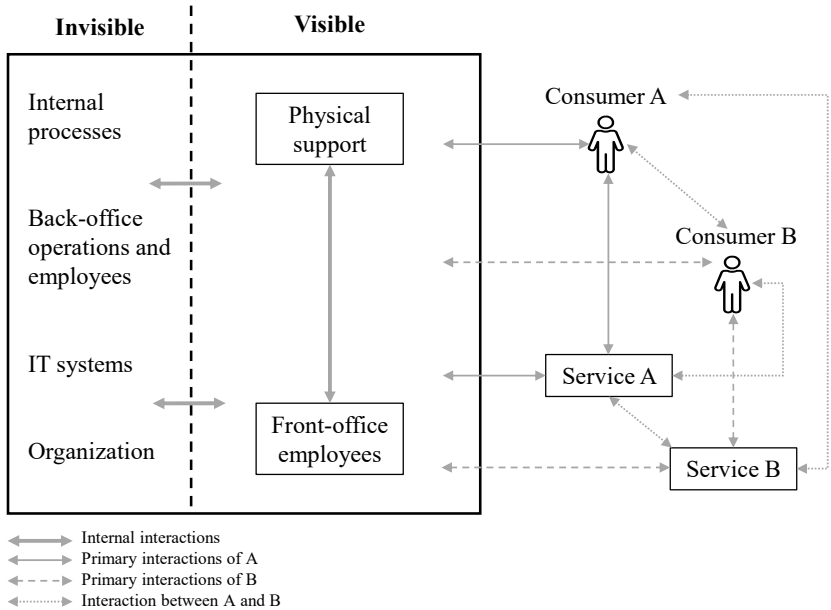

Figure 2.6 Servuction model adapted from Eiglier and Langeard (1977)

Chase (1981) builds on the division between invisible and visible interfaces and proposes a consumer-contact model. The consumer contact model differentiates high-contact from low-contact systems and emphasizes that a service system's efficiency is influenced by consumer involvement. Consequently, organizations should aim to reduce and improve consumer contact, decouple low-contact areas to enable specialization, and employ strategies to improve efficiency, such as standardization or production control (Chase and Tansik, 1983). The model builds on the need to isolate the technical core to allow for stabilization through buffers, enable specialization, and improve efficiency (Thompson, 1967). While the low-contact area aims for processing efficiency, the high-contact area should strive for interaction effectiveness (Chase and Tansik, 1983).

Chase and Tansik (1983) make several propositions for service design, including (i) the need for job specialization due to differences in skill requirements between high- and low-contact areas, (ii) the location of the service facility near consumers (high-contact) versus resources (low-contact), and (iii) the need for a flexible boundary between areas, where some interaction is routine and planned, and others are variable and ad hoc. Wemmerlöv (1990) indicates that designing services with rigid processes, where workflow and processing variability are low, differs from designing services with fluid processes, where workflow and processing variability are high.

Lawrence and Lorsch (1967) argue that complex organizations tend to develop specialized units to address different operational requirements. As differentiation increases, coordination mechanisms become necessary to achieve common goals. Van de Ven *et al.* (1976) refer to coordination as "the integration or linking together of different parts of an organization to accomplish a collective set of tasks" (p. 322). Thompson (1967) emphasized three coordination mechanisms: (i) standardization or rules, (ii) plans and schedules, and (iii) mutual adjustment or informal communication. Van de Ven *et al.* (1976) later added a fourth coordination mechanism: team coordination requiring physical proximity. Mintzberg (1979) elaborated on three different ways of standardization. First, standardizing the work process involves specifying the task to be carried out. Second, the standardization of work outputs requires defining the expected results and performance. Third, the standardization of workers' skills through training to perform the work. Larsson and Bowen (1989) indicate that in services, it is necessary to coordinate front-office, back-office, and consumers. Depending on the consumer's participation in the service system and the diversity of tasks, interdependencies can be more or less customized or standardized. While customization requires mutual coordination and hinders decoupling, standardization enables decoupling.

In summary, service design literature highlights that service systems must be structured to manage different levels of consumer interaction and process variability. Organizations employ mechanisms such as decoupling, buffering, and coordination to balance efficiency and flexibility. Decoupling can be used to separate high-contact from low-contact operations and use buffers to stabilize flows within the technical core. Decoupling service systems requires aligning coordination mechanisms (e.g., standard guidelines, training, or proximity to enable mutual coordination).

The need to align service design with operational conditions reflects a contingency logic, in which there is no one-size-fits-all configuration. Instead, the effectiveness of the configuration depends on its fit with contextual conditions such as variability, volume, and required specialization (Donaldson, 2001). Traditional retail stores are normally organized as mechanistic systems characterized by standardization, formalization, and efficiency, making them suitable to predictable, routine operations (Burns and Stalker, 1961). In contrast, circular services introduce greater uncertainty, variability, and interdependence, resembling non-routine, reciprocal task environments (Thompson, 1967). As a result, integrating circular services into existing nodes without reconfiguration can create misalignment between operational requirements and organizational structures, leading to inefficiencies.

2.4 A summary of the frame of reference

This frame of reference (illustrated in Figure 2.7) conceptualizes circular retail as a new operational context that requires reconfiguring retail stores as circular logistics nodes. Circular retail transformation, material-handling node configuration, and service design and coordination clarify a different part of the same phenomenon. The circular retail transformation literature supports understanding what is changing and why retail stores are taking on new roles as circular logistics nodes. The circular retail transformation emphasizes the introduction of bidirectional product flows, new consumer interactions, and the new operations required for circular services. Material-handling node configuration literature explains what reconfiguration means 'the alignment of operations, layout design, and resources' to handle those new flows within a capacity-constrained node. Service design and coordination literature explains how services are designed and coordinated through decoupling and coupling, buffering, and coordination mechanisms.

Figure 2.7 connects these three perspectives into a frame of reference. The top of the figure shows the circular retail transformation as the external context that influences reconfiguration. The center of the figure shows the retail store as the node that needs reconfiguration. In this node, two product flows coexist within the same physical space: the traditional linear flow and the circular flow. The traditional flow runs from left to right from receiving through to check-out (demand-driven), and the circular flow runs in the opposite direction from collection through sorting and recovery to redistribution (consumer-driven). The consumer shows as a supplier, bringing used items into the store, and as a buyer of redistributed products. Then, layout design and resources, which determine the physical arrangement of the available space and the equipment and staff supporting them. Lastly, service design and coordination explain how operations are decoupled, how variability is buffered, and how the divided system (i.e., front-office, back-office, and consumers) is kept aligned.

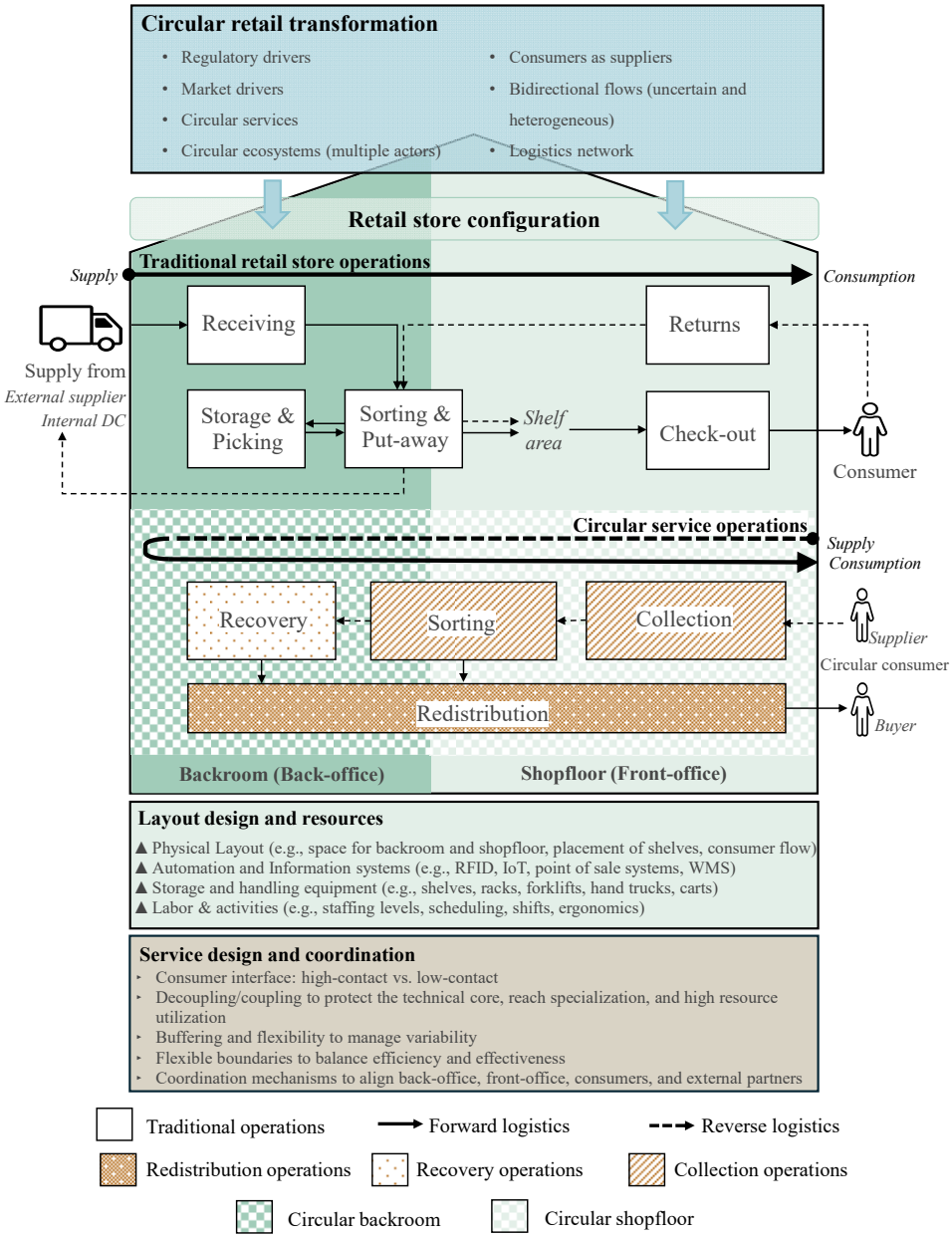

Figure 2.7 Circular retail transformation and the configuration of retail stores

3 Methodology

The methodology chapter presents the philosophy of science that serves as the thesis's point of departure. First, I articulate the foundational philosophical assumptions, epistemological stance, theoretical aim, and methodological approach. Second, I outline the overall research design and structure, as well as the methods applied for each study.

3.1 Philosophy of science

The philosophy of science constitutes a researcher's point of departure, containing assumptions about reality and knowledge. The ontological and epistemological assumptions influence how phenomena are understood, and knowledge is created (Crotty, 1998). As per Fleetwood (2005, p.197), "the way we think the world is (ontology) influences what we think can be known about it (epistemology); and how it can be investigated (methodology and research techniques)." In research, the set of assumptions is connected through paradigms, which Guba and Lincoln (1994, p.105) define as "the basic belief system or world view that guides the investigator".

This research adopts a critical realist paradigm. According to McEvoy and Richards (2003), the critical realism ontological position is that reality exists independent of human perception (e.g., configuration of retail stores as a circular logistics node as a real phenomenon). Critical realism recognizes the multilayered nature of reality: the empirical (e.g., observable elements such as store layouts, systems, or services), the actual (e.g., product flows, operations, and consumer behavior, whether observed or not), and the real (e.g., underlying causal mechanisms such as socio-economic systems or retail ownership structures) (Wikgren, 2005). The interplay between the tangible elements of a retail store and intangible dynamics influences the challenges, opportunities, and configurations of retail stores when integrating circular services.

The critical realism epistemological position recognizes that our access to reality is mediated by subjective experience and that knowledge is developed by interpreting observations to explain elements of reality (Wynn and Williams, 2012). As such, my understanding of this phenomenon is based on how I interpret what I observe in literature and the case retailers. (Miller and Tsang, 2011). The knowledge developed

is therefore not a single objective truth but is grounded in the interpretation of how the studied retail stores integrate and scale circular services.

As a researcher, I am aware that my subjective experience and background influence my interpretation of reality. My background in industrial engineering and my experience working with retailers shape how I interpret the data. In addition, my personal experience using secondhand stores and repair services in Costa Rica and Sweden influences how I view circularity as a consumer. My role as a researcher in both studies has been to describe what I see, make sense of it, and connect it to broader explanations and existing knowledge. To deal with subjectivity, I have aimed to (i) triangulate interpretations and explanations with colleagues and supervisors to look at the data from different angles, and (ii) be transparent in how I interpret data and develop conclusions.

Guided by this perspective, the research employs a literature review and a multiple-case study to investigate the phenomenon. The integrative literature review (Elsbach and van Knippenberg, 2020; Cronin and George, 2023) is selected because of the fragmentation of knowledge on the phenomenon. Relevant insights can be found across multiple research domains (e.g., sustainability, marketing, logistics, and supply chain management), each offering different perspectives. Integrating these perspectives helped me to capture different aspects of this complex, multi-layered reality and develop a better understanding of the circular retail transformation and the implications for retail stores as circular logistics nodes.

The second study was designed to understand what circular retail transformation means for retail stores. Given that the phenomenon is context-dependent and rooted in retail structures, it was necessary to study retail stores in real-life settings and through multiple viewpoints (e.g., roles, organizations). Case study research was considered an appropriate method, as it allows for the study of phenomena in real-world settings while accounting for context (Eisenhardt, 2021; Easton, 2010) and the unfolding of time (Langley *et al.*, 2013). Through interviews and observations, I documented practices and interpreted the structures, constraints, and mechanisms that shape retail store configurations. Rather than treating each store configuration or organizational choice as a unique outcome, the analysis focused on identifying patterns and explaining them in terms of underlying mechanisms, such as uncertainty, space constraints, and resource limitations.

3.2 Research approach and strategy

Given that the reconfiguration of retail stores as circular logistics nodes is an emerging phenomenon, this research adopts a phenomenon-based approach. Phenomenon-based research seeks to identify, capture, document, and conceptualize a phenomenon of interest to facilitate knowledge development

(Schwarz and Stensaker, 2016). One of the challenges with phenomenon-based research is the lack of established databases or data sources, which requires researchers to prioritize qualitative methods (Lumineau *et al.*, 2025). The use of qualitative methods can ensure close collaboration with practitioners so that knowledge development is timely, relevant in practice, and grounded in real-world challenges (Ployhart and Bartunek, 2019).

To follow a phenomenon-based research approach, the first step was to establish contact with practitioners. An expert panel discussion was organized together with the research group in October 2023. The panel consisted of the research group (including two senior researchers and two PhD students) and industry representatives (including three retailers from the fashion and furniture sectors, two technology providers, and one representative from a sustainability organization). The discussion focused on the initiatives, challenges, and success factors that retailers with consolidated logistics networks face when integrating circular services. In addition, the panel explored how technology could support the integration of circular services. After the panel discussion with practitioners, it was clear that retail stores were taking on a new role as circular logistics nodes.

This new role of retail stores entailed new operations, layout design, and resources, which motivated a literature review to understand the circular retail transformation and its implications for retail stores across various research domains. The integrative literature review aimed to synthesize insights across domains (e.g., sustainability, marketing, logistics and supply chain management) and develop a broader understanding of the phenomenon. A key insight from the literature review was that, although there was consensus on the benefits of integrating circular services, there was limited understanding of how to operationalize them in practice and make them work in stores.

During the expert panel discussion, retailers invited the research group to visit their stores and observe the implementation of circular services. This provided a valuable opportunity in 2024 to interview store staff, observe operations, and discuss challenges, opportunities, past and future events. While the initial interview guide was informed by themes identified in the literature review and a loose study protocol, the methodological direction was not fully defined. The original intention was to conduct an interview-based study to capture perspectives on circular retail. However, access to retail stores allowed me to observe how circular services are implemented in practice, the challenges they face, and how operations are organized within the stores. Then it was decided to collect more interviewee perspectives during 2025 from each selected retailer and aim for a more in-depth analysis of how store configurations supported the integration and scaling of circular services. As a result, the study evolved into a multiple-case study.

When presenting this second study at the Colloquium on European Research in Retailing 2025, I was encouraged to draw on Wemmerlöv (1990) as a useful

framework for analyzing service operations. Building on the suggestion, I drew on service marketing insights to support the interpretation and explanation of the empirical data. Accordingly, the study analyzes how linear retail stores are configured to implement and scale circular services. It identifies the operational challenges and explores how retail stores employ decoupling, coordination, and buffering mechanisms to manage the coexistence of linear and circular operations. The latest results were presented to the expert panel in April 2026 to finalize the project, validate results, and capture additional insights.

Figure 3.1 depicts the overall research approach and strategy, illustrating how the studies are interconnected.

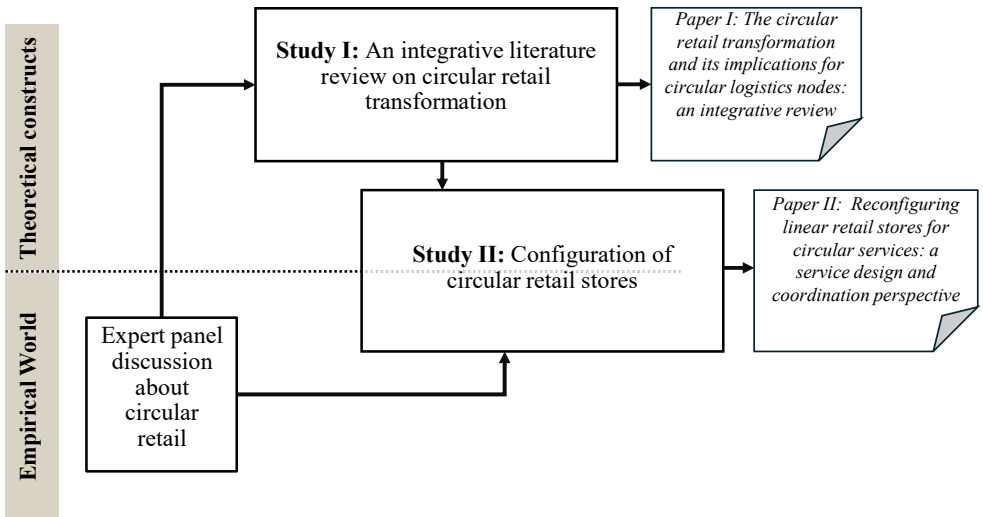

Figure 3.1 Overview of research design and structure

3.3 Study I: An integrative literature review on circular retail transformation

The first study aimed to establish a frame of reference for exploring how circular retail impacts circular logistics nodes, using the retail store as a representative case. The integrative literature review synthesized insights from diverse fields (e.g., marketing, sustainability, logistics and supply chain management) to build a conceptual understanding of the circular retail transformation and its implications for retail stores (Elsbach and van Knippenberg, 2020; Cronin and George, 2023). This study was conducted in collaboration with two senior researchers and librarians at Lund University, following the steps in Figure 3.2 suggested by Durach *et al.* (2017).

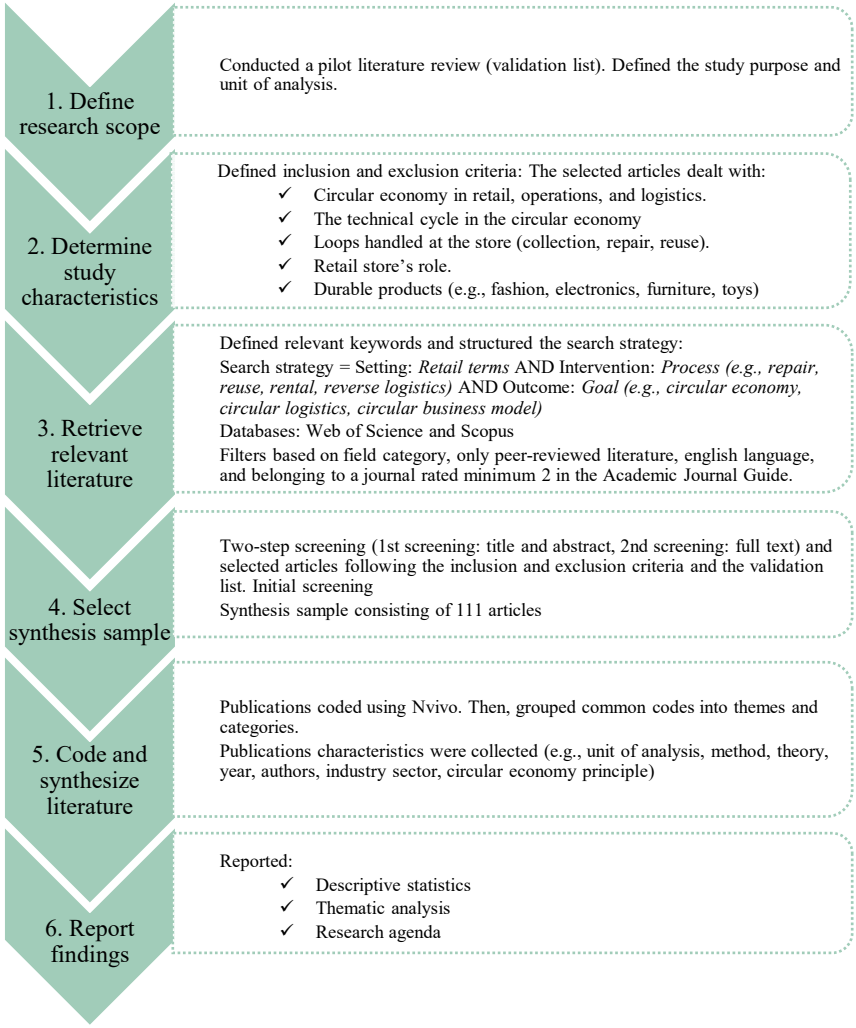

Figure 3.2 Overview of the systematic literature review

First, a pilot literature review was done and discussed with the expert panel to define the research scope and confirm industry relevance. This pilot review was later used as a "validation list" (36 publications) for the integrative literature review. Once the scope was defined, the second step was to establish the study boundaries and the inclusion and exclusion criteria. The selected literature included publications: (i) focusing on the circular economy in a retail context, or circular economy in operations, logistics, and supply chain management; (ii) including the technical cycle of the circular economy and covering loops that can be handled at the retail store (e.g., reuse, repair); (iii) that describe the role of the retail store (e.g., collection, gatekeeping, repairing, cleaning); and/or (iv) focusing on durable

products where life can be prolonged (e.g., clothes, furniture, toys, electronics). Excluded publications were those related to: (i) circular economy in the construction, critical materials, pharmaceutical, agriculture field, or in general sustainability without a circular economy focus; (ii) the biological cycle (e.g., biogas, composting, raw material extraction); (iii) focusing only in remanufacturing, recycling, waste management, in processes that cannot be handled at the store; and/or (iv) research on perishable products (e.g., food).

Third, to define the search strategy, six publications from the validation list were shared with the librarians, who assisted in defining databases (Web of Science and Scopus), keywords, and filters. This process required several iterations to refine the search strategy and ensure that all 36 targeted publications were retrieved. Between iterations, new keywords were added and removed, and filters were tested (the search protocol is summarized in Table 3.2). Due to the surplus of extracted literature, it was decided to narrow the search by focusing on studies published in journals rated level 2 or higher in the Academic Journal Guide, to ensure the rigor and quality of the included publications. The relevant literature consisted of 4539 publications.

Fourth, a two-stage selection process was carried out. The first stage consisted of an initial title and abstract screening using the COVIDENCE platform, which facilitates structuring the screening process. Following this step, a full-text selection was performed. To assess and select articles, the validation list served as a reference. In addition, senior researchers helped resolve doubts when it was unclear whether to include or exclude certain papers. The final synthesis sample consisted of 111 publications.

Table 3.1 Search protocol for literature review

	Keywords	Scopus	Web of Science
Setting	TITLE-ABS-KEY=(Retail* OR Store* OR Apparel* OR Fashion* OR "second hand retail*" OR "secondhand retail*" OR "In-store*" OR "Multi-channel*" OR "Garment*" OR Cloth* OR "Post-consumer" OR Toy* OR Furniture* OR Sport* OR "Outdoor equipment*" OR "Omni-channel*" OR Electronic* OR "Brick-and-mortar" OR Warehouse* OR omnichannel* OR "business model*" OR "product lifetime" OR "end-of-life" OR aftermarket* OR "second-hand market*" OR "used market" OR "CE value*" OR Multichannel* OR "point-of-sale")	4 531 485	2 483 455
Intervention	TITLE-ABS-KEY=("Reverse supply chain*" OR "Reverse logistic*" OR "Second-life retail*" OR Reus* OR Repair* OR Collect* OR "Reverse flow*" OR Take-back OR Resal* OR "Secondhand retail*" OR "dynamic capabilit*" OR "orchestration capabilit*" OR "Resource orchestration*" OR Buy-back OR "Operation* management" OR Takeback OR Buyback OR "lifetime extension" OR "business model innovation" OR "supply chain redesign" OR logistic* OR "return logistic*" OR "slowing of resource" OR "circular *commerce" OR "supply chain management" OR leas* OR rent* OR "circular business*" OR "secondhand retail*" OR "secondlife retail*" OR "circular flow*" OR "circular economy principle*" OR remanufactur* OR recommerce OR refurbish*)	9 234 602	6 506 716
Outcome	TITLE-ABS-KEY=("circular econom*" OR "Sustainable supply chain*" OR "Reverse supply chain*" OR "Sustainable Business model*" OR "Sustainable development goals" OR SDGs OR "Circular product* design" OR "Circular business model*" OR CBM* OR "Triple bottom line" OR TBL OR "Post-retail responsibilit*" OR "Post-consumer*" OR "Circular logistic*" OR "Circular supply chain*" OR "Supply chain loop*" OR Circularity OR "Sustainable business model*" OR "Circular logistic node*" OR "closed-loop" OR "close-loop" OR "circular retail*" OR "sustainable consumption" OR "responsible consumption" OR "waste management responsibility" OR "reverse value chain*" OR "product-service system*" OR "second-hand market*")	423 897	224 862
Combine: Setting AND Intervention AND Outcome.		**14 628**	**8 903**
Exclude	NOT TITLE-ABS-KEY=(medicine OR medical OR hospital* OR "food waste" OR eat OR eatable OR biological OR biology OR mining OR metal OR poly* OR PET OR bottle* OR pharma* OR "construction industry" OR oil OR "gas industr*" OR aviation)	-3 686	-2 372
Filters	**Subject areas:** Business, Management and Accounting; Environmental Science; Engineering; Social Sciences; Economics, Econometrics and Finance; Multidisciplinary	-1 759	X
	WoS Categories: Environmental sciences; engineering environmental; green sustainable science technology, management, business, environmental studies, operations research management science, engineering industrial engineering manufacturing, economics.	X	-1 508
	Document types: article, review, early access, or editorial material	-2 813	-6
	Limit to language: English	-243	-47
Duplicates		-3 600	-6
Final result		2 527	4 964
After journal filter (AJG rate 2 or higher)		7 491	

Finally, the synthesis sample was analyzed and coded. First, descriptive statistics were reported. Second, a content analysis was conducted in NVivo, yielding an initial set of first-order codes. Together with senior researchers, these codes were clustered into themes that together framed the circular retail transformation. An approach like Gioia *et al.* (2013) was followed. Third, the implications for retail stores were derived. To achieve this, each theme was explored to understand how it could affect retail store configurations. This step involved brainstorming, challenging assumptions, and visualizing how retail stores could adapt. Once the implications for the retail store were established, they were used to inform a broader understanding of the implications for circular logistics nodes. These implications were established through discussions with senior researchers and by identifying similarities and differences between the configuration of retail stores and more general configurations of circular logistics nodes, logistics networks, and resource development. Fourth, based on the review and derived implications, a future research agenda was proposed. For a more detailed description of the method, see Paper I.

3.4 Study II: Configuration of circular retail stores

The second study built on the conceptual foundation established in the first study. This study empirically explored how retailers reconfigure store operations, layouts, and resources as circular service volumes grow. It focuses on the use of decoupling, coordination, and buffering mechanisms across front- and back-office activities. To address this purpose, a multiple-case study was conducted (Eisenhardt, 2021). The study's unit of analysis was the configuration of linear retail stores that integrate and scale circular services.

Given the limited availability of data on this novel phenomenon, a purposive sampling strategy was employed to select information-rich cases (Patton, 2015). The study included three cases, each representing a retail store operating within established logistics networks. Each logistics network operated multiple stores configured for linear economies, ensuring that the selected cases were not independent retail nodes. The selected cases (summarized in Table 3.2) operated in different contexts (e.g., sectors, product characteristics, consumer characteristics, retail store characteristics), enabling the analysis of whether the identified trends and patterns were replicable across varying conditions (Gammelgaard, 2017).

In each case, different informants were identified. First, initial contact was established with a representative from each retailer. These retailers were part of the Expert Panel discussion. Later, these experts coordinated retail store visits and referred to other interviewees with relevant knowledge on integrating and scaling circular services.

Table 3.2 Overview of cases

Case Retail sector and circular service	Retail network and store characteristics	Product characteristics	Interviews	Visit
Alpha - Furniture - Resale	+500 stores (brand-owned and franchised), mixed distribution, global operations Big-box stores and small-format city stores.	+20,000 different items across different categories, materials, dimensions, and technologies	A0 Sustainability manager (October 2023 ≈ 3.5hr)	April 2024 May 2024
			A1 Sustainability manager (April 2024 ≈ 1hr and April 2025 ≈ 1hr)	
			A2 Store manager (April 2024 ≈ 2.5hr)	
			A3 Business navigator (May 2024 ≈ 2hr)	
			A4 Country product recovery leader (April 2025 ≈ 1hr)	
			A5 Strategic topic leader (June 2025 ≈ 1.5hr)	
			A6 Consultant (April 2025 ≈ 1hr)	
			A7 Sustainability manager (April 2026 ≈ 1.5hr)	
Beta - Children's clothing - Resale and repair	+60 stores, 3PL distribution, operating in Europe. Small stores in city centers.	+1,000 different items, the majority in different sizes	B0 Logistics manager (October 2023 ≈ 3.5hr)	March 2024
			B1 Store manager (March 2024 ≈ 2.5hr)	
			B2 Regional store manager (April 2025 ≈ 2hr)	
			B3 Logistics manager (March 2024 ≈ 2.5hr and April 2025 ≈ 1hr)	
			B4 Logistics manager (April 2026 ≈ 1.5hr)	
Gamma - Fashion - Resale and Repair	+35 stores, own distribution, global operations. Small stores in city centers.	+190 different items, the majority in different sizes	G0 Circular product manager (October 2023 ≈ 3.5hr)	April 2024
			G1 Circular product manager (April 2024 ≈ 2hr and June 2025 ≈ 1hr)	
			G2 Circular product developer (June 2024 ≈ 45min)	
			G3 Circular supply chain manager (April 2024 ≈ 1hr)	
			G4 Circular product manager (April 2026 ≈ 1.5hr)	

For data collection, an interview guide was crafted initially using the identified themes from study one. The interview guide was developed in slide format to facilitate conversation with the selected participants (attached in Appendix 1). The first series of interviews was conducted concurrently with the observations. These initial interviews served as pilot tests. As the methodological direction was defined and the first set of interviews was transcribed and coded, it was decided to conduct more interviews for each case. For the second round of interviews, the interview guide was more tailored to the study's purpose, and some questions were reformulated, added, or removed. Table 3.3 lists the interviews conducted and their respective durations, spanning the expert panel discussion in October 2023, interviews and observations in March-April 2024, supplementary interviews in April-June 2025, and closure discussion in April 2026.

The data analysis was conducted in three stages.

First, the empirical data were coded using the identified themes from study I as a priori codes. These themes served as the foundation of the interview guide and helped to identify implications for circular retail stores. During this stage, it was evident that there were similarities and differences in the challenges faced across cases, as well as in the mechanisms used to overcome them. For example, to overcome the same challenge, Alpha, Beta, and Gamma could employ very different mechanisms (e.g., decoupling in time, space, or organization).

As different contrasts and patterns drew attention to the mechanisms retail stores used to overcome the challenges they faced, the second stage consisted of uncovering these mechanisms. With this aim in mind, each case was described, operations were mapped onto the store layout, and the mechanisms (e.g., decoupling, buffering, and coordination) were identified. Then the challenges and mechanisms across circular operations (i.e., collection, recovery, and redistribution) were contrasted to identify differences and similarities in retail store configurations.

Patterns indicated the integration of some operations in stores through coupling and decoupling, buffering, and coordination, and the separation of certain operations, leveraging consumer capabilities, and outsourcing to increase capacity to external partners. Then, the identified patterns provided the foundation to develop a configuration matrix and design propositions. For a more detailed description of the method and case details, see Paper II.

3.5 Research quality

To guarantee that this research is rigorous, quality must be ensured and demonstrated (da Mota Pedrosa *et al.*, 2012). From a critical realist perspective, knowledge is interpretive, dependent on context, and fallible. Therefore, traditional research quality criteria based on positivist assumptions (e.g., Yin, 2003), emphasizing measurement of variables and statistical generalization rather than interpretation and context, are not appropriate for this research. This research employs transferability, truth value, and traceability (da Mota Pedrosa *et al.*, 2012; Halldorsson and Aastrup, 2003) as criteria for quality.

Transferability reflects the need for context when constructing knowledge and the degree to which findings can be analytically generalized beyond the studied cases. Transferability refers to how the identified mechanisms operate in other contexts with similar conditions (Halldórsson and Aastrup, 2003). As such, a critical point to ensure transferability is to explain in detail the context of the studied cases. In this research, each case was described, including store characteristics, services offered, available resources, and operations performed. Store visits enabled mapping operations within the store layout, facilitating a deeper understanding of the

organization of such operations. The context of each case was used to interpret why certain configurations and practices emerged under certain conditions. Contextual differences and limitations across cases were considered to interpret the implementation of circular services in stores.

Transferability of the findings can be further strengthened by making the theoretical aim, unit of analysis, and case selection explicit (da Mota Pedrosa *et al.*, 2012). The theoretical aim of this thesis is theory elaboration (Ketokivi and Choi, 2014), as it draws on existing concepts from configuration theory and the service marketing literature to understand a new phenomenon. The unit of analysis and case-selection logic were described to help readers understand the focus of the studies and assess the relevance of the findings to similar contexts. In the studies and dissertation, I used the retail store as a representative example of a circular logistics node and aimed to generalize the insights analytically to a broader range of circular logistics nodes and retail store configurations. While the findings are transferable, their relevance is mainly to retail contexts characterized by similar roles and operational conditions. Research boundaries were further described in section 1.5.

Truth-value concerns the credibility of the findings (Lincoln and Guba, 1986). In a critical realist view, truth-value is not about objective reality but about how interpretations accurately reflect empirical reality. As a critical realist, it is important to highlight that reality is bound to context and that understanding the real world is mediated by subjective experience. First, truth-value is ensured through the use of multiple data sources: interviews, observations, documents, and literature, which enabled triangulation. Second, the analysis followed an iterative top-down/bottom-up coding approach, moving between empirical observations and conceptual constructs. Third, in study I, the coding was supervised by senior researchers, and the formulation of implications for retail stores and circular logistics nodes was discussed and developed together. In study II, the research group was used to discuss interpretations and propositions. Fourth, the research aim and insights were presented and discussed with an expert panel, prior to and after data collection and analysis.

Traceability implies the transparency and documentation of the research process, including dependability and confirmability (da Mota Pedrosa *et al.*, 2012). Correct traceability allows readers to understand how the studies were conducted. In this thesis, traceability was ensured through documentation and descriptions of research design, data collection, and data analysis. As previously mentioned, study II developed from an initial interview study to a multiple-case study; this evolution built on the same research aim and initial data collection. To collect data in a structured way, an interview guide was used. As the methodological direction became clearer, the interview guide was refined, and additional interviews were conducted to deepen the analysis. Logs of data collection activities and databases containing coded transcriptions and coded literature are maintained.

4 Overview and contributions of the appended papers

This chapter summarizes the appended papers by presenting their purpose, main findings, and implications.

4.1 Paper I

Title: The circular retail transformation and its implications for circular logistics nodes: an integrative review

The purpose of the paper was to develop a conceptual understanding of the circular retail transformation and its implications for circular logistics nodes. In this paper, retail stores were used as representative circular logistics nodes. By understanding how retail stores were affected, the findings could be generalized analytically to a broader range of similar nodes. To address this purpose, it was decided to conduct a literature review.

To understand 'the circular retail transformation', it was important first to acknowledge that circular retail is a multidisciplinary field. Multiple research domains address the topic; it was clear that knowledge existed, but it was fragmented across fields such as sustainability, marketing, operations management, logistics and supply chain management, to mention some. Therefore, it was deemed important to synthesize knowledge from multiple fields and build on diverse perspectives to create a conceptual foundation. Then, it was decided to conduct an integrative literature review. An integrative review was considered appropriate because it enabled the synthesis of knowledge from multiple fields (Cronin and George, 2023), the development of theoretical insights from interconnected perspectives (Patriotta, 2020; Snyder, 2019), and the expansion of research boundaries (Krlev *et al.*, 2025).

The integrative literature review followed the steps suggested by Durach *et al.* (2017). First, a scoping phase supported by a pilot literature review and an expert panel discussion. Second, a structured search strategy was developed with librarians to retrieve relevant publications from Web of Science and Scopus. Third, relevant

publications were selected according to inclusion and exclusion criteria. Fourth, iterative coding and synthesis, together with co-authors, were conducted to identify themes and summarize the implications for retail stores as circular logistics nodes. Finally, the insights were extended from retail stores to a broader range of circular logistics nodes, and a research agenda was built.

The synthesis sample comprised 111 publications representing multiple fields, journals, and methods. From the synthesis of insights, seven themes shaping the circular retail transformation were uncovered. A brief description of each theme is presented below:

1. Incentives and regulatory enablers for integrating circular services: The political and market landscape of the circular economy is complex and dynamic (Do Vale *et al.*, 2025; Vadakkepatt *et al.*, 2021). Regulations require retailers to take responsibility for products beyond the point of sale (Liu *et al.*, 2022). At the same time, circular services create opportunities for market expansion and improving consumer loyalty (Sandberg, 2023; Murtas and Pedeliento, 2025). This dynamic environment has implications for circular retail stores, including the need for multiple, flexible configurations to integrate circular services and transform them into competitive advantages (Jayaraman and Luo, 2007).
2. Introducing the circular consumer: Consumers assume a dual role as suppliers and buyers in circular retail (Hultberg and Pal, 2023; Farahani *et al.*, 2022). This shift introduces consumer-driven product flows, in which consumers bring products and trigger circular services. Therefore, it is key to increase convenience (Dukovska-Popovska *et al.*, 2025; Arevalo-Ascanio *et al.*, 2025). Consumer behavior, preferences, and capabilities influence supply availability (Abbey *et al.*, 2015; Hedegård, 2024; Shin *et al.*, 2026), which in turn affects the design of circular services and the configuration of circular logistics nodes.
3. The issue with supply: Supply in circular retail is decentralized and unpredictable in terms of volume, quality, and timing, due to the impact of consumers' geographical dispersion and behavior (Bressanelli *et al.*, 2019; Jayaraman and Luo, 2007). The heterogeneous and variable nature of supply makes product flows difficult to forecast and handle. This means that, at times, some nodes might be overutilized while others are underutilized. Therefore, it is key to decide which nodes should handle supply, and to assess the need for decentralized nodes to achieve consumer convenience and accessibility (He *et al.*, 2024). At the same time, logistics nodes require flexible/modular space and system support to handle dynamic product flows.
4. Circular governance and organization: Governance and organizational structure drive the implementation of circular retail, including levels of

control, distribution of responsibilities, and decision-making autonomy (Pal *et al.*, 2019; Pellegrino *et al.*, 2025). The implementation of circular services must consider the need for local adaptation (Bryson *et al.*, 2024). Therefore, much of the circular service control naturally shifts to nodes closer to consumers. Retailers need to differentiate strategy and decision-making, determine the extent to which headquarters can influence circular service control to support standardization across nodes, and clarify responsibilities for the different nodes.

5. Integrating and scaling circular services and operations: Circular services are normally introduced through pilot initiatives and then scaled (Hultberg, 2025). Scaling is not linear and increases operational complexity (Bocken and Konietzko, 2022), requiring decisions about whether activities should be integrated into existing retail nodes or separated into specialized ones (Stål and Corvellec, 2018). When implementing circular services, retailers must learn from linear to simplify and standardize operations as much as possible, define the nodes suitable for integration or the need for new nodes, and assess the circular services scaling strategy.

6. Leveraging resources to take on circular services: Two resources stand out as crucial in circular retail: technology and skills (Butt *et al.*, 2024; Wilson and Goffnett, 2022). Technology alone is insufficient and must be combined with skilled staff. Retailers need to define which operations can be automated and what skills are needed in the node to deliver circular services (Von Kolpinski *et al.*, 2023). On one hand, technology is key to standardizing and improving operational efficiency. On the other hand, technology is in its infancy; thus, retailers need to upskill staff, invest in training, and enable information sharing across nodes.

7. New performance indicators for circular services: Traditional performance indicators and incentive systems don't suit circular retail (Kant Hvass and Pedersen, 2019; Hultberg and Pal, 2023). It is necessary for retailers and nodes to integrate sustainability and circularity metrics to support decision-making and long-term planning, and to align employee incentive structures to prioritize circular services (Bocken and Konietzko, 2022; Lopes de Sousa Jabbour *et al.*, 2019; Choudhary *et al.*, 2022).

Building on these themes, the research team explored how each influenced the configuration of retail stores. Insights were then extended to circular logistics nodes. The implications revealed an interdependence between node configuration, logistics network configuration, and resource development. As per Kembro *et al.* (2022), node configuration both influences and is influenced by the logistics network's configuration.

The analysis was anchored in a network-node-resource perspective, in which implications spanned and were linked across the different levels: (i) circular

logistics networks configuration, (ii) circular logistics node configuration, and (iii) circular resource development (Figure 4.1). First, retailers will need to define ownership and responsibilities for circular services across all network nodes. Retail networks may require new configurations, additional nodes (e.g., sorting centers, repair centers), and coordination mechanisms to manage collaborations. Second, circular logistics nodes must balance standardization and flexibility to deliver circular services efficiently. Retailers must evaluate whether to integrate or separate circular services within nodes configured for linear operations. Reconfiguring nodes to enable modular, responsive operations is key to handling both circular and linear operations. Third, retailers need to foresee policy dynamics, invest in upskilling and technologies, and align incentive mechanisms and performance indicators for circular services to accelerate the circular retail transformation.

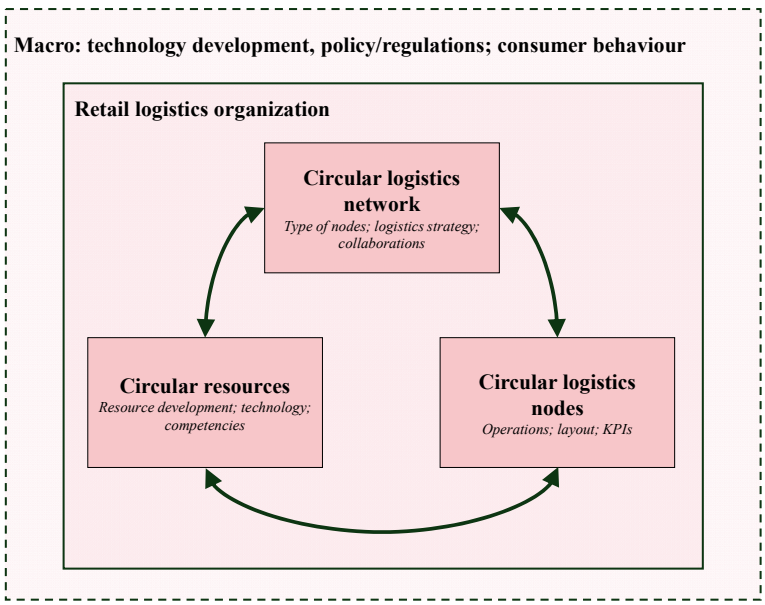

Figure 4.1 Interdependence between the circular logistics network, nodes, and resources

The article contributed to research and practice in different ways. First, one of the paper's central contributions is the conceptualization of retail stores as circular logistics nodes with new roles and responsibilities that enable circular product flows. Circular logistics nodes are defined as physical locations configured through operations, design, and resources to enable circular economy principles by collecting, processing (e.g., gatekeeping, grading, pricing, sorting, cleaning, repairing, remanufacturing), and redistributing products.

Second, the integrative review synthesized fragmented knowledge and established a unified conceptual foundation for understanding circular retail transformation.

Seven themes were identified and discussed, with a focus on the exploration of implications for retail stores as representative circular logistics nodes. The insights were extended to a broader circular logistics system, including the configuration of nodes, networks, and resource development. The identified themes and implications informed the development of a research agenda to advance theory and spark discussion in the field.

Lastly, our study offers practical guidance for retailers and policymakers to further understand and discuss the circular transformation of the dynamic system of interdependent actors and nodes.

4.2 Paper II

Title: Reconfiguring linear retail stores for circular services: a service design and coordination perspective

This second paper aimed to explore how retailers reconfigure store operations, layouts, and resources as circular service volumes grow, focusing on the use of decoupling, coordination, and buffering mechanisms across front- and back-office activities. The research question examined was: *What challenges do linear retail stores face when integrating and scaling circular services, and what mechanisms support retailers in managing linear and circular operations?* A multiple-case study was conducted to empirically investigate the phenomenon and explore the configuration of retail stores that are scaling circular services.

The multiple-case study included three retail stores operating under different contexts: different sectors (e.g., furniture, fashion, baby clothing), varied store characteristics, product assortments, and network configurations to capture differences and similarities across cases. The unit of analysis was defined as the configuration of linear retail stores that integrate and scale circular services.

The findings show that circular services differ from traditional retail operations due to their service nature. In circular retail, consumers assume a dual role as buyers and suppliers (Henninger *et al.*, 2019), introducing consumer-driven product flows that are uncertain in timing, volume, and condition (cf. consumer-induced uncertainty, Larsson and Bowen, 1989). In contrast to linear retail, where supply is planned and controlled, circular services increase operational variability and challenge existing store configurations that are tailored to standardized product handling and predictable flows.

The study identified three core challenges retail stores experience when integrating and scaling circular services:

- Unpredictable supply and product condition, which introduces variability regarding the quantity, quality, and timing of products entering circular flows. The unpredictability of supply hampers planning for resources, skills, and operational capacity.
- Space constraints stem from reduced store space in commercial areas optimized for displaying and selling. Circular services require additional space for operations such as sorting, cleaning, or repairing. As circular services scale, the competition for space becomes more pronounced, and retailers must decide how to balance opportunity cost across linear and circular business models.
- Resource constraints derived from the need for new skills and competencies, and equipment and technologies. Retail staff must carry out operations such as inspection, grading, and repair. Limited staff capacity and lack of specialized technical skills create bottlenecks, especially when service volume increases.

The paper analyzed how front-office and back-office circular operations are configured within retail stores. The front-office operations (e.g., collection and redistribution) required proximity to consumers and interaction with staff, whereas back-office operations (e.g., recovery) required technical skills and flexible areas and buffers to deal with unpredictable product flows (cf. Wemmerlöv, 1990). The study found that retail stores employed various mechanisms to integrate circular operations and overcome the challenges.

The identified mechanisms included: (i) decoupling or the separation of operations across space, time, or actors (e.g., moving technical tasks to backroom or external partners) (cf. Chase and Tansik, 1983); (ii) buffering to absorb variability through inventory or work-in-progress storage and stabilize product flows (cf. input/output buffers from Thompson, 1967); (iii) coordination to align operations between consumers, front-office, back-office, and external partners (cf. Larsson and Bowen, 1989). These mechanisms enabled the studied retail stores to manage variability, protect their technical operations, and support the coexistence of linear and circular operations.

The findings showed that retailers must decide which operations belong to the store, where they should be located, and how they should be integrated. Based on the studied cases, the paper proposed a configuration matrix and configuration propositions that explained how circular operations were organized (Table 4.1). The matrix employed two dimensions: the level of technical specialization required by operations, and the level of integration within the retail store, proposing different configuration patterns. The matrix shows how retailers organize circular services depending on operational requirements and constraints.

Table 4.1 A configuration matrix for circular service design

	Low technical specialization	High technical specialization
Integration within retail stores	**Proposition 1.** Retailers integrate low-technical circular operations by standardizing and communicating acceptance criteria, thereby reducing supply variability and improving consumer contact. **Proposition 2.** As volumes increase, retailers decouple operations across space and time (e.g., using backroom, idle time) to offload front-office resources, manage variability, and balance the coexistence of linear and circular operations.	**Proposition 3**. Retailers integrate high-technical circular operations into retail stores, using space or time decoupling and buffering to protect and stabilize the technical core, and enable specialization. **Proposition 4.** Under unpredictable supply and fluctuating workloads, retail stores increase coordination between shopfloor and backroom by coupling functions through shared or flexible teams to balance workloads and improve responsiveness.
Separation from retail stores	**Proposition 5.** When store capacity is constrained, retailers separate low-technical circular operations to consumers and coordinate through standardized acceptance criteria to reduce in-store workload and input variability. **Proposition 6a.** While shifting low-technical operations to consumers improves in-store efficiency and profitability, it risks excluding recoverable products from circular flows, limiting the effectiveness of circular retail systems. **Proposition 6b.** To maintain circularity, retailers need to differentiate product flows, leverage external partners, and design alternative processing paths to ensure that items unsuitable for in-store recovery remain within circular systems.	**Proposition 7a.** When circular operations require high technical specialization and exceed in-store capacity, retailers outsource operations to external partners to expand capacity and enable technical specialization. **Proposition 7b.** Separating high-technical circular operations reduces retail store operational control and increases the need for coordination across the network and centralized service control.

The study proposed that:

- Retail stores integrate operations that require a low level of technical specialization. Low-complexity operations, such as collection and resale, can be integrated into existing front-office areas to leverage storefronts' high-contact capabilities and proximity to consumers. To do so, retail stores (i) employ standardized acceptance criteria and guidelines to coordinate consumers and staff, and (ii) decouple operations across space and time to manage variability and balance the coexistence of linear and circular operations.

- Retail stores integrate operations that require a high level of technical specialization, if the in-store capabilities exist, or the investment enables additional services (e.g., customization). However, for retailers to manage the operations, it is required to decouple in terms of space, time, or actors, include buffers to stabilize flows, and coordinate between front- and back-office. For example, decouple operations to the backroom, assign a specialized team, allow dedicated hours for circular operations, or adjust staffing levels accordingly.
- Retail stores separate operations that require a low level of technical specialization to offload staff and reduce product flow variability. Retail stores delegate responsibilities to consumers to leverage their capabilities. For example, sorting items according to acceptance criteria and cleaning or repairing them before the staff evaluates them. While these operations can be done by consumers and will demand fewer resources from retail stores, there is a risk that subjective criteria could exclude recoverable products. Instead, to accelerate a circular economy, stores must design alternative take-back and disposition routes and establish partnerships with service providers for other circular initiatives (e.g., upcycling, recycling, remanufacturing) to avoid downcycling products.
- Retail stores separate or outsource operations requiring a high level of technical specialization to dedicated facilities or external partners. To isolate and protect the technical core (cf. Thompson, 1967) from high-contact areas. The separation allows for specialization and increases the efficiency of low-contact operations, but requires increased coordination from the retail store to align front-office, back-office, and consumers.

The paper offered different contributions to theory and practice. First, it provided an empirical, operational-level understanding of circular retail transformation, shifting the focus from the importance of adopting circular services to the reconfiguration of retail stores for circular services. Second, the paper identified mechanisms that enable integration and scaling of circular services. Based on the insights and patterns, a configuration matrix and propositions were developed as an initial effort to explain how circular operations are organized (Table 4.1). These propositions can guide retailers in reconfiguring their stores to integrate and scale circular services. Lastly, the paper offered a foundation for understanding retail stores as circular logistics nodes, which can be later extended to other circular logistics nodes and the logistics network.

5 Discussion

This chapter integrates the findings from Study I and Study II and the two appended papers to develop a broader understanding of how circular logistics nodes are configured and reconfigured for circular services. Section 5.1 discusses the operational requirements that circular services impose on retail stores. Section 5.2 extends the configuration matrix for circular service from Paper II to develop a configuration logic for circular logistics nodes. Section 5.3 builds on the dynamic nature of circular logistics nodes configuration.

5.1 Reconfiguring logistics nodes for circular services

Throughout this thesis and across the retailers studied, it is clear that circular services introduce new operational requirements for retail stores, including bidirectional product flows, new consumer interactions, and additional operations and resources. All in all, the integration of circular services, as in services in general, creates uncertainty and variability (cf. Larsson and Bowen, 1989). The problem lies not in this uncertainty, but in its introduction into nodes designed for predictable, efficient, and standardized linear operations. Understanding why reconfiguration of the node is needed requires drawing on both papers since Paper I establishes what these new conditions are and Paper II shows what they mean for retail stores.

Paper I identifies the introduction of the circular consumer as one of the defining themes of the circular retail transformation. In circular retail, consumers act as buyers and suppliers of used products (Henninger *et al.*, 2019; Fiori *et al.*, 2023). Consumers as key suppliers change the nature of product flows. In traditional retail, supply is controlled: products arrive from partners in planned quantities, at predictable times, in standardized conditions. In circular retail, supply originates from consumers, each bringing items at their convenience, in conditions ranging from new to very worn, and in quantities that depend on their behavior and motivation. Paper II describes this as a challenge experienced by the studied retail stores and connects it to the concept of consumer-input uncertainty (Larsson and Bowen, 1989): the organization's incomplete information about what will arrive, when, in what condition, and how it needs to be processed.

Paper II confirms, across Alpha, Beta, and Gamma, that unpredictable supply and variable product conditions pose challenges for store operations. Because each

incoming item is unique, it cannot be processed by a fixed procedure. Instead, items must be inspected, graded, and routed individually. Wemmerlöv (1990) describes this characteristic as fluid process design: flexible, case-by-case workflows in which task content and processing time vary by item. The problem for retail stores is that they are built around the opposite 'rigid process design' with standardized procedures, predictable task sequences, and low process variability. Embedding fluid circular processes into an environment configured for rigid linear ones creates coexistence challenges that drive the need for reconfiguration.

As circular service volumes grow, the coexistence with linear operations becomes problematic. Paper II shows that at low volumes, retailers manage the coexistence. Circular operations are coupled with existing routines and handled by existing resources and space. For example, Beta's and Gamma's collection operations coupled to checkout, or Gamma's staff helping consumers in the store and doing repairs when store traffic is low. This coupling works at low volume because circular product flows are small enough not to compete with linear operations. However, as volumes increase, retailers experience cannibalization (Bressanelli *et al.*, 2019). But the problem isn't cannibalization of sales, since, as the retailers studied pointed out, this will happen and should happen. It's cannibalization of resources and space, or, as shown in Paper II, space and resource constraints. Retail store space is expensive, and stores are measured by profitability (e.g., sales per square meter). Therefore, space used for sorting, cleaning, or storing items for repair is space not used for selling. Staff time is limited and represents one of the highest operational costs for retail stores (Fisher *et al.*, 2009). So, time spent evaluating, grading, and processing used items is time not spent serving consumers or replenishing shelves.

The mechanisms that Paper II identifies as responses to these challenges are decoupling, buffering, and coordination. Chase and Tansik (1983) argue that the appropriate design response to increase service efficiency is to decouple consumer-facing operations from technical operations, allowing specialization and protecting the technical core from consumer interactions. Paper II shows exactly this decoupling across all three retailers. The studied retailers employed (i) space decoupling, separating sorting and recovery to the backroom, (ii) time decoupling, scheduling circular processing during idle periods, (iii) actor decoupling, assigning dedicated staff, shifting responsibilities to consumers, or outsourcing to partners to remove operations from the staff.

Buffering (Thompson, 1967) is also employed in the stores studied to address consumer-input uncertainty. Paper II emphasizes the use of work-in-progress buffers at multiple points in the circular product flow. For example, between collection and sorting, between sorting and recovery, and between recovery and the shopfloor. All the buffers are designed to absorb variability in inflow and stabilize the flow into recovery. Output buffers also appear on the consumer side as service lead times for repairs to manage consumer expectations and decouple the pace of

demand from the pace of processing. Service lead times allowed the retail stores studied to balance capacity with service demand.

Coordination (Larsson and Bowen, 1989) becomes essential as decoupling creates distance between the circular operations. Paper II identifies two coordination mechanisms in practice. First, mutual adjustment through the proximity between front and back-office and flexible staff working across areas. Second, standardization through acceptance criteria, grading guidelines, pricing routines, training, and work instructions reduced the variability of consumer inputs and enabled more efficient collection operations (e.g., evaluation, pricing). Paper I's theme of leveraging resources to adopt circular operations emphasizes standardization as a key mechanism for scalability. As mentioned in the paper, retail stores need to learn from linear and simplify and standardize operations when possible to enable service scalability.

Together, the findings from Papers I and II reveal that reconfiguring retail stores as circular logistics nodes is not only about adding equipment or hiring new staff. The integration and scaling of circular services require reorganizing operations, design, and resources so that fluid circular processes can coexist with rigid linear ones. This coexistence is achieved through mechanisms such as decoupling, buffering, and coordination. However, as volumes grow and circular operations require more space, staff, and time. The fit between the circular operation and the retail store weakens. This misfit creates the need for a configuration logic that goes beyond the coexistence of circular and linear operations within a store and toward a broader understanding of which operations belong in which type of node: integrated nodes supporting circular and linear services, or specialized (dedicated) circular nodes.

5.2 Towards a matrix of circular logistics node configuration

The findings from both studies show that not all circular operations can or should be integrated into existing logistics nodes, and that the appropriate configuration depends on operational requirements and node capabilities. Paper II develops a configuration matrix for circular operations within retail stores, built on two dimensions: the level of technical specialization required by the operation, and the degree of integration versus separation from existing linear operations, and proposes seven design propositions. Building on both papers and the frame of reference, this section extends the matrix from Paper II (Table 4.1) to a broader range of circular logistics nodes identified in Paper I. The aim is to explore what each configuration looks like, why it emerges, and which mechanisms support it (Table 5.1).

The first dimension, ‘the level of technical specialization required by the operation,’ reflects the need for skills and equipment to carry out the circular operation. In the

‘leveraging resources theme’ in Paper I, it is discussed how circular operations vary in their need for skills and equipment. Collection, sorting, and redistribution require limited technical skill, and the capabilities needed for these operations already exist in most retail stores. In contrast, repair, refurbishment, and remanufacturing require expertise, dedicated tools, and stable processing conditions that retail stores do not provide.

The second dimension, ‘the degree to which circular operations are integrated into existing nodes or separated into dedicated nodes,’ captures the configuration decision that Paper I identifies in its theme on integrating and scaling circular services. Integration means piggybacking on the node's existing (including space, staff, and routines) through coupling or decoupling mechanisms, resulting in integrated nodes. Separation means that the circular operation cannot be adequately managed within the linear store and must be shifted to another actor, area, or node outside the node handling linear operations, resulting in specialized (dedicated) nodes. Paper I highlights that integrating circular services into retail stores enables high resource utilization and keeps circular services close to consumers, but risks cannibalization. On the other hand, separation enables specialization and economies of scale, but requires investment in new infrastructure and more intensive coordination across the logistics network. The four configuration logics that emerge from combining these two dimensions are discussed below:

Table 5.1 Circular logistics node matrix

	Low technical specialization	**High technical specialization**
Integrated node	• Operations aligned with the node operations. Such as collection or redistribution. • Coordination through standardization. • Minimal reconfiguration required. Coupling operations to linear ones.	• Limited to cases where product value justifies investment. • Requires dedicated space, equipment, and skilled staff. • Coordination through mutual adjustment, space decoupling, and input/output buffering
Dedicated node	• Operations requiring scale but limited technical specialization. • Two forms of separation: Preponement to consumers. Need for standardization of acceptance criteria. Postponement to dedicated node for sorting, redistribution, collection. • Inter-node coordination through standardization.	• Highly specialized recovery operations. Advanced repair, remanufacturing. • Coordination through standardization: clear quality specifications, service standards for the output (e.g., lead times), share item-level tracking systems, and formalize service-level agreements.

Integrated nodes with low technical specialization

This configuration logic emerges when circular operations are sufficiently aligned with the logistics node's existing capabilities. Collection and redistribution are ideal operations to integrate within existing nodes, as shown in Paper II. Paper I establishes why consumer proximity is a requirement for both operations. Consumers supply products to the system, and their participation depends on convenience and accessibility (Dukovska-Popovska *et al.*, 2025; Arevalo-Ascanio *et al.*, 2025). Nodes that are geographically close to consumers reduce the effort required to participate in circular services, thereby increasing supply volume and normalizing sustainable consumption. Retail stores, as the default consumer touchpoint in the retail network (Trautrims *et al.*, 2010), are well-positioned to offer this consumer proximity. Similar opportunities for integrating collection with minimal reconfiguration can be observed in other conveniently located nodes, such as recycling centers or pop-up collection points.

Paper II shows that standardization supports the management of supply heterogeneity by clearly establishing which items are eligible for collection, in what condition, and according to which quality standard, as expressed by Alpha, Beta, and Gamma. In Chase and Tansik's (1983) terms, this standardization reduces and improves consumer contact. It transforms what would otherwise be a high-variability consumer interaction into a structured process. The consumer's decision about what to bring has been made before arriving at the store, reducing the responsibility on staff and making collection compatible with linear retail operations. Paper I reinforces this point through its theme on standardization as a scalability mechanism. Without clear acceptance criteria and gatekeeping, collection could saturate the node as volumes grow.

As volumes increase, Paper II shows that even standardized, low-specialization operations generate workloads that begin to compete with linear retail for space and staff time. The studied retailer's response was partial decoupling in terms of space or time. This decoupling shifts sorting to the backroom or off-peak hours and reduces consumer contact in the front office. Buffering through work-in-progress storage between backroom processing and the shopfloor stabilizes redistribution against irregular inflows from recovery or collection, ensuring that the shopfloor remains flexible and modular to handle supply fluctuations. This combination of consumer-facing operations and decoupling of processing operations preserves the proximity to consumers that makes integration strategically valuable, while protecting linear retail from the operational burden of circular processing.

Even though it is in its infancy, Paper I highlights that technology can also reduce the operational burden of circular processing. When supported by technology, collection operations can be streamlined and performed with minimal supervision. Technology becomes an enabler of decoupling and standardization of routines. A practical example is the Swedish deposit-return system Pantamera (Pantamera,

n.d.), where reverse vending machines are integrated into grocery stores to collect cans and bottles. In this case, stores allocate space and equipment to increase operational efficiency and provide high accessibility for consumers, but reduce consumer contact through the employment of technology. Based on this configuration logic, I submit the following proposition:

> **Proposition (i):** *When circular operations require low technical specialization and align with core retail operations, retailers integrate operations into existing logistics nodes by standardizing inputs and routines or using technology to leverage proximity to consumers while minimizing reconfiguration costs.*

Integrated nodes with high technical specialization

The integration of circular operations into existing logistics nodes that require high specialization is rare. This configuration emerges when the value created by circular operations compensates the cost of integrating specialized resources into existing nodes. High specialization requires unique equipment, skilled labor, and space dedicated to the circular operations. For example, in-store repairs require sewing machines, storage for spare parts, work-in-progress, and finished products. The staff must have the skills to handle high-quality repairs. Integrating such recovery operations risks disrupting core operations (e.g., selling or consumer service) and increasing complexity (Stål and Corvellec, 2022). Integration is viable when economic and strategic conditions justify the added complexity. Typically, when the product value is high (e.g., Bundgaard and Huulgaard, 2019; Prosman and Cagliano, 2022), consumers are willing to pay for the service. Cases such as bike or jewelry stores illustrate this logic. Repair and resale are integrated into retail stores because the product's value is high, and the cost of repair from a consumer perspective is justified, which in turn supports retailer investment in specialized capabilities. Resale or repair services, in this instance, complement the existing value proposition and increase consumer loyalty. In Paper II's case, Gamma in-store tailoring and repair services were integrated because they complemented the brand's positioning and created a point of differentiation.

The operational challenge, as Paper II demonstrates, is that high-specialization operations are fluid (Wemmerlöv, 1990), where processing times vary by item. When embedded in a retail environment designed for rigid, standardized processes, this fluidity risks creating backlogs that compete for shared space with linear retail operations. Some retailers rely on *paid experiences* to integrate operations that require a high level of technical skills. Re.Uniqlo can serve as an example (Uniqlo, n.d.). Uniqlo has begun offering paid repair services, which incentivize circular behavior, while also offering customization options (e.g., embroidery, tailoring) for new items to attract new consumers. Both services are value-adding and paid services, which justifies the investment in a high level of technical specialization within the node.

Paper II shows that this risk is also managed through the same set of mechanisms: (i) space decoupling creates a low-contact technical area (Chase, 1981) where repair proceeds without shopfloor interruption; (ii) input buffering as work-in-progress storage to absorb supply variability before recovery; (iii) buffering through service lead times to manage consumer expectations and allow for processing according to backlog and available capacity.

Coordination between front and back-office in this configuration cannot be standardized. Paper II identifies the use of mutual adjustment when nodes integrate high-technical operations (Thompson, 1967; Larsson and Bowen, 1989). The flexible boundaries between front and back-office enable staff to balance their workloads. Across the studied cases, the use of flexible staffing preserves the resource utilization benefits of integration while protecting the technical core. Paper I's theme on performance metrics adds an important warning: when high-specialization circular operations are not priced to reflect their resource costs, as in Gamma's experience of offering free in-store repairs, they generate demand without the revenue to support it. As Gamma noted, this disparity forced a strategic reconsideration of the repair services to allow capacity to be controlled. In line with this configuration, the following proposition is presented:

> **Proposition (ii):** *When circular operations require high technical specialization but generate sufficient economic or strategic value, retailers integrate these operations into existing nodes through space or time decoupling and mutual adjustment coordination to balance workload between front and back-office.*

Dedicated nodes with low technical specialization

This configuration logic arises when low-specialization circular operations exceed the capacity of existing nodes, or when the economies of scale make centralized handling in dedicated nodes more efficient than local processing at various existing nodes (e.g., multiple stores in a network). Paper I's theme on the issue of supply and circular governance explained that because supply is consumer-driven and geographically dispersed, circular services need to locally adapt. However, retailers might face issues with volume collection as it is distributed across nodes. The result could be that no individual node captures sufficient volume to achieve the economies of scale that make these operations profitable.

Paper II identifies two forms of separation. The first is upstream separation to consumers ‘preponement’. Retailers shift initial processing operations to consumers before items enter the store, employing specific acceptance criteria that require items to be cleaned, repaired, or sorted. In Paper II, Beta specified that items brought for resale had to be clean and free of damage, else they would not be accepted. This means that the consumer performs the first stage of quality control. This upstream decoupling reduces in-store workload and draws on what Paper I describes as

leveraging consumers' capabilities, and on what the service literature refers to as the disposition to participate as co-producers in the service system (Larsson and Bowen, 1989; Eiglier and Langeard, 1977). In this form of separation, consumers perform node-like operations. The coordination mechanism that makes this preponement work is standardization. Without clear criteria for what consumers should prepare and how, the preponement would be ineffective.

The second form of separation is downstream or 'postponement' to dedicated nodes. By consolidating sorting, cleaning, and basic recovery into dedicated facilities, retailers can achieve the standardization and economies of scale that individual retail nodes cannot. Examples illustrating this configuration are Sellpy's dedicated sorting and redistribution facility (Sellpy, n.d.), or Retuna's dedicated collection and sorting area (Hedegård *et al.*, 2020). The consolidation of volume and resources enables the industrialization of circular operations (e.g., nodes configured with dedicated equipment, specialized teams, and standardized workflows) and could potentially reduce unit costs compared with dispersed local processing. This configuration points to the emergence of dedicated circular logistics nodes, such as sorting, collection, or basic recovery nodes, that can leverage economies of scale in the circular economy.

This configuration leads to the following proposition:

> **Proposition (iii):** *When circular operations require low technical specialization but exceed what the node can absorb without cannibalizing resources, retailers separate operations from the linear ones either upstream to consumers through standardized acceptance criteria, or downstream to dedicated nodes to improve efficiency or achieve economies of scale.*

Separation requiring high technical specialization

The most resource-intensive configuration logic arises when circular operations require high technical specialization, volumes that exceed existing nodes' capabilities, and considerable investment to resource the node. Paper I's theme on leveraging resources establishes why this configuration is necessary: repair, remanufacturing, and advanced recovery require skills and equipment that are costly and difficult to develop within a traditional retail store. As emphasized by an interviewee from Alpha in Study II: *"Sometimes it makes sense that the consumer sees what you're doing, so maybe you could do a part of (the service) at like the retail store, but that's primarily for educational-buzz and making it more visible. I do think from a practical, scalable point of view, probably the heart of it all, the factory part of it… the retail store is not the prime location. I mean… the linear stuff we're producing today. It's not produced in Times Square."* The efficient recovery of products requires a protected and dedicated infrastructure that retail stores cannot provide without cannibalizing on commercial space and resources. The investment required to develop these

capabilities at each retail store is typically higher than that required to configure a single dedicated specialized facility serving multiple retail stores.

Repair and recovery centers or remanufacturing facilities are examples of this configuration, where retailers seek high levels of industrialization combined with specialization. On a smaller scale, independent bike repair shops, mechanic shops, or electronic repair nodes also represent this configuration, as they rely on skilled labor and specialized tools to manage complex, variable operations. In their case, the specialization in technical skills generates business opportunities as service providers.

Paper II shows this configuration in Gamma's plan to outsource repair operations to an external specialist partner. For Gamma, the high-contact collection functions, such as receiving items for repair and communicating service outcomes, remain in the retail store, where consumer proximity is essential, whereas the low-contact technical operations move to the specialist node. As Paper II's Proposition 7a states, this outsourcing of recovery expands effective capacity and enables technical specialization unavailable in the retail store context. However, separation of operations increases the need for coordination (Mintzberg, 1979). Paper II's Proposition 7b indicates that outsourcing high-specialization operations increases the need for inter-node coordination and reduces the retail store's operational control over the service outcome. When separating, it is key to standardize outputs (Thompson, 1967), define clear quality specifications, define service standards for the output (e.g., lead times), share item-level tracking systems, and formalize service-level agreements. In addition, it is necessary to frequently align capacity across nodes (e.g., a retail store and a repair partner).

> **Proposition (iv):** *When circular operations require high technical specialization and exceed the capabilities of existing nodes, retailers separate operations to dedicated specialist nodes or external partners, disaggregating high-contact intake from low-contact technical processing. to manage complexity and maximize recovery value.*

The four configuration logics together show that the configuration of circular logistics nodes is not a single design decision but a portfolio of decisions, each matched to different circular operation and node capabilities. In alignment with a contingency approach (Donaldson, 2001), no single configuration is optimal. The appropriate choice depends on the nature of the operation, the volume of flows, and the capabilities of the node and the logistics network. Misalignment in either direction, high-specialization operations integrated without adequate decoupling and buffering, or low-specialization operations at low volumes unnecessarily separated, can produce inefficiencies and non-circular outcomes. With that said, retail stores are not always the right node. They are one possible node within a broader network. Then the question is not whether to use a retail store, but which operations belong there and which belong elsewhere.

5.3 Dynamic reconfiguration of circular services

Circular logistics node configurations can be considered dynamic since the fit between circular operations and node capabilities changes over time. As volume grows, technology advances, demand shifts, regulations develop, or product design changes, retailers might reconfigure to adapt to the new context. Understanding the dynamics of reconfiguration and how configurations change over time, and what triggers those changes, is therefore a crucial complement to the matrix configuration logic.

Paper II provides the empirical foundation for this dynamic view. All three retailers studied were in active reconfiguration throughout the period of observation. Alpha provided a bit of their background, noting that it started in a corner of the store and has now moved to a store-in-store layout with a decoupled recovery area. They are testing repair services and continue scaling the service to other markets. Beta progressively expanded its acceptance criteria to include additional items and has had to restrict the space allocated to circular services to avoid cannibalizing resources. It is also exploring and streamlining circular services in other markets. Gamma was evaluating the transition from integrated free repair, which had exceeded its store capacity, to a combination of premium paid-in-store repair and an outsourced dedicated repair node. These journeys reflect a consistent dynamic reconfiguration.

In addition to volume growth as a driver of reconfiguration, Paper I identifies three other drivers that can shift the configuration logic. The first is technology development. Paper I's theme on leveraging resources shows that technology for circular operations is currently in its infancy, but technological development is a driver of circular retail scalability. For example, AI tools, robotic sorting, automated condition assessment, or digital product passports can improve node capacity. As these technologies mature, operations that currently require skilled human judgment may be automated, reducing their specialization requirements and enabling integration that is currently not viable. Developments in grading, pricing, and repair automation will progressively shift the boundaries between the quadrants, enabling integration and standardization.

The second driver is the development of consumer participation. Paper I's theme on the circular consumer identifies consumer behavior and capabilities as dynamic. As circular services become more normalized and consumers develop a clearer understanding of their role as co-producers, their willingness and ability to perform preliminary preparation (e.g., cleaning items before return, sorting by condition, providing product information) may increase.

The third driver is the development of circular ecosystems. Paper I's theme on circular governance notes that the feasibility of high-specialization configurations (Quadrant 4) depends on the existence of specialized dedicated nodes. If such nodes

do not yet exist, retailers are constrained to either integrate highly specialized operations, risking cannibalization, or restrict the scope of their circular services (e.g., exclude recovery). As the circular economy matures and a broader ecosystem of repair centers, sorting hubs, and recovery specialists develops, the range of configurations expands.

As concluded in Paper I, the reconfiguration of the node is inseparable from the configuration of the logistics network and resource availability. A decision to separate operations from retail stores requires transportation, handovers, information systems, training, and central control. Decisions at the node have network implications, and network capabilities constrain the node's configuration options (Kembro *et al.*, 2022). Meaning that resources (e.g., skills, automation, and systems) must be developed in relation to the node-network configuration. Study II provides initial empirical evidence. Beta in UK decision of not having the service at the retail store and allocating the circular operations to the distribution partners was possible because the capabilities existed on the node and logistics network. Gamma's configuration across countries varies: in some countries, they use partners; in others, they use the store. Currently, Gamma is using both types of nodes: integrated nodes offering premium services and dedicated nodes offering free repairs and reconditioning for resale. Alpha's use of the store for circular services varies across countries. For example, in Poland, they are close to a supplier that can offer repairs, so they can extend the service to consumers. But in Sweden, they don't have the same supplier and don't have the space in the store; repair operations were tested in a dedicated node. I submit the following proposition for further research:

> **Proposition (v):** *As contextual conditions change (e.g., volume, technology development, consumer capabilities, circular ecosystem), circular operations are reconfigured across integration and specialization dimensions, requiring retailers to continuously adapt node and network configurations.*
>
> **Proposition (vi):** *As circular services scale, the configuration of logistics nodes becomes interdependent with the configuration of the logistics networks and resource development, such that changes in one dimension require corresponding adaptations in the others.*

This thesis discussion, matrix in section 5.2, and the six propositions show that circular retail transformation requires logistics nodes to be configured and reconfigured to meet the requirements of circular services. The next chapter returns to the research questions and summarizes the thesis's theoretical and practical contributions.

6 Conclusions

This chapter presents the conclusions of this thesis. In this chapter, I revisit the research questions and elaborate on the main theoretical and managerial contributions. Later, I discuss the study's limitations and propose avenues for future research.

6.1 Revisiting the research questions

The purpose of this thesis was to explore the reconfiguration of retail stores to integrate and scale circular services and develop a broader understanding of the configuration of circular logistics nodes. To address this purpose, two research questions were formulated, and two studies were conducted. Study I established the conceptual foundation for understanding the circular retail transformation and its impact on retail stores, which serve as representative circular logistics nodes. Study II empirically explored retail store configurations used by retailers to integrate and scale circular services. In this section, I revisit the research questions and discuss how the thesis's findings address them and fulfill the research purpose.

RQ1: How can circular retail transformation be understood, and what are the implications for retail stores as circular logistics nodes?

Circular retail transformation can be understood as a shift from a linear, demand-driven, standardized operational context to a service-based, bidirectional, and consumer-driven one. This transformation is not just an extension of existing retail operations. It is a shift in the conditions under which retail stores function. Through the integrative literature review in Study I (Paper I), the circular retail transformation is explained through seven interconnected themes: (i) incentives and regulatory enablers for integrating circular services, (ii) introducing the circular consumer, (iii) the issue of supply, (iv) circular governance and organization, (v) integrating and scaling circular services and operations, (vi) leveraging resources to take on circular services, and (vii) new performance indicators for circular services.

An implication of this transformation is that retail stores assume new roles and functions as circular logistics nodes, serving as collection, gatekeeping, sorting, recovery, and redistribution nodes. Circular services introduce new operational

conditions. Circular services are characterized by consumer-input uncertainty (cf. Larsson and Bowen, 1989), highly variable product condition (cf. Sampson, 2006), and fluid rather than rigid process designs (cf. Wemmerlöv, 1990), thereby requiring retail stores to be reconfigured to balance efficiency and flexibility.

Study II complements this conceptual understanding by empirically examining how the changes introduced by circular retail manifest at the store. The findings showed that the integration and scaling of circular services introduce operational challenges, including (i) unpredictable supply of products and their conditions, introducing variability and the need to handle heterogeneous products, (ii) space constraints of retail stores to accommodate all operations and necessary equipment, and (iii) resource constraints, characterized by the lack of skills and technologies, and limiting the capacity of the node. These challenges reflect the service-based nature of circular retail, where consumer-driven product flows and heterogeneous products increase complexity and variability to the service system (cf. Larsson and Bowen 1989; Wemmerlöv 1990).

RQ2: What configurations of circular logistics nodes emerge from the integration and scaling of circular services in retail stores?

The findings from Study II were extended in the discussion chapter, which showed that circular logistics node configurations emerge from the alignment or misalignment between the requirements of circular operations and the node's capabilities. This thesis identifies four configuration logics, captured in the matrix of circular logistics node configurations (Table 5.1). Each configuration emerges from the intersection of two conditions: (i) the level of technical specialization required by the operation, and (ii) the degree to which circular operations are integrated into existing nodes or separated into dedicated nodes

The first configuration (integration requiring low technical specialization) occurs when circular operations align with existing retail capabilities. Activities such as collection and redistribution can be integrated into retail stores with minimal changes, as they build on existing product-handling routines and proximity to consumers. Three mechanisms enable integration: (i) standardization of consumer input through acceptance criteria enables this configuration by reducing consumer-input uncertainty; (ii) space and time decoupling protects linear operations; and (iii) buffering improves flexibility to manage available space.

The second configuration (integration requiring high technical specialization) arises when circular operations require higher levels of technical expertise, but the value created by the operation compensates for the additional complexity, resource requirements, and investment. In these cases, retailers rely on mechanisms such as space or time decoupling and dedicated resources to enable specialization without disrupting core operations. Space decoupling, input and output buffering, and mutual adjustment coordination enable this configuration.

The third configuration (separation requiring low technical specialization) occurs when circular operations exceed in-store capacity or require economies of scale that individual retail nodes cannot achieve. Separation enables the standardization and industrialization of processes such as sorting and cleaning, reducing the operational burden on retail stores. Two forms of separation emerge: (i) upstream 'preponement' to consumers through standardized acceptance criteria that shift preliminary processing to the consumer (Larsson and Bowen, 1989; Eiglier and Langeard, 1977), and (ii) downstream 'postponement' to dedicated nodes, for example, collection nodes, sorting nodes, or basic recovery nodes.

The fourth configuration (separation requiring high technical specialization) emerges when circular operations require both high levels of technical specialization and exceed the capabilities of existing nodes. These operations are typically relocated to dedicated facilities or external partners, where specialized resources and expertise can be concentrated. Through disaggregation (cf. Chase, 1981), the studied retailers separate the high-contact operations (i.e., collection and redistribution), which remain in the retail store, from the low-contact operations (i.e., recovery), which move to the specialist node. Coordination across node boundaries shifts from mutual adjustment to formalized standardization of outputs, inter-node tracking systems, and service-level governance. The feasibility of this configuration depends on the existence of a capable partner in the circular ecosystem.

These different configurations show that circular operations are not organized according to an optimal solution. The configuration depends on the alignment between operational requirements and node-network-resources capabilities. As circular services scale or context changes (e.g., different product characteristics, new regulations, technology development), operations may shift between configurations. Consequently, the configuration of circular logistics nodes is dynamic and context-dependent.

6.2 Theoretical contributions

This thesis contributes to research at the intersection of circular economy, logistics node configuration, and service marketing by developing a conceptual and empirical exploration of the reconfiguration of retail stores as circular logistics nodes. The contributions include three levels: (i) the conceptualization of circular retail as a transformation of the operational context; (ii) the application and extension of service marketing theory to explain circular service design and node configuration; (iii) and the development of a framework for circular logistics node configuration. Each is elaborated below.

First contribution: Circular retail as a transformation of operational context

Prior research has addressed circular retail primarily from various angles: as a business model choice (Bocken *et al.*, 2016; Stål and Corvellec, 2022), from a consumer behavior perspective (Abdulla *et al.*, 2024; Murtas and Pedeliento, 2025; Tangri and Yu, 2023), or from a supply chain lens (Bressanelli *et al.*, 2019; Friedrich *et al.*, 2025). Research acknowledges that circular services, such as repair and resale, are growing, and some studies have begun to examine the operational requirements they entail (Gróf and Netland, 2025). However, prior research has not systematically connected the elements of circular retail transformation, such as consumer-driven supply, bidirectional flows, and fluid processes, to the implications for how logistics nodes are reconfigured. This thesis addresses this gap.

Paper I contributed to by showing that circular retail transformation is best understood as a shift in operational context rather than as the addition of new services to an existing node. The seven themes identified in Paper I show that circular retail does not simply extend the linear retail model, but it shifts the conditions in which retail stores operate (e.g., changes the direction and predictability of product flows, the role of the consumer, the skill and equipment requirements of operations, decision-making, power dynamics, and the performance measurement). This conceptualization provides a foundation that goes beyond existing retail and circular economy research and intersects multiple bodies of knowledge.

Second contribution: Service marketing literature applied to circular retail

Service marketing literature, specifically the consumer-contact model (Chase and Tansik, 1983), the distinction between rigid and fluid processes (Wemmerlöv, 1990), the servuction model (Eiglier and Langeard, 1977), and service design and coordination (Larsson and Bowen, 1989; Thompson, 1967), have been applied to explain service system design in consumer service contexts. Gróf and Netland (2025) discuss consumer interaction as an important construct in product life-cycle extension operations. Friedrich *et al.* (2025) take a network perspective, conceptualizing circular (de-)coupling as the reconfiguration of global production networks to enable circular resource flows. However, there is limited research on applying service marketing literature to explain the design and coordination of circular operations in retail stores as representative examples of circular logistics nodes. This is the contribution of Paper II and this thesis discussion chapter.

Paper II demonstrates that the mechanisms used to manage circular operations within retail stores: decoupling, buffering, and coordination, are not random but are implied by the service characteristics of circular services. Consumer-contact needs decoupling (Chase, 1981); variable product flows require buffering (Thompson, 1967); and the separation of front- and back-office operations requires coordination (Larsson and Bowen, 1989). The application of service marketing theory to a logistics configuration problem is novel.

Furthermore, the thesis extends the application of these service marketing perspectives (Chase and Tansik, 1983; Larsson and Bowen, 1989) to circular logistics nodes within a network. The distinction between mutual adjustment as a coordination mechanism within integrated nodes and standardization of outputs as a coordination mechanism across separated nodes is a theoretical extension of Larsson and Bowen's (1989) framework to a perspective with multiple nodes and actors involved in circular logistics.

Third contribution: A configuration framework for circular logistics nodes

Configuration theory (Miller 1986; Mintzberg, 1979; Donaldson, 2001) holds that performance depends on the alignment among the elements of a system and between the system and its context. Eriksson (2022) and Kembro and Norrman (2020; 2021) apply configuration theory to warehouse design, identifying operations, design, and resources as the three dimensions of node configuration. Prosman and Cagliano (2022) extend configuration thinking to circular manufacturing, showing that circular supply characteristics require a balance between flexibility and homogeneity. What has not existed prior to this thesis is a configuration framework that explains how the specific characteristics of circular services, technical specialization requirements, and integration-versus-separation trade-offs determine which type of node is appropriate for which type of circular operation.

The circular logistics node configuration matrix, developed from Paper II and extended in the discussion chapter, represents this contribution. The matrix proposes two dimensions: the level of technical specialization required and the degree to which circular operations are integrated into existing nodes or separated into dedicated nodes, and identifies four configuration logics. The matrix does not describe a single optimal configuration, but it shows that the appropriate configuration depends on the alignment between the requirements of the circular operation, the capabilities of the node, and the circular logistics network. The matrix also contributes by making the dynamic dimension of configuration explicit. This thesis, informed by the empirical trajectories observed in Paper II, proposes that circular logistics node configurations shift over time as volume, technology, consumer behavior, and ecosystem maturity develop. In addition, the thesis extends Kembro *et al.'s* (2022) perspective on node-network-resource configuration interdependence as a core feature of circular logistics node configuration.

6.3 Managerial contributions

The findings provide several managerial implications for retailers seeking to integrate and scale circular services. First, managers should recognize that circular retail transformation represents a shift in the operational conditions rather than simply the addition of new services. Circular services introduce new operations,

product flows, consumer roles, and actors that can differ from traditional retail operations. Retailers should avoid treating circular services as add-ons and instead consider and anticipate their impact on the store's overall configuration and the logistics system. Using retail stores as circular logistics nodes requires reconfiguration. Retailers who proactively plan the reconfiguration of their nodes, allocate dedicated space, develop skills, and establish clear acceptance criteria before volumes increase will be better positioned to scale circular services without disrupting their core business.

Second, the mechanisms of decoupling, buffering, and coordination provide a practical toolkit for managing the coexistence of linear and circular operations. Retailers should design circular operations with a clear separation between consumer-facing intake and back-office processing, build work-in-progress buffers at transitions between operations, and establish acceptance criteria to standardize consumer inputs before they enter the technical system. The specific mechanism used should fit the nature of the operation. For example, high-specialization operations require more space decoupling and dedicated resources, whereas low-specialization operations can be coupled with existing routines at low volumes. Similarly, coordination mechanisms must evolve as operations scale. Mutual adjustment is sufficient within an integrated node, but standardization of outputs and formalized governance are necessary when operations are separated across node boundaries, as in traditional retail.

Third, managers should adopt a configuration perspective when integrating and scaling circular services. Instead of focusing on which services to offer, managers need to determine where and how circular operations should be performed. The proposed configuration framework suggests that some operations can be integrated into retail stores, while others should be separated into dedicated nodes or external partners, depending on the level of technical specialization and capacity requirements. This configuration matrix can be used as a decision tool for integrating and scaling circular services and support decisions regarding space allocation, resource investment, and layout and operational design.

Finally, managers should recognize that circular services extend beyond the retail store's boundaries and require coordination across logistics networks. Decisions regarding the configuration of circular operations involve multiple actors, including consumers, partners, and specialized facilities. Managers should consider how retail stores interact with other logistics nodes and develop capabilities that enable coordination across the network.

6.4 Limitations and avenues for future research

This thesis has certain limitations in terms of scope, methodology, and empirical context. First, the study focuses on retail stores as representative circular logistics nodes. While this approach allows for an in-depth exploration of how nodes are reconfigured to integrate circular services in capacity-constrained environments, the findings are context-dependent. Retail stores are characterized by high consumer interaction and limited space, which shape configuration decisions. Other circular logistics nodes may operate under different constraints and objectives. For example, a warehouse may be limited by automation technologies that prevent the integration of certain circular operations, even when they align with core activities. Future research could expand this study by exploring other nodes in circular logistics, such as warehouses, manufacturing plants, sorting centers, repair centers, or waste management facilities, to examine how differences in context influence configuration decisions.

Second, this thesis collects data from multiple retailers across sectors such as fashion, children's clothing, and furniture (including some electronic products). While the selected cases vary in product characteristics, store formats, and circular services, this study does not include empirical cases dealing exclusively with electronic products. Dealing with electronics may require higher levels of technical expertise, specialized equipment, and stricter quality control, which could lead to different configuration decisions for circular logistics nodes. Future research could extend the findings of this thesis to other retail sectors, examining how product characteristics influence the integration, decoupling, or separation of circular operations.

Along similar lines, the selected cases operate in Sweden. Sweden is a mature circular market with advanced regulations in circular retail. The findings of this thesis may be influenced by factors such as consumer awareness, policy frameworks, and organizational maturity, which may differ across markets. In addition, consumer beliefs and practices can influence how they engage with circular services, such as their willingness to return or buy used products or repair products. Cultural perceptions related to product ownership, hygiene, or status may constrain participation in some contexts, while in others, circular practices may be ingrained in everyday routines without being explicitly framed as “circular.” Given that consumers are key actors in circular systems, such differences may influence the configuration decisions. Future research should therefore explore how cultural and institutional contexts influence the configuration of circular logistics nodes across regions.

Third, while this study examines circular logistics nodes through the lens of retail stores, circularity requires a broader systems perspective. The configuration of retail stores is influenced not only by internal factors but also by their position within a

wider system. This includes the capabilities of the logistics network and the surrounding circular ecosystem (Perotti *et al.*, 2025; Schultz and Valentinov, 2026; Sinha *et al.*, 2026). As such, key configuration decisions may depend on interactions with external actors and system-level dynamics that are not fully captured in this study. Future research could adopt a systems perspective and examine circular logistics nodes embedded within circular ecosystems, where multiple actors with different goals, roles, and capabilities interact.

Fourth, this thesis focuses on services that prolong the product lifecycle, including repair and resale. While rental could be seen as multiple resale cycles, the operational requirements for circular logistics nodes may differ. For example, nodes may need to support dynamic inventory management, inventory tracking, rental logs, and more frequent consumer interactions. In this research, the infancy of rental hindered the inclusion of linear retail stores offering rental services. Future research could focus on extending the insights to other in-store circular services and their implications for circular logistics node configurations.

Fifth, while this thesis identifies and conceptualizes how circular logistics nodes are configured to integrate circular services, it does not evaluate their performance in terms of efficiency, costs, or circular results. Future research could examine the performance implications of different configurations. For instance, by assessing how alternative ways of integrating, decoupling, or separating circular operations affect costs, profitability, service levels, and circular outcomes.

Finally, a limitation of this thesis, as a phenomenon-driven research study, is that circular retail is still emerging. Many of the observed configurations reflect evolving practices. As retailers continue to scale circular services, configurations may change. Therefore, future research could employ longitudinal studies (Langley, 1999) to assess the development of circular logistics node configurations over time.

7 References

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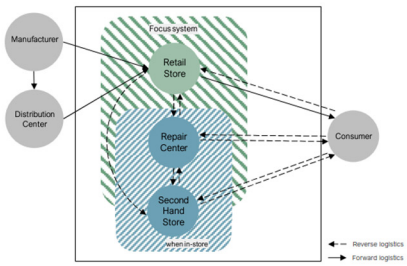
8 Appendix

Interview Guide: *Retail stores integrating circular services*

The system explored



Purpose of interview

- Discuss and reflect on the future role of retail stores in a circular economy.
- During this interview, we explore how retailers utilize their retail stores when integrating circular retail services (rental, resale, repair).
- I would like you to provide your opinion and/or examples.

1

The circular retail store – challenges and opportunities

1. How would you define a circular retail store?
   - What are the main role/functions of circular retail stores today?
   - How has it evolved during the last 10 years?
   - What do you think will be the main role of a circular retail store in the future?
2. What are the challenges and opportunities with the inclusion of circular service in the retail store?
   - (examples)
3. How do you manage the contradiction of trying to promote circularity while driving consumption?
4. What government incentives or regulations do you consider necessary to encourage retailers to integrate circular retail services?

2

The circular retail store – setting up the services

5. Why is (RETAILER) offering circular services in your stores?
   - Is there a benefit to offering the circular service in-store vs. online or another format?
6. When setting up a circular store:
   - What factors are considered?
   - What factors are not considered? (actively excluded)
   - What factors have been not considered and should have been considered?
7. How is the process for setting up the service in terms of decision-making? How much autonomy do stores have in grading, pricing, or managing circular flows? (Influence on and freedom)
8. How should retailers measure (KPIs) the success of circular retail services?
9. Have you noticed any difference between the stores (formats/locations) operating circular retail services?
   - (*mainly collection nodes, better reselling points, better at repairing*)
   - What do you think drives this difference?
10. Are there differences across markets in how customers engage with circular services?
11. How scalable is this model across different markets and store formats? What has made circular services easier or harder to scale across different store formats or countries?

3

The circular retail store – configuring the store

12. What circular operations should be performed in-store, and which are better outsourced?
    - What operations are more challenging? How do you deal with time-consuming operations?
    - How do operations need to evolve to support circular services within the store?
13. How does (RETAILER) deal with supply uncertainty in terms of planning?
14. How has the layout/design of your stores changed (if any) to integrate circular retail services?
15. What new skills, knowledge, and roles do you think will be important for circular store staff?
    - For example, to manage the take-back, sorting, and processing of used products
    - How can retailers build that competence?
16. What key technologies are important for enabling profitable and scalable circular retail store operations?
17. If you could give one piece of advice to other retailers trying to make their stores more circular, what would it be? If you could start over, what would you do differently in setting up circular retail services?

4

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