Realising product circularity through business networks

A case of circular workwear

Ann Vellesalu

UNIVERSITY
OF BORÅS

Thesis in Textile Management
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Abstract

Product circularity has gained increasing attention among practitioners, researchers and policymakers due to its potential to create value and increase resource efficiency throughout a product's whole lifecycle. However, prior research on product circularity has largely only treated the different stages of the lifecycle, such as development, production and use, as isolated and sequential processes. Furthermore, research has mainly been conducted at the micro level, focusing on the individual company. This has limited the possibilities to capture the complexity that characterises the circular economy, in which collaboration and coordination across interconnected business and non-business actors are crucial.

To address these limitations, this thesis uses Service-Dominant Logic (SDL) and the Industrial Network Approach (INA) as two complementary theoretical lenses. These enable a deeper understanding of product circularity by focusing the analysis on how relationships between interconnected actors shape the conditions for value creation and resource efficiency throughout a product's whole lifecycle. SDL places product circularity in a multi-level system, where value creation and resource integration are shaped through institutional work at the micro, meso and macro levels. INA provides analytical tools to investigate in more depth the inter-organisational relationships, resource connections and interaction processes through which product circularity is realised. Together, both perspectives contribute to a greater understanding of product circularity as something that is shaped, maintained and further developed through the interaction between actors and resources at multiple levels.

Against this backdrop, the aim of this thesis is to explore how product circularity can be conceptualised and realised through inter-organisational interaction, and to examine the implications this has for business networks. To achieve this aim, two case studies and a conceptual study have been conducted with a focus on the micro, meso and macro levels and the different product lifecycle stages. Both case studies examine workwear and build on several data collection methods: semi-structured interviews and participant observations, supplemented with unstructured interviews, online surveys and document studies. Through systematic combining, the empirical material and the analytical framework were iteratively developed, facilitating a conceptualisation of product circularity and a deeper understanding of how the phenomenon is realised in practice.

By applying theoretical lenses that extend beyond both individual companies and dyadic relationships, this thesis not only shows how product circularity is realised through inter-organisational interaction. It also contributes to a theoretical understanding of product circularity as a relational multi-level phenomenon, where the interplay between resource interaction, relationship development and institutional work is key to creating both stability and change within business networks. For practitioners (e.g. workwear manufacturers, service providers and customers), the findings offer guidance as regards which relationships to prioritise, how related risks can be managed, and how increased inter-organisational interaction and proximity between the development, production and use network settings can be supported.

Keywords: product circularity, inter-organisational interaction, business network, workwear, circular economy

Sammanfattning

Produktcirkularitet har fått allt större uppmärksamhet bland praktiker, forskare och beslutsfattare tack vare sin potential att skapa värde och öka resurseffektiviteten genom produktens hela livscykel. Tidigare forskning har emellertid i huvudsak behandlat livscykelns olika faser, såsom utveckling, produktion och användning, som separata och sekventiella. Forskningen har dessutom främst bedrivits på mikronivå med fokus på det enskilda företaget. Detta har begränsat möjligheterna att fånga den komplexitet som präglar den cirkulära ekonomin, där samarbete och samordning mellan sammanlänkade affärs- och samhällsaktörer är avgörande.

För att möta dessa begränsningar tillämpar avhandlingen Service-Dominant Logic (SDL) och Industrial Network Approach (INA) som två kompletterande teoretiska perspektiv. Dessa möjliggör en fördjupad förståelse av produktcirkularitet genom att fokusera analysen på hur relationer mellan sammanlänkade aktörer formar förutsättningarna för värdeskapande och resurseffektivitet genom produktens hela livscykel. SDL placerar produktcirkularitet i ett flernivåsystem där värdeskapande och resursintegration formas genom institutionellt arbete på mikro-, meso- och makronivå. INA erbjuder analytiska verktyg för att mer ingående undersöka de mellanorganisatoriska relationer, resurskopplingar och interaktionsprocesser genom vilka produktcirkularitet förverkligas. Tillsammans bidrar de bägge perspektiven till en ökad förståelse av produktcirkularitet som något som formas, upprätthålls och vidareutvecklas genom samspel mellan aktörer och resurser på flera nivåer.

Mot denna bakgrund är avhandlingens syfte att utforska hur produktcirkularitet kan konceptualiseras och förverkligas genom mellanorganisatorisk interaktion, samt att undersöka vilka implikationer detta har för affärsnätverk. För att uppnå syftet har två fallstudier och en konceptuell studie genomförts med fokus på mikro-, meso- och makronivåerna samt på produktlivscykelns olika stadier. Båda fallstudierna undersöker arbetskläder och bygger på flera datainsamlingsmetoder: semistrukturerade intervjuer och deltagande observationer, kompletterade med ostrukturerade intervjuer, webbaserade förfrågningar och dokumentstudier. Genom systematic combining utvecklades det empiriska materialet och det analytiska ramverket iterativt, vilket underlättade en konceptualisering av produktcirkularitet och en fördjupad förståelse av hur fenomenet förverkligas i praktiken.

Genom att tillämpa teoretiska perspektiv som sträcker sig bortom såväl enskilda företag som dyadiska relationer visar avhandlingen inte bara hur produktcirkularitet förverkligas genom mellanorganisatorisk interaktion. Den bidrar också till en teoretisk förståelse av produktcirkularitet som ett relationellt flernivåfenomen, där samspelet mellan resursinteraktion, relationsutveckling och institutionellt arbete är centralt för att skapa både stabilitet och förändring i affärsnätverk. För praktiker (t.ex. tillverkare av arbetskläder, tjänsteleverantörer och kunder) erbjuder resultaten vägledning om vilka relationer som bör prioriteras, hur de risker som följer av dessa kan hanteras samt hur ökad mellanorganisatorisk interaktion och närhet mellan utvecklings-, produktions- och användningsmiljöer kan främjas.

Nyckelord: produktcirkularitet, interaktion mellan organisationer, affärsnätverk, arbetskläder, cirkulär ekonomi

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This PhD journey has been as rewarding as it has been challenging. I started in March 2020 and spent most of the first year at my kitchen table, reading one article after another. Later, I was able to attend numerous courses and conferences, start teaching, and discuss my research with colleagues in Borås and beyond. While doing a PhD can often be a lonely process, this thesis would not have been possible without the many people who were involved along the way, and for whom I am thankful.

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Ann Vellesalu
Borås, August 2026

List of appended papers

Paper 1:

Vellesalu, A., Chkanikova, O., Hjelmgren, D. & Salomonson, N. (2023). Institutional re-configuration and value co-creation in circular product development: A service ecosystem perspective in the textile and apparel industry. *Journal of Cleaner Production*, 414, 137682.

Paper 2:

Vellesalu, A., Hjelmgren, D. & Lind, F. (2025). Circular product development from a multi-level perspective: Adaptations in business networks. *Industrial Marketing Management*, 128, 88-100.

Paper 3:

Vellesalu, A., Salomonson, N. & Hjelmgren, D. (2026). Shaping SME purchasing for sustainability: a case study of supplier-buyer relationships and extended product lifetimes. *Journal of Business and Industrial Marketing*, 41(13), 282-298.

Paper 4:

Hasche, N., Keränen, O., Ojansivu, I., Ulkuniemi, P. & **Vellesalu, A.** (2025). Network change in circular economy transitions: examining interconnectedness, embeddedness and adaptations as key constructs. *Journal of Organizational Change Management*, 1-17.

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Abbreviations

Abbreviation	Full term
A2A	Actor-to-actor
B2B	Business-to-business
B2C	Business-to-consumer
CE	Circular economy
INA	Industrial Network Approach
RQ	Research question
SDL	Service-Dominant Logic
SME	Small- and medium-sized enterprises

1. Introduction

This chapter provides a backdrop for the research topic and context, setting the scene as regards identifying and discussing the research problem and gap. The research aim and questions are then presented, followed by an outline of the thesis.

1.1 Addressing inefficient resource use at the product level

In recent years, improving the resource efficiency of products has become a priority for practitioners and researchers (e.g., Aguiar and Jugend, 2022; Bocken *et al.*, 2016; Jensen *et al.*, 2021; Pinheiro *et al.*, 2019; Schöggl *et al.*, 2024), and for policymakers (e.g., European Commission, 2019; European Parliament, 2024; ETC/WMGE, 2019; Swedish Government Offices, 2021). To address the sustainability challenges associated with the linear 'take-make-dispose' model, prior research has emphasised the need to decouple resource use from economic growth (Lazarevic and Valve, 2017). This focus has translated into studies on, for example, product design strategies (Aguiar *et al.*, 2022; Battesini Teixeira *et al.*, 2023), novel production technologies (Liu *et al.*, 2023), and challenges related to both user acceptance (Klemm and Kaufman, 2024) and regulatory frameworks (Kirchherr *et al.*, 2018).

The circular economy (CE) has been proposed as a solution (Geissdoerfer *et al.*, 2017), with its strategies for slowing and closing resource flows. Slowing resource flows involves improving resource efficiency by developing durable products and services that extend their useful life (Bocken *et al.*, 2016). First, it is key to consider all the stages of a product's lifecycle, from development and production to use. Second, an understanding is required of when and why products become obsolescent; whether this is due to declining performance or changing customer preferences. Third, product durability is dependent on characteristics such as material quality, sturdiness and technical reliability. Fourth, users should be recognised as active participants who impact how products are used, maintained and kept in circulation (cf. Jensen *et al.*, 2021).

In the context of the CE, it is crucial to extend beyond traditional lifecycle thinking. While prolonged product use, reduced replacement rates and enhanced durability all contribute to slowed resource flows, these should be supported by additional circular strategies aimed at decreasing the use of virgin resources (Bocken *et al.*, 2016). Closing resource flows is thus necessary to ensure that existing materials are recovered, recycled and reintegrated into new production (Bakker *et al.*, 2014; Shevchenko *et al.*, 2023). Consequently, the emphasis moves away from a linear lifecycle thinking towards the realisation of product circularity, where both long-lasting products and material recirculation contribute towards slowing and closing resource flows across the development, production and use stages.

1.2 Workwear as a priority product category

This thesis focuses on the textile and apparel industry. Textile products constitute one key product category that both the Swedish Government Offices (2021) and the European Commission (2014) have identified as essential to address during the transition towards the CE. In the EU, textile products are the fourth highest pressure category of all the consumed products[1] due to their high use of water and raw materials (ETC/WMGE, 2019). While European policies place responsibility for this transition primarily on manufacturers and distributors (e.g. service providers) within the business network, successful implementation also depends on the actions and commitment of policymakers and other actors in the broader business environment (Ghisellini *et al.*, 2016). The focus is therefore on the business network, while also considering the surrounding business environment.

More specifically, this thesis explores product circularity within the workwear sector, which in Sweden consists of numerous suppliers[2] engaged in the development and production of textile products, as well as service providers (e.g. rental and industrial laundry). These suppliers serve customers across both the private and public sectors,

[1] After food, housing and transport

[2] The Swedish workwear industry is dominated by Swedish-owned companies, with the six largest brands accounting for over 80% of the domestic market Anderberg, B. 2022. Arbetskläder – en bransch med komplexa hållbarhetsutmaningar. *Byggindustrin* 23.3.2022.

where workwear as personal protective equipment is the responsibility of the employer[3], whether this is procured through centralised or decentralised purchasing. The sector provides workwear for a variety of industries, from automotive and construction to the food industry and healthcare.

In Sweden, workwear has to comply with strict standards governing the design and use of logos, material composition, and the industrial washing and finishing procedures used to test the durability of workwear, as regulated by the Swedish Institute for Standards (e.g. ISO 15797:2017; SS 8760121:2020). This further illustrates the influence of the broader business environment on the sector. Moreover, as workwear is a business-to-business (B2B) product, realising its circularity depends in particular on inter-organisational interaction between the companies involved in its development, production and use.

Prior research on the workwear sector has shown how collaboration and coordination between suppliers and business customers can support more efficient resource use. For example, rental service providers and their customers can jointly manage inventory levels and monitor usage patterns to optimise product flows and extend product lifetimes (Kumar *et al.*, 2022). Likewise, involving users in testing new designs has been found to enhance sustainability awareness on the individual level (Engzell and Kambanou, 2024).

Despite these potential benefits, collaboration between suppliers and customers remains limited, with factors such as low demand for used workwear and company-specific logos that restrict opportunities for reuse (Engzell and Kambanou, 2024) further hindering the realisation of product circularity. Moreover, scholarly attention to workwear as a textile product remains limited compared to the extensive focus on fashion (Kambanou *et al.*, 2024). Because of the B2B nature and the strict regulatory and performance requirements that workwear needs to meet, tackling inefficient resource use in the sector requires a more detailed understanding. These aspects thus make it a particularly relevant industrial context for exploring how product circularity can be realised through business networks.

[3] Information acquired from The Swedish Tax Agency (Skatteverket) on February 5th, 2026 (Benefits. Workwear).

1.3 Limitations of prior research

As described earlier, addressing inefficient resource use at the product level through slowing and closing resource flows depends on multiple actors across the entire product lifecycle. Yet, prior research related to product circularity tends to focus on the micro level (Ghisellini *et al.*, 2016; Kirchherr *et al.*, 2017), either on the product, the supplier or the customer, and the dyadic interactions between these actors. Fewer studies extend to the meso level of the business network (Ghisellini *et al.*, 2016; Kirchherr *et al.*, 2017), where inter-organisational interaction is shown to improve resource efficiency (e.g. Cantù and Tunisini, 2023; Dominidiato *et al.*, 2025b). The macro level entailing regional and global systems (Ghisellini *et al.*, 2016; Kirchherr *et al.*, 2017) receives even less attention, appearing either due to the interplay between the three levels (Kühl *et al.*, 2022) or due to government regulation as a barrier to circularity (Kirchherr *et al.*, 2018).

In addition to remaining largely at the micro level, existing research further focuses on the distinct stages of a product's lifecycle, showing that different actors and their decisions shape circular outcomes at each stage (Jensen *et al.*, 2021). Studies of the development stage centre on managerial decision-making (Diaz and Baumgartner, 2024; Gmelin and Seuring, 2014), while studies of production centre on technology and internal capabilities (Castro-Lopez *et al.*, 2023; Liu *et al.*, 2023; Wang *et al.*, 2021) and studies of use centre on user motivation and skills (De Los Rios and Charnley, 2017; Klemm and Kaufman, 2024; Shevchenko *et al.*, 2023). Each stage is thus associated with a distinct set of actors and resources, and business logic.

This diversity reflects the breadth of the field but also reveals, taken together, a fragmented body of research. Studies tend to confine analysis to the micro level, separating lifecycle stages into sequential stages and treating companies as independent entities pursuing their own strategies. This has limited the possibilities to capture the complexity that characterises the circular economy, in which collaboration and coordination across interconnected business and non-business actors are crucial. As a result, existing research offers limited theorising on how product circularity can be realised through business networks, involving inter-organisational interaction between business and non-business actors across the product lifecycle.

1.4 Drawing on Service-Dominant Logic and the Industrial Network Approach

To address the limitations of prior research, this thesis draws on both Service-Dominant Logic (SDL) and the Industrial Network Approach (INA). SDL makes it possible to capture the multi-level nature of the CE by analysing resource combinations within and between the micro (e.g. organisations), meso (e.g. industries) and macro (e.g. nation, global market) levels (Akaka *et al.*, 2013). As it provides a lens for analysing an aggregate level of society (Grönroos and Gummerus, 2014), SDL is well suited to exploring how all social and economic actors (e.g. individuals, households, companies, nations, etc.) contribute towards achieving individual benefits while sustaining system-level viability (Vargo *et al.*, 2008).

However, SDL pays limited attention to the nature of resources and how these can be managed in complex systems, focusing instead on how contextual factors, such as institutions, shape resource combining (Bocconcelli *et al.*, 2020). Likewise, its systemic view of loosely-coupled actors (Lusch *et al.*, 2010) lacks a clear understanding of inter-organisational interactions in business relationships and networks (Corsaro *et al.*, 2011; Leroy *et al.*, 2013). This is particularly relevant since an understanding of network-level change in the context of sustainability challenges remains underexamined (Harrison *et al.*, 2023; Sharma, 2020).

INA complements SDL by addressing its limitations, conceptualising interaction within individual business relationships and the broader network, and emphasising how this is grounded in resource interaction (Baraldi *et al.*, 2012; Håkansson and Waluszewski, 2002). It describes relationship development as it is shaped by direct and indirect connections with other relationships, highlighting the interconnectedness inherent in business networks (Blankenburg and Johanson, 1992; Harrison *et al.*, 2023). As CE research tends to focus on the individual company (Fraccascia *et al.*, 2019), INA thus makes it possible to examine inter-organisational interaction within both the dyadic relationship (i.e. micro level) and the network (i.e. meso level).

Beyond network-level analysis, INA emphasises how implementing changes in products requires modifications across three business network settings of development, production and use (Ingemansson and Waluszewski, 2009; Landqvist and Lind, 2019). Taking the interplay between the network settings (Håkansson and Waluszewski, 2007) into consideration further demonstrates INA's relevance to exploring product circularity

in line with its lifecycle stages. Integrating SDL and INA as complementary theoretical lenses therefore allows analysis to move between dyadic business relationships and multi-actor collaboration across the business network and its surrounding business environment.

1.5 Aim and research questions

Against this backdrop, the aim of this thesis is to explore how product circularity can be conceptualised and realised through inter-organisational interaction, and to examine the implications this has for business networks. In line with this aim, the thesis seeks to answer the following research questions (RQs):

RQ1: How is product circularity realised through inter-organisational interaction across the micro, meso and macro levels?

RQ2: How can business relationships contribute towards mitigating the challenges associated with realising product circularity?

RQ3: How does realising product circularity reshape the business network?

The first RQ addresses the need to understand how and under what conditions product circularity can be realised through inter-organisational interaction by means of zooming in and out between the micro, meso and macro levels. This RQ is a reaction to the gap in the prior literature regarding the tendency to treat lifecycle stages in isolation and to focus on the individual company, rather than on the collaboration and coordination across interconnected business and non-business actors that the CE requires.

The second RQ builds on this by zooming in on interaction within the business network. Addressing the need for increased collaboration and coordination across product lifecycle stages requires a specific focus on interaction within business relationships, and how this in particular can contribute towards mitigating the challenges associated with realising product circularity.

The third RQ adds to these by focusing on the network-level consequences. While prior research highlights the need for collaboration and coordination, less is known about

how this affects business networks. Combined, these research questions provide a comprehensive understanding of product circularity, with an additional focus on its implications for business networks.

Addressing these research questions has theoretical, practical and societal relevance. Integration of SDL and INA contributes to a theoretical understanding of product circularity by focusing the analysis on how relationships between interconnected actors shape the conditions for value creation and resource efficiency throughout a product's whole lifecycle. Interacting with other theoretical approaches not only enables the development of an integrated conceptual understanding (Dubois *et al.*, 2023), it also allows theoretical lenses to inform one another (Aramo-Immonen *et al.*, 2020). Moreover, the findings contribute to a deeper understanding of circular workwear as a product category that remains underexplored in research on the textile and apparel industry (Kambanou *et al.*, 2024).

For practitioners, exploring how and under what conditions product circularity can be realised can offer guidance regarding how to manage the complexity of the CE. This involves which relationships to prioritise, how related risks can be managed, and how increased inter-organisational interaction across a product's lifecycle can support the transition towards the CE. Lastly, the societal relevance of the thesis is grounded in providing guidance to both practitioners and policymakers in improving the efficiency of physical resource flows by emphasising the importance of interaction across multiple levels. In particular, the findings can inform regulatory frameworks that support, rather than hinder, the realisation of product circularity through business networks.

1.6 Thesis outline

This compilation thesis is a stand-alone publication with its own contributions, building on the findings of the four appended papers. The current chapter describes the background to the research, followed by the aim and research questions. The second chapter presents an overview of the circular economy and product circularity in prior research. The third chapter presents an analytical framework, based on SDL and INA as complementary theoretical lenses for exploring product circularity and inter-organisational interaction. Thereafter, the methodological choices are described in the fourth chapter, with further elaboration being provided on the two cases in the fifth

chapter. The sixth chapter provides an overview of the appended papers and their individual contributions to the thesis. The seventh chapter answers the RQs by merging and extending the findings from the separate studies and by discussing the findings in line with prior research. The eighth chapter presents the conclusions in terms of theoretical and managerial implications, considering the limitations of the thesis and presenting suggestions for future research.

2. Product circularity in prior research

This chapter first describes the concept of the circular economy and its definition for the scope of this thesis. It then presents an overview of prior research on product circularity.

2.1 Circular economy

The concept of the CE is rooted in a diverse set of ideas and traditions, with its origins tracing back to Kenneth Boulding's 1966 essay *The Economics of the Coming Spaceship Earth*, in which he argues that circular systems are essential for sustaining human life (Geisendorf and Pietrulla, 2018; Korhonen *et al.*, 2018b). Other research traditions taking a circular approach include the cradle-to-cradle design (Mcdonough and Braungart, 2002), industrial ecology focusing on manufacturing strategies (Frosch and Gallopoulos, 1989), biomimicry (Benyus, 1997), and product-service systems (Tukker, 2015). These also reflect ideas that have contributed to the refinement and development of the CE (Geisendorf and Pietrulla, 2018; Ghisellini *et al.*, 2016)

The CE was popularised by the Ellen MacArthur Foundation in 2013. They defined CE as *"…an industrial system that is restorative or regenerative by intention and design. It replaces the 'end-of-life' concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through superior design of materials, products, systems, and, within this, business models.*". It is promoted to enable decoupling economic revenue from resource use. This is based on a set of design principles; i.e. designing out waste, building resilience through diversity, using energy from renewable resources, thinking in 'systems', and 'waste is food' (Ellen Macarthur Foundation, 2013).

The popularisation of the CE has led to its further development and application by practitioners, such as policymakers and businesses (Korhonen *et al.*, 2018a). In the European Union, it serves as a strategic tool for shaping locally-driven environmental and waste management policies (Ghisellini *et al.*, 2016). For example, the Ecodesign for Sustainable Products Regulation sets requirements for product design (European

Parliament, 2024) while the Waste Framework Directive introduces additional fees for every product taken to the market by manufacturers (European Commission, 2025). While this approach reflects the responsibility placed on manufacturers and distributors (Ghisellini *et al.*, 2016), it also emphasises the importance of the business environment to enabling or challenging the transition towards the CE (Ghisellini *et al.*, 2016; Korhonen *et al.*, 2018a). For example, a lack of support on the part of policymakers, through effective legislation and financial incentives, can act as a barrier (Rizos *et al.*, 2016).

Due to its widespread use in both research and practice, numerous definitions of the CE have emerged over time. Several review papers have attempted to synthesise these definitions, in some cases proposing their own. For example, Kirchherr *et al.* (2017) analysed 114 definitions and found that most focus on reducing, reusing and recycling activities, primarily aimed at economic success and neglecting systemic change and a connection with sustainable development. Geisendorf and Pietrulla (2018) emphasise the core CE characteristics, e.g. maintaining resource value and avoiding waste. Nobre and Tavares (2021) highlight the CE as an economic system operating across the micro, meso and macro levels, stressing the role of governments and consumers in enabling the systemic shift. Revisiting the discourse, Kirchherr *et al.* (2023) reviewed 221 definitions, noting an increased emphasis on stakeholder collaboration and questioning whether or not the CE can support both economic growth and environmental sustainability. Overall, these varied definitions reflect diverse perspectives and an evolving understanding of the CE concept.

While the Ellen MacArthur Foundation has presented the CE as a proven concept that needs to be accelerated (Ellen Macarthur Foundation, 2013), it has also received widespread criticism. For example, Lazarevic and Valve (2017) criticise unrealistic expectations that the CE can fully eliminate waste and virgin resource use. Figge *et al.* (2023) argue that most existing definitions of the CE are either too broad or too narrow, but fail to specify conditions that would be necessary and sufficient. Corvellec *et al.* (2021) highlight challenges around (1) fragmented definitions; (2) implementation difficulties for policymakers, companies and individual consumers; and (3) an unclear contribution to environmental and social sustainability. Related to these issues, Dzhengiz *et al.* (2023) suggest that focusing on dyadic partnerships ignores the required systemic change, that there is a lack of attention to non-business actors, and that not all partnerships result in positive outcomes, despite this frequently being assumed.

For the scope of this thesis, the CE is *"an 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, meso level and macro level, with the aim to accomplish sustainable development." as* defined by Kirchherr *et al.* (2017). The micro level can involve, among others, individual companies (Melander and Arvidsson, 2022; Murray *et al.*, 2015), while the meso level can involve business networks (Melander and Lind, 2022) or industries (Melander and Arvidsson, 2022). The macro level can involve both government agencies and society at the local, regional and national levels (Garcia *et al.*, 2019; Ghisellini *et al.*, 2016; Kirchherr *et al.*, 2017; Melander and Lind, 2022).

There is a particular focus on product circularity rather than broader sustainability approaches. The choice is grounded in CE strategies, specifically the focus on material resource flows, providing a more actionable alignment with business logic. As described earlier, slowing resource flows means using resources more efficiently by designing durable products and services that support product life extension (e.g. repair, rental, remanufacturing). Closing resource flows means decreasing the use of virgin resources by recovering and recycling materials, which are then reintegrated into new production cycles (Bocken *et al.*, 2016; Shevchenko *et al.*, 2023).

This circular thinking underpins the EU Waste Framework Directive (2008/98/EC), which prioritises prevention and reuse in waste management. Together with recycling, these strategies align with the CE strategies for addressing material resource flows in order to realise product circularity. With a primary focus on resource efficiency, the CE is thus referred to as a condition of achieving sustainable development (Geissdoerfer *et al.*, 2017).

2.2 Product circularity in prior research

Research related to product circularity has grown rapidly in recent years, particularly between 2019 and 2025. This section builds not only on studies explicitly addressing product circularity but also those examining products from broader sustainability perspectives where these align with the CE objectives. This overview underpins the research gap introduced in Section 1.3. While the aim is not to provide a systematic review, several inclusion criteria were applied. Articles were included if they

contributed to understanding product circularity through resource efficiency, product life extension, or resource recirculation. In addition, only articles published in peer-review journals and written in English were considered.

This approach reflects the considerable diversity in terminology, framing and level of analysis. Studies range from broad sustainability and triple bottom line framings (e.g. Bakker *et al.*, 2014; Ellström and Carlborg, 2022; Fung *et al.*, 2021) to CE-specific implementation (e.g. De Lima and Seuring, 2023; Kühl *et al.*, 2022; Pinheiro *et al.*, 2019). Consequently, terminology shifts between *sustainable*, *circular* and *green* products, even as these contribute to understanding of product circularity.

Similar diversity is evident in the variety of research outlets and areas. The articles included in the review were published mainly in journals on environmental science and engineering (e.g. Journal of Cleaner Production, Sustainable Production and Consumption, Resources, Conservation and Recycling), business and management (e.g. Business Strategy and the Environment, Journal of Business Research), and operations and supply chain (e.g. International Journal of Production Economics, Production Planning & Control). There is a further focus on those more specific to B2B and marketing (e.g. Industrial Marketing Management, Journal of Business and Industrial Marketing). However, the majority of the articles contribute to the field of environmental science, further highlighting the limited theoretical grounding in organisational and network theories.

Despite the fragmentation of prior research, the review identified emerging themes in relation to the product lifecycle stages, in relation to multiple levels of analysis, and in relation to the use of diverse theories and industries. First, a key theme in the literature concerns distinct product lifecycle stages, highlighting the importance of different actors and how their decisions impact circular outcomes (Jensen *et al.*, 2021). Second, part of prior research links product circularity to business models, supply chains or networks, reflecting broader levels of analysis, although the micro level remains the dominant focus. Third, the literature spans diverse theoretical perspectives and industries, ranging from automotive to machinery and chemicals. However, this thesis focuses specifically on studies employing organisational or network theories and those addressing textile products, given the societal relevance of textile circularity.

Product lifecycle stages

A significant amount of prior research addresses product design and new product development, highlighting the dominance of early-lifecycle interventions in CE research. Here, prior research has attempted to define product design in a circular economy (Den Hollander *et al.*, 2017), proposed design strategies (Aguiar *et al.*, 2022; Battesini Teixeira *et al.*, 2023; Bocken *et al.*, 2016; Gmelin and Seuring, 2014; Pinheiro *et al.*, 2019) and frameworks for evaluating the development process (Aguiar and Jugend, 2022). Several studies also emphasise the importance of internal and external capabilities, particularly as regards new product development (Aguiar and Jugend, 2022; Ellström and Carlborg, 2022; Pinheiro *et al.*, 2019).

A related theme is the barriers to circular product development, from a lack of knowledge and technologies to low customer valorisation of circular products (Hecker and Toivonen, 2024; Jugend *et al.*, 2024). To overcome such barriers, the recommendation is to strategically prioritise circular product development (Diaz *et al.*, 2022; Diaz *et al.*, 2021). The attention to early-lifecycle interventions is consistent with Bakker *et al.* (2014), who emphasise material efficiency and longer product lifetimes as design strategies aligning with the EU Waste Framework Directive's first priority of waste prevention. However, this perspective only provides limited insight into how circularity should be realised during later lifecycle stages, including production and use.

Liu *et al.* (2023) have a particular focus on production in identifying strengthened CE culture and integrated management systems as crucial for implementing circular manufacturing. Specifically, the use of novel materials or technologies can reduce energy use and enable more efficient material utilisation (Liu et al., 2023), thus also serving as cost-reduction measures (Wang *et al.*, 2021). Sustainability culture (Liu et al., 2023) and organisational capabilities, such as agility and proactivity in exploiting new opportunities, have more impact than external pressures (Castro-Lopez *et al.*, 2023).

Additionally, developing trust between partners results in more successful process innovation (Fang *et al.*, 2024). These findings show that circular outcomes in production not only depend on technology, but also on organisational competencies and mindsets. Nevertheless, producers face the risk of increased short-term costs, as well as operational and technological risks (De Lima and Seuring, 2023).

The use stage is less studied in the B2B context. Notable examples include Kumar *et al.* (2022), who recognise that higher utilisation rates directly contribute to reduced waste and lower environmental impacts, which can be achieved through product-service

systems (Copani and Behnam, 2020; Pecorari and Lima, 2021). Major barriers relating to the use stage include customers' limited knowledge at the point of purchase (Jensen *et al.*, 2021), the low prioritisation of features such as recyclability or durability over price (Klemm and Kaufman, 2024), and limited access to customer knowledge during product design (Hecker and Toivonen, 2024). Many studies also focus on the business-to-consumer (B2C) setting (e.g. Jugend *et al.*, 2024; Klemm and Kaufman, 2024; Shevchenko *et al.*, 2023), yet even here the emphasis remains on design strategies that in turn support circular consumption processes (Selvefors *et al.*, 2019).

Product circularity on multiple levels of analysis

The focus of the reviewed studies primarily tends to be on a single actor in terms of both data analysis and the analytical perspective, for example in terms of required competencies or input into the development process. Castro-Lopez *et al.* (2023) demonstrate the importance of organisational agility and proactivity as drivers of circular product innovation and circular production. De Los Rios and Charnley (2017) identify the key competencies required by designers, while Kambanou *et al.* (2024) highlight the importance of managers developing collaborative capabilities.

Kühl *et al.* (2022), in contrast, show the interplay between contextual factors within the micro, meso and macro levels, and their role in contributing towards circularity through product-service systems. Several studies also address business models, emphasising their influence on how circular products are developed. De Sousa Jabbour *et al.* (2019) describe how adopting circular business models affects decision-making during product development, in terms of creating new demands related to work procedures, the coordination of intra- and inter-organisational relationships, and the integration of novel technologies. Further research identifies the opportunities and challenges of implementing circular business models through product design (e.g. Bocken *et al.*, 2016; De Kwant *et al.*, 2021), including how uncertainties, for example aesthetic or economic obsolescence, relating to business models aimed at extending product lifetimes can be mitigated by designing products that are adaptable (Nyström *et al.*, 2021).

Other business model research focuses more specifically on extending product lifetimes, investigating diverse business models and evaluating their environmental impact (Kambanou *et al.*, 2024), for example sharing by means of renting or sharing between B2B customers (Melander and Arvidsson, 2021). Additionally, Kumar *et al.*

(2022) highlight the importance of increased information-sharing between service providers and customers in order to optimise product flows and extend product lifetimes. This need for interaction extends into supply chain research more broadly, particularly in relation to information sharing and collaborative product design (De Lima and Seuring, 2023). Product design is the foundational step for operationalising the CE in supply chains (Burke *et al.*, 2023; Fung *et al.*, 2021), supported by collaboration practices such as shared responsibility for product recovery and joint product development efforts (Sudusinghe and Seuring, 2022).

Use of organisational and network theories

A substantial body of prior research adopts a practice-oriented approach and contributes to research related to product circularity by empirically analysing different stages of a product's lifecycle, identifying strategies or barriers, among other things. Fewer scholars ground their analysis on organisational theories. For example, dynamic capabilities theory is applied to identify organisational agility as a driver of circular product innovation and production (Castro-Lopez *et al.*, 2023). A natural resource-based view has been adopted by Agyabeng-Mensah *et al.* (2021) and Kühl *et al.* (2022), who argue for the importance of organisational learning and stakeholder integration, respectively, as key organisational capabilities for providing competitive advantage and minimising a product's environmental impact.

While these examples focus on the perspective of a single company, other studies apply network-level theories. In particular, INA has been used to show how collaboration enables circular product innovation and use across business networks. In the main, developing partnerships with existing and new actors is required for sustainability-led product development (Cantù and Tunisini, 2023; Dominidiato *et al.*, 2023) along with the implementation of sharing-focused business models for circular product use (Melander and Arvidsson, 2021). Sufficient resource allocation for intra- and inter-organisational development activities is similarly important (Alkki *et al.*, 2025), supporting alignment between network actors (Dominidiato *et al.*, 2025b).

Textile products

Research related to product circularity in the context of the textile and apparel industry focuses on both B2C and B2B products, resulting in differing emphases on the involved actors. In the B2C domain, the reviewed articles tend to adopt either a firm- or consumer- centric perspective. These range from how to integrate circular principles into

textile product development (Battesini Teixeira *et al.*, 2023), including diverse challenges (Curwen *et al.*, 2013; Franco, 2017; Goworek *et al.*, 2020), and how circular product attributes shape consumer decision-making (Klemm and Kaufman, 2024).

In contrast, B2B-oriented studies focus more explicitly on inter-organisational interaction during product development. This includes investigating the participatory development of circular textile material prototypes (Rubik *et al.*, 2024), which can entail paradoxes that constrain both circular progress and business relationships (Runfola *et al.*, 2025). Some scholars have also explored how this process unfolds within supplier-customer relationships (Dominidiato *et al.*, 2023; Dominidiato *et al.*, 2025a).

Within this B2B context, particular attention has also been paid to workwear. For example, product design strategies (Kambanou *et al.*, 2024) and increased interaction between service providers and B2B customers (Kumar *et al.*, 2022) contribute towards extended product lifetimes. Additionally, it is key to involve users during product design to increase their sustainability awareness (Engzell and Kambanou, 2024). Despite these insights, realising product circularity through inter-organisational interaction across a product's entire lifecycle remains underexplored, particularly in relation to workwear as a textile product (Kambanou *et al.*, 2024).

3. Theoretical framework

This chapter presents Service-Dominant Logic and the Industrial Network Approach as theoretical lenses suitable for exploring how product circularity can be realised through business networks. The chapter results in an analytical framework that integrates the two lenses.

3.1 Service-Dominant Logic

Service-Dominant Logic was introduced by Vargo and Lusch (2004), who proposed reframing the market around a new dominant logic. In contrast to the conventional goods-dominant logic, SDL shifts the focus of the market towards interaction between all actors (i.e. actor-to-actor, A2A) that achieve mutual benefits through the exchange of services. This involves combining resources (Akaka *et al.*, 2012; Laud *et al.*, 2019), particularly knowledge and skills that become the fundamental unit of exchange and the source of competitive advantage (Vargo and Lusch, 2004). Consequently, knowledge and skills are used to apply material resources more effectively, efficiently and sustainably (Lusch *et al.*, 2010).

Zooming in and out across the micro, meso and macro levels

Contrary to INA's focus on B2B interaction, SDL includes all social and economic actors in its analysis (Vargo and Lusch, 2008). Therefore, any type of actor (ranging from suppliers and users to universities) can be involved in combining resources for mutual benefit (Vargo *et al.*, 2008), something which enables the analysis of marketing phenomena across multiple levels (Chandler and Vargo, 2011; Vargo *et al.*, 2017). In particular, the micro, meso and macro levels include, for example, (1) organisations (i.e. micro level), which operate within and are thus affected by (2) industries (i.e. the broader meso context), which operate within and are thus affected by (3) the national or global market (i.e. the macro context) (Akaka *et al.*, 2013). While this shifts the focus away from dyads and networks (Bocconcelli et al. 2020), it does not downplay the importance

of dyadic interaction, instead highlighting how A2A interaction involves a multitude of parties (Vargo, 2011).

By having a broader level of analysis compared to INA's focus on business relationships and networks, SDL can be useful for addressing the often-conflicting goals of actors operating across multiple levels. For instance, development and production costs are important at the organisational and industry levels, while the environmental value is captured at the societal level. Companies may consequently be reluctant to contribute towards reducing their environmental impact when circular transition costs do not lead to returns that offset the costs (Garcia *et al.*, 2019).

SDL argues that diverse actors within and between these levels can draw on both their own resources and those of others (Vargo *et al.*, 2008). These include private (e.g. family and friends), public (e.g. government legislation), and market-facing resources (e.g. competitors within an actor's network) (Laud *et al.*, 2019). SDL is therefore appropriate for understanding how business and non-business actors interact to achieve mutual benefits for themselves while also sustaining the viability of the larger system.

In line with Saviano et al. (2025), circularity can thus be understood not as a static goal but as an emergent property of the larger system, arising from actor interactions rather than from any single actor or resource. Nevertheless, the prevailing conceptualisation of resources remains centred on the tangible-intangible distinction, with an overemphasis on the latter (Bocconcelli *et al.*, 2020; Campbell *et al.*, 2013). As a result, tangible resources such as products are mainly understood as carriers of embedded knowledge and skills (Vargo and Lusch, 2004). While this results in a limited focus on products, it is also where SDL becomes relevant to circularity research.

Some studies have nonetheless addressed resource flows and the CE as regards phasing out the linear 'take-make-dispose' model. For example, Vargo (2021) argues that circularity focused on material resource flows only partially addresses sustainability problems since retaining value in physical resources through recycling maintains these as crucial for economic activity. Instead, he reasons that by treating intangible resources as fundamental to exchange, SDL not only highlights how they reduce material resource flows, but also how service exchange decreases material dependency.

In contrast, Findsrud *et al.* (2025) contend that material resources cannot be ignored as sustaining the viability of a system depends on how these resources are used. In particular, the potential for continued resource combining, and thus sustained benefits, depends on the ability to restore, or replace, depleted resources. Fehrer *et al.* (2023)

define material resource flows within and between the nested micro, meso and macro levels. These resource flows are described as taking place through product reuse, repair, sharing and remanufacturing in order to circulate resources without waste.

Ultimately, resource combining across multiple levels is key to addressing systemic sustainability challenges. However, SDL offers limited insight into how actors interact to combine resources for circularity. This is important because resources are not inherently valuable, instead becoming valuable through institutions (Koskela-Huotari *et al.*, 2016; Koskela-Huotari *et al.*, 2020; Vargo *et al.*, 2015). This means that the value of a given resource is realised through the beneficiary's interaction with other actors, while the possible combinations, and how the outcomes are enabled or constrained, will depend on the surrounding institutions (Bocconcelli *et al.*, 2020).

Institutional work

Institutions (i.e. regulative, normative and cognitive rules) act as governance mechanisms that provide the context for, and thus influence, dyadic interactions (Vargo, 2011). SDL argues that institutions within and between the micro, meso and macro levels either enable or constrain resource combinations, thus influencing the resulting benefits or disadvantages for the involved actors (Edvardsson *et al.*, 2014; Vargo and Lusch, 2016). As illustrated in Figure 1, resources are combined by two actors at the micro level, which is shaped by the micro-level institutions. The same pattern recurs at the meso and macro levels, as well as across the three levels.

Equally, actors themselves can influence institutions by interacting with their surrounding context (Koskela-Huotari *et al.*, 2020; Lawrence and Suddaby, 2006). This institutional work, undertaken by the actors involved, is key to driving change through collaboration (Vargo *et al.*, 2015), for example when realising product circularity. The making and braking of institutions are necessary in order for the change to be driven towards the shared goal of the actors involved. However, maintaining institutions is also critical for sustaining familiarity and trust, which in turn supports system stability (Koskela-Huotari *et al.*, 2016). These institutional reconfigurations shape actor and resource constellations, as new actors may become involved, or the potential of previously unrecognised resources is revealed (Koskela-Huotari *et al.*, 2016).

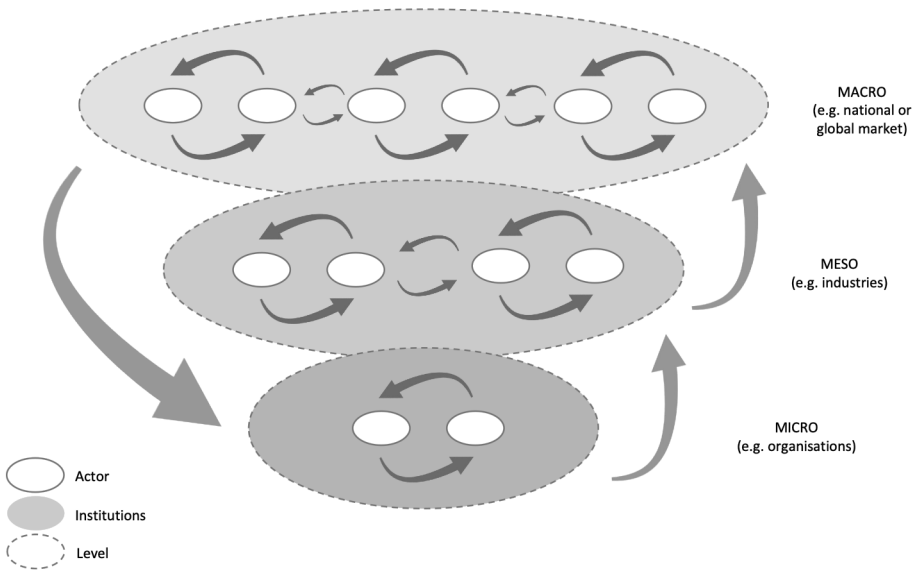

Figure 1. Institutional work: adapted from Akaka et al., 2013

These developments of SDL highlight the importance of intangible resources and the shaping role of institutions across the micro, meso and macro levels. Building on this, interaction is conceptualised as the simultaneous exchange of knowledge and skills unfolding within and across these levels (Chandler and Vargo, 2011). This perspective is particularly valuable for exploring product circularity as the dynamic A2A orientation (Vargo and Lusch, 2011) aligns with CE's systemic and collaborative nature.

However, as described earlier, SDL pays only limited attention to the nature of resources, with which resources are combined, or to the interplay between these (Bocconcelli *et al.*, 2020), thus offering only a partial interpretation of how product circularity can be realised in relation to the material resource flows that are key to the CE. Moreover, the generic A2A orientation lacks a clear understanding of inter-organisational interaction in business relationships and networks (Corsaro *et al.*, 2011; Leroy *et al.*, 2013). Therefore, the Industrial Network Approach is also applied in order to gain a better understanding of inter-organisational interaction and network dynamics.

3.2 Industrial Network Approach

The Industrial Network Approach, developed by the Industrial Marketing and Purchasing (IMP) Group (Dubois et al., 2023; Ojansivu et al., 2022), emerged during the 1970s by challenging the conventional views of the process and structure of business. The process was then described as involving transactional interactions between suppliers and buyers, featuring the exchange of products for economic value. This structure entailed individual companies subsequently developing and implementing their independent strategies (Ford and Håkansson, 2006). The IMP Group argued that this view of the business world, consisting of independent companies in standardised markets, does not capture the complexity of business relationships (Ford, 2011). Håkansson (1982) proposed that business relationships between suppliers and buyers are instead characterised by long-term and complex interaction patterns.

Interaction in business networks

Inter-organisational interaction can be difficult to capture due to its complex nature (Baraldi *et al.*, 2012). INA describes such interaction through business relationships that are characterised by the actors, resources and activities involved, as well as by the surrounding context. In particular, it concerns how the actors perceive one another, how their resources interact, and how their activities are coordinated. Due to such interconnectedness, the position, development and outcomes of a company are dependent on its ability to develop its relationships (Håkansson and Snehota, 1995).

Interaction within business relationships is typically investigated on the basis of resource interaction as companies jointly develop and combine their resources (Baraldi *et al.*, 2012; Håkansson and Waluszewski, 2002). These resources are categorised as products, production facilities, business relationships and business units (i.e. actors) (Håkansson and Waluszewski, 2002). A company combining its own resources with those of its partners must also account for the wider network these resource bases connect to, directly or indirectly (Gadde *et al.*, 2012), as illustrated in Figure 2. This implies that a company changing its product must consider whether other connected actors are able to make corresponding changes in their products or production facilities. In turn, this can become a coordination challenge that makes realising product circularity dependent on a company's ability to develop its relationships.

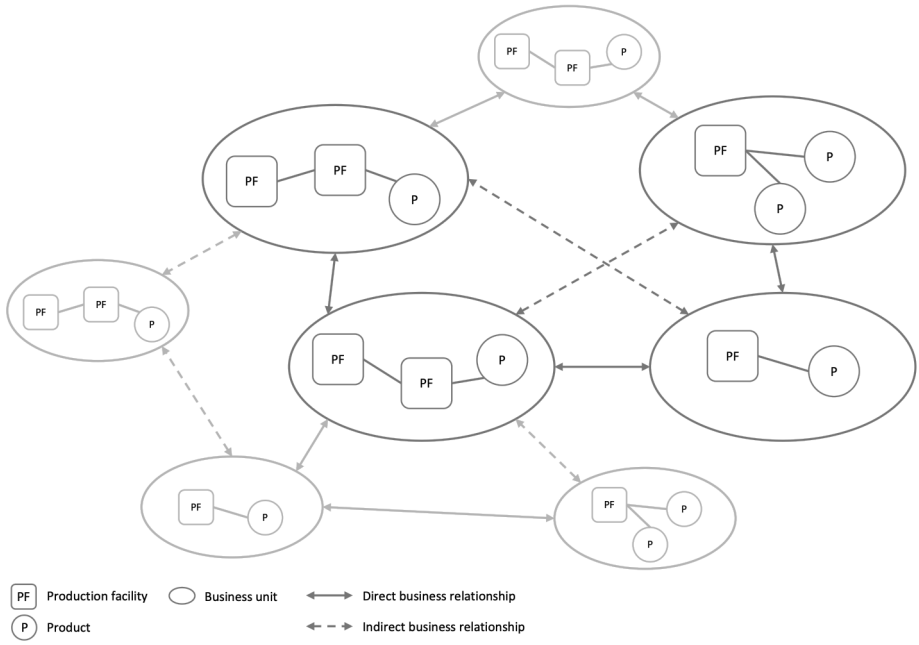

Figure 2. Interaction through direct and indirect business relationships

Resource interaction between business actors thus enables the investigation of systemic sustainability challenges as inter-organisational issues (Dubois *et al.*, 2023). Harrison *et al.* (2023) build on this by pointing to the need for further research on how such challenges can be handled, for example by restructuring networks and mobilising diverse actors through business relationships. Consequently, INA gains relevance when examining product circularity as it enables the identification and mapping of resource flows, as well as consideration of the direct and indirect relationships that may support, or hinder, adapting resources, such as products.

Prior INA studies have investigated how sustainability initiatives emerge through inter-organisational interaction involving knowledge sharing (Cantù and Tunisini, 2023), purchasing (Meqdadi *et al.*, 2017), and relationship development (Dominidiato *et al.*, 2025b). Not only does interaction in business networks support prolonged product use (Andersson Wänström *et al.*, 2025; Melander and Arvidsson, 2021), it can also

influence network structure (Dominidiato *et al.*, 2025b) and lead to tensions (Stegehuis *et al.*, 2023).

Within the context of the CE specifically, Dominidiato *et al.* (2025b) and Huemer and Flygansvær (2025) demonstrate that realising circularity depends on the understanding of network dynamics. Cantù and Tunisini (2023) investigate network configurations for sharing circular knowledge. Moreover, some INA studies consider the role of policymakers. Brüel Grönberg and Hulthén (2022a) highlight the potential (mis)alignment of legislation with the goals of business networks, while Baraldi and Wagrell (2022) demonstrate the suitability of INA's resource interaction approach as regards informing policy development. Building on this, Waluszewski *et al.* (2019) emphasise the need for policymakers to actively engage within business networks in order to shape the direction of business development in line with their own objectives.

These studies demonstrate the appropriateness of using INA as a theoretical lens for addressing systemic sustainability challenges, such as realising product circularity. In particular, Sharma (2020) and Harrison *et al.* (2023) both emphasise the importance of moving beyond the dyad to analysing interaction at the network level. Doing so requires addressing not only the connectedness of business relationships, but also their nature, which includes the frequency and intensity of interaction, and the involvement of diverse actors across companies.

The nature of business relationships

Business relationships can be characterised based on levels of involvement (Ford *et al.*, 2011; Gadde and Snehota, 2000), reflecting their complex and multifaceted nature (Holmlund and Törnroos, 1997). On the one hand, low involvement is characterised by standard interactions limited to purchasing and sales, since no adaptations to products or services are required (Ford *et al.*, 2011). On the other hand, high involvement relationships entail strong connections between companies (Gadde and Snehota, 2000), through which their respective resources and activities are adapted (Anderson *et al.*, 1994). Analysing levels of involvement in business relationships can therefore be useful for understanding how the realisation of product circularity can be enabled or hindered.

High-involvement relationships lead to an increased frequency and intensity of interaction, as the number of actors involved increases (Ford *et al.*, 2011; La Rocca *et al.*, 2016). It is therefore important to distinguish between a customer (i.e. a company or

a manager) purchases the product, and a user (i.e. an employee of the same company) that uses the product (Laage-Hellman *et al.*, 2014; Landqvist and Lind, 2019). While managerial involvement is typically described, closer interaction between suppliers and buyers can also facilitate user involvement. For example, users can be included in product development, preferably early on in the process (Laage-Hellman *et al.*, 2018), in order to identify their needs, or to evaluate concepts or final products (Laage-Hellman *et al.*, 2014).

User involvement has also been described during purchasing, especially in the case of complex, costly and user-specific products (La Rocca and Snehota, 2014). Since the user experience is critical when optimising product use (De Los Rios and Charnley, 2017; La Rocca and Snehota, 2014), recognising their input is especially important for addressing systemic sustainability challenges (Harrison *et al.*, 2023), for example when increasing product use or extending the useful lifetime.

Enabling this kind of user involvement depends on close, long-term relationships, which can provide the stability needed to coordinate activities (Håkansson, 1982). However, the interdependencies they create can also restrict a network's capacity to change (Freytag *et al.*, 2017; Håkansson and Snehota, 1995). Companies respond to this tension differently. Some actively mobilise their networks to pursue new opportunities (Håkansson and Snehota, 1995) while others prioritise stability to safeguard previous investments and thus resist change (Håkansson, 1990; Håkansson and Waluszewski, 2002). How interaction takes place in business networks therefore shapes how product circularity can be realised through balancing change and stability that benefits all stakeholders.

Stability and change through interaction

As interaction unfolds through direct and indirect relationships that vary in their degree of actor involvement, business networks are continuously changing while also retaining stability from established interaction patterns. While a focal actor may pursue change, the extent to which this is achieved depends on how its partners respond and adapt. This can be further understood through the INA concepts outlined below, which shape the understanding of interaction in business relationships and characterise, in turn, stability and change in networks. These are thus relevant to exploring inter-

organisational interaction and how product circularity can be realised through business networks.

Adaptations

Adaptations are the modifications companies make at the individual, group or organisational levels to meet the needs of their partners (Hagberg-Andersson, 2006). Although companies also adapt to new technologies or shifting industry norms (Brennan and Turnbull, 1999), partner-specific adaptations demonstrate commitment (Brennan and Turnbull, 1999; Hagberg-Andersson, 2006). Often involving changes to both technical and organisational resources, these form the basis for close, long-term relationships (Hallen *et al.*, 1991).

These adaptations can range from changes to product design and manufacturing processes to modifications in planning, delivery and administrative procedures (Håkansson, 1982), and can be categorised either as 'hard' or 'soft'. The former involves, for example, improving the efficiency of material use, investing in novel production processes (Hagberg-Andersson, 2006; Von Corswant, 2005), or adopting the specific quality standards required by certain customers (Brennan *et al.*, 2003). The latter involves changes to personnel or the organisational structure (Gadde and Håkansson, 1993; Schmidt *et al.*, 2007). Such changes can reflect a partner's corporate culture (Brennan and Turnbull, 1995), for example circular values within the organisation (Svensson and Funck, 2019).

Interconnectedness

While the goal of adaptation is to reach a solution that is economically beneficial to both partners, adaptations often entail consequences that extend beyond those directly involved (Håkansson, 1982), which can be explained by interconnectedness. Interconnectedness encompasses all the direct and indirect connections that link a focal relationship with other relationships within a business network (Blankenburg and Johanson, 1992; Håkansson and Snehota, 1995). Consequently, a change in one relationship triggers changes throughout the network (Håkansson and Snehota, 1995). In particular, the concept highlights how the impact of indirect relationships and network-level effects on individual relationships allows analysis to move beyond the dyad (Araujo and Easton, 1996, cf. Harrison et al., 2023).

These connections can result in interdependencies, as described earlier. Since an actor's productivity and efficiency depend on how coordination between actors is handled, it becomes crucial to manage these interdependencies systematically (Gadde *et al.*, 2003). This is particularly important given that interdependencies can limit the network's capacity to change, for example when developing resources or reconfiguring existing networks to realise product circularity. Moreover, these interdependencies have consequences for the focal company's network position and opportunities, which can be explained by embeddedness.

Embeddedness

Embeddedness refers to the extent to which companies are dependent on their surrounding context, including past interactions and expectations for the future (Halinen and Törnroos, 1998). It highlights how development occurs in business networks, particularly how both interconnected relationships and the interdependencies resulting from adaptations shape a focal actor's position and opportunities. Networks are thus socially- and historically-constructed (Halinen and Törnroos, 1998), based on the information, routines, memories and expectations existing within business relationships (Baraldi *et al.*, 2012). Understanding embeddedness is thus critical for realising product circularity, because it enables actors to identify opportunities for, and drive, network change.

Embeddedness also refers to the surrounding broader context (i.e. the business environment) in which the relationships unfold. In particular, it adds a layer of complexity to interaction, which is affected by temporal, spatial, social, political, market and technological conditions (Halinen and Törnroos, 1998). This also means that, although interaction between two actors is impacted by others within the network (Gadde *et al.*, 2012), no single actor can have a complete understanding of the broader network and surrounding business environment (Ford and Mouzas, 2013). To overcome these challenges, achieving proximity between all the stakeholders can be beneficial, particularly between those directly involved across the stages of a product's lifecycle.

Development, production and use network settings

Exploring how product circularity is realised through inter-organisational interaction across a product's lifecycle aligns with INA's conceptualisation of business

network settings. Håkansson and Waluszewski (2007) proposed that an innovation (e.g., a product) needs to relate to the network settings of development, production and use. In the development network setting, new solutions should match the production network setting and meet customer needs (Håkansson and Waluszewski, 2007). In the production network setting, the solution is transformed into a product. This may require adaptations to production facilities, for example enhancing production technologies to improve efficiency and reduce costs. Lastly, in the use network setting, the customer should perceive clear benefits from using the product, which may also require adaptations to the customers' and end-users' resources (Landqvist and Lind, 2019).

Each network setting is shaped by distinct actors and business logics, in line with prior research on product circularity where the product lifecycle stages are treated as sequential, thus resulting in isolated solutions. However, according to INA, achieving proximity between the three network settings is essential (Ingemansson and Waluszewski, 2009; Landqvist, 2020) as resources interact and are adapted across all three network settings, as well as among the companies involved (Ingemansson and Waluszewski, 2009; Landqvist and Lind, 2019). This understanding is thus favourable in the context of the CE, in which increased collaboration and coordination between diverse actors across the product's lifecycle are required.

Prior INA studies applying the network settings have, for example, addressed how new actors become embedded in business networks (Landqvist and Lind, 2019). More specifically, these scholars have demonstrated the importance of new actors engaging in both low- and high-involvement business relationships that enable resource combinations across the three network settings. Brüel Grönberg and Hulthén (2022b) further highlight the complexity of and the resource interdependencies between different network settings as regards improving the efficiency of the packaging used in e-commerce as the focal resource. Lastly, the usefulness of investigating the specific networks and analysing complex resource interactions in the context of sustainability challenges is emphasised by Baraldi and Wagrell (2022). While the conceptualisation of the business network settings is not applied to the appended papers, it informs the analytical framework, enabling the merging and extension of findings across the separate studies.

3.3 Analytical framework

The analytical framework (see Figure 3) integrates SDL and INA to explore how product circularity can be conceptualised and realised through inter-organisational interaction, and how this, in turn, has implications for business networks. The framework emerged from an iterative process between theory and the empirical material and reflects the previously identified research gap regarding the tendency to treat lifecycle stages in isolation and to focus on the individual company, rather than on the collaboration and coordination across interconnected business and non-business actors that the CE requires. As a result, it becomes possible to capture both the specificity of inter-organisational interaction and the broader institutional work that shapes it across the product's lifecycle and the micro, meso and macro levels.

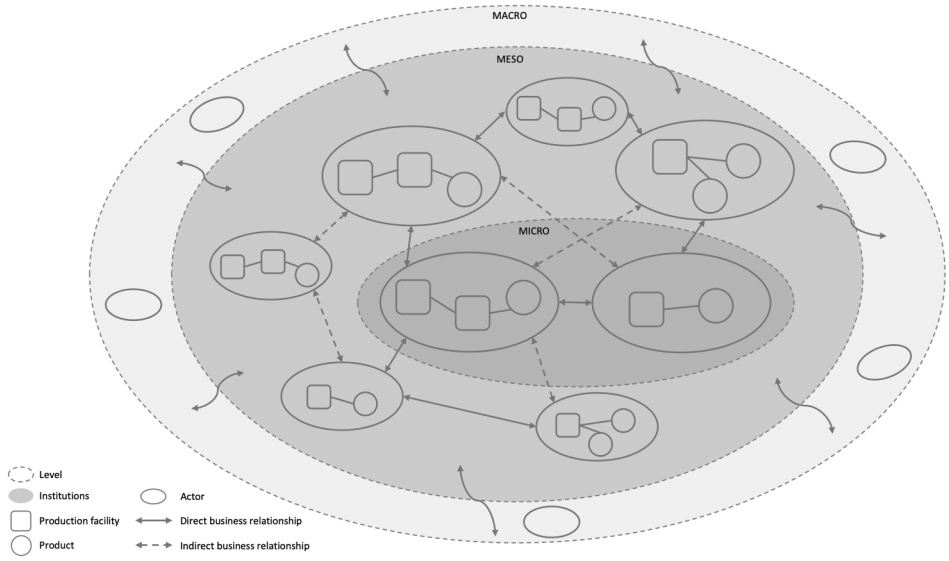

Figure 3. Analytical framework

As illustrated in the figure, the framework's starting point is the micro level. Here, a dyadic relationship between a supplier and a buyer involves mutual adaptations, reflecting the nature of the relationship (i.e. length, frequency and intensity) (Brennan and Turnbull, 1999; Hagberg-Andersson, 2006). The focus is particularly on resource

interaction, reflected by both technical and organisational resources visualised in the figure, aligning with the CE's focus on addressing resource flows. While SDL's focus on resource combining emphasises the importance of intangible resources, for example knowledge and skills, INA's focus on tangible resources enables an understanding of how to address resource efficiency on the product level.

Moving to the meso level, interconnectedness means adaptations made within such dyadic relationships affect direct and indirect business relationships across the wider business network (Håkansson and Snehota, 1995; Harrison *et al.*, 2023), while the focal relationship is also shaped by changes elsewhere in the network. This co-evolution spans both the micro and meso levels of analysis, as well as the three business network settings. Understanding such interplay is essential for explaining how companies can mobilise their network resources for mutual benefits, while responding to systemic sustainability challenges. Yet INA offers limited insight into what governs this process. This is where institutions become critical, acting as governance mechanisms (Vargo *et al.*, 2015) that shape which adaptations and resource combinations are possible across the business network, as indicated by the shaded areas in the figure.

Embeddedness further reflects how change unfolds across the micro, meso and macro levels. In particular, it illustrates how the interconnectedness, as well as interdependencies arising from adaptations shape both a focal actor's position within the network and opportunities for the future (Halinen and Törnroos, 1998). Embeddedness also reflects the surrounding context, which can enable or hinder the realisation of product circularity. Yet INA treats the surrounding context largely as a backdrop, offering limited insight into the multitude of actors that shape it. SDL's macro level focus addresses this by highlighting the importance of non-business actors, such as policymakers and universities (Vargo *et al.*, 2008), extending analysis to the multi-actor coordination that the CE requires, as illustrated in the figure.

4. Methodology

This chapter outlines the methodological approach of the thesis. Specifically, there is a description of the scientific reasoning, followed by the research phases and process. Thereafter, the research design is presented, including the methods employed to collect and analyse the data. Lastly, reflections on research quality and ethical considerations are presented.

4.1 Scientific reasoning

The scientific reasoning of this thesis is grounded in a critical realist stance, which assumes that objective reality exists independently of our perceptions or knowledge of it (Alvesson and Sköldberg, 2018; Easton, 2010). This reality cannot be fully captured, but it can be approached using theoretical lenses. Critical realism holds that observable phenomena are not fully visible but are produced by underlying structures and processes (Easton, 2010). Empirical observations are accordingly treated as displays of these mechanisms, which the researcher seeks to uncover and interpret through theoretical explanation.

While reality exists independently of the researcher, access to it is inevitably shaped by the researcher's own involvement in the process, meaning knowledge cannot be entirely objective (Knowles, 2006). Interpretations are shaped by the researcher's prior knowledge and experience, regardless of efforts to remain unbiased. Subjectivity also arises in the empirical setting itself, where meaning emerges through interaction between actors (Dubois et al., 2023). This is particularly relevant for network studies, where meaning is not held by any single actor but is continuously shaped through the interactions between them. Because empirical insights are shaped both by the researcher's involvement and the interactional production of meaning, the research process as a whole is inherently interpretive (Alvesson and Sköldberg, 2018).

Because reality can only be partially approached through theory, and because the research process is interpretive, knowledge in this thesis is understood to develop iteratively, through continuous movement between empirical observations and theoretical interpretation (Dubois and Gadde, 2002; Dubois and Gadde, 2014; Dubois et

al., 2023). This iterative process, known as systematic combining, is operationalised in this thesis primarily through case studies, which are well suited to studying of complex phenomena, for example inter-organisational interaction and business networks (Easton, 2010). These methods, in turn, call for a qualitative approach, which is used here to explore how and under what conditions product circularity can be realised, and the implications for business networks.

Because systematic combining is an evolving, rather than fixed, process, the following sections first outline how the research unfolded over time in Section 4.2 and how the individual studies relate to and build on one another in Section 4.3, before describing the research design in Section 4.4.

4.2 Research phases

I started conducting the research presented in this thesis in March 2020. The initial plan was to identify the opportunities for and barriers to the servitisation of workwear manufacturers by means of case study research using a combination of SDL and INA as its theoretical lenses. While I was carrying out a review of prior SDL and INA literature, as originally planned, to ensure familiarity with the theoretical lenses and associated concepts, an unforeseen research opportunity prompted a reorientation of the scope of the thesis. Specifically, this was an opportunity to participate in an applied research project focusing on conditional design[4] and enabling access to collecting data from different actors in the workwear sector, between September 2020 and December 2021.

By participating in the project, I was able to outline the first phase of the research (see Figure 4), and to redefine the overall scope from servitisation to circular products. The initial exploratory approach to data collection enabled me to be open to emerging patterns. The research focus thus evolved in response to insights derived from the empirical material which informed the focus on the micro, meso and macro levels. During this phase, I wrote and submitted the first two appended papers (Papers 1 and 2). These papers use SDL and INA respectively and align themselves with the focus on institutional work and resource interaction across the three levels of the analytical framework. While the focal point of both papers was development and production, it

[4] Conditional design entails designing products on the basis of CE principles in order to provide them with longevity and recyclability.

was also clear that input from the use stage was relevant as regards informing choices made during the development and production stages.

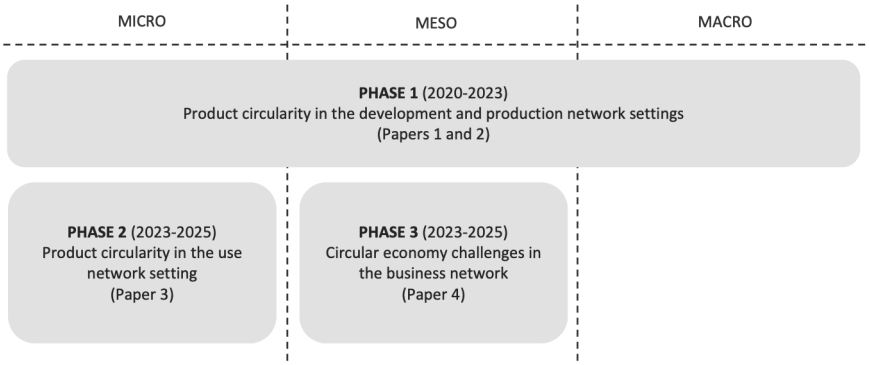

Figure 4. Research phases

Given the interconnectedness between the lifecycle stages revealed during the first phase, I consequently broadened my research focus to explore product circularity during the use stage. The second phase of the research was thus outlined on the basis of studying a small service provider working closely with a large workwear manufacturer in order to provide product-service offerings to small and medium-sized enterprises (SME) working with construction and manufacturing. The data was collected between August 2023 and October 2024 and informed the development Paper 3. In particular, this phase aligned with the micro level of the analytical framework due to the focus on the development of direct business relationships.

Following the initial reorientation of the topic, I further refined the scope of the thesis after this phase. Firstly, this entailed the inclusion of the business network settings, which align with the product lifecycle stages. Secondly, the findings from the first two phases not only highlighted diverse solutions for realising product circularity through inter-organisational interaction, but they also revealed notable challenges facing business networks. This outlined the third phase and defined the fourth appended paper (Paper 4), with its focus on the meso level challenges in the transition towards circularity. This expansion of the analytical framework allowed for a comprehensive understanding of both the product's whole lifecycle and how realising product circularity, in turn,

affects the business network. The research process is described in more detail in the following section.

4.3 Research process

Understanding the realisation of product circularity and its implications for business networks is achieved using a qualitative approach, which is well suited to addressing "how" questions, incorporating multiple perspectives, while remaining sensitive to contextual factors (Patton, 2015). Moreover, given the fragmentation of the research field, an exploratory approach is adopted, allowing conceptualisation to emerge from empirical insights (Eisenhardt and Graebner, 2007).

The interconnected studies have evolved through a continuous, iterative alignment of theory and empirical observations. This process was supported by the use of multiple data sources, which can reveal previously unknown aspects of the phenomenon and, in turn, prompt a refocusing of the research (Dubois and Gadde, 2002). Insights emerging from the data were accordingly matched against relevant concepts from the prior literature, clarifying how it could be understood within its context.

By integrating SDL and INA as complementary theoretical lenses, the exploratory research process has captured aspects that a fixed research design may have overlooked. In particular, the use of multiple theoretical lenses has broadened the analytical perspective, enabling a more nuanced understanding of the phenomenon (Dubois *et al.*, 2023), while also mitigating the risk of being limited to a single set of assumptions (Denzin, 1989). This allowed me to compare and understand how SDL and INA complement, rather than compete with, one another, in line with Bennett (1997).

This complementary use of SDL and INA unfolded through an exploratory and iterative process, illustrated in Figure 5. As mentioned earlier, prior theoretical knowledge of SDL and INA served as the starting point for the research presented in this thesis. The initial data collection and analysis demonstrated the interplay associated with changing norms between the micro, meso and macro levels. Based on this, I decided to first apply SDL. Its focus on analysing interaction across multiple levels where the goal is to achieve individual benefits and system viability aligns with the CE as one possible approach to achieving sustainable development (cf. Geissdoerfer *et al.*, 2017). Through

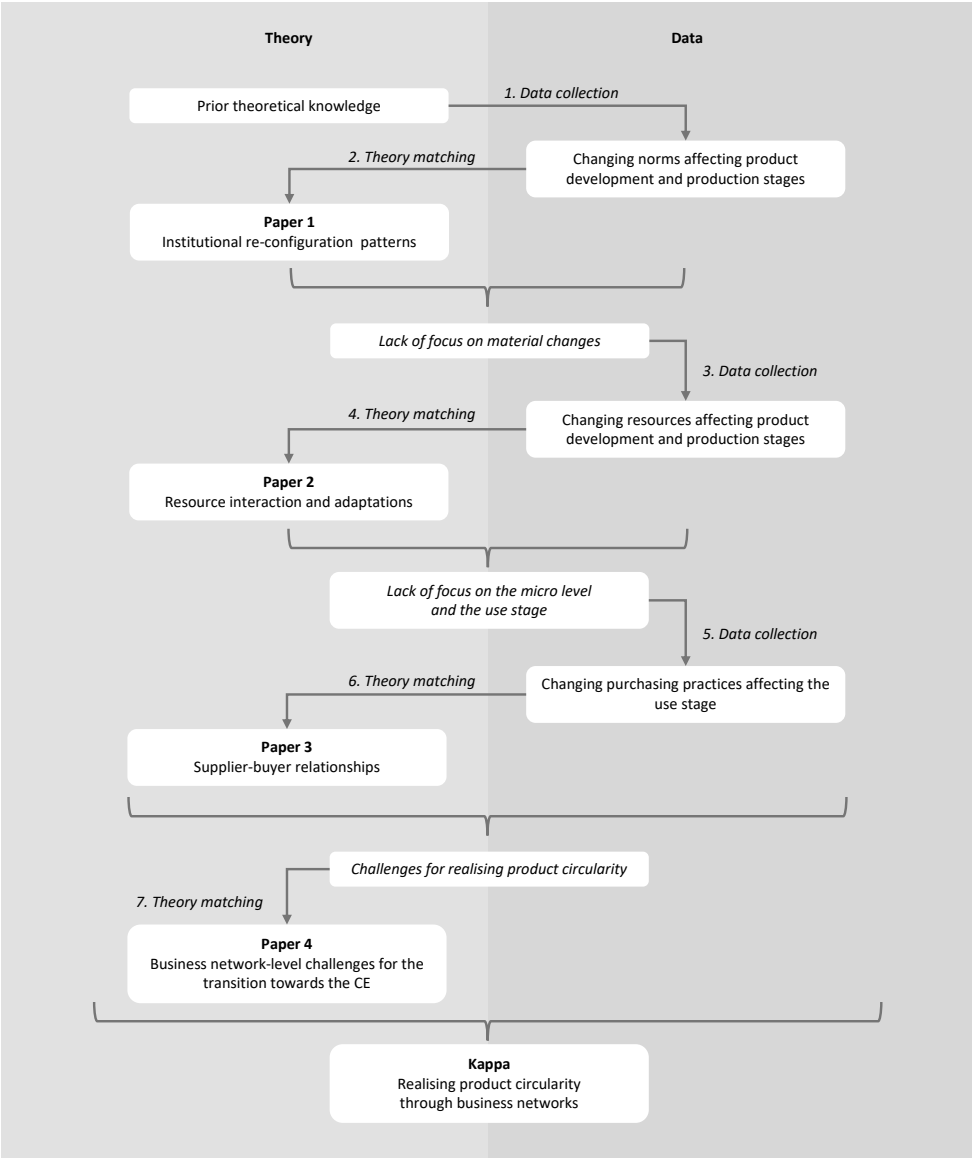

Figure 5. Research process

further data collection and preliminary analysis, I aligned these insights with institutional re-configuration patterns (Koskela-Huotari et al., 2016; Wilden et al., 2017) and explored how these patterns act as coordinating mechanisms that structure collaboration across the three levels.

SDL has thus provided a valuable lens for zooming in and out across the micro, meso and macro levels, in order to explore how institutional work enables stability while leading to the required changes. However, as demonstrated in the figure, it places less emphasis on analysing the resources themselves. This includes a limited focus on how resources can be managed and leveraged by business actors, due to SDL instead describing how resource combinations are shaped by institutions and vice versa (Bocconcelli *et al.*, 2020). Moreover, SDL lacks a nuanced understanding of inter-organisational interactions within business networks (Corsaro *et al.*, 2011; Leroy *et al.*, 2013).

I thereafter relied on INA when collecting and analysing the data for Paper 2, as it conceptualises inter-organisational interaction as an "economic process through which all of the aspects of business, including physical, financial and human resources, take their form, are changed and are transformed" (Håkansson *et al.*, 2009). This understanding of interaction enabled me to explore how changing resources affects product development and production stages, while still allowing the analysis across multiple levels to be driven by the empirical material. Accordingly, I mapped and analysed the resources of both business and non-business actors to identify the technical and organisational adaptations necessary to realise product circularity.

The findings from Paper 2 provided further insight into how resources can be organised and leveraged by the actors involved, while also complementing the findings of Paper 1 by highlighting the interplay between institutional re-configuration patterns and resource interactions. At the same time, the findings underscored the importance of incorporating input from the use stage, since considering users' experiences already during the development stage appeared crucial for increasing use frequency. However, as presented in Figure 5, the findings primarily reflected broader perspectives and focused mainly on the development and production stages.

Therefore, I chose to also investigate how product circularity can be realised during the use stage to gain a comprehensive understanding of the whole product lifecycle. Here, micro-level purchasing practices became key in Paper 3 as regards gaining a more in-depth understanding of inter-organisational interaction beyond institutional re-

configurations and resource interaction. Through iterative engagement with the empirical material and INA, the importance of supplier relationships became apparent as regards facilitating structured and decentralised purchasing. Furthermore, the inclusion of users as previously overlooked actors within the INA framework (Harrison *et al.*, 2023) strengthened the importance of the interplay taking place between the development, production and use network settings in realising product circularity.

Lastly, the findings of the first three appended papers, as well as the prior CE literature, highlighted a variety of challenges facing business networks, as demonstrated in Figure 5. Overcoming these challenges aligned with the INA concepts explaining how interaction in business networks can be understood, particularity through adaptations, interconnectedness and embeddedness. This led to defining Paper 4, which demonstrates how to overcome network-level challenges in the transition towards circularity.

Consequently, by basing the research process on systematic combining, conducting a review of prior research related to product circularity, and synthesising the findings from the four appended papers, I developed a relational multi-level framework of product circularity. The framework offers a conceptualisation of product circularity and an understanding of its realisation through, and implications for, business networks.

4.4 Research design

In line with the scientific reasoning and research process, the research design is based on a qualitative approach. The importance of qualitative methods lies in studying entities in their own context to create meaning as regards the substance and implications of the underlying mechanisms (Denzin and Lincoln, 2003). In particular, the aim of this thesis is to investigate the realisation of product circularity through inter-organisational interaction, in order to develop insights transferable to settings beyond those directly studied (Lincoln and Guba, 1985). This phenomenon-driven aim is addressed through the iterative process of systematic combining described earlier, which informs the design choices outlined below.

Specifically, both empirical material and prior research have been analysed to understand how product circularity is conceptualised and realised through business networks, drawing on a literature review presented in Section 2.2, two single case studies, and one conceptual study. The case and conceptual studies were undertaken as

part of the appended papers and are summarised in Table 1. Together, these studies form the current compilation thesis, with each appended paper reflecting different phases of the research process and collectively contributing towards answering the research questions defined earlier.

Table 1. Key elements of the research design

	Paper 1	Paper 2	Paper 3	Paper 4
Research design	Single case study 1		Single case study 2	Conceptual study
Data collection	Participant observations Semi-structured interviews Online queries		Semi-structured interviews Unstructured interviews Informal conversations Online queries	Literature review
Data analysis	Thematic analysis	Systematic combining	Systematic combining	Synthesis of domain and method theory
Unit of analysis	Institutional re-configurations	Resource interactions, adaptations	Supplier-buyer relationships, purchasing	CE challenges
Level of analysis	Micro, meso and macro		Micro	Meso

Single case studies

The single case study is a method chosen for its ability to capture complexity and to provide contextual understanding of a phenomenon (Andersen *et al.*, 2018; Dubois and Gadde, 2002). This thesis includes two single case studies carried out during the first two phases, as described earlier. Given the aim of understanding the underlying processes and structures of inter-organisational interaction in business networks, the case study method is particularly well suited to studying industrial networks (Halinen and Törnroos, 2005; Waluszewski *et al.*, 2019), as it allows us to *"investigate one or a small number of social entities or situations […] and develop a holistic description through an iterative research process"* (Easton, 2010).

The thesis consequently explores business networks defined as "a set of companies (and potentially other organisations) connected to each other for the purpose of doing business" (Halinen and Törnroos, 2005). Purposeful sampling was utilised since it involves selecting cases based on the research aim, as well as the potential to provide rich in-depth understanding of the phenomenon (Patton, 2015). Not only do both cases demonstrate unique characteristics (Eisenhardt and Graebner, 2007), they also contribute collectively towards understanding of how product circularity can be realised through inter-organisational interaction across the micro, meso and macro levels, as well as the whole product lifecycle.

The first case (Case 1) focusing on the development and production network settings involved interaction between diverse business and non-business actors, which is uncommon from a day-to-day perspective. The interaction within the specific actor constellation is analytically significant because it reveals the importance of evolving actor roles and interconnectedness that contribute to the realisation of product circularity. The second case (Case 2), focusing on the use network setting, involves a company proposing a distinctive product-service offering in the workwear sector in collaboration with its supplier and customers. The uniqueness of the case lies in how product circularity is realised through high-involvement supplier relationships, particularly by involving users in operational tasks such as the purchasing of workwear.

A common challenge facing network studies is defining boundaries between a case and its context, as interconnected relationships make it difficult to clearly define the focal network (Halinen and Törnroos, 2005). Given the relevance of contextual conditions to the studied phenomenon (Stake, 2005), Case 1 was expanded on the basis of the collected data, extending from the micro level to the broader business network and non-business actors at the macro level. At the same time, Case 2 focused more closely on the actors and relationships considered relevant by the focal actor, in line with Halinen and Törnroos (2005). Due to the complexity of how such networks function (Halinen and Törnroos, 2005), and the different levels of analysis applied to the studies, detailed case descriptions are provided in Chapter 5. These rich narratives serve as a crucial feature of qualitative research, offering depth to the findings accompanied by extensive context-specific descriptions (Denzin and Lincoln, 2003; Holmlund *et al.*, 2020).

Besides enabling iterative movement between empirical material and theoretical insights (Dubois and Gibbert, 2010; Ketokivi and Choi, 2014), the case study approach

also supports the use of multiple sources of data (Yin, 2014). This flexibility and variety in the data is essential for developing a nuanced understanding of the role of inter-organisational interaction in realising product circularity in context. Employing the case study design has thus allowed both theoretical insights and empirical observations to evolve during a continuous "back-and-forth" process, where emerging interpretations have guided subsequent data collection and while novel findings have prompted theoretical refinement. Data collection methods used in the case studies have relied on different interview methods, participant observations, online queries and document studies, all of which are described in more detail in the following sections.

Conceptual study

Conceptual studies serve to advance our theoretical understanding by developing frameworks that clarify, organise and explain relationships between key constructs (Jaakkola, 2020; Vargo and Koskela-Huotari, 2020). In this thesis, the appended conceptual study (Paper 4) follows the logic outlined by Jaakkola (2020). The CE serves as the domain theory: prior research has identified numerous network-level challenges to CE transitions across diverse contexts but lacks an explanation of how these can be overcome. INA is applied as a method theory, as its concepts of network processes and structure enable an explanation of how such challenges can be better understood and overcome. As a result, the study develops three premises that illustrate how to overcome the challenges to achieve network change towards the CE.

Data collection methods

Interviews

Data collection via interviews can take many forms. In the two single case studies included in this thesis, semi-structured interviews with managers and unstructured interviews with users were carried out. A total of 31 interviews were conducted across the two single case studies, amounting to approximately 14 hours of recorded material and resulting in 239 pages of transcribed data. The interviews were conducted in either English or Swedish, depending on the preference of the interviewee. All the Swedish transcripts were translated into English prior to data analysis. Depending on the approach

used in the respective case studies, follow-up interviews or meetings and email correspondence were used to conduct member checks, which enable participants to confirm the correctness of the data and to provide supplementary clarifications where needed.

The semi-structured interviews with 11 managers ranged between 30 and 80 minutes. A predefined set of guiding questions was prepared, providing the flexibility during the interviews to explore emerging topics in greater depth (Brinkmann and Kvale, 2018). In other words, the interviewer follows an interview guide, but can also adapt the sequence, ask follow-up questions, and probe for clarifications. This approach allows participants to describe their experience in their own terms, while also enabling us to understand complex processes and maintain enough structure to enable comparability between the interviews (Brinkmann and Kvale, 2018). The semi-structured interviews were aimed at capturing multiple perspectives, in particular those of suppliers and buyers, in line with the recommendations of Eisenhardt and Graebner (2007).

The unstructured interviews with 16 users in Case 2 amounted to 85 minutes. A broad set of topics was prepared based on earlier interviews with managers. This approach was particularly suitable given the practical context, as the users were interviewed while waiting to be fitted out with new workwear, which required flexibility and spontaneity. Given that user experiences in this context can be difficult to access, the format enabled the exploration of use-stage experiences. While the open-ended conversations allowed the respondents to guide the discussion on the basis of their own experiences, the approach did not provide any in-depth explanations of individual experiences. Rather, it served to complement the data collected through the semi-structured interviews with managers and also helped to uncover issues and meanings that were not yet well understood.

Additionally, informal conversations were conducted with managers during the data collection for both case studies. As an accepted and valuable data source in case study research (Ellegaard, 2009), these conversations not only supplemented the semi-structured interviews by providing contextual insights, they also helped to build familiarity and trust between the researcher and the participants. This facilitated easier access to the participants, while also supporting the continuation and depth of following data collection efforts. Brief notes were taken immediately after each conversation, capturing key points and contextual details that complemented the main data sources.

Participant observations

Participant observations have served as an important data collection method complementary to the interviews, as they provide access to real-time interactions and an in-depth understanding of the observed context (Grove and Fisk, 1992; Yin, 2014). In Case 1, I took part in an applied research project in a supportive role, contributing towards assessments of the environmental and economic implications of potential solutions aimed at realising product circularity. This active involvement in the project created opportunities for following everyday discussions, decisions and emerging challenges, as they occurred. This direct access offered insights that would be difficult to obtain interviews from that are retrospective.

As many of the meetings involved confidential information, all the participants were informed of the research purpose in line with Grove and Fisk (1992). Over the course of the project, I observed 27 meetings and two workshops ranging from short 1-2 hour sessions to full-day events, resulting in a total of 39 hours of observations. The meetings mainly focused on planning and discussing the progress of different constellations, as well as project updates in larger groups. One fieldtrip was also made to the local region's laundry facility. Fieldnotes were taken during each encounter to document agendas, participants, key discussion points, decisions made, and my own reflections. These notes were expanded and revised shortly after each encounter to ensure accuracy (Grove & Fisk, 1992). Repeated observations throughout the project also helped to build trust and familiarity with the participants, making them more comfortable during the subsequent stages of data collection (Saunders, Lewis & Thornhill, 2009).

Online queries and document studies

Two online questionnaires were used in Case 1 to gather insights from the managers and the end-users within the local region. The questionnaire for the managers was aimed at exploring the expectations regarding the results, as well as which resources and activities were expected to be the most relevant. This questionnaire was distributed at the beginning of the applied research project. The questionnaire for the end-users was developed in collaboration with the project managers, with distribution and data collection being facilitated by the local region, whose established relationships with end-users ensured access and a higher response rate. The purpose of the questionnaire was to gain a better understanding of how the end-users perceived and used the products, and

to identify opportunities for improving product quality and longevity by implementing changes during the development and production stages. The results informed the participating companies' decision-making and were incorporated into the evaluation and refinement of potential solutions aimed at realising product circularity.

Other online sources, for both cases, included documents outlining relevant regulations. For Case 1, standards, such as material certifications, product requirements, and industrial laundry specifications (e.g., SS 8760164:2020, SS 8760120:2020) were reviewed. These documents provided contextual information about the regulatory expectations and technical constraints influencing choices made during the development, production and use stages. Additionally, publicly available company information, including website content and sustainability reports, offered insights into organisational practices, priorities and existing circularity initiatives. Complementary data from external platforms (e.g. allabolag.se) was collected for further details of the companies' backgrounds. Together, these secondary sources enriched the empirical material and informed the preparation of the interview guides.

Data analysis methods

The data analysis underpinning this thesis and the appended papers draws on two approaches: systematic combining approach, applied in Papers 2 and 3 and in this thesis, and thematic analysis, applied in Paper 1. Firstly, when applying systematic combining, both the empirical material and the theory are developed using an iterative process (Dubois and Gadde, 2002; Dubois and Gadde, 2014). The iterative approach aligns both with the exploratory nature of the study and with case study research investigating complex phenomena that are context dependent.

As described earlier in section 4.3, systematic combining allowed for the resulting understanding of product circularity to evolve throughout the research process, particularly as different theoretical lenses were integrated. For example, the findings of Paper 1 demonstrated the importance of institutional work but left the nature of resources and inter-organisational interaction in business networks unclear. This prompted me to apply INA to explore such interaction in terms of resource interaction. Additionally, conducting initial interviews for Paper 3 guided the focus to SMEs and their difficulties with sustainable purchasing. Applying systematic combining is thus appropriate since the research design remains flexible by means of allowing adjustments in the focus, data

sources and analytical direction as new insights are developed (Dubois and Gadde, 2002; Dubois and Gadde, 2014).

Secondly, thematic analysis was employed in Paper 1 to interpret the collected empirical material. The process involved the stages of coding, condensation and interpretation, in line with Brinkmann and Kvale (2015). Initially, the data was explored by identifying the relevant extracts, which were then grouped into preliminary codes and categories. As additional data was collected, these codes were refined, merged and reorganised to form themes aligned with the analytical framework guiding the study. During the final phase, the themes were analysed in relation to one another, allowing the identification of underlying connections and patterns across the micro, meso and macro levels of the empirical context.

4.5 Reflections on research quality

Ensuring the research quality of the thesis is based on trustworthiness. This comprises credibility, transferability, dependability and confirmability, as suggested by Lincoln and Guba (1985).

Firstly, credibility concerns how accurately the findings represent the studied phenomenon. In line with the case study approach, I applied data triangulation, in both cases by using multiple data collection methods, as described earlier. This enabled the capturing of a multifaceted perspective on product circularity. Researcher triangulation was applied to all the appended papers to ensure agreement on the appropriate theoretical concepts (Creswell and Miller, 2000; Denzin, 1989), and to support a consistent and robust interpretation of the collected material (Tracy, 2010). Additionally, the ongoing work was continuously discussed with fellow researchers at conferences and research groups, providing opportunities to challenge emerging conclusions, thereby enhancing the credibility of the findings.

Beyond triangulation, active participation in the project in Case 1 helped build trust with the project participants, encouraging them to share information more openly (Saunders *et al.*, 2009). Field notes were revised and expanded shortly after each encounter to reduce reliance on memory, and clarifications were sought during subsequent interviews and meetings where needed. Interviewees were also given the opportunity to verify the accuracy of the transcripts and to provide clarifications, though

none requested changes. These considerations collectively contributed to the level of credibility by minimising misinterpretation and strengthening the accuracy of the findings.

Secondly, transferability addresses the extent to which the findings may be applicable to other contexts (Lincoln and Guba, 1985; Mays and Pope, 2000). In this study, transferability relies on providing rich case descriptions, rather than on the replication logic typically associated with multiple-case study designs (Halinen and Törnroos, 2005; Yin, 2014). Besides providing detailed descriptions in the appended papers, the thesis also outlines the rationale for case selection, as well as the scope of each case in terms of the actors involved, the relationships and the network dynamics. Transferability of the findings thus depends on the reader's judgement regarding how well the study context and processes have been described (Lincoln and Guba, 1985). Additionally, the study aims to achieve analytical rather than statistical generalisability, where the findings are generalised to theoretical concepts rather than to a broader population, in line with Yin (2014).

Thirdly, dependability concerns the reliability and consistency of the research process by means of transparent communication of methodological decisions (Lincoln and Guba, 1985). In this thesis, dependability was supported by providing detailed descriptions of how the study was undertaken, how access to the participants was achieved, and the choices for data collection and analysis. This is especially important in case study research, where theory and empirics develop iteratively (Dubois and Gadde, 2002). As Mays and Pope (2000) emphasise, transparent reporting of these choices enables readers to assess whether they were made consistently.

Lastly, confirmability addresses the objectivity of the findings (Lincoln and Guba, 1985), requiring reflexive awareness of how the researcher's prior knowledge, positionality and interactions in the field can shape the analysis (Mays and Pope, 2000). This is particularly important to both case studies presented in this thesis. Firstly, during Case 1, I was not an external observer but an active participant in the unfolding empirical setting, in line with Halinen and Törnroos (2005). This required ongoing reflection on how my presence shaped the collected empirical material and its interpretation. For example, when presenting the results from the economic and environmental assessments of the proposed solutions to the participants, I reported the outcomes as they were, instead of offering my own suggestions. Secondly, given the focus on circularity outcomes in Case 2, there was a risk of emphasising positive outcomes while

downplaying tensions. This was addressed by means of ongoing discussions among the co-authors, during which emerging interpretations were questioned and revised against the empirical material whenever a stronger alternative explanation emerged.

4.6 Ethical considerations

Research that utilises qualitative methods often involves direct or indirect interaction with individuals since researchers seek to access subjective experiences. Because such research can affect its participants (Brinkmann and Kvale 2005), ethical considerations are of key importance and should be both anticipated and integrated into the research design. It is thus crucial to secure informed consent, to respect the participants' right to withdraw from the study at any time and to build trust through transparency relating to the aims of the research (Brinkmann and Kvale 2005).

In Case 1, the participants were informed of the research purpose and that data was collected by means of participant observations. As an active contributor to the project, I was involved in assessing the environmental and economic impact of the proposed solutions as a part of the project. This participatory role was beneficial for gaining access to the project's internal discussions and commercially sensitive information, neither of which may have been accessible in a purely observational role. While this participatory role again raises the question of the potential impact my role could have on the discussions and the findings of the research, I sought to mitigate this by discussing the data and emerging interpretations with my co-authors during analysis and the write-up. As they were not directly involved in the project, this helped counterbalance potential bias arising from my participatory role. However, complete separation between participation and observation was not possible.

Such involvement in the project was additionally beneficial in that it helped build trust with the participants, in turn encouraging more open disclosure, such as discussing material and production costs, which the participating companies considered commercially sensitive. To protect this information, such details were not shared between companies and were only discussed at meetings with the individual companies concerned. Additionally, all the empirical data was treated as confidential when publishing the appended papers, and thus this sensitive information was not included in the project reports, the appended papers, or the thesis.

In Case 2, the 16 users included in the study were approached directly while standing in line for a fitting in the customer's car park. Given the time-constraints applicable to this setting, the participants were assured that their participation was voluntary, to avoid any sense of obligation. As a result, there were additional users who chose to only listen in on the conversations without actively participating. Consent was obtained verbally at the point of approach, with those who joined being given a short overview of the research purpose.

Additional considerations focused on member checks. While the participants were given the opportunity to review the interview transcripts during both case studies, none of them requested any changes or corrections, suggesting that the transcripts had been considered an accurate record of what had been said. Nonetheless, potential misinterpretations cannot fully be anticipated, either by the researcher or the participant (Stake 2005).

5. Case descriptions

This chapter provides detailed descriptions of the two case studies that form the basis for Papers 1 and 2 (Case 1) and Paper 3 (Case 2).

The two case studies presented below address not only different business network settings but also multiple levels of analysis. These network settings and levels include stakeholders that represent diverse roles within both the business network and the business environment. Specifically, Case 1 explores how product circularity can be addressed in the development and production network settings. By zooming in and out across the micro, meso and macro levels, analysis captures how resource interactions take place and how these are shaped by institutional re-configuration patterns. Case 2 explores how product circularity can be addressed in the use network setting through the development of high-involvement business relationships. Analysis focuses purely on the micro level dyadic supplier-buyer relationships to understand how these can support buyers in developing structured decentralised purchasing models that actively involve users.

5.1 Case 1: production and development network settings

Case context

The first case explores how product circularity is realised through inter-organisational interaction in the development and production network settings. Here, an applied research project was the starting point, where the multi-actor collaboration was facilitated and coordinated by a science park. The aim of the project was to enhance the product stakeholders' understanding and to support the implementation of CE principles in the chosen products. Involving stakeholders from both rental systems and public procurement, the involved actors aimed at developing products with favourable conditions, i.e. longevity and recyclability. The former involves facilitating longer

lifetimes by prioritising quality, modular design and design solutions that are accepted by both customers and users. The latter involves facilitating the recovery of materials after a product's end-of-life by means of modular design and the use of monomaterials (Carlsson *et al.*, 2017).

Two products were chosen due to the high quantities of these that were produced and used, as well as their potential for realising product circularity through conditional design. The first product is a shirt used in operating theatres. It is made of almost 100% of monomaterials, consisting of 99% polyester and 1% carbon fibre. The carbon fibre is added to minimise the spread of skin particles in order to prevent the onset of postoperative infections, and to prevent the buildup of static electricity for safety reasons. The shirt thus needs to meet high quality and hygiene standards, in addition to being comfortable and breathable in terms of the chosen materials and design.

The second product is trousers, which are used in more relaxed settings like when meeting with patients. These consist of 65% cotton and 35% polyester and are expected to be comfortable and breathable. While both products follow standards developed by the Swedish Institute of Standards, the shirt additionally needs to use textile materials that meet European standards regarding safety requirements. Because of this, the shirt can be laundered up to 120 times, while the trousers are laundered, on average, 120 times. The trousers' end-of-life is determined on the basis of their functional performance, appearance, and the predetermined rental period. The products are not the personal property of individual employees and are washed at industrial laundry facilities. Common issues with such products, which interfere with the realisation of product circularity, involve the use of material blends, low product quality, high quantities and a poor fit.

Description of key actors and activities

The key organisations involved in the project (Table 2) were: a fabric manufacturer, a garment manufacturer and a rental and industrial laundry service provider. While these companies, within the micro level, were not in involved via business relationships, they had experience of the chosen materials and garments. The meso level included a local administrative region that purchases such workwear for use at its healthcare facilities, a university, and a Science Park, as well as a consultancy agency focusing on the CE in the textile and apparel industry. From each organisation,

one or more actors were involved on the basis of their suitability and expertise in relation to the project goals. Further actors from the macro level, albeit not included either in the project or consequently in data collection, included the Swedish Institute of Standards and Swedish and EU policymakers.

Table 2. Key actors in Case 1

Organisation	Area of focus	Actor(s) involved
Fabric manufacturer	Technical textiles manufacturer	Business developer
Garment manufacturer	Workwear manufacturer	Product manager, sustainability manager, manging director
Service provider	Industrial laundry and workwear rental	Product manager, commercial director
Local administrative region	Regional governance	Environmental strategist
Circular change agency	Consultants	CEO, circular design strategists (2)
University	Higher education institution	Senior lecturer, lecturer, PhD student
Science Park	Innovation hub	Project managers (2), designer, innovation strategist

Key activities undertaken within the project involved a range of activities featuring different actor constellations. Educational activities facilitated by the Science Park and circular change agency were aimed at informing the stakeholders of the principles of the CE, as well as existing and upcoming policies impacting the activities carried out in the development and production network settings. Several workshops were held to guide the companies through ideation and development by means of educating them about conditional design, as well as with regard to evaluating the environmental impacts of the developed solutions. These solutions include increasing product lifetime, using materials with a lower environmental impact (e.g. recycled or monomaterial), recovering materials at end-of-life through recycling, and adapting industrial laundry standards.

5.2 Case 2: use network setting

Case context

The second case investigates how product circularity is realised through inter-organisational interaction in the use network setting. Here, the starting point was initiating contact with a workwear distributor providing customer-specific product-service solutions. The distributor as a service provider develops high-involvement relationships with SMEs active in construction and manufacturing. The provision of the product-service solutions is facilitated by a workwear manufacturer whose products are distributed. Such inter-organisational interaction is unique in the marketplace, as it involves close supplier-buyer relationships between actors of differing size and power, as they provide favourable conditions for extending product lifetimes by supporting SMEs' purchasing.

Common issues with the products involve overconsumption, overstocking and premature product obsolescence, often resulting from inappropriate style and size selections by users (i.e. employees of the SMEs) or managers. These issues often arise from insufficient knowledge and inadequate or unstructured planning, regardless of whether they occur within decentralised or centralised purchasing structures. These challenges often occur due to the limited availability of better alternatives as regards workwear suppliers and low-involvement supplier relationships. Collectively, these factors contribute towards higher costs for the SMEs, as well as an increased environmental impact due to unnecessary waste and resource consumption.

Description of key actors and activities

Key actors in this case (see Table 3) include the service provider that distributes workwear using customer-specific product-service solutions. The service provider focuses on agility and flexibility by not keeping any stock and instead relying on the resources of the workwear manufacturer. The latter typically refrains from establishing high-involvement relationships with SMEs due to resource constraints, instead prioritising customers that purchase in bulk through centralised purchasing models. The customers studied in this case are four SMEs that operate in the construction and

manufacturing sectors. These SMEs have all experienced the previously described issues to varying degrees on the basis of their chosen approach to purchasing practices.

Table 3. Key actors in Case 2

Company	Area of focus	Actor(s) involved
Service Provider	Workwear distributor	CEO, software developer
Garment manufacturer	Workwear manufacturer	Sales representative, sustainability manager
Customer A	Construction	CEO
Customer B	Construction	CEO
Customer C	Manufacturing	Quality and environment manager, Senior CSO
Customer (D)	Construction	Site managers (2), supervisors (4), carpenters (10)

To address resource inefficiencies during the use stage, the service provider facilitates the choice of appropriately styled and sized garments by means of individual fitting. This is achieved by using a mobile store that visits workwear users at their worksites. The range is pre-determined, and purchasing is based on annual individual budgets. The service provider also facilitates the reuse of products that have become obsolescent due to incorrect orders or temporary employees at the same company, or between different companies depending on the product type. Furthermore, the final purchasing decisions are carried out via the e-commerce platform workwear manufacturer, typically reserved for large customers, and finalised by the manufacturer's logistics systems.

6. Summary of appended papers

The following chapter presents a summary of the appended papers. This includes authors and titles, status, purpose, main contribution and relation to the thesis, and the authors' contribution to each paper.

The four appended papers include the two previously described single case studies and a conceptual study, being summarised in Table 4 below. The first case involves Papers 1 and 2, while the second case involves Paper 3.

Table 4. Overview of the appended papers

Research design	Paper	Key theoretical concepts	Business network setting	Level
Single case study	1	Institutional re-configurations	Development and production	Micro, meso and macro
	2	Resource interaction, adaptations	Development and production	Micro, meso and macro
	3	Purchasing practices, supplier-buyer relationships	Use	Micro
Conceptual study	4	Interconnectedness, adaptations, embeddedness	Development, production and use	Meso

6.1 Paper 1

Authors and title

Vellesalu, A., Chkanikova, O., Hjelmgren, D. & Salomonson, N. (2023). Institutional re-configuration and value co-creation in circular product development: a service ecosystem perspective in the textile and apparel industry.

Status of the manuscript

Published in the Journal of Cleaner Production. An earlier version of this paper was presented at Frontiers in Service in Boston, USA on June 24th, 2022.

Purpose and overview

The purpose of Paper 1 is to explore how institutional arrangements shape resource combining during circular product development within a complex network of actors by drawing on SDL. The research is guided by the following RQ: *"How do multi-level institutional re-configurations influence resource integration and associated value co-creation during circular product development?"*. Analysis is based on a single case study of circular product development. Data was collected through participant observations and semi-structured interviews, and analysed using a thematic analysis.

Main contribution and relation to the thesis

The paper contributes to research on institutional re-configuration patterns (Koskela-Huotari *et al.*, 2016; Pop *et al.*, 2018) by identifying interdependencies between the re-configuration patterns of making, breaking and maintaining institutional rules of resource integration (see Table 5) in the context of circular product development. Moreover, the findings also demonstrate that all three types of re-configuration patterns are interrelated between the micro, meso and macro levels. These perspectives add to our understanding of circular product development as systemic and collaborative, which is lacking in the prior literature (Pinheiro *et al.*, 2019).

These findings contribute to RQ1, RQ2 and RQ3 by demonstrating how the institutional re-configuration patterns shape how business and non-business actors combine their resources and develop relationships. Not only do these re-configurations take place through inter-organisational interaction across the micro, meso and macro levels, they also enable both stability and change in the business network. Stability is achieved through certain kinds of institutional work, for example breaking unilateral leadership practice or maintaining competitiveness on the industry level. Simultaneously, change is achieved through institutional work involving, for example the making of research project involvement and the breaking of end-user resistance as regards accepting fully synthetic materials, further discussed in Chapter 7.

Table 5. Summary of institutional re-configurations: adapted from Paper 1

Institutional work/Level	Make	Break	Maintain
Micro	- Proactive engagement in standards development in line with CE principles - Research project involvement - Inter-organisational collaboration between fabric and garment producer and rental and laundry service provider	- Insufficient involvement of rental and laundry service provider - Unilateral leadership practice	- Participate in SIS working groups - Align circular product development with standards and regulations - Core competencies
Meso	- Customer and end-user involvement - Collaboration with university and science park - Proactive involvement in establishing recycling infrastructure	- Insufficient customer and end-user involvement - Customer resistance to product design changes - End-user resistance to fully synthetic materials	- Competitiveness among collaborating companies on the industry level
Macro	- Public funding of research projects	- Prevailing socio-economic paradigm of the linear economy	- Informed regulatory frameworks - Industry standards development

Authors' contribution to the paper

I was the main author who initiated and designed the study, collected the data, conducted the analysis, and co-wrote the paper. Olga Chkanikova, Daniel Hjelmgren and Nicklas Salomonson participated in data analysis and the co-writing of the paper.

6.2 Paper 2

Authors and title

Vellesalu, A., Hjelmgren, D. & Lind, F. (2025). Circular product development from a multi-level perspective: Adaptations in business networks.

Status of the manuscript

Published in Industrial Marketing Management, in the Special Issue: Interaction and networking for adaptation in a complex and challenging environment. Earlier versions of this paper were presented at the 26th Nordic Workshop on Interorganizational Research in Kolding, Denmark on April 28th, 2022, and the 38th Annual IMP Conference in Florence, Italy on August 31st, 2022.

Purpose and overview

The purpose of Paper 2 is to explore inter-organisational interaction, specifically resource interaction in circular product development, by drawing on INA. The research is guided by the following RQ: *"How does resource interaction in circular product development affect the micro, meso and macro levels, and what are the roles of business and non-business actors?"*. Analysis is based on a single case study of inter-organisational interaction in terms of resource interaction during circular product development. Data was collected through participant observations and semi-structured interviews and analysed using systematic combining.

Main contribution and relation to the thesis

The paper contributes to INA's framework of resource interaction by identifying and demonstrating the importance of both business and non-business actors' resources at the micro, meso and macro levels, reflecting the broader and systemic nature of product development on the basis of CE principles. The findings demonstrate a pattern of network forces for stability and change through complex and minor adaptations respectively (see Table 6). Additionally, the roles of non-business actors at the meso and macro levels are emphasised regarding business networks' efforts to realise product circularity. This involves some actors, for example the Science Park, coordinating the network, while others, such as the local administrative region, play a dual role as the customer and the policymaker.

Table 6. Summary of resource adaptations: adapted from Paper 2

Level	Resource	Adaptation
Micro	Fabric	Use recycled fabric
	Fabric manufacturing facility	Use recycled yarn
	Dyeing facility	Use a different dyeing method
	Industrial laundry facility	Lower water temperatures and shorten drying cycles
Meso	Yarn manufacturing facility	Use recycled materials
	Business relationship between recycler and component supplier for yarn manufacturer	Initiate a business relationship
	Business relationship between garment manufacturer and business customer	Further develop business relationship to increase interaction with the users
	Business relationship between rental and laundry service provider and business customer	Further develop business relationship to increase interaction with the users

These findings contribute to RQ1, RQ2 and RQ3 as regards how realising product circularity requires adaptations to resources and resource interactions between business and non-business actors. While the results highlight how increased resource interaction facilitates proximity between the development, production and use network settings, they also emphasise how challenges related to the realisation of product circularity can be overcome.

Authors' contribution to the paper

I was the main author who initiated and designed the study, collected the data, conducted the analysis, and co-wrote the paper. Daniel Hjelmgren and Frida Lind participated in data analysis and the co-writing of the paper.

6.3 Paper 3

Authors and title

Vellesalu, A., Salomonson, N. & Hjelmgren, D. (2026). Shaping SME purchasing for sustainability: a case study of supplier-buyer relationships and extended product lifetimes.

Status of the manuscript

Published in the Journal of Business and Industrial Marketing. An earlier version of this paper was presented at the 40th Annual IMP Conference in Oulu, Finland on August 29th, 2024.

Purpose and overview

The purpose of Paper 3 is to explore how SME purchasing is shaped through supplier-buyer relationships in order to extend product lifetimes. The research is guided by the following RQ: "*How do supplier relationships shape SMEs' purchasing practices with the aim of extending product lifetimes?*". Analysis is based on a single case study of a workwear manufacturer, its distributor and the latter's four SME customers. Data was collected through semi-structured and unstructured interviews with managers and workwear users (i.e. a customer's employees).

Main contribution and relation to the thesis

The paper contributes to sustainable purchasing by demonstrating the importance of high-involvement relationships. Particularly for SMEs, such relationships with more resourceful suppliers enable resource constraints to be overcome by leveraging internal and external capabilities. Rather than the informal and ad hoc purchasing practices typical of SMEs, the relationship with the service provider enables these companies to implement structured and decentralised purchasing models and to involve users in purchasing decisions. Implementing supplier-led micro-level mechanisms (see Table 7) results in a balance between operational efficiency and user safety and satisfaction, as well as overcoming challenges related to cost management and garment maintenance aimed at extending product lifetimes.

Table 7. Summary of supplier-led mechanisms: adapted from Paper 3

Level	Supplier-led mechanism	Contributing to operational efficiency	Contributing to product circularity
Micro	Individual fittings	Improved sizing accuracy	Reduced returns and extended usage
	Pre-approved e-commerce ranges	Prevents branding inconsistencies and streamlines user selection	Enhanced purchase alignment and increased garment longevity
	Integrated repair and laundry services	Accessible maintenance via digital interface	Increases garment reuse and likelihood of repair
	User budget constraints	Reduces one-off purchases	Encourages garment care and cost discipline
	Resale and redistribution	Facilitates intra- and inter-firm garment redistribution	Reduces obsolescence and textile waste

These findings contribute to RQ1, RQ2 and RQ3 by demonstrating how developing close supplier-buyer relationships facilitates user involvement in operational tasks, which in turn leads to the realisation of product circularity. In this case, the increased frequency and intensity of the interaction enabled the service provider to deliver innovative product-service solutions to SME customers. Crucially, these offerings were made possible only by means of access to the manufacturer's key resources, in turn facilitating SMEs in overcoming the challenges related to operational efficiency, as well as user safety and satisfaction.

Authors' contribution to the paper

I was the main author who initiated and designed the study, collected the data, conducted the analysis, and co-wrote the paper. Daniel Hjelmgren participated in data collection, and both Daniel Hjelmgren and Nicklas Salomonson participated in data analysis and the co-writing of the paper.

6.4 Paper 4

Authors and title

Hasche, N., Keränen, O., Ojansivu, I., Ulkuniemi, P. & **Vellesalu, A.** (2025). Network change in circular economy transitions: examining interconnectedness, embeddedness and adaptations as key constructs.

Status of the manuscript

Published in the Journal of Organizational Change Management, in the Special Issue: Integrating Behavioural Insights into Organizational Change for Circular Economy. An earlier version of this paper was presented at the 40th Annual IMP Conference in Oulu, Finland on August 29th, 2024.

Purpose and overview

The purpose of Paper 4 is to understand how INA's theoretical constructs of adaptation, interconnectedness and embeddedness provide insights into CE challenges and the meso level network change during the transition towards the CE. The research is guided by the following RQ: *"How can the constructs of adaptations, interconnectedness and embeddedness explain network change in CE transitions and how can these constructs help to overcome the challenges?".* The conceptual study is based on drawing on INA as a method theory for increasing our understanding of CE transitions as a domain theory.

Main contribution and relation to the thesis

The findings contribute to an understanding of network change during CE transitions by proposing three premises (see Table 8) in relation to INA's theoretical constructs of adaptation, interconnectedness and embeddedness. Additionally, a conceptual model for network change during CE transitions is developed, in which the most common challenges from the prior literature are related to solutions based on the three premises.

Table 8. Summary of network change: adapted from Paper 4

Level	Network change during CE transitions		
	CE challenge	INA construct	Premise
Meso	Restructuring existing networks	Adaptations	CE transition is facilitated by a focus on mutual adaptations in business relationships, to ensure alignment between the companies initially at the dyadic level and then extending to the broader restructuring of existing network structures.
	Introducing new actors, resources and activities	Interconnectedness	CE transition is facilitated by a focus on interconnectedness between companies and their resources and activities, ensuring the more effective integration of new actors and entailing the coordination of activities and resources within existing networks.
	Connecting actors holistically	Embeddedness	CE transition is facilitated by a focus on embeddedness by aligning coordination and support between companies on the basis of past experiences and future expectations in order to achieve the individual and collective CE goals.

These findings contribute to RQ2 and RQ3 by demonstrating that transitioning to the CE cannot be achieved by individual companies but that it requires instead coordinated efforts and the overcoming of network-level challenges. The need for a relational approach helps explain why addressing systemic sustainability challenges, particularly related to product circularity, depends on dyadic adaptations, not only to technical resources but also to organisational ones. These adaptations can have consequences for actors beyond those who are directly involved due to interconnectedness, influencing their embeddedness in terms of network positions and shaping, thus, opportunities for future action.

Authors' contribution to the paper

I contributed to conceptualisation, data collection, analysis, and the writing of the paper equally with my co-authors Nina Hasche, Outi Keränen, Ilkka Ojansivu and Paula Ulkuniemi.

7. Findings and discussion

This chapter presents the findings of the thesis and discusses them in relation to the prior literature on product circularity by answering the three research questions defined in the Introduction. In particular, the RQs are discussed in relation to how realising product circularity unfolds across the business network settings of development, production and use, as well as the micro (companies), meso (business network) and macro (society) levels.

7.1 Realising product circularity across the micro, meso and macro levels

Addressing RQ1, the findings demonstrate how product circularity can be realised through inter-organisational interaction across the micro, meso and macro levels. At the micro level, increased supplier-side interaction across the development and production network settings contributes to the realisation of product circularity through resource interaction. This is consistent with prior research emphasising that inter-organisational interaction is key for circular product development (Cantù and Tunisini, 2023; Dominidiato *et al.*, 2025b), given the breadth of knowledge and skills this requires (De Los Rios and Charnley, 2017). In particular, the sharing of technical product knowledge between fabric and garment manufacturers enabled the adaptation of the focal products towards the realisation of product circularity.

Two adaptations specifically illustrate more efficient resource use in line with Liu *et al.* (2023). The fabric manufacturer's implementation of new dyeing methods contributes towards reduced resource consumption during production (Kirchherr et al., 2017), while adapting to recycled fibres contributes to closing resource flows. These adaptations do not restrict the production facility from manufacturing other products (Håkansson and Waluszewski, 2002), nor do they compromise product standards. However, driving further network-level change depends on the fabric manufacturer’s willingness to invest and adapt.

The findings further highlight the role of institutional work (Koskela-Huotari *et al.*, 2016; Koskela-Huotari *et al.*, 2020) in facilitating these resource interactions and

adaptations. Research project involvement contributed to initiating inter-organisational interaction. Notably, the fabric manufacturer, rather than the product manufacturer, assumed the lead role during development, which reflects the importance of specialised knowledge of materials manufacturing processes for progress towards the realisation of product circularity. This positions the fabric manufacturer as key facilitator of change (Gadde *et al.*, 2003), owing to both its technical knowledge and willingness to invest in adapting materials and production facilities for improved resource efficiency. Simultaneously, the rental and laundry service provider became more actively involved during product development, contributing knowledge of laundry processes to ensure that the previously described adaptations remained compatible with existing laundry standards. These findings align with Sudusinghe and Seuring (2022) who emphasise the importance of joint responsibility for addressing resource efficiency.

The attention to early-lifecycle interventions during the development and production stages aligns with Bakker *et al.* (2014), who emphasise material efficiency as a means of waste prevention in line with the EU Waste Framework Directive. However, the findings show how contributing to this Directive is also possible through extending product lifetimes during the use stage. In the user-oriented network setting, increased interaction between suppliers and customers contributes to the realisation of product circularity through relationship development.

In particular, increased interaction frequency (Ford *et al.*, 2011; La Rocca *et al.*, 2016) between the garment manufacturer, the service provider and its customers, along with their respective resources, facilitates an innovative product-service offering. This offering includes, for example, individual fittings provided by the service provider to address users' limited knowledge at the point of purchase, which is identified by Jensen *et al.* (2021) as a barrier to product circularity. The service further enables user access to the manufacturer's e-commerce platform, directly involving users in the operational task of purchasing workwear within pre-set budget constraints. Combined, these novel solutions help overcome the low user valorisation of circular products as an additional barrier identified in prior literature (Hecker and Toivonen, 2024; Jugend *et al.*, 2024). In turn, this contributes towards slowing resource flows by means of improved garment care that prolongs product use, and fewer returns at the point of purchase.

At the meso level, the findings show that micro-level solutions alone are insufficient to realise product circularity, requiring further meso-level interaction to overcome these limitations. For example, adapting to recycled materials requires the

fabric manufacturer to develop a new business relationship with manufacturers of recycled fibre to purchase these raw materials. More broadly, this network change also involves establishing recycling infrastructure that enables the availability of recycled materials in the required volumes and at competitive prices for large-scale implementation. This meso-level resource interaction is supported by means of institutional work including the involvement of new actors, as well as changing roles and responsibilities.

Firstly, collaboration with a circular change agency, facilitated through research project involvement, provided access to relevant circular economy competences that further supported this resource interaction. Secondly, product-owning actors such as the industrial laundry and rental provider and customers become central to generating a steady feedstock for recyclers, enabling these to scale up manufacturing and thereby decrease the price of recycled materials. This, in turn, is enabled by micro-level institutional work, in which the fabric manufacturer takes lead during product development due to their technical knowledge. Together, these findings indicate that meso-level actors play a crucial role in scaling micro-level adaptations into cost-viable resource flows, and companies owning workwear are thus key collaboration partners in realising product circularity (Aarikka-Stenroos *et al.*, 2022).

As regards the macro level, the findings demonstrate how broader collaboration and knowledge transfer across the business network is enabled through increased interaction with macro-level actors. For example, resource interaction with the science park and university facilitated companies' access to relevant competences, including environmental and economic feasibility evaluation, as well as the mediation of financing from policymakers. This is further supported by macro-level actors coordinating inter-organisational interaction through an applied research project. In line with Dominidiato *et al.* (2025b), who emphasise the importance of coordinating actor alignment during circular product development, the findings highlight how such coordination creates the conditions for knowledge transfer, joint problem-solving and relationship development between actors typically operating in more isolated or sequential stages as regards a product's lifecycle. While lack of legislative support has been described as a typical barrier (Rizos *et al.*, 2016), policymakers' active engagement within business networks supports business network alignment (Waluszewski *et al.*, 2019).

The findings further suggest that macro-level involvement is not one-directional but depends on coordinated resource interaction and standards development across the

micro, meso and macro levels simultaneously. This complexity is illustrated by the proposed solution of adapting laundry processes to further reduce resource reuse. However, this would have required coordinated resource interaction and standards development across the three levels simultaneously and was therefore not pursued. This suggests that addressing systemic sustainability challenges depends not only on the involvement of diverse actors (Aarikka-Stenroos et al., 2022; Melander & Arvidsson, 2022), but also on the possibilities to coordinate such multi-actor collaboration.

Combined, the findings show that product circularity is realised through multi-actor interaction across the micro, meso and macro levels, with each level enabling or constraining what can be achieved at the others. Product circularity can thus be understood, in line with Saviano *et al.* (2025), as arising from interactions across the wider system as a whole, rather than being attributable to any single actor or level in isolation. Specifically, the resource interactions and relationship development required for this are facilitated by institutional work at each level, spanning from micro-level material and process adaptations to meso-level scaling, to macro-level actors providing the structure, standards and funding that make such interaction possible across the network. In line with Dzhengiz *et al.* (2023), this points to the need to move beyond dyadic interactions to account for the complexity of required systemic change towards circularity. However, not all interactions result in positive outcomes, underscoring the need to understand how increased interaction can also help mitigate the challenges this presents.

7.2 A relational approach to mitigating circularity challenges

Addressing RQ2, the findings demonstrate how interaction in business networks shaped by an understanding of adaptations, interconnectedness and embeddedness can contribute towards mitigating the challenges associated with realising product circularity. Firstly, the findings show that the previously described adaptations to changing materials in products or investing in new production facilities can encounter resistance from both customers and users. For example, using recycled materials may increase prices, while fully synthetic materials designed to facilitate recycling may reduce perceived comfort. This resistance can be rooted in customers' limited

knowledge at the point of purchase (Jensen *et al.*, 2021) and manufacturers' limited access to customers during product development (Hecker and Toivonen, 2024), constraining progress towards closing resource flows.

The findings show that involving customers and users during product development helps address these knowledge gaps, increasing their understanding of, and confidence in, adapted products. In turn, mutual adaptations across the network, ranging from 'hard' adaptations to products and production facilities (Hagberg-Andersson, 2006; Von Corswant, 2005) to 'soft' adaptations as regards to new business relationships and increased actor constellations (Gadde and Håkansson, 1993; Schmidt *et al.*, 2007), contribute towards the network-level change required for the realisation of product circularity.

Beyond adaptations, the findings show that interconnectedness allows risk to be distributed rather than absorbed by a single company. For example, garment manufacturers that typically face the risk of higher costs (De Lima and Seuring, 2023) can move away from unilateral leadership during product development towards increased resource interaction with suppliers and customers. The fabric manufacturer contributes in-depth material knowledge and access to recyclers, while the industrial laundry and rental service provider contributes access to customers, together enabling the promotion of monomaterial designs and the collection of used garments for recycling. Specifically, monomaterial design makes garments recyclable, while systematic collection generates the high-volume feedstock recyclers need to scale up production. It is this scaling, rather than the interaction itself, that contributes to the lower cost of recycled materials, meaning that relying on interconnectedness mitigates the cost risks facing garment manufacturers indirectly, by creating the conditions under which recyclers can achieve economies of scale.

Additionally, the findings show that interconnectedness can also address barriers rooted in product design itself. For example, recirculation of workwear branded with company logos restricts opportunities for reuse (Engzell and Kambanou, 2024), thus hindering the realisation of product circularity through product lifetime extension. However, the findings demonstrate how this challenge can be overcome through a novel product-service offering in which the service provider facilitates the internal resale of unused garments to employees of the same company, illustrating how direct high-involvement relationships between actors can resolve challenges that adaptation at the

product level alone cannot. Interconnectedness thus facilitates the (re)integration of resources into the business network.

The findings also emphasise the importance of embeddedness for mitigating challenges to realising product circularity, particularly through mobilising one's network position. For example, developing a high-involvement relationship with a service provider enables resource-constrained SMEs to draw on the resources of both the service provider and a large manufacturer through direct and indirect business relationships. In turn, developing these relationships contributes to optimising product use, a typical challenge identified in prior research (De Los Rios and Charnley, 2017; La Rocca and Snehota, 2014), by means of individual fittings and the coordination of workwear resale within the same company. These activities enable SMEs additionally to mitigate users' commonly low prioritisation of recyclability and durability over price (Klemm and Kaufman, 2024). This suggests that developing high-involvement supplier relationships not only strengthens SMEs' network positions and helps offset power imbalances relative to more resourceful suppliers, but also enables the responsibilities and risks to be redistributed across the network through this greater embeddedness (Halinen and Törnroos, 1998).

Taken together, the findings demonstrate that an understanding of how adaptations, interconnectedness and embeddedness shape inter-organisational interaction contributes to mitigating the challenges associated with realising product circularity. While addressing customers' and users' knowledge gaps enables adaptations facilitating network-level change, relying on both interconnectedness and embeddedness distributes responsibilities and risks across the business network. Together, an understanding of these mechanisms enables individual actors to benefit from realising product circularity while also sustaining broader system viability. In doing so, this understanding makes it possible to address the conflicting environmental and economic goals of diverse actors (Garcia *et al.*, 2019), underlining how realising product circularity reshapes business networks in turn.

7.3 Realising product circularity reshapes business networks

Addressing RQ3, the findings demonstrate how realising product circularity reshapes business networks. While prior literature related to product circularity has demonstrated the importance of different actors and how their decisions impact circular outcomes (e.g. Jensen *et al.*, 2021), the findings instead emphasise how the realisation of product circularity requires close interaction across a product's lifecycle stages, in line with Ingemansson and Waluszewski (2009) and Landqvist and Lind (2019) who argue that resources interact and are adapted across all three network settings simultaneously.

For example, adapting within dyadic relationships supports more effective coordination (Brennan *et al.*, 2003; Håkansson and Snehota, 1995), in turn facilitating the development of novel solutions (Choi and Hara, 2018), such as the realisation of product circularity. The findings demonstrate how first adapting within the direct supplier-buyer relationship between the fabric and garment manufacturer was key to contributing to resource efficiency, through switching to recycled fibres and new dyeing processes. While the resulting adaptations were minor in scope, their successful outcome extends beyond the development and production network settings, depending in turn on the use network setting, in line with Hallstedt and Isaksson (2017). Increased proximity with the use network setting enabled overcoming customer and user resistance, as described earlier. This illustrates how even adaptations that are minor in scope require proximity between network settings to facilitate the transition towards circularity.

The increased proximity also signals a shift in how the use network setting contributes to the realisation of product circularity. Users contribute more directly by being involved in product development and purchasing, extending the findings of La Rocca and Snehota (2014) by showing that user involvement is beneficial not only for complex and costly products, but also for those directly contributing to user satisfaction and safety. The findings across both cases demonstrate how this involvement enables feedback from the use network setting to flow directly into the development and production network settings, for example regarding garment fit, quality and use frequency. Increased actor collaboration further generates network effects extending to those not directly involved in the focal interaction. For example, quality issues faced by SMEs were relayed to the manufacturer by the service provider in the second case, with

both SMEs and the manufacturer benefitting from this input to the development and production network settings.

The findings thus highlight how realising product circularity requires expanding actor constellations, including their respective resources and activities. Specifically, broadening supplier-buyer interfaces results in involving not only users, but also the service providers and manufacturers involved in SMEs' purchasing in order to slow resource flows in the use network setting. Even if aligning inter-organisational interaction across diverse actors can be challenging (Harrison *et al.*, 2022; Harrison *et al.*, 2023), increased proximity between the production and use network settings was achieved by means of mediation by a service provider. This suggests that even resource-constrained companies, for example SMEs, can realise product circularity by leveraging high-involvement relationships to increase proximity with the development and production network settings, particularly with more resourceful suppliers.

While these network-level changes can create stability among the actors involved, the interdependencies resulting from high-involvement relationships can also generate lock-in effects as described by De Jesus and Mendonça (2018). For example, the fabric manufacturer's and customers' role in enabling coordinated progress towards material and process adaptations in the first case increased the garment manufacturer's reliance on these actors, which may constrain its future development paths in the network. While this coordination may affect how some actors actively mobilise the network to pursue new opportunities (Håkansson and Snehota, 1995), others may prioritise stability and therefore resist change (Håkansson and Waluszewski, 2002), connecting to the broader question of how stability and change can be balanced through institutional work to facilitate knowledge transfer, joint problem-solving and relationship development, in turn contributing to the realisation of product circularity.

Taken together, these findings show that realising product circularity requires proximity between the development, production and use network settings that extends beyond isolated and sequential company or dyadic relationship focus, reshaping the broader network. Adding to the findings of Liu *et al.* (2023) and Castro-Lopez *et al.* (2023), this reshaping is driven not only by external pressures, but also by actors within the network taking initiative to coordinate and collaborate, reflecting proactivity in exploiting new opportunities, alongside a broader sustainability awareness.

8. Conclusions

Based on the findings presented in the previous chapter, a relational multi-level framework (see Figure 6) underpins the conceptualisation of product circularity. The framework responds to gaps in prior literature on product circularity, which has tended to treat lifecycle stages in isolation and focus on the individual company. In doing so, it addresses calls for systemic change beyond the individual company and dyadic interactions in order to tackle systemic sustainability challenges (Harrison *et al.*, 2023; Sharma, 2020). It demonstrates how product circularity can be realised through business networks, by means of the collaboration and coordination across interconnected business and non-business actors that the CE requires. Moreover, the multi-level framework enables an understanding of how reaching individual goals while sustaining system viability can be achieved in the case of diverse actors with conflicting goals (Garcia *et al.*, 2019; Harrison *et al.*, 2023). This forms the basis for the following theoretical and managerial implications.

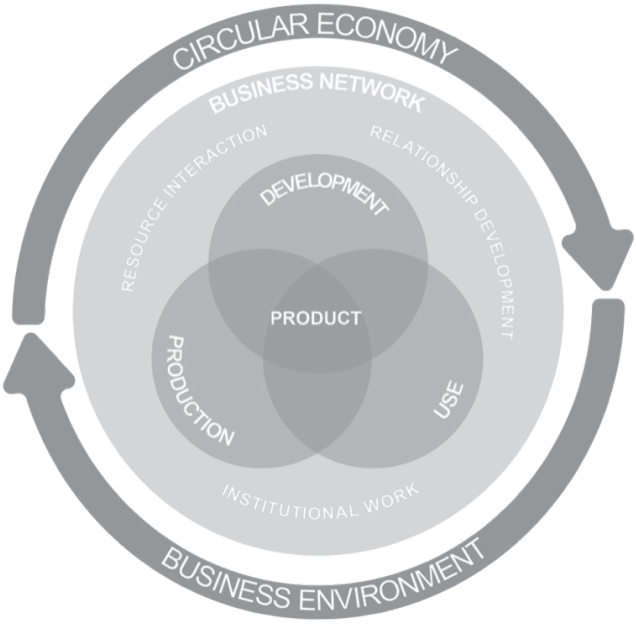

Figure 6. A relational multi-level framework for product circularity

8.1 Theoretical implications

Building on the framework, an understanding of product circularity as relational and multi-level contributes towards conceptual refinement of the phenomenon, addressing the fragmentation that characterises prior research. This fragmentation is evident in the field's considerable diversity in focus and level of analysis, as studies often focus solely on the distinct impact of different actors on circular outcomes (Jensen *et al.*, 2021). While increased collaboration and coordination has been acknowledged by prior research as key for addressing inefficient resource use (e.g. Brüel Grönberg and Hulthén, 2022a; Dzhengiz *et al.*, 2023; Keränen *et al.*, 2021; Korhonen *et al.*, 2018a; Melander and Lind, 2022), this study demonstrates how such interaction contributes to realising product circularity specifically through increased interaction that spans both the development, production and use network settings, as well as the micro, meso and macro levels. In doing so, this study responds to critiques of fragmented definitions within CE research more broadly (Corvellec *et al.*, 2021).

The relational approach to realising product circularity demonstrates how the interplay between resource interaction, relationship development and institutional work extends current understanding of how both stability and change are achieved within business networks. This moves beyond prior research, which has predominantly focused on addressing resource efficiency within supplier networks (e.g. Brüel Grönberg and Hulthén, 2022a; Dominidiato *et al.*, 2025b; Meqdadi *et al.*, 2020), by demonstrating the importance of proximity between the three network settings.

In the supplier-oriented network settings, increased interaction between diverse suppliers contributes to the realisation of product circularity through resource interaction, specifically by adapting products and production facilities. While the findings support the prior research highlighting the financial risks faced by manufacturers (De Lima and Seuring, 2023), maintaining stability and mitigating such risks requires institutional work to re-configure the institutional arrangements supporting increased resource interaction. This involves, for example moving beyond unilateral leadership during product involvement, as well as involving customers and users during this process.

In the user-oriented network setting, increased interaction between suppliers and customers contributes to the realisation of product circularity through relationship development. Customer and user acceptance of circular products, a barrier commonly

described in the prior literature (e.g. Hecker and Toivonen, 2024; Jensen *et al.*, 2021), is thus not an isolated user-side concern, but can instead be addressed through institutional work aimed at increasing their involvement. As users become active participants in realising product circularity, their previously underexplored role in B2B research (Harrison *et al.*, 2023) emerges as critical not only in user-facing interactions, but also within the development and production settings involving suppliers, consistent with prior research (e.g. Laage-Hellman *et al.*, 2018; Landqvist and Lind, 2019).

This relational approach is further reinforced by the interplay with macro level actors, particularly resource interaction and institutional work involving policymakers, academia and science parks, which facilitates the forms of inter-organisational interaction identified above. As highlighted in the findings, policymakers play a dual role in the business network. They simultaneously develop and enforce regulations that constrain or enable circularity, and act as customers, for example of workwear, through public procurement. This understanding underscores how inter-organisational interaction is embedded in broader business environments (Halinen and Törnroos, 1998; Möller *et al.*, 2020) and points to the active role of non-business actors in shaping both change and stability in business networks. This is further supported by the finding that increased interaction with macro level actors supports the alignment of business actors between different network settings, thus adding to the findings of Brüel Grönberg and Hulthén (2022a) and Baraldi and Wagrell (2022).

This conceptualisation of product circularity is possible by means of grounding analysis in SDL and INA. Prior research has limited theoretical grounding in theories that would address the complexity if the CE, for example examining organisational capabilities (Agyabeng-Mensah *et al.*, 2021; Castro-Lopez *et al.*, 2023; Kühl *et al.*, 2022) or diverse business models (Kambanou *et al.*, 2024; Melander and Arvidsson, 2021). In contrast, the integration of SDL and INA provides complementary perspectives, allowing analysis to draw on distinct advantages of each lens. The findings consequently contribute towards deepening the conceptualisation of product circularity, in line with the rationale of Dubois *et al.* (2023) as regards combining different theoretical lenses.

Building on this integration, the results further show how insights gained from applying the INA can enrich SDL's use as a theoretical lens for exploring CE-related phenomena, and vice versa, illustrating how theoretical lenses can inform one another (Aramo-Immonen *et al.*, 2020). Drawing on INA, the findings show that technical

resource adaptations, particularly those involving products and production facilities, drive change towards the CE, thereby contradicting SDL's view of intangible resources being fundamental to addressing sustainability challenges (Vargo, 2021). Rather than overlooking the nature of resources, as has tended to be the case in prior SDL studies (Bocconcelli *et al.*, 2020), the findings instead support the position taken by Fehrer *et al.* (2023) and Findsrud *et al.* (2025), namely that tangible resources play a critical role in sustaining system viability.

In applying SDL, the findings further highlight the interplay between different levels and diverse actors with conflicting goals. SDL's neutral A2A approach to interaction (Vargo and Lusch, 2004) underscores the importance of broadening INA's network analysis beyond its business-centric focus. While users at the micro level, as well as academia and policymakers at the macro level, have featured in prior INA research, the findings of this thesis extend their involvement to network-level change as described earlier. The integration of SDL and INA thus enables a comprehensive analysis of the interplay across the product lifecycle stages and the micro, meso and macro levels, in line with the complexity of the CE (Kirchherr *et al.*, 2017).

8.2 Managerial implications

Given the limited focus of prior research on workwear (Kambanou *et al.*, 2024), the findings of this thesis offer valuable insights for the workwear sector, involving companies across the product's lifecycle. Moreover, the findings are relevant to policymakers who can facilitate the transition towards the CE by supporting business networks' efforts in addressing resource efficiency at the product level.

For manufacturers, strategies that prioritise closer partnerships with both suppliers and customers are crucial in order to remain competitive and gain access to user insights. Competitiveness is facilitated by increased collaboration during product development, resulting in adaptations to products, production processes and business relationships. In particular, product manufacturers should leverage interconnectedness in order to mitigate cost-related risks by mobilising material manufacturers to adapt to recycled and recyclable materials, while simultaneously educating customers about the benefits of these materials. Additionally, achieving proximity with the use network setting

facilitates integrating user insights into product development and thus becoming more responsive to user needs.

For customers, strategies which strengthen connections with the wider network and leverage contextual factors based on embeddedness, for example network position and power, should be prioritised in order to access supplier resources. Developing close relationships with more resourceful suppliers enables customers to enhance their internal capabilities and contribute towards operational performance. This is particularly relevant for SMEs, which are typically resource-constrained. Service providers can act as intermediaries, offering SMEs indirect access to large manufacturers and their resources. In turn, this enables SMEs to involve users in purchasing practices, which also contributes to improved user satisfaction and safety.

For policymakers, conceptualising product circularity as relational and multi-level can inform regulatory frameworks that support network development, encouraging inter-organisational interaction and proximity between the development, production and use network settings. This closer alignment across the network is particularly relevant for generating benefits for business actors while also maintaining system viability. Workwear as a textile product is prioritised in CE policy both nationally (Swedish Government Offices, 2021) and regionally (European Commission, 2014). However, policymakers are not only regulators in this context. As major customers of workwear, for example through public procurement for sectors such as healthcare, policymakers' purchasing decisions play a significant role in driving circularity.

8.3 Limitations and suggestions for future research

This research is restricted in its scope by both deliberate choices and external circumstances: i.e. the availability of data, the empirical context, the theoretical stance, and the chosen methods. The thesis project started in March 2020, in parallel with the project constituting the source of data for the first case study. Due to restrictions on physical meetings during the COVID-19 pandemic, most of the data collection was conducted via online meeting platforms. This limited having closer access to the participants from different companies because the meetings were only dedicated to specific issues and because it was not possible to access further information through informal conversations. Limited access to workwear users (i.e. employees of the

customer companies), for financial reasons at the participating companies, further restricted data collection during the second case study.

Future research can address these limitations by increasing the volume of the collected data, extending the duration of the data collection period, and making data collection more varied, for example by using managerial diaries and online questionnaires with users. Managerial diaries are useful for immediate, real-time access to participants' activities and experiences, generating insights that help inform subsequent interviews. Thus, managerial diaries serve as observational data when combined with interviews (Wulff, 2019; Zimmerman and Wieder, 1977). Online questionnaires offer efficient access to users, enabling a larger number of informants than interviews. Extending the data collection period makes it possible to observe how product circularity is realised in the long-term, and thus also to better understand its network-level consequences.

The thesis focuses on realising workwear circularity in the B2B context, thus excluding the role of the consumer (i.e. individuals who purchase workwear for personal reasons). Although the B2C perspective is relevant in broader discussions on circular workwear, it is the B2B context that holds a greater potential for realising product circularity due to the large volumes being developed, produced and used. The findings are applicable to a Swedish context in which sustainability is a key concern for industry and policymakers, especially in aligning product circularity efforts with national and regional goals. This means that the contextual specificity should be considered when assessing the transferability of the findings to other settings, and when studying other types of products.

The choice of the theoretical lenses through which the data has been analysed has influenced the scope of the research. While both SDL and INA were applied, the focus on INA in particular has guided the predominant focus towards inter-organisational interaction and business network settings. However, extending data collection to the broader business environment can generate additional insights from macro-level actors, in doing so broadening the analytical focus and strengthening the applicability of SDL.

The qualitative and exploratory approach, in line with Patton (2015) and Eisenhardt and Graebner (2007), has been a key strength of this research, enabling the study of an under-researched field and addressing the fragmentation that characterises an understanding of product circularity. However, this qualitative nature of this research also limits scope, since it focuses on the relational processes (i.e. resource interaction,

business relationship development and institutional work) that result in the realisation of product circularity through business networks. Future research can thus delve into measuring the degree of product circularity realised, by means of measuring the values created and captured by the involved actors in the business network settings.

References

Aarikka-Stenroos, L., Chiaroni, D., Kaipainen, J. & Urbinati, A. 2022. Companies' circular business models enabled by supply chain collaborations: An empirical-based framework, synthesis, and research agenda. *Industrial Marketing Management,* 105**,** 322-339.

Aguiar, M. F. & Jugend, D. 2022. Circular product design maturity matrix: A guideline to evaluate new product development in light of the circular economy transition. *Journal of Cleaner Production,* 365**,** 132732.

Aguiar, M. F., Mesa, J. A., Jugend, D., Pinheiro, M. a. P. & Fiorini, P. D. C. 2022. Circular product design: strategies, challenges and relationships with new product development. *Management of Environmental Quality: An International Journal,* 33**,** 300-329.

Agyabeng-Mensah, Y., Tang, L., Afum, E., Baah, C. & Dacosta, E. 2021. Organisational identity and circular economy: Are inter and intra organisational learning, lean management and zero waste practices worth pursuing? *Sustainable Production and Consumption,* 28**,** 648-662.

Akaka, M. A., Vargo, S. L. & Lusch, R. F. 2012. An exploration of networks in value cocreation: a service-ecosystems view. Emerald Group Publishing Limited.

Akaka, M. A., Vargo, S. L. & Lusch, R. F. 2013. The complexity of context: a service ecosystems approach for international marketing. *Journal of International Marketing,* 21**,** 1-20.

Alkki, L., Aarikka-Stenroos, L., Jaakkola, E. & Pohls, E.-L. 2025. How do business-to-business actors experience circular solutions? Uncovering the interplay between experience, interaction, and adaptation in the case of concrete element reuse. *Industrial Marketing Management,* 131**,** 181-195.

Alvesson, M. & Sköldberg, K. 2018. *Reflexive methodology : new vistas for qualitative research,* Los Angeles, Sage.

Anderberg, B. 2022. Arbetskläder – en bransch med komplexa hållbarhetsutmaningar. *Byggindustrin* 23.3.2022.

Andersen, P. H., Dubois, A. & Lind, F. 2018. Process validation: coping with three dilemmas in process-based single-case research. *The Journal of Business & Industrial Marketing,* 33**,** 539-549.

Anderson, J. C., Håkansson, H. & Johanson, J. 1994. Dyadic business relationships within a business network context. *Journal of Marketing,* 58**,** 1-15.

Andersson Wänström, A., Hjelmgren, D., Landqvist, M. & Lind, F. 2025. Exploring renting models for clothing items–resource interaction for value creation. *Journal of Business & Industrial Marketing,* 40**,** 1439-1450.

Aramo-Immonen, H., Carlborg, P., Hasche, N., Jussila, J., Kask, J., Linton, G., Mustafee, N. & Öberg, C. 2020. Charting the reach and contribution of IMP literature in

other disciplines: A bibliometric analysis. *Industrial Marketing Management,* 87**,** 47-62.
Araujo, L. & Easton, G. 1996. Networks in socioeconomic systems: A critical review. *Networks in Marketing***,** 63-107.
Bakker, C., Wang, F., Huisman, J. & Den Hollander, M. 2014. Products that go round: exploring product life extension through design. *Journal of Cleaner Production,* 69**,** 10-16.
Baraldi, E., Gressetvold, E. & Harrison, D. 2012. Resource interaction in inter-organizational networks: Foundations, comparison, and a research agenda. *Journal of Business Research,* 65**,** 266-276.
Baraldi, E. & Wagrell, S. 2022. Applying the resource interaction approach to policy analysis – Insights from the antibiotic resistance challenge. *Industrial Marketing Management,* 106**,** 376-391.
Battesini Teixeira, T. G., De Medeiros, J. F., Kolling, C., Duarte Ribeiro, J. L. & Morea, D. 2023. Redesign in the textile industry: Proposal of a methodology for the insertion of circular thinking in product development processes. *Journal of Cleaner Production,* 397**,** 136588.
Bennett, J. A. 1997. A case for theory triangulation. *Nursing Science Quarterly,* 10.
Benyus, J. M. 1997. *Biomimicry,* New York, NY, William Morrow.
Blankenburg, D. & Johanson, J. 1992. Managing network connections in international business. *Scandinavian International Business Review,* 1**,** 5-19.
Bocconcelli, R., Carlborg, P., Harrison, D., Hasche, N., Hedvall, K. & Huang, L. 2020. Resource interaction and resource integration: Similarities, differences, reflections. *Industrial Marketing Management,* 91**,** 385-396.
Bocken, N. M. P., De Pauw, I., Bakker, C. & Van Der Grinten, B. 2016. Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering,* 33**,** 308-320.
Brennan, R. & Turnbull, P. 1995. Adaptations in buyer-seller relationships. *11th IMP Conference.* Manchester Federal School of Business and Management.
Brennan, R. & Turnbull, P. W. 1999. Adaptive behavior in buyer–supplier relationships. *Industrial Marketing Management,* 28**,** 481-495.
Brennan, R., Turnbull, P. W. & Wilson, D. T. 2003. Dyadic adaptation in business-to-business markets. *European Journal of Marketing,* 37**,** 1636-1665.
Brinkmann, S. & Kvale, S. 2015. *InterViews: Learning the craft of qualitative research interviewing,* Los Angeles, Sage Publications.
Brinkmann, S. & Kvale, S. 2018. *Doing Interviews,* London, SAGE Publications Ltd.
Brüel Grönberg, S. & Hulthén, K. 2022a. Disembedding air from e-commerce parcels: A joint challenge for supply chain actors. *Industrial Marketing Management,* 107**,** 396-406.

Brüel Grönberg, S. & Hulthén, K. 2022b. E-commerce packaging as an embedded resource in three network settings. *The International Review of Retail, Distribution and Consumer Research,* 32**,** 450-467.
Burke, H., Zhang, A. & Wang, J. X. 2023. Integrating product design and supply chain management for a circular economy. *Production Planning & Control,* 34**,** 1097-1113.
Campbell, N., O'driscoll, A. & Saren, M. 2013. Reconceptualizing resources: A critique of service-dominant logic. *Journal of Macromarketing,* 33**,** 306-321.
Cantù, C. L. & Tunisini, A. 2023. A circular innovation strategy in a supply network context: Evidence from the packaging industry. *Journal of Business & Industrial Marketing,* 38**,** 220-238.
Carlsson, J., Gwilt, A., Larsson, J., Mattila, H., Pal, R., Torstensson, H. & Lidström, A. 2017. Feasibility of conditional design: Organizing a circular textile value chain by design principles.
Castro-Lopez, A., Iglesias, V. & Santos-Vijande, M. L. 2023. Organizational capabilities and institutional pressures in the adoption of circular economy. *Journal of Business Research,* 161.
Chandler, J. D. & Vargo, S. L. 2011. Contextualization and value-in-context: How context frames exchange. *Marketing Theory,* 11**,** 35-49.
Choi, Y. & Hara, Y. 2018. The performance effect of inter-firm adaptation in channel relationships: The roles of relationship-specific resources and tailored activities. *Industrial Marketing Management,* 70**,** 46-57.
Copani, G. & Behnam, S. 2020. Remanufacturing with upgrade PSS for new sustainable business models. *CIRP Journal of Manufacturing Science and Technology,* 29**,** 245-256.
Corsaro, D., Sebastiani, R. & Snehota, I. 2011. Business interaction in S-D Logic.
Corvellec, H., Stowell, A. F. & Johansson, N. 2021. Critiques of the circular economy. *Journal of Industrial Ecology,* 26**,** 421-432.
Creswell, J. W. & Miller, D. L. 2000. Determining validity in qualitative Iinquiry. *Theory into Practice,* 39**,** 124-130.
Curwen, L. G., Park, J. & Sarkar, A. K. 2013. Challenges and solutions of sustainable apparel product development: A case study of Eileen Fisher. *Clothing and Textiles Research Journal,* 31**,** 32-47.
De Jesus, A. & Mendonça, S. 2018. Lost in transition? Drivers and barriers in the eco-innovation road to the circular economy. *Ecological Economics,* 145**,** 75-89.
De Kwant, C., Rahi, A. B. M. F. & Laurenti, R. 2021. The role of product design in circular business models: An analysis of challenges and opportunities for electric vehicles and white goods. *Sustainable Production and Consumption,* 27**,** 1728-1742.
De Lima, F. A. & Seuring, S. 2023. A Delphi study examining risk and uncertainty management in circular supply chains. *International Journal of Production Economics,* 258.

De Los Rios, I. C. & Charnley, F. J. S. 2017. Skills and capabilities for a sustainable and circular economy: The changing role of design. *Journal of Cleaner Production,* 160**,** 109-122.
De Sousa Jabbour, A. B. L., Luiz, J. V. R., Luiz, O. R., Jabbour, C. J. C., Ndubisi, N. O., De Oliveira, J. H. C. & Junior, F. H. 2019. Circular economy business models and operations management. *Journal of Cleaner Production,* 235**,** 1525-1539.
Den Hollander, M. C., Bakker, C. A. & Hultink, E. J. 2017. Product design in a circular economy: Development of a typology of key concepts and terms. *Journal of Industrial Ecology,* 21**,** 517-525.
Denzin, N. K. 1989. *The research act: A theoretical introduction to sociological methods,* Englewood Cliffs, N.J, Prentice Hall.
Denzin, N. K. & Lincoln, Y. S. 2003. *The landscape of qualitative research: Theories and issues,* London, SAGE Publications.
Diaz, A. & Baumgartner, R. J. 2024. A managerial approach to product planning for a circular economy: Strategy implementation and evaluation support. *Journal of Cleaner Production,* 442.
Diaz, A., Reyes, T. & Baumgartner, R. J. 2022. Implementing circular economy strategies during product development. *Resources, Conservation and Recycling,* 184.
Diaz, A., Schöggl, J.-P., Reyes, T. & Baumgartner, R. J. 2021. Sustainable product development in a circular economy: Implications for products, actors, decision-making support and lifecycle information management. *Sustainable Production and Consumption,* 26**,** 1031-1045.
Dominidiato, M., Guercini, S., Milanesi, M. & Tunisini, A. 2023. Supplier-customer relationships for sustainability-led innovation in the textile industry. *Journal of Business & Industrial Marketing,* 39**,** 15-26.
Dominidiato, M., Guercini, S. & Tunisini, A. 2025a. Exploring the effects of sustainable innovation on a textile company's business network. *Business Strategy and the Environment*.
Dominidiato, M., Hjelmgren, D. & Lind, F. 2025b. Towards a circular economy through collaborative product development in business relationships: A case study in the denim industry. *Journal of Business & Industrial Marketing,* 40**,** 186-198.
Dubois, A. & Gadde, L.-E. 2002. Systematic combining: An abductive approach to case research. *Journal of Business Research,* 55**,** 553-560.
Dubois, A. & Gadde, L.-E. 2014. "Systematic combining"—A decade later. *Journal of Business Research,* 67**,** 1277-1284.
Dubois, A. & Gibbert, M. 2010. From complexity to transparency: Managing the interplay between theory, method and empirical phenomena in IMM case studies. *Industrial Marketing Management,* 39**,** 129-136.
Dubois, A., Hedvall, K. & Sundquist, V. 2023. No concept is an island: Conceptualising (in) the industrial network approach. *Journal of Business & Industrial Marketing,* 38**,** 211-219.

Dzhengiz, T., Miller, E. M., Ovaska, J. P. & Patala, S. 2023. Unpacking the circular economy: A problematizing review. *International Journal of Management Reviews*.
Easton, G. 2010. Critical realism in case study research. *Industrial Marketing Management,* 39**,** 118-128.
Edvardsson, B., Kleinaltenkamp, M., Tronvoll, B., Mchugh, P. & Windahl, C. 2014. Institutional logics matter when coordinating resource integration. *Marketing Theory,* 14**,** 291-309.
Eisenhardt, K. M. & Graebner, M. E. 2007. Theory building from cases: opportunities and challenges. *The Academy of Management Journal,* 50**,** 25-32.
Ellegaard, C. 2009. The purchasing orientation of small company owners. *Journal of Business & Industrial Marketing,* 24**,** 291-300.
Ellen Macarthur Foundation 2013. Towards the circular economy.
Ellström, D. & Carlborg, P. 2022. Manufacturer go green: A typology of offerings and capability requirements. *Industrial Marketing Management,* 107**,** 423-432.
Engzell, J. & Kambanou, M. L. 2024. Incumbents versus circular start-ups in the workwear industry: Organisational and individual drivers and barriers to a circular economy. *International Small Business Journal,* 42**,** 551-580.
European Commission 2014. Towards a circular economy: A zero waste programme for Europe.
European Commission 2019. Sustainable products in a circular economy – Towards an EU product policy framework contributing to the circular economy.
European Commission 2025. Revised waste framework directive enters into force to boost circularity of textile sector and slash food waste.
European Parliament 2024. The ecodesign for sustainable products regulation.
European Topic Centre on Waste and Materials in a Green Economy (Etc/Wmge) 2019. Textiles and the Environment in a Circular Economy.
Fang, M., Cai, L., Park, K. & Su, M. 2024. Trust (in) congruence, open innovation, and circular economy performance: Polynomial regression and response surface analyses. *Journal of Environmental Management,* 358**,** 120930.
Fehrer, J. A., Kemper, J. A. & Baker, J. J. 2023. Shaping circular service ecosystems. *Journal of Service Research*.
Figge, F., Thorpe, A. S. & Gutberlet, M. 2023. Definitions of the circular economy: Circularity matters. *Ecological Economics,* 208**,** 107823.
Findsrud, R., Hanssen, M. & Sörhammar, D. 2025. Toward a theory of sustainable resource integration. *AMS Review,* 15**,** 142-156.
Ford, D. 2011. IMP and service-dominant logic: Divergence, convergence and development. *Industrial Marketing Management,* 40**,** 231-239.
Ford, D., Gadde, L.-E., Hakansson, H. & Snehota, I. 2011. *Managing business relationships*, John Wiley & Sons.

Ford, D. & Håkansson, H. 2006. The idea of business interaction. *The IMP Journal,* 1**,** 4-20.
Ford, D. & Mouzas, S. 2013. Service and value in the interactive business landscape. *Industrial Marketing Management,* 42**,** 9-17.
Fraccascia, L., Giannoccaro, I., Agarwal, A. & Hansen, E. G. 2019. Business models for the circular economy: Opportunities and challenges. *Business Strategy and the Environment,* 28**,** 430-432.
Franco, M. A. 2017. Circular economy at the micro level: A dynamic view of incumbents' struggles and challenges in the textile industry. *Journal of Cleaner Production,* 168**,** 833-845.
Freytag, P. V., Gadde, L.-E. & Harrison, D. 2017. Interdependencies - blessings and curses. *In:* HåKANSSON, H. & SNEHOTA, I. (eds.) *No business is an island - making sense of the interactive business world.* Emerald Publishing.
Frosch, R. A. & Gallopoulos, N. E. 1989. Strategies for manufacturing. *Scientific American,* 261**,** 144-153.
Fung, Y.-N., Chan, H.-L., Choi, T.-M. & Liu, R. 2021. Sustainable product development processes in fashion: Supply chains structures and classifications. *International Journal of Production Economics,* 231**,** 107911.
Gadde, L.-E. & Håkansson, H. 1993. *Professional purchasing,* London, Routledge.
Gadde, L.-E., Hjelmgren, D. & Skarp, F. 2012. Interactive resource development in new business relationships. *Journal of Business Research,* 65**,** 210-217.
Gadde, L.-E., Huemer, L. & Håkansson, H. 2003. Strategizing in industrial networks. *Industrial Marketing Management,* 32**,** 357-364.
Gadde, L.-E. & Snehota, I. 2000. Making the most of supplier relationships. *Industrial Marketing Management,* 29**,** 305-316.
Garcia, R., Wigger, K. & Hermann, R. R. 2019. Challenges of creating and capturing value in open eco-innovation: Evidence from the maritime industry in Denmark. *Journal of Cleaner Production,* 220**,** 642-654.
Geisendorf, S. & Pietrulla, F. 2018. The circular economy and circular economic concepts - A literature analysis and redefinition. *Thunderbird International Business Review,* 60**,** 771-782.
Geissdoerfer, M., Savaget, P., Bocken, N. M. P. & Hultink, E. J. 2017. The circular economy – A new sustainability paradigm? *Journal of Cleaner Production,* 143**,** 757-768.
Ghisellini, P., Cialani, C. & Ulgiati, S. 2016. A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems. *Journal of Cleaner Production,* 114**,** 11-32.
Gmelin, H. & Seuring, S. 2014. Determinants of a sustainable new product development. *Journal of Cleaner Production,* 69**,** 1-9.
Goworek, H., Oxborrow, L., Claxton, S., Mclaren, A., Cooper, T. & Hill, H. 2020. Managing sustainability in the fashion business: Challenges in product

development for clothing longevity in the UK. *Journal of Business Research,* 117**,** 629-641.
Grönroos, C. & Gummerus, J. 2014. The service revolution and its marketing implications: Service logic vs service-dominant logic. *Managing service quality,* 24**,** 206-229.
Grove, S. J. & Fisk, R. P. 1992. Observational data collection methods for services marketing: An overview. *Journal of the Academy of Marketing Science,* 20**,** 217-224.
Hagberg-Andersson, Å. 2006. Does adaptation pay off? *Industrial Marketing Management,* 35**,** 202-209.
Håkansson, H. 1982. *International Marketing and Purchasing of Industrial Goods*, John Wiley & Sons, Ltd.
Håkansson, H. 1990. Technological collaboration in industrial networks. *European Management Journal,* 8**,** 371-379.
Håkansson, H., Ford, D., Gadde, L.-E., Snehota, I. & Waluszewski, A. 2009. *Business in Networks,* Chichester, Wiley
Håkansson, H. & Snehota, I. 1995. *Developing relationships in business networks*, Routledge London.
Håkansson, H. & Waluszewski, A. 2002. *Managing technological development*, Routledge.
Håkansson, H. & Waluszewski, A. 2007. *Knowledge and innovation in business and industry: The importance of using others*, Routledge.
Halinen, A. & Törnroos, J.-Å. 1998. The role of embeddedness in the evolution of business networks. *Scandinavian Journal of Management,* 14**,** 187-205.
Halinen, A. & Törnroos, J.-Å. 2005. Using case methods in the study of contemporary business networks. *Journal of Business Research,* 58**,** 1285-1297.
Hallen, L., Johanson, J. & Seyed-Mohamed, N. 1991. Interfirm adaptation in business relationships. *Journal of Marketing,* 55**,** 29.
Hallstedt, S. I. & Isaksson, O. 2017. Material criticality assessment in early phases of sustainable product development. *Journal of cleaner production,* 161**,** 40-52.
Harrison, D., Munksgaard, K. B. & Prenkert, F. 2022. Coordinating activity interdependencies in the contemporary economy: The principle of distributed control. *British Journal of Management*.
Harrison, D., Prenkert, F., Hasche, N. & Carlborg, P. 2023. Business networks and sustainability: Past, present and future. *Industrial Marketing Management*.
Hecker, M. & Toivonen, T. 2024. Towards regenerative material design and innovation: Overcoming multi-level barriers. *Journal of Innovation Management,* 12**,** 91-116.
Holmlund, M. & Törnroos, J.-Å. 1997. What are relationships in business networks. *Management Decision,* 35**,** 304-309.
Holmlund, M., Witell, L. & Gustafsson, A. 2020. Viewpoint: Getting your qualitative service research published. *The Journal of Services Marketing,* 34**,** 111-116.

Huemer, L. & Flygansvær, B. 2025. Increasing circularity: The importance of resource interactions when adapting from waste management to resource management. *Industrial Marketing Management,* 125**,** 118-130.
Ingemansson, M. & Waluszewski, A. 2009. Success in science and burden in business. On the difficult relationship between science as a developing setting and business as a producer-user setting. *The IMP Journal,* 3**,** 20-56.
Jaakkola, E. 2020. Designing conceptual articles: four approaches. *AMS Review,* 10**,** 18-26.
Jensen, P. B., Laursen, L. N. & Haase, L. M. 2021. Barriers to product longevity: A review of business, product development and user perspectives. *Journal of Cleaner Production,* 313**,** 127951.
Jugend, D., Dos Santos, H. H., Garrido, S., Siqueira, R. M. & Mesa, J. A. 2024. Circular product design challenges: An exploratory study on critical barriers. *Business Strategy and the Environment*.
Kambanou, M. L., Matschewsky, J. & Carlson, A. 2024. Business models and product designs that prolong the lifetime of construction workwear: Success, failure and environmental impacts. *Resources, Conservation and Recycling,* 206**,** 107602.
Keränen, O., Komulainen, H., Lehtimäki, T. & Ulkuniemi, P. 2021. Restructuring existing value networks to diffuse sustainable innovations in food packaging. *Industrial Marketing Management,* 93**,** 509-519.
Ketokivi, M. & Choi, T. 2014. Renaissance of case research as a scientific method. *Journal of Operations Management,* 32**,** 232-240.
Kirchherr, J., Piscicelli, L., Bour, R., Kostense-Smit, E., Muller, J., Huibrechtse-Truijens, A. & Hekkert, M. 2018. Barriers to the circular economy: Evidence from the European Union (EU). *Ecological Economics,* 150**,** 264-272.
Kirchherr, J., Reike, D. & Hekkert, M. 2017. Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling,* 127**,** 221-232.
Kirchherr, J., Yang, N.-H. N., Schulze-Spüntrup, F., Heerink, M. J. & Hartley, K. 2023. Conceptualizing the circular economy (revisited): An analysis of 221 definitions. *Resources, Conservation and Recycling,* 194.
Klemm, C. & Kaufman, S. 2024. The importance of circular attributes for consumer choice of fashion and textile products in Australia. *Sustainable Production and Consumption,* 45**,** 538-550.
Knowles, J. 2006. *Theory of science: A short introduction,* Trondheim, Tapir Akad. Forl.
Korhonen, J., Honkasalo, A. & Seppälä, J. 2018a. Circular economy: The concept and its limitations. *Ecological Economics,* 143**,** 37-46.
Korhonen, J., Nuur, C., Feldmann, A. & Birkie, S. E. 2018b. Circular economy as an essentially contested concept. *Journal of Cleaner Production,* 175**,** 544-552.
Koskela-Huotari, K., Edvardsson, B., Jonas, J. M., Sörhammar, D. & Witell, L. 2016. Innovation in service ecosystems—Breaking, making, and maintaining institutionalized rules of resource integration. *Journal of Business Research,* 69**,** 2964-2971.

Koskela-Huotari, K., Vink, J. & Edvardsson, B. 2020. The institutional turn in service research: Taking stock and moving ahead. *Journal of Services Marketing,* 34**,** 373-387.
Kühl, C., Skipworth, H. D., Bourlakis, M. & Aktas, E. 2022. The circularity of product-service systems: The role of macro-, meso- and micro-level contextual factors. *International Journal of Operations & Production Management,* 43**,** 619-650.
Kumar, V., Ekwall, D. & Zhang, D. S. 2022. Investigation of rental business model for collaborative consumption-workwear garment renting in business-to-business scenario. *Resources, Conservation and Recycling,* 182**,** 106314.
La Rocca, A., Moscatelli, P., Perna, A. & Snehota, I. 2016. Customer involvement in new product development in B2B: The role of sales. *Industrial Marketing Management,* 58**,** 45-57.
La Rocca, A. & Snehota, I. 2014. Value creation and organisational practices at firm boundaries. *Management Decision*.
Laage-Hellman, J., Landqvist, M. & Lind, F. 2018. Business creation in networks: How a technology-based start-up collaborates with customers in product development. *Industrial Marketing Management,* 70**,** 13-24.
Laage-Hellman, J., Lind, F. & Perna, A. 2014. Customer involvement in product development: An industrial network perspective. *Journal of Business-to-Business Marketing,* 21**,** 257-276.
Landqvist, M. 2020. *Patterns of resource interaction in resource constellations: The case of start-ups approaching the Swedish energy system.*
Landqvist, M. & Lind, F. 2019. A start-up embedding in three business network settings – A matter of resource combining. *Industrial Marketing Management,* 80**,** 160-171.
Laud, G., Bove, L., Ranaweera, C., Leo, W. W. C., Sweeney, J. & Smith, S. 2019. Value co-destruction: A typology of resource misintegration manifestations. *Journal of Services Marketing*.
Lawrence, T. B. & Suddaby, R. 2006. Institutions and institutional work *In:* CLEGG, S., HARDY, C., LAWRENCE, T. B. & NORD, W. R. (eds.) *The SAGE Handbook of Organization Studies.* 2 ed. London: SAGE Publications Ltd.
Lazarevic, D. & Valve, H. 2017. Narrating expectations for the circular economy: Towards a common and contested European transition. *Energy Research & Social Science,* 31**,** 60-69.
Leroy, J., Cova, B. & Salle, R. 2013. Zooming in VS zooming out on value co-creation: Consequences for BtoB research. *Industrial Marketing Management,* 42**,** 1102-1111.
Lincoln, Y. S. & Guba, E. G. 1985. *Naturalistic inquiry,* Beverly Hills, Calif, Sage.
Liu, Y., Farooque, M., Lee, C. H., Gong, Y. & Zhang, A. 2023. Antecedents of circular manufacturing and its effect on environmental and financial performance: A practice-based view. *International Journal of Production Economics,* 260.

Lusch, R. F., Vargo, S. L. & Tanniru, M. 2010. Service, value networks and learning. *Journal of the Academy of Marketing Science,* 38**,** 19-31.
Mays, N. & Pope, C. 2000. Qualitative research in health care: Assessing quality in qualitative research. *BMJ: British Medical Journal,* 320**,** 50-52.
Mcdonough, W. & Braungart, M. 2002. Design for the triple top line: New tools for sustainable commerce. *Corporate Environmental Strategy,* 9**,** 251-258.
Melander, L. & Arvidsson, A. 2021. Introducing sharing-focused business models in the B2B context: Comparing interaction and environmental sustainability for selling, renting and sharing on industrial markets. *Journal of Business & Industrial Marketing,* 36**,** 1864-1875.
Melander, L. & Arvidsson, A. 2022. Green innovation networks: A research agenda. *Journal of Cleaner Production,* 357.
Melander, L. & Lind, F. 2022. A start-up's collaboration in networks for sustainable freight transport: A micro-meso-macro approach to innovation. *Supply Chain Management: an International Journal*.
Meqdadi, O., Johnsen, T. E. & Johnsen, R. E. 2017. The role of power and trust in spreading sustainability initiatives across supply networks: A case study in the bio-chemical industry. *Industrial Marketing Management,* 62**,** 61-76.
Meqdadi, O., Johnsen, T. E., Johnsen, R. E. & Salmi, A. 2020. Monitoring and mentoring strategies for diffusing sustainability in supply networks. *Supply Chain Management: An International Journal,* 25**,** 729-746.
Möller, K., Nenonen, S. & Storbacka, K. 2020. Networks, ecosystems, fields, market systems? Making sense of the business environment. *Industrial Marketing Management,* 90**,** 380-399.
Murray, A., Skene, K. & Haynes, K. 2015. The circular economy: An interdisciplinary exploration of the concept and application in a global context. *Journal of Business Ethics,* 140**,** 369-380.
Nobre, G. C. & Tavares, E. 2021. The quest for a circular economy final definition: A scientific perspective. *Journal of Cleaner Production,* 314**,** 127973.
Nyström, T., Whalen, K. A., Diener, D., Den Hollander, M. & Boyer, R. H. W. 2021. Managing circular business model uncertainties with future adaptive design. *Sustainability,* 13.
Ojansivu, I., Medlin, C. J., Andersen, P. H. & Kim, W. 2022. Using a 'lens' to re-search business markets, relationships and networks: Tensions, challenges and possibilities. *Industrial Marketing Management,* 100**,** 49-61.
Patton, M. Q. 2015. *Qualitative research & evaluation methods: Integrating theory and practice,* Thousand Oaks, California, SAGE Publications, Inc.
Pecorari, P. M. & Lima, C. R. C. 2021. Correlation of customer experience with the acceptance of product-service systems and circular economy. *Journal of Cleaner Production,* 281**,** 125275.

Pinheiro, M. a. P., Seles, B. M. R. P., De Camargo Fiorini, P., Jugend, D., Lopes De Sousa Jabbour, A. B., Da Silva, H. M. R. & Latan, H. 2019. The role of new product development in underpinning the circular economy: A systematic review and integrative framework. *Management Decision,* 57**,** 840-862.

Pop, O. M., Leroi-Werelds, S., Roijakkers, N. & Andreassen, T. W. 2018. Institutional types and institutional change in healthcare ecosystems. *Journal of Service Management,* 29**,** 593-614.

Rizos, V., Behrens, A., Van Der Gaast, W., Hofman, E., Ioannou, A., Kafyeke, T., Flamos, A., Rinaldi, R., Papadelis, S., Hirschnitz-Garbers, M. & Topi, C. 2016. Implementation of circular economy business models by small and medium-sized enterprises (SMEs): Barriers and enablers. *Sustainability,* 8.

Rubik, F., Nebel, K., Klusch, C., Karg, H., Hecht, K., Gerbig, M., Gärtner, S. & Boldrini, B. 2024. Textiles on the path to sustainability and circularity—Results of application tests in the business-to-business sector. *Sustainability,* 16**,** 5954.

Runfola, A., Monteverde, G. & Guercini, S. 2025. Sustainable innovations in business-to-business at the crossroad: emerging paradoxes in the fashion industry. *Journal of Business & Industrial Marketing,* 40**,** 87-102.

Saunders, M., Lewis, P. & Thornhill, A. 2009. *Research methods for business students,* Harlow, Financial Times Prentice Hall.

Saviano, M., Barile, S., Caputo, F. & La Sala, A. 2025. Sustainability as a co-created service: Integrating complex adaptive systems and service-dominant logic within the triple helix framework. *AMS Review,* 15**,** 127-141.

Schmidt, S. O., Tyler, K. & Brennan, R. 2007. Adaptation in inter-firm relationships: Classification, motivation, calculation. *Journal of Services Marketing,* 21**,** 530-537.

Schöggl, J.-P., Baumgartner, R. J., O'reilly, C. J., Bouchouireb, H. & Göransson, P. 2024. Barriers to sustainable and circular product design–A theoretical and empirical prioritisation in the European automotive industry. *Journal of Cleaner Production,* 434**,** 140250.

Selvefors, A., Rexfelt, O., Renström, S. & Strömberg, H. 2019. Use to use – A user perspective on product circularity. *Journal of Cleaner Production,* 223**,** 1014-1028.

Sharma, A. 2020. Sustainability research in business-to-business markets: An agenda for inquiry. *Industrial Marketing Management,* 88**,** 323-329.

Shevchenko, T., Saidani, M., Ranjbari, M., Kronenberg, J., Danko, Y. & Laitala, K. 2023. Consumer behavior in the circular economy: Developing a product-centric framework. *Journal of Cleaner Production,* 384.

Stake, R. E. 2005. Qualitative case studies.

Stegehuis, X., Von Raesfeld, A. & Nieuwenhuis, L. 2023. Inter-organizational tensions in servitization: A dialectic process model. *Industrial Marketing Management,* 109**,** 204-220.

Sudusinghe, J. I. & Seuring, S. 2022. Supply chain collaboration and sustainability performance in circular economy: A systematic literature review. *International Journal of Production Economics,* 245**,** 108402.
Svensson, N. & Funck, E. K. 2019. Management control in circular economy. Exploring and theorizing the adaptation of management control to circular business models. *Journal of Cleaner Production,* 233**,** 390-398.
Swedish Government Offices 2021. Circular economy - Strategy for the transition in Sweden.
Swedish Institute for Standards 2018. Industrial washing and finishing procedures for testing of workwear
Swedish Institute for Standards 2020. Dress pattern for health care textiles - blouse for staff
Tracy, S. J. 2010. Qualitative quality: Eight "Big-Tent" criteria for excellent qualitative research. *Qualitative Inquiry,* 16**,** 837-851.
Tukker, A. 2015. Product services for a resource-efficient and circular economy – A review. *Journal of Cleaner Production,* 97**,** 76-91.
Vargo, S. L. 2011. From micro to macro: Stakeholders and institutions. *Journal of Macromarketing,* 31**,** 125-128.
Vargo, S. L. 2021. Beyond circularity—A service-dominant (SD) logic perspective. *Circular Economy and Sustainability,* 1**,** 257-260.
Vargo, S. L., Akaka, M. A. & Vaughan, C. M. 2017. Conceptualizing value: A service-ecosystem view. *Journal of Creating Value,* 3**,** 117-124.
Vargo, S. L. & Koskela-Huotari, K. 2020. Advancing conceptual-only articles in marketing. *AMS Review,* 10**,** 1-5.
Vargo, S. L. & Lusch, R. F. 2004. Evolving to a new dominant logic for marketing. *Journal of Marketing,* 68**,** 1-17.
Vargo, S. L. & Lusch, R. F. 2008. Service-dominant logic: Continuing the evolution. *Journal of the Academy of Marketing Science,* 36**,** 1-10.
Vargo, S. L. & Lusch, R. F. 2011. It's all B2B…and beyond: Toward a systems perspective of the market. *Industrial Marketing Management,* 40**,** 181-187.
Vargo, S. L. & Lusch, R. F. 2016. Institutions and axioms: An extension and update of service-dominant logic. *Journal of the Academy of Marketing Science,* 44**,** 5-23.
Vargo, S. L., Maglio, P. P. & Akaka, M. A. 2008. On value and value co-creation: A service systems and service logic perspective. *European Management Journal,* 26**,** 145-152.
Vargo, S. L., Wieland, H. & Akaka, M. A. 2015. Innovation through institutionalization: A service ecosystems perspective. *Industrial Marketing Management,* 44**,** 63-72.
Von Corswant, F. 2005. Organizing interactive product development. *Managing product innovation.* Emerald Group Publishing Limited.
Waluszewski, A., Snehota, I. & La Rocca, A. 2019. What remains to be discovered? Manifesto for researching the interactive business world. *Journal of Business & Industrial Marketing,* 34**,** 232-239.

Wang, S., Su, D., Ma, M. & Kuang, W. 2021. Sustainable product development and service approach for application in industrial lighting products. *Sustainable Production and Consumption,* 27**,** 1808-1821.
Wilden, R., Akaka, M. A., Karpen, I. O. & Hohberger, J. 2017. The evolution and prospects of service-dominant logic: An investigation of past, present, and future research. *Journal of Service Research,* 20**,** 345-361.
Wulff, G. 2019. *Behind the scenes of transparency – A study of a Swedish denim company.* PhD Doctoral dissertation University of Gothenburg.
Yin, R. K. 2014. *Case study research: Design and methods,* London, SAGE.
Zimmerman, D. H. & Wieder, D. L. 1977. The diary: Diary-interview method. *Journal of Contemporary Ethnography,* 5**,** 479-498.