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Drivers and barriers for circular development in Swedish furniture industry

Master's thesis in Management and Economics of Innovation and Production Engineering

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SUMMARY

The Swedish furniture industry is facing increasing pressure to transition towards more circular practices. Low national levels of circularity indicate significant losses of value and resources, while European and national strategies are creating new expectations for industry actors. In this context, circular development is becoming increasingly relevant for furniture manufacturers and the wider network of actors surrounding them.

This study investigates how actors in the furniture industry, comprised of mainly small and medium enterprises, currently experience circular economy, and how collaborations can play a part in supporting transition. The study is based on an interview study comprised of 21 interviews held with industry experts in qualitative research design. A key goal was investigating current experiences of circular economy transitions, and to explore how interorganizational collaborations can facilitate development of circular business models through directed and conventional content analysis. Interviews were conducted with actors within the value chain, ranging from suppliers to retailers. A snowball sampling technique was used to identify interviewee candidates. Empirical data was analyzed with 4R (reduce, reuse, repair, recycle) strategies, in a multilevel perspective supported by ARA network framework.

The findings show several challenges connected to circular development, including inter-organizational coordination, product design, market demand, logistics, and data management. At the same time, the study identifies important drivers and opportunities. Product longevity, including both technical durability and timeless design, is a central foundation for circularity. Collaboration across the network can also support circular strategies by connecting complementary resources, activities, and roles between actors.

The study concludes that circular development in the Swedish furniture industry cannot be understood only as a firm-level issue. Instead, circularity depends on how actors, resources, activities, and system conditions are connected across the wider furniture network. A key condition for circular development is therefore alignment between firm-level capabilities, coordination between actors, and broader system conditions such as regulations, procurement criteria, and market expectations.

Keywords: circularity, 4R, circular economy, Swedish furniture industry, SMEs

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1 Introduction

Sweden's territorial emissions of greenhouse gases (GHG) have seen a rising trend since 2023. Emissions from industries have seen a negative trend since the beginning of the century from 20 $MtCO_2e$ to 14 $MtCO_2e$ (Swedish Environmental Protection Agency, 2025). The decrease in emissions from industry contrasts with the total national emissions, which instead is rising. Rising is also the private consumption of household furniture and textiles, according to a report from Swedish Society for Nature Conservation (SSNC) (2021). The report shows a significant increase in consumption of new furniture in the past decades, leading to high levels of consumption-based emissions. Specifically, the report contrasts emissions for newly produced products with alternatives for prolonging product life and shows that reused or refurbished products offer environmental savings. An implication for the furniture manufacturing industry that can be gathered from the report is the importance of long product life. Furniture requiring no maintenance, repair, or replacements are concurrently the most resource efficient and environmentally friendly, giving rise to the least levels of emissions. According to furniture statistics (TMF, 2026), the accrued annual value of produced furniture in Sweden has seen a rise from 21 billion SEK in 2013 up to approximately 26 billion SEK for 2025. It indicates that more products are produced, to a higher value, and that the trend is rising. More value is produced by manufacturers, and more resources are required in facilitating production to meet market demand.

The contrast between SSNC's (2021) call for action in taking care of furniture, with an increase of national furniture production (TMF, 2026), highlights a conflicting interest in minimizing environmental impact on one hand, and growing the furniture industry, on the other. A concept that can have a positive impact on environmental sustainability is the adoption of a circular economy (CE). Sweden performs meagerly in this area, according to a recent study, scoring a circularity index of 3,4% (Circle Economy, 2022). The score indicates vast opportunities nationwide to support an economy based on more efficient use of resources. The report also points to how resources and products already on the market can support circularity at the end of life (EOL) by disassembly of components, separation of materials, and reintroducing these resources into a production flow. Likewise, industries are

encouraged to focus on resource-efficiency, thus maximizing value creation out of resources and minimizing waste.

Circle Economy (2022) encouraged Sweden to focus on three areas to increase national circularity. First, to develop strategies with concrete goals and specific circularity metrics to measure progress in the area. Regulations supporting transformation through incentives are proposed as mechanisms that can aid national progression. Second, a circular transformation happens collectively between businesses, government agencies, citizens, and other organizations. A high level of commitment should be visible throughout society and infused in organizations serving the public. Collaborative coalitions help support and boost actors to adopt new business models, thus creating a consumerism paradigm shift. Third, peer-to-peer learning on a global scale, incentivizing knowledge sharing across national borders. Transition into CE is still in its infancy, governments are amid making sense of how CE can be approached on a national level. No nation has the key to making a successful transition, but different experiences and strategies have been developed. Consolidating global knowledge is important to gain insights and better understanding of how circularity shapes international relationships and trade.

National development strategies are vague for guiding businesses towards practical transformation but are effective strategic measures to incite societal change. Both Sweden and Europe have adopted strategies for transitioning towards CE (Ministry of Climate and Enterprise, 2020; EMF, 2026). Political instruments of control are also found in incentives, subsidies, and regulations. These instruments encourage voluntary change, and, in part, enforce compliance. Concrete governance is powerful measure encouraging market change. Regulations shape business dynamics, and with a strategic vision of a circular Europe, the market will inevitably shift towards focusing more on CE. With changing market perspectives industry must adapt to stay relevant, motivating the need for change as a quest for survival.

2 Background

Linear economics is traditional practice for businesses. The concept is differentiated in steps, and commonly denoted by the three steps "take-make-dispose". Variants of the steps exist, yet the main commonality is a flow with definite endpoint and distinct product life phases in which valuable resources end as waste

(Hoang et al., 2026; Neves & Marques, 2022). Linear economy has traditionally been prevalent in the manufacturing industry. Production systems have been developed with efficiency in mind, focusing on making the process of turning raw materials into products as smooth as possible with short takt times and high output. The results can be seen today in optimized flows for incrementally increasing value of the product going through the manufacturing process with minimum delay between processing steps. Limitations in managing disruptions of the flow have arisen with increased rigidity and inflexibility. In production flow engineered for manufacturing through a sequential flow with raw materials going in and finished products going out, there are strict expectations of when and where raw materials and components are introduced into the flow.

Growing concerns regarding resource depletion and inefficient resource utilization have intensified criticism towards current linear production and consumption systems. According to the Global Resource Outlook 2024, global material use has more than tripled in the last 50 years and continues to increase (UNEP, 2024). The report highlights how material extraction and processing are major contributors to GHG emissions and environmental degradation. These developments have increased interest in CE, focusing on improving recourse efficiency, reducing waste, and extending the value of products and material. Transitioning from linear to circular systems involves more than introducing recycled materials and improving production efficiency. Circular strategies often require bigger organizational and systematical changes (Danvers et al., 2023). CE puts new requirements on manufacturing and challenges the traditional notion of efficient production.

A linear market approach inevitably makes waste of still valuable resources, either in the form of fully functional products, or in products with valuable but unclaimed components or materials. Loss of value caused by nullifying resources is a waste of physical resources, labor, and has an economic aspect which can be measured. Circle Economy (2025) states Sweden has a value gap of 19% corresponding to 600 billion SEK annually, showing an underutilization of materials, products, and resources. Discarding products prematurely is stated as the most significant reason for lost value. Attempts at ranking circularity in Europe on a national level (Adithep Banjerdpaiboon & Phantisa Limleamthong, 2023; Pakuła et al., 2025) stresses the point further by showing Sweden being surpassed by several

other countries in national advancement within CE adoption. Sweden's adoption of CE is lagging.

The furniture industry is affected by the linear economy waste creation. Bolin et al. (2017) analyzed sustainability in circular furniture flows predicting savings of 45 million kg CO2e if office furniture nationwide were repaired and reused to a higher degree than today. Linear economy has served companies well economically thus far, but with increasing requirements of resource efficiency and demanding regulations, CE is becoming more attractive. In Swedish context, Kans and Löfving (2023) show how furniture companies are enthusiastic and optimistic about circularity prospects. Swedish companies encounter similar barriers for circularity as in the European rural environment (Uvarova et al., 2020), fronted by lackluster competence in strategy development and operational implementation of circular approaches. Additional challenges are multidimensional and include both practical challenges i.e. implementing viable reverse logistics, as well as intangible concerns, i.e. customer perception and expectations of remanufactured furniture (Kans & Löfving, 2023).

Collaboration is needed, and multistakeholder alliances are enablers to the transition (Kirchherr et al., 2023; Bolin et al., 2017; Circle Economy, 2022). Collaboration is defined as a process in which autonomous actors jointly create structures that govern their relationships and shared actions. To advance circular strategies, collaboration has been identified as a key enabler of CE implementation, as it supports knowledge integration, access to resources, and coordinated value creation across organizational boundaries (Danvers et al., 2023). Small and medium size enterprises (SMEs) represent a major part of the furniture industry in Sweden, see figure 1. Thus, it is of significance to understand circularity from the perspective of SMEs. Capability for development of circular business models may depend not only on internal resources, but also on the quality, structure and governance of inter-organizational relationships. In this study, we consider how SMEs can take advantage of interorganizational business relations to tackle circularity and to enhance existing business models. Relationships exist in a network of actors, and to put individual actors in perspective opening for a holistic understanding, the business network will be analyzed. We interpret Håkansson and Ford's (2002) idea of a network as a structure of integrated actors linked through ongoing relationships that carry resource, knowledge, and activity inter-dependencies and will use this definition in analysis.

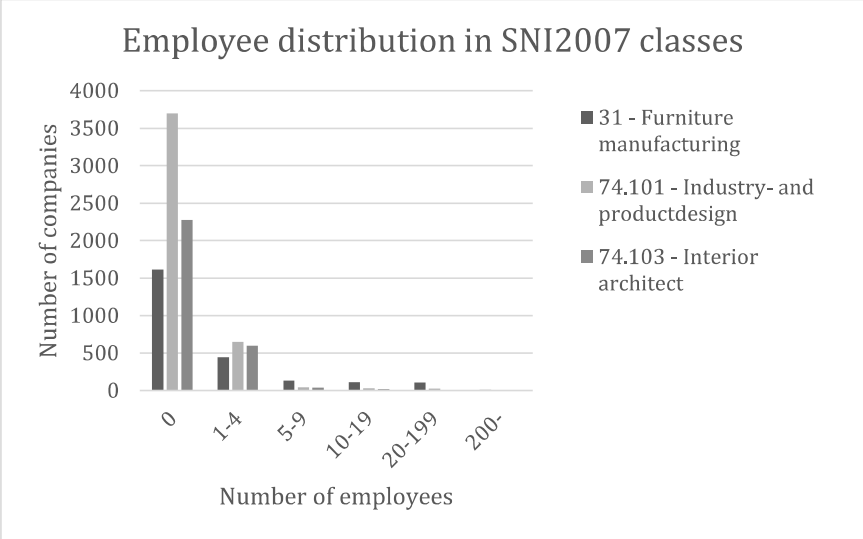

Figure 1: Number of companies belonging to furniture industry clustered by number of employees. Source: SCB:s allmänna företagsregister, 2025.

2.1 Problem discussion

Collaboration is increasingly recognized as central for circularity advancement, as circular strategies often require changes in business processes, practices, and norms across networks of actors (Kujala et al. 2023; Danvers et al., 2023). Although collaboration is frequently mentioned as an important factor, Danvers et al (2023) argue that limited knowledge exists regarding how organizations effectively work together to achieve circularity in practice.

In the context of Swedish furniture manufacturing SMEs, recent studies have mapped evolving actor constellations and network transformations under different circular scenarios (Kans & Hetti-Arachchige, 2024). These studies show that circular transitions may increase network complexity by involving new actors, relationships, and activities. However, limited attention has been devoted to understanding how manufacturing SMEs and related network actors experience, structure, and navigate such relationships in practice. Value creation in the CE depends on actor engagement, creating rewarding partnerships. Business relationships seeking to advance circular business models need partnerships with mutual and aligning interests requiring transparency and trust to advance (Re & Magnani, 2023). Proximity is suggested by Chembessi et al. (2025) as an enabler for circular strategy deployment, exploiting knowledge sharing and local networks for improving adaptability towards circular transitions. Geographical and cultural context impacts common practices in business relationships, geographically distant interview (Chembessi et al.) and case studies (Re

and Magnani) cannot be assumed to be generalizable to a wider setting, nor applicable specifically to a Swedish context. This suggests a need for empirical research that examines how Swedish furniture manufacturers and relevant network actors engage with circular strategies, how collaboration is experienced within these networks, and what challenges, drivers, and opportunities emerge in relation to circular development. This complements current studies by researching engagement in circular transitions in a specifically Swedish geographical and cultural setting, which broadens the current base of knowledge, and allows for a context-specific understanding of how national and local business culture affects attitude of circularity.

2.2 Purpose

The background section has shown that although the importance of collaboration for circular transitions is known, limited attention has been devoted to how Swedish manufacturing SMEs develop and navigate interorganizational relationships when working with circular strategies. This study addresses this gap by examining how Swedish furniture manufacturing SMEs and relevant network actors engage with circular strategies, and how challenges, drivers, and opportunities influence circular collaboration and development.

Since circular strategies involve several actors, the study first develops a current-state understanding of key actors, their roles, and their relationships within the studied Swedish furniture network. This provides a basis for analyzing how collaboration may support or limit circular development. Key actors are understood through their roles in the furniture network and their relevance for circular strategies. Building on the premise that circular strategies depend on collaboration across organizational boundaries, the study seeks to identify conditions that may support or hinder circular collaboration and the development of circular strategies. Concepts are further explained in chapter 3 (Theoretical framework). This leads to two research questions. Suggestion: The first research question aims to identify and understand the challenges, drivers, and opportunities encountered by Swedish furniture manufacturers and relevant network actors in their work with circular strategies. The second research question examines how collaboration between manufacturers and network actors can facilitate the development and implementation of circular strategies.

2.3 Research questions

Two research questions were developed from the problem formulation and constitutes the aim for the study.

RQ1: What challenges, drivers, and opportunities do Swedish furniture manufacturers and relevant network actors experience when working with circular strategies?

RQ2: How can collaboration between manufacturers and network actors facilitate the development and implementation of circular strategies?

2.4 Delimitations

Our study considers how a transition into CE can be supported in Sweden. Circularity is studied exclusively in the Swedish furniture industry with manufacturers as focal actor. Related actors are included, with an inclusion criterion that the actor must work with furniture as a main product in their business or work role. The study only includes industry input from suppliers, manufacturers, designers, retailers, and architects. Only actors with main operations in Sweden was considered. A particular focus was on SMEs.

Companies participating in the study were also limited by customer segments. Mainly companies having most of their sales focused towards commercial or public customers were included. Actors with the private consumer market as their main target audience were excluded.

3 Theory and key concepts

The core of the theoretical framework is circular strategies and network theory. The section of circular strategies defines the circular concept and incorporated strategies. Following these strategies is a delineation of elements in industrial network theory and multilevel perspectives. Finally public procurement act, a central piece in public procurement, is outlined together with an introduction to the idea of digital product passports (DPP).

3.1 Circular strategies

Circularity has gained popularity in both industry and academia. In the race to be sustainable, governments, businesses, organizations, academia and individuals have all identified CE as the new buzzword. Popularization has led to an abundance of definitions for "circular economy" leading to a fragmented and diffused grasp of the concept (Nobre & Tavares, 2021). A comprehensive definition of circular economy used in the context of this report is from Geissdoerfer et al. (2017): "Circular Economy is a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling."

Kirchherr et al. (2017) defines circular economy as an economic system in which the traditional end of life (EOL) concept is replaced by circular strategies such as reducing, reusing, recycling and recovering materials in production, distribution, and consumption processes. The authors further argue that this system operates across multiple levels, including the micro level (products, firms, consumers), the meso level (inter-organizational networks and industrial ecosystems), and the macro level (regional and national context), with the aim to achieve sustainable development by simultaneously generating environmental, societal, and economic value.

Bocken et al. (2016) used a three-dimensional framework using the concepts of narrowing, slowing, and closing as the three dimensions, with binary indicators for each dimension. Narrowing means using less resources, the concept of slowing is to extend the product life or intensify product use. Regular maintenance, service, and remanufacturing are examples with the potential of extending product life, while servitization is an example of intensifying use. In the framework, Bocken et al. describes the closing dimension as including recycling and recovering of waste such

that post-production materials are reintroduced into production creating a circular flow of resources.

Circularity can be explored by adapting Bocken et al.'s (2016) detailed framework into a model of four strategies. The 4R concept, corresponding to different modes: Reduce, reuse, repair and recycle. The modes roughly correspond to Bocken et al.'s framework. with narrowing corresponding reduce, slowing corresponding to reuse and repair, and closing fit to recycle and reuse. The modes describe strategies for circularity closing, narrowing, and slowing resource flows. Our use of the 4R's as circular strategies is based on Bocken et al's framework, and our definitions are as follows.

Reduce: In the production phase, reduce the level of harmful materials, minimize waste, and make efficient designs that require less material to uphold the same level of structural integrity creating less waste. Abdolmaleki et al (2025) says Reduce has the aim of minimizing waste through use of technology. Reike et al. (2018) notes that reduce can be a holistic approach to the whole product life cycle, and in an extension, include consumer behavior. They state that reduce is often connected explicitly to manufacturing, taking on the meaning of making production more resource efficient. This is also the main context in which reduce is used in this report, although a broader perspective is considered in terms of initiating business relationships.

Reuse: Products used in one context may for one reason or another be discarded or replaced. This can occur regardless of the condition of the product, which may still be good enough for the product to have continued use, far from having reached EOL. Strategy of reuse aims to find ways in which furniture can find new use (Abdolmaleki et al, 2025). Finding purpose for products destined for disposal is the epitome of this phase, which is firmly seated in the use of a product, before the need for repair has arisen. In the study, we apply reuse specifically for products themselves, and not the reuse of components which is considered being part of recycling. Stated to be the most common application of reuse, we use the term to mean a change of product ownership between customers (excluding retailers) (Rieke et al., 2018). Reusing products is in this sense unrestricted in terms of the context in which the product can be reused. Products designed for, and have an intended use in, a business setting may find new purpose in the personal consumption sphere. It is a strategy of extending product life.

Repair: Products having reached end of useful life can often be repaired. King et al (2008) defines repair as correction of faults in a product, restoring functionality. In our use of the 4Rs, repair includes also what King et al. defines as reconditioning and remanufacturing where product condition is return to that of OEM quality. In case disassembly and separation of components is possible, any individual broken or defective component may be replaced and the product reassembled. Advanced 3D-printing technologies enable precision repair to strengthen and repair worn areas (Saboori et al., 2019). Repair includes practices where a product is partly or fully disassembled to replace worn components and reassembled. Repair includes regular maintenance (washing, replacing minor components, lubricating, etc.) and remanufacturing through a major overhaul. Remanufacturing here means strip a product to the barebones frame and rebuilding with components such that the result is a product with good-as-new properties and quality. Reike et al (2018) identifies a general conception that repair means to extend product life which is how we use the term.

Recycle: The term recycle is frequently used, and often defined with different meanings (Reike et al, 2018). While recycling can be defined broadly as "any recovery for any purpose" (Ghisellini et al., 2016, as interpreted by Reike et al., 2018), this study mainly uses the term to refer to material recovery and end-of-life recovery operations. The recycling phase indicates separation of components into distinct raw materials for reintroduction into the technical phase of production, or as reintegration into the biosphere for biological growth. In cases of inseparability, the recycle phase also includes energy recovery or any other form of recovery operation.

3.2 Industrial network theory

Håkansson and Ford (2002) describes networks as an abstract collection of nodes and interconnecting threads. When put in a business context, the nodes represent companies or organizations, and the threads represent the relationships between them.

Industrial network theory, as per Håkansson and Ford (2002), provides the perspective that a relationship is not only dependent on the two parties involved, but it is also embedded in a network containing all other relationships sharing common nodes. This contrasts the view of markets as collections of independent actors.

This study adopts an industrial network perspective, where firms are understood as embedded in networks of relationships characterized by interdependencies between actors, activities, and resources. To support the analysis of these interdependencies, concepts from the ARA model are used as an analytical lens.

3.2.1 ARA-model

The actor-resource-activity (ARA) model is a commonly used framework for understanding business relationships and networks. The model originates from the Industrial Marketing and Purchasing (IMP) group (Koporcic, 2017). According to Håkansson and Snehota (1995), business relationships can be conceptualized through three interrelated dimensions: activity links, resource ties, and actor bonds as described in the following.

Actor bonds refer to relationships at an organizational level. Actor bonds influence how actors perceive and interact with each other, shaping trust, commitment, and expectations.

Resource ties refer to how resources, such as knowledge, materials, and capabilities, can be interconnected across firms. Through relationships, firms gain access and adapt to each other's resources, which creates opportunities for innovation, but may lead to dependencies between actors as well.

Activity links refer to how activities carried out by companies are connected and coordinated through relationships. This includes both operational activities, such as production and logistics, and administrative activities. As companies interact, they often need to adapt their internal activity structure to align with each other.

The three dimensions are closely interconnected, meaning that changes in one dimension often affect the others. Together, the ARA model provides a framework for understanding relationships in business networks.

In this study, the ARA model is not applied as a strict categorization framework, but rather as a supporting analytical lens for understanding how interdependencies between actors influence circular collaboration. The concepts of actor bonds, activity links, and resource ties are used to support the interpretation of empirical material.

3.3 Multi-level perspective

Kirchherr et al. (2017) describes circularity in for various levels of stakeholders, on micro, meso and macro levels, but does not expand on what the

levels mean themselves. Due to this lack of prior definition, these terms are defined more in detail to create a common understanding of what the terms mean in this report. The micro level is the level of independent agents, and their resources and capabilities to act (Serpa & Ferreira, 2019). We assign the individual company as the agent, limiting the micro-perspective to actions performed by initiative from, and within the company or its employees. Meso concerns interaction between organizations, linked to the economical and relational organization of companies (Tomessini et al., 2025). The meso-perspective analyses individual company's interactive relations, for example within associations, formal unions, and shared interest groups (Serpa & Ferreira, 2019). Macro constitutes the highest level of abstraction. This level concerns overarching mindsets common for a broader population, as well as national and global governance. The macro level concerns the social system in a national and international context concerning strategy, governance, legislation, and regulations that affect businesses. Together the three levels of analysis allows for comprehensive analysis of actors, activities, and resources operating in different levels of society.

3.4 Public procurement act

Procurement practices differ between private businesses and public organizations. Public procurement is regulated by formal tendering procedures designed to ensure transparency, equal treatment, non-discrimination, proportionality, and fair competition. In Sweden, public procurement is governed by the Public Procurement Act (SFS 2016:1145), which is based on EU legislation. Procurement within government agencies, municipalities, and regions is therefore affected by legal requirements that regulate how tenders are formulated, evaluated, and awarded.

Public procurement in Sweden is governed by five principles (SFS 2016:1145) originating from six procurement principles of the EU (European Commission, n.d.) as follows.

Non-discriminatory: Tender proposal may not be discriminate towards nations or, in a similar manner, specify requirements only possible for specific companies to meet. Proposals should be general enough such that companies outside of Sweden are able to meet posed requirements, and such that local companies are not given preference.

Equal treatment: No preference must be given to any certain company, and tenders must be treated equally and given the same opportunities and information.

Proportionality: Requisites, conditions, and criteria must be proportionate, appropriate, befitting and relevant to the tender proposal.

Transparency and openness: Tender proposals must be given such that they are predictable and exhaustive providing all information necessary for companies to evaluate the proposal fairly. Any information relevant to the tender proposal that may influence the actions of a bidding company must be provided openly.

Mutual recognition: Documents, accreditations from member nations within EU must be recognized and accepted by purchasing organizational unit.

A tender should be appointed to the supplier providing an offer showing the highest degree of economic advantage for the purchasing unit (SFS 2016:1145). Based on this idea there are three evaluation principles to use in offer evaluation according to Public Procurement Act (SFS 2016:1145, Chapter 16. 1 §). The evaluation principles are in a matter of degree based on the price. One evaluation principle is solely based on the price, i.e. the lower the price, the better. A second principle is evaluation of price in relation to time, i.e. cost. Evaluation of cost involves consideration of cost effectiveness. A third and final evaluation method considers the ratio of quality and cost in relation to criteria and factors in addition to, or in place of, price. Criteria posed in the tender proposal must adhere to the principles of a tender proposal as previously outlined.

3.4.1 Digital Product Passport

Europe implements strategies for a greener and more sustainable future Europe. Part of the strategic framework is The Green New Deal, which includes DPPs. Wicaksono et al. (2025) describe DPPs as extensive tools including vast amounts of information dedicated to individual products, providing customers and other stakeholders with detailed information of the origin of a product. Detailed product information proposed to be included in DPPs aims to give a full understanding of the manufacturing, transport and lifecycle of products. Legislation on ecodesign for sustainable product regulations (ESPR) states that information should be readily available to consumers, and with crucial aspects pertaining to health and safety be especially accessible (Regulation (EU) 2024/1781). Information is proposed to be available freely, for example by online websites, and found by data

carriers on the product. Information requirements on product performance data and environmental declarations should be declared such that parameters may be comparable and influence future product development. According to Wicaksono et al. (2025) data includes lifecycle data of component materials and the product itself, quantity and type of materials used in the product, manufacturing processes, details of logistics and transport data, environmental effects such as energy and emissions, and how to care for the product at end of life. Information should also be updateable for tracking changes to the product.

4 Method

In this section the method employed in the study will be described. First off is the overall research design, followed by data collection and analysis.

4.1 Research design

The methodology is qualitative in nature, where data acquisition is through interviews. The study aims to bring conceptual understanding of real-world phenomena and exploring elements of interaction of inter-company relationships within the furniture sector, which makes the qualitative approach suitable (Säfsten & Gustavsson, 2020, Ch. 2). Rather than measuring data quantitatively providing an objective, quantifiable result, or results based on statistics, this study first and foremost aims to provide a qualitative aspect of company relations.

Within the frame of qualitative studies, this study is also experiential, pursuing answers to our research questions. Our questions that we want to answer in this study are open-ended with no definitive or objectively correct answers and instead aim to find and understand perspectives from within the furniture industry, which suits an experiential, inductive method (Braun & Clarke, 2013). The intention of using an experiential method is to collect and organize empirical data (Braun & Clarke, 2013) from key actors from within furniture industry to understand and contextualize views from individual actors. In practice, our research is based on an interview study.

4.2 Data collection

Data collection was from an interview study including companies from within the furniture sector. In total 37 interview requests were sent resulting in 21 interviews, see table 1 for details. Focal to this study was furniture manufacturing companies, which is also the reason why there were a disproportionate number of interviews within this business category.

Table 1: Number of interviews with companies.

Business type	Interviews
Manufacturer	10
Design	4
Retailer	3
Interior architect	2
Strategy consultant	1
Public sector	1

Interviews were requested at least a week in advance through a calendar invitation. The invitation included an interview guide containing a battery of guiding questions. The interviewee was thus given the opportunity to prepare for the interview with material sent in the interview invitation before the interview took place. The interview guide had four sections covering introduction, industry network and relations, circularity, and wrap-up. Questions in the interview guide were generic to suit a diverse set of businesses but were formulated such that the key areas of network relations and circularity were covered. All interviewee candidates were sent the same questions. Interviews were semi-structured but problem-centered allowing the interviewee to discuss freely within boundaries of the interview guide (Flick, 2018, Ch. 15). The interviewers asked in-depth questions encouraging discussions as long as the subject of discussion was still within the boundaries of circularity, interorganizational relationships, and sustainable business strategies.

As our study was using a snowballing sampling technique, the interview list of companies was not set or fixed from the start. Who to interview (i.e. what professional role) and at what company was the effect of asking early interviewees for hints and ideas. Snowballing referrals from early interviews, the number of potential interviewees grew, and requests were sent out accordingly. In addition to these tips, we also contacted and sent interview requests to companies active within a particular type of business mentioned in interviews, in this way incrementally exploring relationships. The snowballing process is shown in figure 2. Bell et al (2019) proposes snowball sampling as a necessary technique to use in which there is no available, fixed, sample population. They also suggest effectiveness with snowballing with hard-to-reach populations when such a sampling frame is missing. Thus, snowballing was an effective sampling tool to gain access to relevant companies which were previously unknown to the authors, which also paved way to understand the type of

relationship each interviewee had with other actors in the network. Due to a limited insight into the furniture industry actors, the authors were prone to select interviewee candidates according to the recommendations provided. Although the sampling method provided us with a varied sample of actors and companies, the selection was steered by the industry representatives. An effect of this is visible in the weighted distribution of sampled business type in table 1, where manufacturers represent almost half of the total sampling population. A matter of issue with the unbalanced distribution is the low representation of actors who had little or no direct relation with manufacturers. Spotting these actors and their role in the network was more difficult and required the authors to be vigilant and purposive about expanding actor diversity in the network. Even so, the research subjects picked for interview may have resulted in a biased selection of actors sharing common attitudes. Bias in shared attitudes was to a certain extent counteracted by the authors exploring interview candidates according to the lower loop in figure 2, where subjects were identified and contacted by the authors only by recommendation on business type. The focal actor in our study was the manufacturers, but due to a limited outreach to distant actors there was also a limited opportunity exploring novel relationship prospects.

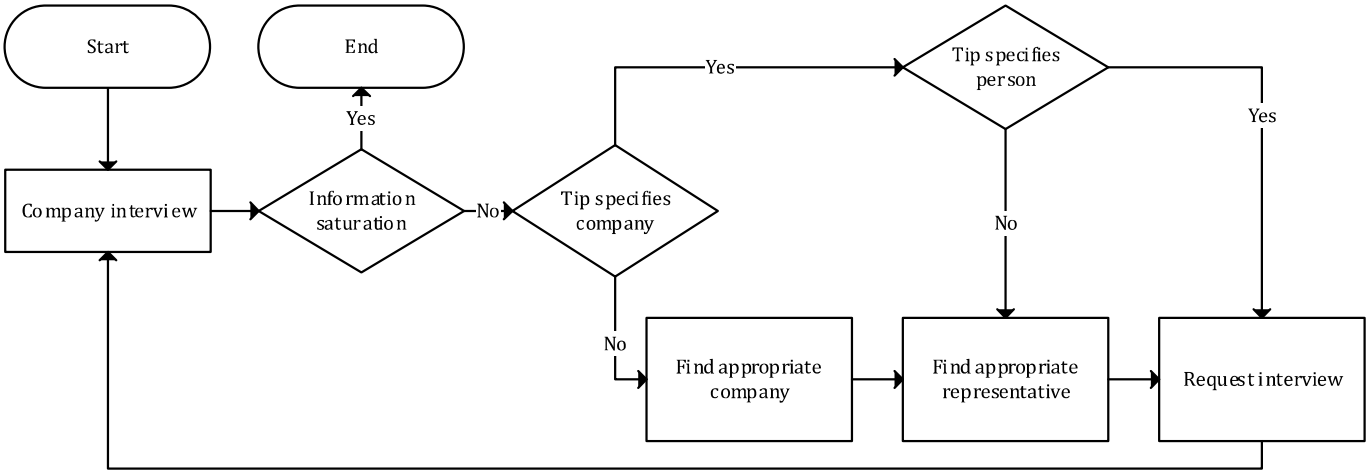

Figure 2: Process illustration of interview candidate snowballing

The interviews were conducted online in 18 cases, and by in-person meetings in three cases. All the interviews were conducted during March and April 2026 and the length of each interview was approximately 1 hour. At the beginning of each interview, the interviewers asked for permission to record the conversation, and began recording after such explicit grant had been given orally by the interviewee. Recordings were

saved locally and in a cloud environment where privacy settings were set up such that only the authors had access to the files. Anonymization designator and company description are detailed in table 2.

Table 2: Description of companies interviewed and interview mode.

Designation	Sector	Description	Interview
D1	Design	Design company	Online
D2	Design	Design company	Online
D3	Design	Furniture designer	In person
D4	Design	Furniture designer	Online
I1	Interior Architect	Architect firm	In person
I2	Interior Architect	Architect firm	In person
M1	Manufacturer	Furniture manufacturer	Online
M2	Manufacturer	Furniture manufacturer	Online
M3	Manufacturer	Furniture manufacturer	Online
M4	Manufacturer	Custom furniture	Online
M5	Manufacturer	Furniture manufacturer	Online
M6	Manufacturer	Custom interior solutions	Online
M7	Manufacturer	Furniture manufacturer	Online
M8	Manufacturer	Furniture manufacturer	Online
M9	Manufacturer	Furniture manufacturer	Online
M10	Manufacturer	Supplier	Online
R1	Retailer	Retailer and solutions provider	Online
R2	Retailer	Retailer and solutions provider	Online
R3	Retailer	Retailer and solutions provider	Online
S1	Strategy	Strategic partner	Online
T1	Procurement org.	Partner to municipalities and regions	Online

4.3 Data analysis

Transcription of the interviews used aTrain (Harberl et al, 2024), a locally run machine learning tool for automatic transcription. aTrain ran locally and did not depend on an online service to function. This fact ensured that the data i.e. the recordings, input into the program was not unknowingly shared to any third party.

Generated transcripts from aTrain were verified and edited manually for correctness by listening to the interview and simultaneously editing inconsistencies in the transcript. Focus was on correcting any words or sentences misinterpreted by the AI-tool, not taking into consideration the correctness of the start and ends of sentences or paragraphs. Analyzed transcripts had the aim of providing a correct

representation of the words and their order said during the interview, in likeness to scriptio continua, with added spaces between words for added degree of readability.

The focus in analysis was establishing understanding of relationships between different actors in the industry network, to see how the relationships influence circular strategies. Particular attention was given to identifying barriers and enablers within these networks. A network perspective based on ARA-model was used in analysis, in combination with circular strategies.

4.4 Coding

Qualitative content analysis was the main method used for analysis. The content analysis allowed us to use predetermined categories (Flick, 2018) and analyze the interviews accordingly. Categories of level of analysis (micro, meso, macro) and 4R was used for fitting statements and interpretations from the interviews to predetermined categories by directed content analysis in a deductive fashion (Säfsten & Gustavsson, 2020). A limit of our categorization into preconceived groups may have created a selection bias of what material was deemed interesting and included in analysis. In addition to the deductive approach, conventional content analysis was used in by adding a category of contextual labels. These labels were created by identifying aspects in transcriptions observing the context. The contextual labels were then used in categorization complementing 4R and levels of analysis. Using inductive labeling in addition to a deductive categorization helped to reduce the risk of data selection bias and increase data diversity (Säfsten & Gustavsson, 2020). The inductive method maintained a frame of reference for the labels which helped analyze contextual relations. Coding was performed in cyclical iterations, revisiting the data and assigning codes to verify correct categorization. The iterations served the purpose of also making the codes coherent, and group unique labels with similar meaning. Codes were also assigned to one or more of the categories of challenge, opportunity, or driver. The process of data collection, coding, and assignment followed Bell et al.'s (2019, Chapter 24) three levels of coding involving an identification of basic principles, recoding, reallocation, and consolidation, and finally a consolidation into broader themes (see figure 3).

The transcripts were analyzed by highlighting, marking, and writing down phrases, and words into a spreadsheet. These were then categorized by the authors into preexisting categories and labeled. An initial coding resulted in 489 phrases. In

the second iteration the data was cleaned. Extraneous, repetitive and irrelevant data points were removed. Data points unassigned in the first iteration were assigned to labels and categories, and in addition, reevaluation and relabeling of the extant labels were made. Synthetization of labels according to contextual proximity grouped the labels into themes. Peculiarities between challenges, and opportunities and drivers, were captured by identifying unique themes for respective category.

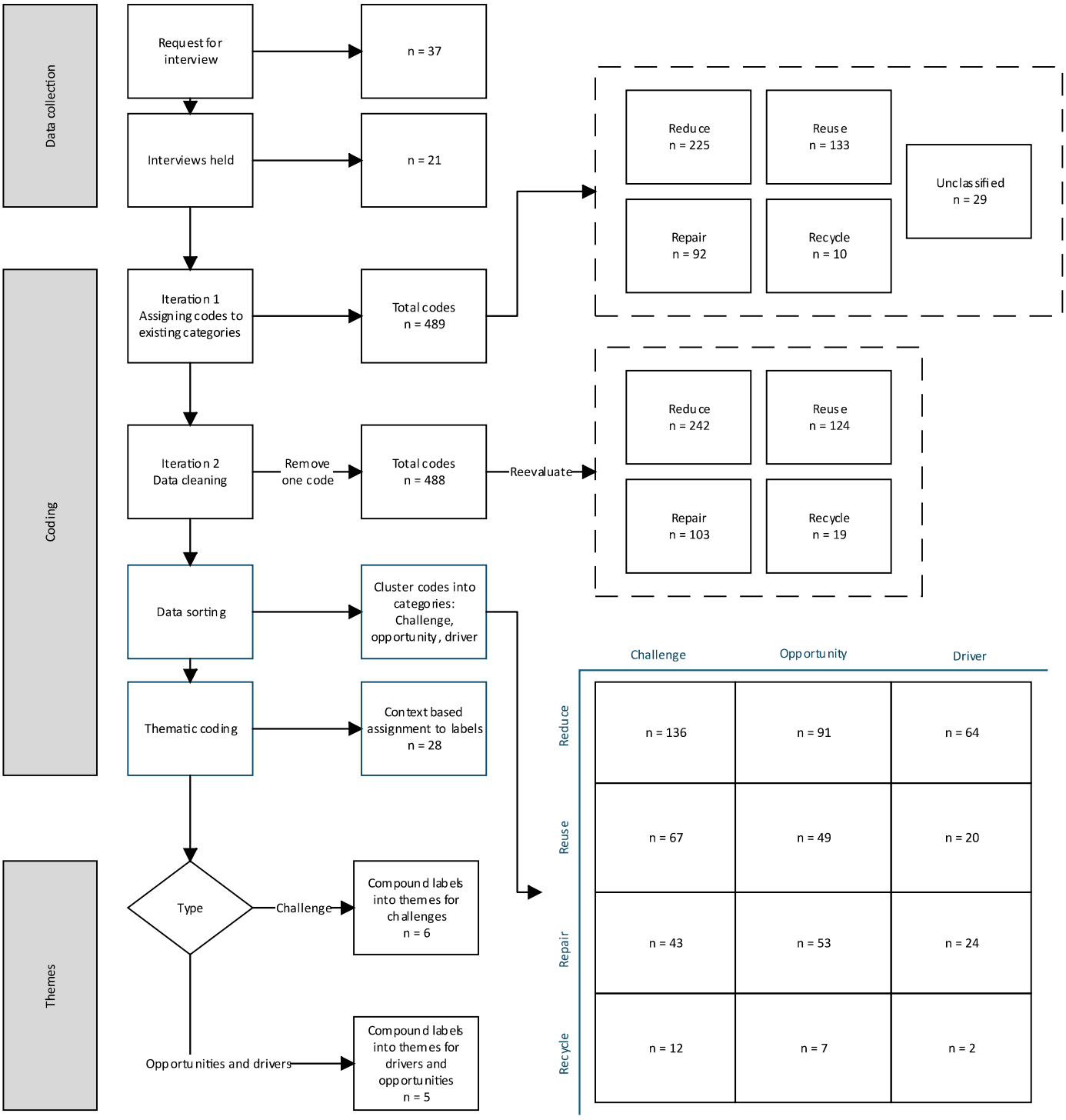

Figure 3: Process of coding and theme assignment

4.5 Ethical considerations

Ethical considerations in this study considered research guidelines from Swedish Research Council, summarized by Säfsten and Gustavsson (2020) in 14

guidelines. A select number of guidelines are applicable in this study, and how those guidelines are met are described in further detail here.

We had integrity in thoughts and actions. What we have done was aligned with prior thoughts, ideas, and statements. Promises and agreements towards stakeholders have been honored, and there has been an intention to communicate clearly and sincerely if and when mistakes and misunderstandings occurred. To the best of our understanding, laws, rules, and regulations have been followed.

The aim of this study was to strengthen the knowledge of our research area of circularity in Swedish furniture industry by building our study on previous research in the field. An intention has also been to increase the knowledge level in industry with regards to circularity, to bring further unification of understanding of what circularity is and how it may affect industry actors. This coincides with the ethics guideline of competence (Säfsten & Gustavsson, 2020), seeking to develop and share attained knowledge to both the science and industry community.

Interview participation in the study was voluntary, and the interviewees were given the opportunity to retract their agreement to being part of the study at any time and for any reason. Potential research subjects were contacted by email with an invitation for an interview. The email included a background description of the study, who we, the authors and interviewers, were and details about our expectations from the interview, and what was expected of the subject. Invitation stated the intention of having one interview, during a time frame of 60 minutes, online via Microsoft Teams. The subjects were free to come up with suggestions on different platforms for conducting the interview, and a few were conducted in person at the subject's workplace. Research subjects showed agreement to the interview by replying positively to the invitation. Additional background material was sent to interviewees upon request. Orally at the beginning of interviews, the interviewers repeated that the data was only to be used in research and not shared with illegitimate third parties.

Before publication, participants were given the opportunity to review how material from their interview was used and reported, including anonymized descriptions and translated quotations. The purpose of this review was to allow participants to identify any misleading or inappropriate representation of their contribution. Participants were also given the opportunity to comment on how they preferred to be acknowledged in the final report.

Sensitive information captured during the interview included name and company of the employer. No other personal data, e.g. on race, political opinions, religious beliefs, health, sexual orientation (Säfsten & Gustavsson, 2020), was collected. Interviewees were guaranteed confidentiality, and data used in the presentation of results de-identified.

5 Results

This section provides insight into the results gathered from interviews regarding relationships between actors, and views on challenges, opportunities and drivers in developing circularity practices. The first section describes the network of key actors and their main relations. In the second section challenges are presented, followed by opportunities and drivers in the third and last section.

5.1 The network

The network of key actors was analyzed with the focal view of manufacturing companies. There are two distinct flows separating which kinds of relations actors have with one another. The most prominent flow is that of the product itself, marked by a supply chain from manufacturer to end user. The other flow is of information and communication which involves yet other actors than the physical product flow.

Key actors involved in either product or information flow, or both, are the manufacturer, designer, supplier, interior architects, retailers, end user, and governmental agencies. Actors and relational flows are shown in figure 4.

Manufacturers can have internal designers or use the services of an external designer. In either case, the designers are given a brief from the manufacturer outlining the wishes and/or requirements of the product to be designed. There is no standardized structure of what a design brief, and so it depends on a case-by-case basis how constrained the designer is to find creative solutions, D3 explains: “It is a mix. Some (briefs) may be very specific [...] We need a chair in this price range, in this material, it should be stackable, and so on. [...] others can be ‘make a chair that sells well’”.

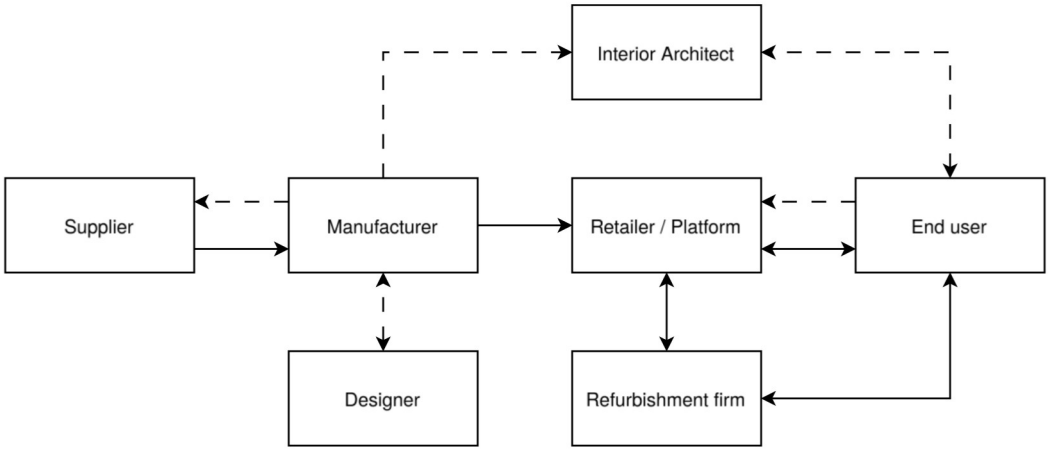

Figure 4: Key actors with information and physical flows. Physical flow is shown with non-dashed lines, information flow with dashed lines.

During the design process there is regularly an information exchange between the manufacturer and the designer to ensure that the product meets the technical and aesthetic requirements, and are in accordance to the production requirements to allow for manufacturing. Little to no physical product flow exists in the relation, except for stages of conceptualization and finalization of the product design.

The relationship can work the other way around, putting the designer in charge. In such case, it is the designer exploring production technology capabilities to find out if their design can be produced. Designers are in a spectrum of designing their own furniture, then being responsible for finding production site and logistics solutions, or if the designer is hired by a company for designing a specific set of furniture. In the latter case the company takes the responsibility to produce and distribute downstream, and the responsibility of the designer ends when the design is finished and approved by the manufacturing company.

Suppliers supply manufacturers with materials for production. The material can be raw materials, processed, or partly assembled. Manufacturers have varying levels of vertical integration in the production, M2 take responsibility for most of the processing themselves: “we receive wooden planks in one end of the factory and output the finished product at the other end”. In companies with high vertical integration, the most common procured supplies are raw materials, then processed within the company’s own production including subsequent assembly.

Interior architects and retailers are intermediaries between the manufacturer and the end user. Relations are in the form of communication flows,

with no physical product flow directly involving the architects. Manufacturers make visits to architects to promote their products and to encourage the architects to use the company's furniture in their designs and proposals. I1 puts the relationship into context and exemplifies: "we welcome suppliers (note: suppliers from the architect's perspective is here what in the report is referred to manufacturers) […] and they give a presentation about their products and such". Architects work based on public or private commission dictating the vision of the project. As for furniture designers, the project commission for architects may vary vastly in terms of level of specificity from the customer. Regulations dictate on what level architects allowed to prescribe furniture. In projects of public procurement, where the furniture procurement is by tender, the architects are limited to describing details and properties of the furniture. Illustrations are allowed, but only for the purpose of illustrating an envisioned environment without specifying detailed furniture. I2 states: "if we prescribe new furniture, it must be precisely described in text, because we are not allowed to include a picture. Well, we are technically allowed, but in that case we must state that it is for illustrative purposes".

Private commissions have no restriction in this sense, the architects are free to prescribe, name and specify furniture on a detailed level providing an in-depth specification of what to buy to achieve what the architects envision. Architects have information flow both upstream and downstream, but mainly in the latter.

Architects can prescribe furniture but may not have the retailer capability of procuring furniture for the customer. Retailers take the role of selling, equipping, and setting up furniture for businesses, both public and private. Information flow can be bidirectional with architects and end user both, depending on the complexity of a project. Retailers have the main purpose of providing end users with furniture. Additional customer care services can include servicing of furniture, upgrades, supplements, and full-service solutions for maintenance, repair, and disposal. Retailer R2 explains that customer care from their perspective is to: "help our customers appreciate their products for as long as possible, but also to repair what's broken or have become obsolete".

The business model of established B2B retailers in Sweden has been focused on adhering to the linear economic model. The linear model has limited product responsibility over the product's lifecycle, handing over responsibility for a product as the product gain new ownership. Furniture produced for the business market is of

high quality with high durability and long product life. Because of the durable properties of the furniture, actors from within the manufacturers themselves identified a new business opportunity for secondhand furniture, T1 says: “circular retailers are an offspring from the linear furniture industry”.

Circular retailers have emerged taking advantage of the business opportunity of secondhand business furniture. The retailers find furniture sitting unused, or items that are soon to be disposed of by an organization, and acquires it instead. In the hands of the circular retailers furniture is, if there is such need, upholstered, repaired, or refurbished. The furniture is then stored at a facility in wait for customer order. Refurbishment services of the retailer can be internal or purchased by external partners. The service can be a combination of both, where more complex upholstery is outsourced while simpler jobs are performed by internal staff. Repairs may require OEM replacement parts from the original manufacturer. Component needs are met by ordering parts from the original manufacturer. R3 states the relation between them as a retailer and manufacturers as one of taking on the customer role: “we are customers to them (note: manufacturers), that is the relation we have because we buy things from them to complement our own assortment”

Refurbishment can take place with various actors. With retailers increasingly noticing the demand for refurbishment and repair services, there are multiple alternative actors offering the service. Platforms have been developed for reuse and refurbishment services aimed at providing easy access whole-services for companies. Platforms in the market are both third-party services with the purpose of acting as link between customer and restoration service. Leasing agreements between retailers and end user may stipulate that service is offered and provided by the retailer, but services are also offered to customers who own their products. Products will then flow from the customer to the retailer and be returned after refurbishment. Another route is for the customer to directly contact the original manufacturer for maintenance and repair of the furniture. A third alternative is for the customer to directly contact a refurbishment firm. M2 explains how the two latter options work: “we can send business to them (note: refurbishment firm) directly. Like, 250 chairs we would like to keep in-house, but 20 chairs are barely worth it. In that case I send you (the customer) to them (refurbishment firm) directly. They will help you with the repair, and we will provide parts or technical knowledge for the products”.

5.2 Challenges

Interviews revealed challenges in various areas that act as barriers to circularity. The challenges are grouped in six overarching themes, with each theme containing detailed areas of interest, summarized in table 3.

Table 3: Challenges in transitioning to CE

Theme	Challenge	Main actor involvement	Challenge summary
Competence	Customer attitude	Retailer	Customer prejudice of secondhand furniture.
	Redefining value	Architect, Retailer	Customer mindset centered on price.
Knowledge and information gaps	Insufficient professional competence	Architect, Manufacturer	Siloed understanding of furniture value chain.
	Elusive definition of circular economy	All	No common definition of CE.
	Integrating data into business operations	Manufacturer, Retailer	No standard procedures in data management.
Coordination across network	Unbalanced authoritative power to invoke system change	Architect	Decisive authority misaligned with professional roles
	Evolving relationships into collaborations	Designer, Manufacturer	Finding suitable partners for growing collaborations.
	Fragmented sense of responsibility	Architect, Designer, Manufacturer	Allotting fair responsibility
Navigating the market	The role of promotional marketing	Manufacturer	Risk of greenwashing
	Specification of requirements in projects and tenders	Retailer	Procurement proposals inadequately adapted for reuse.
	Maneuver national and European regulations	Manufacturer, Retailer	Incorporating regulations into operations
	Implications for adopting circular strategies	Manufacturer	Analyzing short- and long-term effects on business.
	Integration of actors and technical systems	Architect, Manufacturer, Retailer	Developing interorganizational system for coordination.
	Staying relevant in a changing market	Designer, Manufacturer	Exploiting growing customer demands in reuse and repair
	Cost of circular strategies	Manufacturer, Retailer, Refurb. firm	Identifying and managing costs
	Shifting customer demand towards high quality products	Designer, Manufacturer	Creating demand for high quality products
Product properties	Finding balance between durability and separability	Designer	Combining long product life and separability
	Design for circularity	Designer	Incorporating cycled materials, and design for repairability.
Operations and logistics	Managing reverse logistics	Manufacturer, Retailer, Refurb. Firm	Cost, coordination and inefficiencies
	Integrating repairs in manufacturing operations	Manufacturer	Inflexibility in production environments.
	Furniture as a service	Manufacturer, Retailer	Poor market demand and development of viable services.

5.2.1 Customer perception of value and reuse

5.2.1.1 Customer attitudes

A prevalent and widespread perception almost all interviewed actors have discussed is the attitude towards reused second-hand furniture. There is a prevalent idea that downstream actors and stakeholders hold an attitude of furniture as consumables, treating furniture as objects to use and replace. R3 believes a secondhand furniture is rejected based on poor prior experience, for example from the private consumer market: "there is a lot of prejudice about reuse. What even is it? Maybe you have bought a sofa on Blocket (private marketplace), and that becomes (your) point of reference."

There is a negative prejudice against the reuse of furniture, forcing the actors operating in repair and sales to go above and beyond in their efforts to make repaired products outshine newly produced alternatives. R3 again points to embedded prejudice in the market, stating that reused furniture must convince the market: We at R3 sell premium products, we leave three years guarantee on everything we sell because that is what the customer wants. […] You need to convince and show that there is a lot of opportunities here to do good things".

Market attitude is biased towards purchasing brand new furniture, for the idea that new furniture has inherently better properties in relation to reused ones, or rather, that reused furniture has – in some sense – worse quality than new. In extension to the notion of reuse as a lower-quality product is the assumption of low cost for buying reused. Reused however does not automatically translate to lower costs, and the customers assumption of so being the case makes for a discrepancy between customers' assumptions and realistic offerings. But, I1 emphasize that good interior design is still very much possible: "Reuse does not mean it has to be boring — not at all".

5.2.1.2 Redefining value

Related to customer attitudes is the challenge of how value is understood and evaluated in circular flows. Several actors indicated that reused furniture needs a broader understanding of value than purchase price alone. Cost of repair in preparation for reselling and reusing furniture invokes high costs, as seen in challenge Finance. Reused furniture can have a high purchase price, comparable to newly produced furniture. However, price alone does not capture the full value of reused products, as it often excludes additional values such as environmental savings of

manufacturing and transport. In fact, the total cost (i.e. the price) for a customer may in some cases be higher when procuring reused furniture instead of new. R2 explains:" only doing it (buying reused) in terms of economic incentives, or to assume significant savings is […] generally speaking, it is a challenge. […] that's why it's so important to highlight other values of reuse".

This suggests that the value of reused furniture cannot only be assessed through economic cost. Environmental savings and extended product life contribute to the value in a CE, where material reuse is a key issue. However, these values are not always visible, nor readily apparent, to customers, which makes it difficult to include as a factor in purchasing decisions.

At the same time, the interviews indicate that actors at various stages must be aware of the point of no return, i.e. to recognize at what stage furniture may be better off disposed than repaired, and to also be mindful of what furniture that can have an added or restored value by repair. Not all products are made with the quality required for repair, and it is important for actors downstream from manufacturers to recognize what furniture can have an increased value by repair. I2 describes a challenge in balancing repairs and the effect on product life, saying that repairing low quality furniture may be a waste of resources: "Maybe it's not worth it to put a lot of money on re–covering and such, because the chair is low quality. Then it will fail anyways, the product life won't get longer."

5.2.2 Knowledge and information gaps

Challenges regarding knowledge and information were seen in the empirical findings, as circular strategies require actors to make decisions based on knowledge that is often fragmented and difficult to compare. This both includes competence related to design, materials, and production, but also shared definitions of circularity and data regarding production and environmental aspects. The challenge is therefore seen both in individual actor's lack of knowledge, but also in how information is shared in the network.

5.2.2.1 Insufficient professional competence

Competence-related challenges appear in both pre-manufacturing and post-manufacturing. As will be discussed later in relation to design, the design stage of a new product is where the possibilities of circularity are the greatest. Drawings translating into actual concepts and final production-ready products are a physical

manifestation of designer vision, and in the translation from sketch to hands-on product comes the choice of materials. Technical material properties serve well for fitting the most suitable materials for a given purpose, e.g. durable textiles where wear is expected. However, selecting materials solely based on their performance during the use phase is insufficient from a circular perspective. Additional consideration must be given to how materials can be integrated into technical or biological loops. D4 has seen a decline of Swedish workmanship and is concerned about a continued decline in practical material knowledge, and competence in small scale furniture production: "There is a risk that we lose competence in small-scale furniture production, and then furniture design inevitably follow suite. You stop designing it if no one can produce it."

A further challenge is understanding what current practices imply in the context of furniture manufacturing in Sweden, and how raw materials procured from outside national borders affect local businesses. It is believed that very few actors have sufficient understanding and know-how of current supply chains, and what impact material choices have nationwide on furniture manufacturing industry, including a preconceived perspective consumers have on locally produced furniture. There is a vast difference between furniture assembled in Sweden, and furniture being both made from Swedish materials and assembled in Sweden. Across actors there is a missing holistic understanding of how materials are procured, where they come from, and how circularity is affected. M9 is concerned about the knowledge gap evident in Sweden where the perception of Swedish production is far from reality: "this knowledge gap is an essential part […] You don't know that this is how it is in Sweden, you believe that it is Swedish wood […] we have our forests and our iron-ore, and we have production of this and that. But that is not what reality looks like anymore, that was a long time, it was like that 50–60 years ago."

Post-production, as furniture reaches EOL, the need for repairs increases. Customers seeking to refurbish and repair their furniture face a limited availability of firms dedicated to repair. Competence in workmanship and craftmanship related to wooden furniture production and repair is lacking, creating an insufficient supply of businesses operating in the repair business for an increasing demand. Both regulatory and customer demands set the path towards an increase in reuse of furniture, meaning that repairs will become more commonplace. However, the current supply of businesses capable of managing this repair demand appears inadequate. M3 described

how skills in furniture manufacturing is becoming scarce: ”(generally) it is very difficult to find it (competence), this kind of know-how has dissipated with time”.

5.2.2.2 Elusive definition of circular economy

The definition of circularity is inconsistent and remains unclear in industry. Even though there is a common understanding of the overall aspects of what the concept means, details vary. This ambiguity leads to several challenges. When there is no common definition, actors come to use and interpret words differently, as I2 says: “there are many companies saying they work with reuse, but it depends on what you mean.”

Since the concept of circularity varies substantially between actors, there is uncertainty regarding what activities can legitimately be considered circular. Even government agencies struggle with defining circular strategies, says M2: “Regulatory authorities do not always seem to know what reuse or circularity actually means in practice.” Giving an extreme example of the problem of not having any common definition, M2 emphasize the importance of regulatory control if circularity becomes a factor in business trade: “If a chair is returned through reclamation and sold again, is that considered reuse? In that case, could I just as well place the chair outside the door, cough on it twice, bring it back in, and call it reuse?”

Fragmented definitions create an opportunity for superficial circular initiatives and intensified greenwashing.

5.2.2.3 Integrating data into business operations

The interviews indicated two main challenges regarding data. First, manufacturers do not always have a clear understanding of what data they currently collect, or what is needed for legislative or certification purposes. Second, standards are lacking in how data is collected, processed, and presented, making the results difficult to compare between actors.

Manufacturers have extended responsibilities in managing diverse legal requirements and certifications. The administrative burden has increased, putting more pressure on companies to collect data about the product, components, raw materials, and suppliers. Data in refined form is an order qualifier, raising the bar for manufacturers to being able to sell products to market. As informed decisions have become a norm in procurement and tenders, data (or lack thereof) can disqualify manufacturers and suppliers, but it is not clear what data is needed to produce

sufficient declarations to pass the bar of order qualification. Since quantifiable data now is a benchmarked factor in sales, actors are competing to present the "best numbers". However, there is no shared standard in how product data should be presented, and thus presented data from different actors may not be directly comparable without understanding what and how the data was collected, and what method was used to find the results. I2 expresses disapproval of how metrics have gained an increased significance in business relations, without considering how the figures have been calculated:" People use figures to compete, even though it's impossible to know the underlying calculations."

5.2.3 Coordination across the network

5.2.3.1 Unbalanced authoritative power to invoke system change

A power related challenge concerns the gap between an actor's potential influence and their actual decision-making power. Interior architects were described by manufacturers as actors with a potentially important role in enabling circularity, since they develop interior concepts and can propose circular furniture solutions in line with customer needs. However, the interviews also showed that their influence is limited. While the architect may produce a concept, consisting of an envisioned future, the concept should be realized. In the end, it is the customer deciding what to purchase, though the architect's concept may serve as inspiration. According to M9, architects is in disadvantage due to a loss of power: "problematic that […] architects are disconnected from authority."

Retailers also influence the outcome, since they operate close to the purchasing decision and can suggest alternative products. Customers are interested in spending as little money as possible to get the desired result, and retailers providing furniture have a large influence on what the customer finally decides to buy. M9 exemplifies with a scenario of retailers replacing prescribed furniture: "'you know what, pick this chair instead and you will save this many thousand crowns. […] And that is a huge problem. We have an incredibly unfair balance of power with these actors (retailers)" This shows that circular or locally produced options are not benefitted when actors in the network redirect the customer towards lower-cost options.

The findings suggest that power in the network is not evenly distributed. Architects shape concepts and influence what is considered desirable, but retailers,

customers, and procurement structures do, in many cases, have a stronger influence over what is purchased. This creates challenges for circularity, when actors promoting circular alternatives are not always the ones who have the authority to ensure these alternatives are being chosen in the end.

5.2.3.2 Evolving relationships into collaborations

Collaboration emerges as a challenge because circular loops require actors to connect across organizational boundaries. The interviews indicate that collaboration is still underdeveloped in several parts of the network.

Relationships are established as companies and actors meet. Meetings between actors and companies of a particular branch have had exposure attending and visiting exhibitions. Exhibits are arenas for exposure to businesses, and provide opportunities to connect with others to build networks. Popularity for these arenas are, as D3 mentioned, in decline:" Exhibits are a bit on the point of extinction, in a way. […] That is how I have gotten in contact with manufacturers. […] they see my potential and knowledge."

Innovation of production technology and materials will only be valuable if the technology is used in practice. Therefore, it is central that relationships are tied between material developers, production technology innovators and manufacturers using the technology. The challenge is to find combined areas of exposure for these actors and to create networking arenas where professional networks can be established, but such arenas are today lacking. D2 says collaboration is needed in early stages of material development: "early dialogue with material manufacturer, manufacturer, and also with the material designer".

The interviews indicate that limited contact between actors contributes to problems remaining isolated and contained on a micro level within the confinements of individual actors. Collaboration can be hampered when actors willing to embark on the circularity journey find themselves lacking in knowledge of what potential collaboration partners there are on the market. While this study has not mapped existing meeting arenas, several interviewees mentioned a lack of spaces where relevant actors can meet.

Finding potential partners can be challenging, but turning a potential partnership into functioning collaboration can be an additional challenge. Partnerships are not determined only by economic feasibility and immediate business value.

Business partnerships are also dependent on a trusting relationship where the actors find purpose in longevity and willingness to build a relationship that is built collectively for the benefit of both. M3 emphasizes the importance of both the economic value of partnerships and the personal fit: ”after crossing off economic feasibility we move on with a personal meeting and progress (with business relationship) if it gives a good feeling”.

5.2.3.3 Fragmented sense of responsibility

There are unclear responsibility boundaries among the key actors for who is, and should be, responsible for circular development and taking action within the network.

Several actors described how the progression of circularity may stagnate as responsibility is not clearly distributed between the actors, where no single actor perceives themselves as capable of independently leading the transition. D2 says it is easy to blame other actors forgetting the impact you can make yourself: ”you have a big responsibility yourself. It is easy to think that the big corporations are the bad guys, but how you design something has an enormous impact on product lifecycle”

The manufacturer alone cannot be held responsible for driving a circular transition, since their outreach and influence over final purchasing decisions are limited. Therefore, other actors must also be part of circular change and work either in coalition with, or at least in coordination with, manufacturers to create market demand that manufacturers can respond to. In a B2C context, responsibility can be understood as distributed between at least three actor groups: manufacturers, who need to produce high-quality products; retailers, who need to acquire and promote sustainable products; and consumers, who need to demand and appreciate quality and long product life. According to M3, the most important responsibility for manufacturers is to produce quality products: “it is important that the manufacturers take responsibility and produce with high quality, that the stores take their responsibility and purchase things that are sustainable. And also, that the quality becomes something that is appreciated by the customers”.

Interior architects have an opportunity in their professional role to prescribe circular products within projects, especially towards commercial businesses. Architects have responsibility to be a knowledgeable link between the manufacturer and the consumer, and have a role of driving the change by creating demand for

reused furniture. Manufacturer M7 believes architects and designers can use their role in the industry to boost circularity transition: “Architects [...] and designers can make this (circularity transition) happen“.

Another challenge concerns the responsibility of designers, which is currently limited in scope by the agreement established with the client. During the design process, designers influence product properties, material choices, and aesthetics, and thereby affect the circular potential of the product. However, once the product design is finished, the designer’s formal responsibility ends. As D3 explained: “The responsibility for a designer ends with the agreement — when the product design is finished.”

Looped products introduce another aspect of responsibility. Independent repair studios can reupholster and repair furniture, which raises questions about guarantees and responsibility for the product after intervention. A manufacturer may provide product guarantee for the original product, but it is not always clear how responsibility shifts if the product is repaired or modified by another actor. The boundary of responsibility may therefore become blurred between the manufacturer and the repair studio. As I1 remarked: “the chair is produced by someone, and then reused, reupholstered, re-covered — who, then, should take responsibility?”

5.2.4 Navigating the market

5.2.4.1 The role of promotional marketing

Relating to challenges mentioned for the market, marketing is another challenge aimed primarily at manufacturers. Established brands already have a business going with current state of manufacturing in Sweden. Brands with a heritage can continue to profit from classic timeless furniture, without necessarily needing to actively communicate or justify the sustainability of these products. While questions and demands are raised for furniture market overall, some manufacturers may benefit from customers’ outdated perception of Swedish manufacturing as inherently sustainable. M9 explains why businesses might be unwilling to change: “manufacturers is profiting from an obsolete (widespread) perception of Swedish production”

Actors without any so called “design classics” in their portfolio are challenged in piercing the market with novel types of marketing. With numerous Swedish manufacturers branding their products with “Made in Sweden” (and perhaps with

environmental certifications) have made a market that demands more, but also, preferably, at a low cost. In the race for attention manufacturers must balance the risk of greenwashing, while still promoting their work on circularity. D4 highlights retailers as a hindrance disconnecting manufacturer and customer, and asks manufacturers to have a higher confidence in their own products: “the manufacturer is […] a little timid in promoting their products. […] he waits for retailers to come and give approval, instead of making a decisive choice to develop a product, a series, or whatever, and make sure it reaches market.”

A question raised is about the necessity of marketing. Given that the business works well as it is today, there are few incentives to change. The most convenient approach is to simply continue as one has done before, and allow for the external factors to influence the company to change when change is due. There may not be a need to market circular business models, because the business is operating well as it is in its current state, and focus is better put in the core company competence. Manufacturer M7 says for example that a share of their operations are in repair of other manufacturers products, and that promoting would increase demand, but that the company has enough demand as it is: “in that case we would have to promote that part of our business”

5.2.4.2 Specification of requirements in projects and tenders

Tendering processes are increasingly becoming focused on circularity. Public procurement frameworks exist for both new furniture, and for reuse, but retailers criticize tender proposals to be too specific and too demanding to allow for reused furniture. The demands put in tender proposals for reused furniture are not adapted for how the market of reused furniture operates, and lack detailed understanding in what is possible to provide or not. Tender proposals for new and reused furniture cannot be written in the same way, yet retailers find that tender proposals are provided and written such that the requirements cannot be met. A lacking knowledge of what the implication is of procuring reused furniture means, especially in terms of what requirements and demands are reasonable (and achievable) in a tender proposal, hinders circular solutions. Tender proposals are not adapted for procurement of reused furniture, which may make demands in procurement proposals impossible to meet. Aspects of circularity and reuse has to be considered in such proposals, which currently, may not be the case. R3 is critical to proposals that does not properly

consider properties and limitations of reused furniture: “competence isn’t all there. You try to apply same rules for reuse as you do for new products. We, on the other hand, know that you can’t write proposals like that, because it becomes too restrictive, and fewer will be able to deliver.”

5.2.4.3 Maneuver national and European regulations

Several manufacturers described uncertainty regarding future regulatory demands at both European and national levels. Macro-level strategies serve the purpose of navigating societal change on a long-term basis. Including all aspects of society in these strategies, it is difficult to pinpoint how specific actors on the micro-level are supposed to work with the strategy. Some manufacturers described uncertainty around future regulations as making innovation and investment decisions more difficult. Instead of feeling certainty in strategic direction, the European strategies, sometimes boiled down into national goals, have actors in the industry unsure of what future regulations will be put in place. Investments into material and production technology become a financial risk in an already volatile market. A challenge for the industry is therefore to manage current and future legislation as it takes effect, while also navigating uncertainty in the political and regulatory environment. M1 highlights the importance of continuity and market equality: “You can have as tough requirements as you want, but you have to be transparent, and the requirements must be predictable, and the rules has to be impartial within the whole of EU.”

Another issue with regulations, and in particular in public procurement, is inflexibility. Strict interpretation of public procurement rules can create challenges for public actors trying to procure reused furniture. Inflexibility in specifications of requirements can create situations where products of reuse cannot be used because of how requirements are specified. Procurement proposals asking for reused furniture may put too specific requirements of products which makes it close to impossible to meet the demands. In this regard, R2 states that a higher degree of flexibility is needed to be able to meet essential demands: “from public actors where, say, they have put a minimum ratio of 75% of this project should be reused. […] Great! […] and then you see the specification of requirements and see that the products should adhere to these material requirements, they should not be produced before 2015, they should have textiles compliant to these specifications. And, I mean, we can’t do

magic". Besides the difficulty of adhering to too detailed requirements, M4 also believes that public organizations is missing the whole point of purposeful procurement. Stating that a big problem in public procurement is the focus on lowest price, it is not certain that the cheapest product is the one that also has the best functionality. M4 believes that public procurement should take more consideration into needs and functionality than price, and highlights the importance of specifying quality requirements to avoid low quality products: "you have to ask the customer: 'do you want crappy furniture?'. Everyone will say no, I get that. But no one asks, and then everyone gets the crappy furniture anyways! […] that is a challenge we can counter if we ask the customer 'what quality do you want? Do you want quality?'–if so, we have these companies for you (to choose from)".

5.2.4.4 Implications for adopting circular strategies

Introduction of circular business models may interfere with current business models with pronounced focus on sales of newly manufactured products. The main challenge here is to analyze the market, identifying trends, and benchmarking against competition. Rigorous business models built with a linear economy in mind may find revamping of the business models complex, raising questions of benefits. Analyzing consequences to avoid making actions haphazardly is an important aspect according to M5: "I don't think that the only option (for customers) should be to buy new and throw the old away […] but you should consider options. A lot of these things is to understand the consequences, for companies, and for the welfare state."

Introduction of enforcing legislation may force companies to adapt, but a challenge would then be to analyze potential effects of a transition into CBMs and how that would affect the business, i.e. think before acting. There is a risk overzealous engagement, and overhyped effects are attributed to CE. A strategic change in macro and micro level may risk being too eager, or being unconcerned of the effects, then lagging competition and societal change. Questioning dogmatic terms are M5, saying that there needs to be careful consideration of implementing environmental regulations before enforcing novel legislation: "What are the consequences for a company to keep up to date with all of this (new regulations, requirements, demands)?"

5.2.4.5 Integration of actors and technical systems

Undefined flows of resources make it difficult to understand how the changes in the micro level affect society on the macro level and vice versa. Concrete examples of how macro level governing affects companies on the micro level can be evident of each individual company and business owner, but the changes occurring in the meso level between companies is elusive. In vague terms, interviewees mention challenges in maturity of reverse flow of products, and technical loops for resources. The lack of maturity of a systematic framework with clear delineated actors and responsibilities makes companies uncertain of how to move forward. I2 gives an example of failure points: ”often they (customers) have an imposed requirement for reuse, but when it’s time to order there is no money. Alternatively, everything should go in haste, and the products are not available just then. The work processes (for working with reused products) are not established.”

Separation of work and responsibilities between actors works in a system with distinct competences that are working in isolation. A systematic way of collaboration across actors is missing in current ways of working, yet there is an identified need to work together to facilitate transition into circularity. D4 said too much centralized responsibility on a single actor will not work: “The manufacturers are supposed to do everything. They should be good at production, working with different methods. They should be good at marketing, they should be good at finance, they should be good at developing new product types, and they should be good at exports. It is obvious, it is not viable.”

At the same time as the call for circularity grows louder, technical systems, IT infrastructure, and practical frameworks for working circular appear underdeveloped or not yet sufficiently established, leaving actors to rely on ad-hoc solutions or making circular practices difficult to implement. I1 says that the workflow of projects with involving reuse is hampered by inefficient systems: “maybe we don’t have the best kinds of systems to work with reused furniture as of yet.”

5.2.4.6 Staying relevant in a changing market

The current market is still largely shaped by linear business models. Moving from linear business models towards circular strategies involves considerable uncertainty for many actors. Market trends may point towards a perceived customer willingness to be more sustainable, more circular, to repair and reuse as much as possible. Yet, what is said and what is done are, in reality, two different things that

are not necessarily aligning. Several interviewees described the current market as price-centered, with global competition making it difficult for circular, durable, or high-quality products to compete. On this note, D1 explained the market demand in Europe and Sweden: “in Sweden, price is the most important factor. Not durability, circular products, or high quality. Only the price.”

Even as furniture with the lowest price ultimately wins the day, notions of sustainability have gained traction amongst manufacturers. Sustainability certifications and environmental declarations of furniture have become commonplace and are, for public tender agreements, compulsory additions. Some actors raised concerns about the increasing focus on certifications, where furniture previously without certifications has become certified without the product itself has changed. When the market demands certifications, the manufacturers answer with certified products. At the same time, some actors expressed concern that certifications may support superficial sustainability claims if they are not connected to actual product or process improvements. Rather than invoking product improvements and production investments or a rethink about supplier relations, certifications and the demand from market creates an environment where the bar for order qualification is raised to include certifications. Incentives are created for manufacturers to certify individual products and the company itself, but if no practical changes are made it is still the same products produced as before, which may come across as greenwashing. Existing products may therefore be reframed through sustainability rhetoric, without necessarily being changed in practice. D2 was concerned about the emergence of companies that suddenly appear circular, without having made any revisions to products: “it is the same furniture, so the only thing that has changed is the rhetorics, or certifications, but really nothing has changed.”

A hindrance towards circularity is quickly shifting market trends. At one moment to the next, products become unmodern and untrendy – spurring consumption, and waste. High volatility trends are unpredictable, uncertain, and fit for cheap and low quality products that are quick to dispose and replace. D4 sees unsustainable trends in the furniture market which will be replaced by new trends within a few years: “Trends today […] will not be sustained long term. In just a few years, if even that long, they (trendy furniture) will have vanished”.

Rapid trends drive the surge for imported cheap furniture that are not required to have all the bells and whistles of a premium product. Long product life is, even if a

desired property, not a necessity. D4 expands the thoughts on furniture trends with the increased amount of low quality products on the market: “This market idea of use-and-abuse […] There are loads of importers who have never touched the furniture market before, but who now imports humongous amounts (of furniture)”.

Imagining a wide adoption of circularity, the question must be asked about the future of designers. Some designers’ income models may be closely connected to the development and sale of new products. In a future with increased circularity, where demand for newly manufactured products may decrease, this raises questions about how designers are compensated for in circular flows. Circular retailers have no royalty program with designers of the original furniture. As furniture is sold and marketed by the name of the designer (especially for famous and attractive design furniture) there is currently no established model for compensating the designer in a circular loop. Given an increase in market demand for repairs overall, society will see an uprise in reused furniture. Repaired products in the hands of repairmen can become like the original, but if originality should be retained even repair firms may need to be certified to guarantee original quality and aesthetics. D3 raises a question of licensing for repairs: “Who are allowed to refurbish their (specific manufacturer) furniture? Should you have some sort of credibility certification?”

5.2.4.7 Cost of circular strategies

Reuse involves a high cost, mainly attributed to transport and manual handling. A consequence of labor costs in Sweden is that manual work is relatively expensive to facilitate. Repairing furniture involves manual processing. Maintenance and simpler repairs may be facilitated on-site by mobile service personnel. Reverse logistics and the manual handling involved in collection and freight of furniture is a service with high cost factor due to the personnel involved. Take-backs and repair is more costly than customers often realize, raising the price of a reused piece of furniture up to the level of a brand new. Repairs by manual labor is expensive, said D4, citing the time it takes to complete a repair project: “The cost to do it for a craftsman or similar (is high). It’s quite many hours of work”.

Some interviewees perceived national economic incentives as favouring the existing linear economy, particularly through continued export-oriented resource use. Sweden is a net-export country with a continued interest for international trade. Economic incentives for continued trade overshadow sustainability demands and

increased circularity within national borders. Increasing demand on a local, national, level involving higher requirements on sustainability out of line with international market demands can create an economic conflict leading to increased manufacturing costs and reduced competitiveness. One interviewee problematized how Swedish natural resources are often managed through economic logics, where export profitability may conflict with circular ambitions within national borders. M9 expressed frustration in describing how resources are managed: “We should export our forest, we should export our iron ore, because that is most profitable” (said in a disgruntled, sarcastic tone).

5.2.4.8 Shifting customer demand towards high quality products

Cheap products are in demand. Swedish companies struggle in a global competition environment where the cheapest products are the products most in demand. Sustainable and long-lasting products may struggle to compete when low prices are prioritized. The demand today is focused on trendy design and price, creating a fast fashion model for furniture. D2 expressed a societal duality, both conscious and ignorant: “it is an odd (phenomena in) society, because in part we have this (environmental) consciousness, but then you have the super fast fashion with Shein and the likes.”

Cheap and disposable products drive the demand for increasing consumption. As the products become cheaper, the longevity decreases, both in terms of technical life, and aesthetics. Disposable products hinder the transition towards circularity by encouraging increased consumption and reducing incentives for repair. M8 put blame towards cheap products, and how the market has normalized cheap products for the customer: “I feel that customers have now found themselves in buying cheap stuff, and then it is cheap in really every possible interpretation.”

Consumers are accustomed to buying furniture at a certain price point. Introducing cheap products to markets creates nudges of attitude change pushing the demand for products at a lower price point. A sole price focus undervalues other attributes of importance to circularity, and undermines the transitional movement. M5 problematizes the conflict of cheap(er) products and sustainability: “Yes, the product will be more expensive. Then, maybe you buy something from Poland with higher levels of emissions than what we have, just because the product is cheaper. […] buy products that will last over time, and think about how it affects society.”

Another issue within the demand is that of product uniformity. Customers expect products to look alike, feel alike, just as if products were stamped from the same sheet. What is problematic with this kind of thinking is that handmade products, and products made of natural materials such as wood may show aesthetic, and sometimes technical differences. Customers demanding high quality handmade, Swedish produced product made of wood or other organic material put high demands on the manufacturer to make the products have a uniform look. M2 scrap components with an abnormal look – even though the technical properties are adequate – stating that customers do not accept discrepant product looks: "There is no technical issue with this product at all, except that it looks a bit odd. We scrap this today because the customer rejects it". The challenge is to shift the mindset of customers to become more accepting of the looks and properties of organic materials. But M2 is hopeful that the demand will change in the future: "I am 100% sure that we can sell these products for the exact same price (as the ordinary), but with a higher degree of heart and soul within a couple of years"

5.2.5 Product properties

5.2.5.1 Finding balance between durability and separability

Furniture designs focused on reliability and long product life may involve trade-offs with ease of disassembly. Interviewees believed there was a compromise to be made in durability, in terms of separability. Furniture can be designed for longevity, and can last for tens, or a hundred, years provided that the furniture frame is built solid. Long product life is very much possible when using solid and technically durable materials. Frames made of metal and wood can last for a long time, but depending on the construction, they may be difficult to separate or adapt with replaceable components. Materials set the basis for future possible product life, it is not however a certain predictor for the actual product life. Maintenance is often required to keep products in good and usable condition. Even furniture built to be durable requires maintenance and proper care to retain their technical properties. M5 stresses the point of daily product care, "the challenge is, I believe […] how you care for the product."

A long product life may even become a challenge for manufacturers and suppliers who may find replacement parts difficult or costly to store for an extended period. A high service level for providing replacement parts for current and historic

furniture may make storage for such components costly, with a high inventory cost for components with unknown demand. Manufacturers are challenged in striking a balance between service level and inventory costs. However, an increased focus on replaceable parts may also create incentives for continued consumption of components, especially if repairability is not combined with high product quality. The possibility to repair furniture and replace broken parts or components is an important step towards circularity, according to EU (EMF, 2026). A risk incentivizing repairability is that furniture is designed with lower quality standards but with replaceable parts, then creating a market (and consumption) for replacement parts. Such market trajectory moving towards circularity through means of repairability may miss the goal of reuse and reduction of emissions, M6 said sarcastically: "[…] sell loads of replacement parts, that is super circular—that's a gold star for me!"

5.2.5.2 Design for circularity

Design emerged as a key challenge in creating circular furniture. Design decisions made early in the product development process influence the possibilities for recycling, repair, and reuse. The design process involves making trade-offs of properties of the furniture, such as quality, design, and repairability, explained by D1: "design is a compromise. It is to reach a goal such that the viewer desires (the product), that it works, that the industry is capable making it, and to the right price."

Several actors described an increasing demand for repairable furniture, but there is a compromise between longevity and ability to disassemble and repair. Furniture designed and assembled for non-repairability may have a longer product life than furniture designed for disassembly and repair. Regulative requirements of modularity and repairability may create challenges in design and quality of furniture construction. Combined with increased requirements for recycled materials the design and construction of components should be redesigned compensating for differences in material properties between recycled and virgin raw materials. Modular product designs may invoke higher product costs during production phase, says R1: "If you look at product design, we have a big focus on replaceable parts […] but to design it like that can increase costs somewhat". R1 also mentioned complexity in evaluating of technical quality of recycled materials: "There are some challenges in quality of recycled materials, and to verify the quality."

Besides the structural integrity of the product itself, a furniture has lost its meaning if it is not used. To have appreciation of furniture and create a circularity through extended use of a product a crucial point is to have the product designed in an aesthetically pleasing way that makes the end user want to keep the furniture for a long time. That is, the design must be marked by a timelessness that can transpire generations without feeling out of place. Product longevity is dependent on design that can be appreciated for years and decades to come, and M6 believed in making designs more minimalistic: “I think that maybe you must be a bit more careful with things that exaggerate too much. Maybe the way forward is to be a bit more restrained”.

The purpose of the furniture lays the foundation for product design. Product design in turn, lays the foundation for subsequent product life. Design is inherently a process of compromise, and the challenge is to make priorities.

5.2.6 Operations and logistics

5.2.6.1 Managing reverse logistics

Optimization of logistics has made the linear flow from manufacturer to retailers and consumer efficient. The demand for flow efficiency has made the transports of products optimized by route and loading goods to maximize use of transport space and volume. The efficiency of delivery is not mirrored in take-back operations. In deliveries the furniture may be packaged partly disassembled, reducing bulk size making it possible to fit more products in less space. The need for an efficient delivery flow comes as an effect of the desire to reduce costs. Transport contributes to the cost of furniture due to manual handling. Deliveries must be efficient to be profitable and by finding value in economy of scale. T Take-back operations and reused furniture logistics often cannot rely on the same economies of scale and may require more manual handling. Assembled furniture, typically in the case of reuse, are more bulky and more difficult to transport than the unassembled counterparts. R2 explained challenges: “logistics is more complicated. You ship individual pieces of furniture from one place to another […] already assembled which makes it volume-based transport. It requires more manual […] handling”.

Furniture consuming more cargo space per piece reduces profitability in transports, due to a reduced capability of utilizing economies of scale. A proximate challenge is due to the demand and need to fit as much as possible in limited space,

contributing to the risk of damaging products. Internal logistics solutions are preferred to minimize the risk of transport damage, according to M3: “[…] buy services from external logistics companies. It is problematic because of transport damages, and that is something we would like to avoid.”

The overall challenge of logistics is how to make the transport cost-efficient, in terms of capacity-utilization and damage control.

5.2.6.2 Integrating repairs in manufacturing operations

Manufacturing has been developed for efficiency in a linear system. Production lines are built for raw materials to be turned into products through processing and assembling. The straight flow of manufacturing is disrupted by circular loops asking for produced products to be reintroduced into the flow, for repair or simple refurbishment. The production flow, however, is not suited for a flow going in reverse with complete products as input. Manufacturers are challenged with an incipient market demand for repair of products. A streamlined production flow is disrupted by products needing to be repaired, as the regular flow must be managed concurrently. Repair orders are received irregularly, and differ in number of pieces, product condition, and thus the processing steps needed in the repair process varies too. M5 said it is typically a problem because of how repair work interrupts regular manufacturing: ”it’s a big disturbance conflicting with ordinary production lines […] and it’s complex to present a fixed price up front”.

A drawback with optimized linear flows lies in production inflexibility. Processes, and machines, optimized to work according to a specific method, using a specific type of material with specific dimensions introduce a vulnerability to the production, and an inability to make adaptations into the work process. Experimentation is effectively discouraged, and limited by, how custom machines are adapted to current production. Inflexible machines may have restrictions of dimensions of input materials, and what type of materials can be processed. D2 gave an example: “it was a little too thick, or maybe too short, so it didn’t fit the processing machine”

Still a novelty, alternative production methods such as 3D-printing can be used in conceptualizing, and, for manufacturing. However, novel production methods come with drawback of operating cost and slow rate of manufacturing, counting hours for manufacturing of a single piece of furniture. Compared to conventional

manufacturing, D2 said about novel production technologies: ”The production method is expensive both in terms of labor and material costs, and just the electricity to drive this thing.”

Yet with the production inefficiencies inherent in these production methods, the cost of production per piece is steep. Possibility of utilizing alternative materials for processing in conventional production machines is limited by the flexibility and adaptability of the machine at hand. A company open to experimenting with alternative materials may face expensive investments in the horizon to facilitate the processing capability.

5.2.6.3 Furniture as a service (FaaS)

Servitization is a prospect that has a risk of driving increased consumption through customer dissatisfaction or boredom. M6 exemplified a risk with servitization: “The customer can come to you and, like, ‘I’m bored with this interior’ after half a year. And then ‘I want a new one, because I have a leasing agreement’”

Developed services must be simple to use for the user, and there must be a clear benefit in using the service rather than purchasing and owning the product. Actors face challenges in meeting demands for a simple service without having established relationships allowing a holistic service hosted by multiple actors. R2 believed in creating simple solutions to make a circular transition appealing to a broad populace: “It is about lower the bar to get people to change behavior […] if it is complicated, well, then I believe a transition will be very challenging.”

5.3 Drivers and opportunities

While the previous section presented challenges for circular development, the empirical material also showed several drivers and opportunities that may support circularity in the furniture network. The themes presented in this section are not completely separated from the challenges but often represent ways in which actors attempt to respond to them. An overview of identified drivers and opportunities is shown in Table 4.

5.3.1 Longevity as a foundation

A central driver for circularity identified in the interviews is the ability to keep furniture in use for as long as possible. Actors described long product life as a foundation for circular strategies since, as S1 says: “a product is never as circular as

when it is being used". The ability to keep products on the market, in use, and with retained value, is shaped already in the design, construction, and manufacturing

Table 4: Overview of opportunity and drivers in circular transition.

Opportunity / Driver	Main actor involvement	In sum
Longevity as a foundation	Designer, Manufacturer	Durable furniture is an enabler and a prerequisite for circularity allowing for reuse.
Design and storytelling	Architect, Designer, Manufacturer	Timeless design is as important as durability. Stories attached to furniture enhance value retention.
Collaboration across the network	All	Willingness to address market needs collaboratively strengthen capability of providing value for actors.
Circular business opportunities	Manufacturer, Retailer	FaaS allows for a higher degree of product value retention through company responsibility
Economical aspects	Manufacturer	Higher price of furniture overall may reduce consumption rate and prolong ownership.
Procurement and regulations	Architect, Manufacturer, Retailer	Enforcing regulations and stricter tender proposals may force manufacturers to adapt.
Information and traceability	Architect, Manufacturer, Retailer	Transparent furniture data give customers more insight and allow for circular procurement practices

stages. Durability is built into a product through high quality components, reliable materials, and sturdy construction. In this way, quality and longevity create conditions for later circular activities.

A product with high durability is more likely to remain functional after its first use phase, which makes it meaningful for other actors to invest in labor and resources to maintain the product and reintroduce it into use. If the product has retained its structural quality, components can be repaired or replaced, and surfaces can be refinished, allowing for new users and contexts. This means that durability not only prolongs the first use cycle, but it also opens for additional use cycles. In contrast, low quality products might lose their function or value before circular strategies are relevant and economically justifiable. Durability is therefore a key enabler for allowing for value retention and for products to be reused continuously. This was also reflected by M6, who stated that "the very best thing is for products to last as long as possible, according to their purpose".

5.3.2 Design and storytelling

While quality and durability create conditions for circularity, the design influences whether furniture remains relevant, repairable, and attractive over time. Design is therefore a highly important factor contributing to the circular potential. Features such as modularity and material choices can make the product easier to maintain, adapt, and reuse. At the same time, aesthetic design influences whether a product continues to be appreciated for years to come. A product that is technically durable can still lose circular value if it is no longer perceived as desirable in new contexts.

Sustained value is therefore closely connected to design that remains relevant over time. Several actors described how quality furniture is something that can be used by several generations before reaching EOL. M5, for example, described how "quality furniture is kept and inherited over time". Timeless design can therefore function as a driver for circularity by making furniture more likely to be repaired, reused, resold, or passed on rather than replaced. This also connects to the design process itself. Timeless design can be understood as a contrast to trend-driven design, as it aims to remain relevant over time, and D4 states specifically that a "long process is required for a good design", suggesting that design is important for longevity and long-term appreciation of the product.

Storytelling and identity can further support value retention, as reused furniture may gain higher acceptance when it is connected to historical highlights, a certain manufacturer, designer, place, or person. Instead of only being perceived second-hand, the furniture can then be understood as carrying previous value that continues into a new context. This strengthens emotional and symbolic value, which was described in the interviews as an important factor, since it makes customers more willing to accept and care for the furniture.

5.3.3 Collaboration across the network

The interviews indicate that collaboration can function as a driver for circularity when it creates coordination and concrete links between actors. Circular strategies such as reuse, repair, and recycling require activities that are often distributed across several actors. Collaboration therefore becomes important not only as a general principle, but as a way of connecting these activities into functional circular flows. In practice, this means that some companies can take a larger

coordinating role, while others contribute with specific activities, such as repair, refurbishment, or logistics. The important point is that the circular flow needs to be connected, and that each necessary activity is covered by an actor with competence. In this way, collaboration can reduce the expectation that one actor should manage the circular process alone.

Several examples can be found in empirical material. In some cases, reuse actors contributed with inventory, assessment and coordination, while manufacturers contributed with repair and refurbishment. In other cases, intermediary actors coordinated with external providers for similar services. This indicates that circular flows often depend on access to complementary competences outside the individual company.

This makes local networks particularly relevant. Some manufacturers described collaboration with small local businesses as key in circular practices, as these actors can provide competence that would otherwise be difficult to access internally. Local actors can support manufacturers by contributing knowledge and related services. In this way, local entrepreneurs are both an opportunity and a driver for developing and increasing the overall knowledge, competence, and innovation in the wider network. M3 emphasized that local actors are important to their business because of the competence and services they offer.

Collaboration was also described as important in early stages of design, material development, and production. Circularity becomes easier when relevant actors are involved before important decisions affecting circular potential are locked in. Manufacturers will benefit when designers understand production conditions. Material experts and researchers need to be in contact with manufacturers for new materials and methods to be used in practice. Early coordination can therefore enable circular initiatives, when future aspects are considered from the beginning rather than added later in the supply chain.

Intermediaries appear as important actors in shaping demand and spreading circular knowledge through the network. Actors such as interior architects, retailers, and procurement-related organizations often operate between manufacturers and customers. From the manufacturer's side, these actors were described as enablers when they use, specify, and demand circular products.

5.3.4 Circular business opportunities

The key opportunity for circularity is to build quality products that can enable use for decades to come, rather than being replaced after a short period of time. Allowing products to have a long and extendable product life serves also as a driver towards exploring alternative circular strategies to broaden company strategies.

Building on the importance of longevity and retained value, the interviews also indicated that circularity could create business opportunities when furniture is treated as long-term assets rather than a one-time sale. When products remain functional and attractive over time, companies can develop services and business models around this principle. Clear examples of this are reuse actors, whose business model is entirely built on circulating secondhand furniture, but the interviews showed examples of traditionally linear manufacturers also creating beneficial business opportunities around circularity. M7 explains how customers demanding 100% furniture up-time benefit from their offered service of take-back and repair: “we repair their furniture and keep them in good condition”. Similarly, M1 described servitization as something they strongly believe in for the future, indicating that some manufacturers see service-based models as a future customer offering.

Furniture has traditionally been owned by the user, and ownership remains an important part of how furniture is procured. Purchasing products as a fixed asset allows companies to plan future investments. However, interest in leasing as a service-based business opportunity was indicated in interviews. M4 described it as “a good way to retain the value of products”. Regular maintenance included in leasing agreements may reduce the risk of excessive wear and enable repair before products lose function or value. Leasing can also provide flexibility for customers as the amount of furniture can be adapted to changing needs without requiring storage. Responsibility of available, and functional, furniture is shifted away from the user, towards the leasing company e.g. manufacturer or retailer. From a business perspective, leasing may create recurring revenue streams and increase the likelihood that furniture will be returned after use. This allows for greater control over the products during several use phases and may allow the same furniture to be offered to new customers. The same companies also described challenges connected to leasing. For an existing manufacturer, leasing requires new systems for logistics, maintenance, contracts, product assessment, etc. It also requires customers to be open to new forms of access and use, as the habit of owning furniture remains deeply rooted.

A broader company purpose may also contribute to how value is perceived. I2 argued that businesses need a more holistic purpose, stating: "We are to save the environment; that should be our purpose". Product value can be enhanced by the company association. This suggests that circular value can be strengthened when products are connected to company values and a wider sustainability ambition.

5.3.4.1 Economical aspects

Economic drivers for circularity are reflected in principles of incentives and deterrence. Manufacturers share a view on the necessity of increasing value of pre-owned furniture to incentivize repairs. In monetary incentive terms the sunk cost retained in the product should deter from disposal. At the same time the sunk cost creates incentive for facilitating care and repair of the product to retain value. It is found important that the cost of retaining and caring for extant furniture should not exceed the cost of replacing them with new units. A high secondhand value provides alternative circular paths for furniture prolonging life through both repairs, and sales. As long as the value of the furniture is sustained, the economic value of repairs facilitates circular loops of recirculating materials and products focused on the levels of reuse and repair. The business environments can use depreciation tables to appreciate asset value, but M6 says there is an opportunity to adapt depreciation tables to align with circularity practices maintaining and regaining product value: “interior furniture that a company purchases is depreciated in 3-5 years […] interesting to talk about depreciation period for furniture, and how it would be possible to regain value in a product”

A higher price drives incentivization for actions prolonging life, but it is in combination with high(er) quality products looping makes sense economically and environmentally. Higher quality may have the effect of increased product life, reducing the environmental impact due to prolonged ownership and less need for repair. D2 reasons that higher price combined with additional properties signifying an overall higher quality product would have a longer product life: “if you would have a premium price on things, combined with higher quality, better design, and function, the product would not be replaced as often”

Unused products represent an opportunity for increasing circularity. Creating strategic choices to exploit and utilize extant assets is an economic incentive for organizations to reduce wasteful non-use of fixed capital. Both public and commercial

actors can reduce spending in purchasing with a higher degree of utilization of existing furniture assets. T1 believes this issue is a low-hanging fruit for organizations that want to save money: “They have to save money, and they do that in furniture. The circularity aspect is unmistakable. They look in their storage spaces, they begin to see what they already have bought.”

Exploring storage spaces and inventories can produce positive effects in the organization through better use of finances, and can have a minimizing effect of storage space. Less space used for storage allow for repurposing of prior storage areas for expanding valuable organizational functions at low or no cost.

5.3.5 Procurement and regulations

Publicly funded organizations are key players in the procurement of interior design and furniture. Centralized tender processes streamline purchase procedures for government agencies. With support from T1’s work on establishing general agreements, government agencies can reap the benefits by managing agency purchases. The public sector represents an attractive market for manufacturers and retailers, says T1, “Purchasing power in public tender is really strong”. Since the agreements are highly attractive for sellers, they also impose power over what is offered to the customers, and it is in the tender proposals that tougher requirements can be added. Raising the bar for access to public agreements forces change within the industry because suppliers do not want to miss out on the public organization market. A balance has to exist, according to T1, “if they (industry) are to make a transition, the public customer must go in the same direction and vice versa”. The public customer provides economic incentive for industry to change, but incentives must go hand in hand with requirements.

From an industry perspective, the change of direction in the public customers has not gone unnoticed. For example, M2 says “have to reuse in order to […] fulfill criteria and requirements”, which serves to show that manufacturers find it necessary to adapt to still be relevant as a supplier to the public. General agreements for the public may have limited effect as the agreements are optional for agencies to participate in. A greater driver for change is to revise legislation, S1 hints, “Public procurement act is simultaneously the great menace, and the great enabler”.

Legislation both national and European are driving the transition towards circularity through strategies and goals. European legislation is at the forefront of

circular strategy development and already puts pressure on companies to adapt in order to remain competitive, says M1, “The great pull today is European legislation”.

Procurement in all sectors will change as DPP becomes enforced, and it can become a driver for companies to best each other in competition as product data becomes transparent and widely available. DPP is a marketing opportunity as much as it is a driver for companies to present what data the customer demands, and D1 says that it has great potential, “Opportunity for you to be able to study (the data) to see if the product is that good […] it becomes a new way of thinking […] That is, like, a utopia. It’s the best scenario”.

A driver in both the public and commercial sectors is to put forth requirements on maximum levels of emissions that are allowable in projects. Construction projects or smaller scale interior design projects can benefit from having a limit on the levels of emissions. A limit of this kind serves as a sustainability budget, as an addition and a complement to (economic) project budget. By introducing this additional constraint, the project leaders are forced to consider product options more carefully to find a balance of economics and sustainability while adhering to both limitations. M9 suggests implementing a “emission limit”, and believes this would help drive transition effectively, “I think a very simple legislation (saying) that things should have an emission limit would be adequate”.

5.3.5.1 Information and traceability

Environmental aspects, supported by environmental data, were described as an increasingly important factor in what is considered valuable by customers within the context of circularity. In addition to potential monetary savings, reused furniture can gain additional value when its environmental benefits are made visible. Transparent data presentation can drive demand for reused furniture and increase the motivation to repair or refurbish products rather than disposal. R2 stated that data and visualizations can demonstrate the environmental value of reuse and emphasized that clear graphics can help customers understand where and how choosing second-hand products is the most sustainable alternative. Such visualizations help close the gap between conceptual and factual understanding of the benefits of reuse.

Digital product passports were described as potential enablers for creating and communicating such data. S1 says “there is no doubt that the value of things will increase with digital product passports”, referring to possibilities that emerge with

DPP. DPPs may extend what constitutes product value by connecting environmental data with information about materials, origin, and history. Vintage furniture can with historical information find market value reinvigorated, S1 says: “[knowledge of history] suddenly gives value to the chair”. In this sense, digitalization can support a more transparent furniture market, by making products easier to trace and compare. When information is more accessible, it will be easier for customers to make active and informed choices.

However, several actors also emphasized that the value of DPPs depends on how they are developed and implemented. As D3 noted, it is still unclear for industry how DPPs will function in practice. At the same time as they were described as potential enablers, some raised concerns regarding data handling, practicality, and complex administration. S1 mentioned that many manufacturers believe they must have “all data”, which makes DPPs feel difficult to approach. M8 noted that “the traceability needs to be kept at a reasonable level”, highlighting the fact that highly detailed DPPs may become (too) demanding for manufacturers, particularly smaller manufacturers.

6 Discussion

The results show that challenges, drivers, and opportunities for circularity are closely interrelated. What appears to be a barrier in one part of the network may contain opportunities when resources and activities are organized differently. Therefore, this discussion will not separate challenges and opportunities as isolated categories but rather discuss the connected aspects of how circularity is shaped in the wider network.

As the findings indicate, the transition towards circularity in the Swedish furniture industry is not primarily constrained by the actions of individual firms alone, but by how the wider network around the firms are organized. Therefore, concepts from the ARA model are used in this discussion as an analytical lens to examine how challenges, opportunities, and drivers emerge through the interactions between actors, resourses, and activities. By applying the ARA model, discussion moves beyond identifying individual barriers and enablers and instead examines how they are embedded in the structure of the network. In addition, the 4R concept and the multilevel perspective are used to further structure the discussion. The 4R concept is

used to concretize which circular strategies are involved, while the multi-level perspective is used to contextualize the findings across micro-, meso- and macro-levels. A summarizing outline of the fundamental learnings and connections between the ARA, 4R and multilevel perspectives is provided in table 5. Each perspective is developed in the following sections.

Table 5: Overview of analysis of perspectives related to development and implementation of circularity

Discussion subject	Main analytical point	ARA interpretation	4R connection	Level perspective
Keeping furniture in use	Circular potential depends on whether furniture sustains value over time.	Furniture is a resource, but value needs to be activated through activities in the network, including repair, resale, etc.	Mainly reduce, reuse, and repair. Recycle becomes relevant when product life is exhausted.	**Micro**: Product quality and design. **Meso**: Network recognizes and activates value. **Macro**: Norms around reuse affect perceived value.
Coordinating the network	Circularity depends on linking distributed roles and responsibilities across network actors.	Circularity is facilitated when actor bonds, resource ties, and activity links connect complementary roles across the network. Weak activity links can hamper coordination and responsibility allocation	Mainly reuse and repair, since these require coordination in the network after the first use phase.	Mainly taking place on **meso-**level, but is affected by **micro-**level capabilities and **macro-**level demands and regulations.
Creating circular business value	Circular strategies need to become economically and operationally viable long-term.	Strengthened activity links facilitate current relationships to foster and new ones to emerge.	Mainly reduce, reuse, and repair. In the findings business value is mostly connected to slowing existing flows rather than recycling.	**Micro**: Business model **Meso**: Complementary roles and services **Macro**: Market expectations
The effect of regulations on operations and CE popularization	Requirements can support circularity, but only if they align with practical network conditions.	Data, standards, and documentation can become resources, but weak activity links may prevent them from creating circular benefits.	Can support all 4Rs.	**Macro**: Regulations and standards shape conditions. **Meso**: Requirements must be translated into network activities. **Micro:** Firms must implement them in practice.

6.1 Keeping furniture in use

The findings suggest that keeping furniture in use is central, and this is done by quality, durability, lasting design, and storytelling. The circular potential depends both on the products' material properties and whether actors continue to recognize its value over time.

Furniture can be understood as a resource in the network, but its circular value is not inherent or automatically realized. A durable product can contain functional, aesthetic, and economic value, but it needs to be mobilized in the network through activities such as repair, refurbishment, resale, specification, etc. In other words, a durable product does not become circular simply because it is able to last for a long time, it becomes circular when its value is recognized by actors in the network who connect it to relevant activities.

The challenge of value perception therefore shows that resources do not carry circular value automatically. Rather, value is constructed, communicated, and activated through activities performed by actors in the network. Without strong actor bonds, this value may remain unrecognized or fail to be translated into circular activities such as repair, reuse, or resale.

In relation to the 4R concept, keeping furniture in use mainly supports reduce, reuse, and repair. Quality products contribute to reducing the need for replacement and new production. Reuse becomes possible when the product retains enough value to be linked to circular activities. Repair is central, as it can be understood as an activity that activates the resource and makes reuse possible. Recycling is not connected in the same way, as it becomes relevant when the product can no longer be kept in use through repair or reuse.

Keeping furniture in use is shaped across several levels. At the micro level, product characteristics and design elements influence the lifetime of the product greatly, as it will decide if it can physically last an extended period of time. At the meso-level, it is shown that all actors in the network have an influence on whether the products value is recognized, communicated, repaired, specified, and appreciated. At macro level, broader norms affect whether long-lasting and reused furniture is considered attractive and legitimate. These norms shape customer expectations and a wider societal attitude towards reuse, which in turn influences actors' ability to operate at the meso-level.

6.2 Coordinating the network

The results show that circularity depends on coordination between several actors and not only isolated firm initiatives. Circular strategies are distributed across the network, and specific activities are often controlled by different actors. The findings show challenges regarding unclear responsibility, uneven power dynamics, and difficulties in establishing trusted collaborations. Designers and manufacturers can manufacture durable products, and architects can promote circular choices, but they rarely have authority over whether products are actually purchased in the end.

It was also indicated that collaboration becomes a driver when actors connect complementary competences and roles. Circularity is facilitated when resources and activities such as knowledge, competence, customer relations, and logistics are linked across the network. The main challenge is not the lack of circular resources and

activities, but rather missing links between them. This helps explain the unclear responsibilities identified in the findings. Responsibility becomes difficult to allocate when the circular process is distributed across actors without clearly established activity links. No actor controls the full circular flow, yet each actor controls some part that is necessary for it to function. This raises the question of who has the mandate to coordinate circular flows and distribute responsibility across the network. The results are in line with conclusions of Kirchherr et al. (2023) recognizing the importance of multistakeholder alliances in future circular paradigm shift. Emerging relationships on vertical and horizontal planes can be found as crucial components in building a shared network and a connected value chain with supportive collaborations.

Coordinating the network seems particularly important for reuse and repair. Both circular strategies take place after the first use phase, which, as discussed above, usually needs coordination between several actors in the network. Recycling appears less central in the empirical findings compared to strategies regarding keeping furniture in use. Although recycling is a part of CE, Pakuła et al. (2025) noted a correlation between high levels of recycling and consumption, failing to address the problem of excessive resource use. Addressing recycling further, Circle Economy (2022) indicates that recycling is a limited solution that must be accompanied with more high value looping strategies. Our findings may indicate that recycling is less integrated in the studied actor network, and that there is a need for further exploration in this area. Lack of mentions of recycling in empirical data may also indicate that Swedish furniture industry already works with higher levels of circular strategies, i.e. reduce, reuse and repair, while recycling appears less integrated in the business models discussed in the interviews. The findings point to industry's willingness to sustain products in the market for extended periods and a desire to prolong product life with offerings of repairs and replacement parts. Recycling may play a role in enabling material reuse transforming waste into valuable resources as the final stage before energy recovery. Neves and Marques (2022) suggest that material recycling drives reintroduction of resources into the economy. They do not however consider that manufacturers (or other companies using recycled material) require a certain quality of recycled material to be able to use it as resources in production. Our findings show how virgin material in furniture cannot be replaced haphazardly with recycled material due to varying quality and different technical properties. Using

recycled material may thus demand a redesign or reconstruction of a product to compensate for lower technical performance. Yet, recycling material is an important piece for circularity that allows for low-level reuse where high-level value sustaining efforts have been exhausted and should not be ignored in CE transition.

6.3 Creating circular business value

The results show that circularity can create business value when furniture is treated as an asset that can generate value across several use cycles, rather than as a product whose value ends after the first sale. The empirical findings point to several opportunities connected to circular strategies, at the same time as these opportunities are connected to challenges. Circular business models may create tensions with existing business models, where revenue streams often are connected to production and sale of new furniture. Geissdoerfer et al. (2020) give a framework suggesting that transformation is a suitable strategy for transition of core business, and our results align with this developmental pathway. Geissdoerfer outlines alternative improvement strategies that reveal opportunities for additional added circular opportunities beyond current core business by means of diversification. Diversification can serve as a pathway for furniture manufacturers to exploit the opportunity of developing additional business offerings by the concept of structural ambidexterity discussed by (Slack & Lewis, 2024, Chapter 8). Simultaneous efforts for exploiting core business capabilities and exploring novel opportunities bring added flexibility and resilience to the operations. Results also show that customers often expect reused and refurbished furniture to be cheaper, even though activities such as assessment, transport, storage, repair, and other related services require labor and resources. This is not only a micro-level challenge but also shaped by the broader market norms on a macro-level, influencing customer perception, and may serve as a motivation to explore novel business ideas.

Previous research on the Swiss furniture industry shows similar patterns (Kulakovskaya et al., 2024). A key barrier for increasing circularity is the cost-effectiveness of reverse logistics, and the work cost related to refurbishing. Companies already provide services for repair and refurbishment, but have no well-established take-back strategy, nor offer third-party services for customers. Kulakovskaya et al. (2024) show how individual circularity efforts are offered by manufacturers, but how circularity does not work in isolation. Hindered by economic

barriers and resulting in high costs of take-back, manufacturers need more efficient closed-loop supply chains to compete with the cost effectiveness of the linear economy. This relates closely to the findings of this study. Without functioning activity links, circular services risk remaining isolated initiatives rather than scalable business models. From the perspective of ARA, this suggests that circular business value is closely connected to the development of new activity links after the first sale. Circular services require activities that are not always part of traditional production and sales models. These activities need to be connected to resources such as relevant competence, product knowledge, spare parts, storage, and logistics. In this sense, circular services are strongly connected to network coordination at the meso-level, since these activities are extremely difficult to organize as a single actor. Interorganizational coordination is pivotal for circular services to gain market popularity, together with other novel alternatives for penetrating demand and shift market from linearity to circularity. Strategic ecosystem collaboration can be supportive (Mosgaard et al. 2025) in this shift where actors from both within and beyond current network relationships co-develop strategies and jointly invest in growing symbiotic relationships and functional systems for waste management, and efficient logistics services. Involving competitors in exploring novel collaborative business possibilities for a common greater purpose of pushing for circular change can create an environment of coopetition. Coopetition involves competitors that collaborate to pursue a common cause. The common goal can be to advance the market such that a change will bring a greater benefit for society and the actors themselves. Mosgaard et al. (2025) indicate that relying on market incentives to pursue innovation may not be applicable if the market environment does not provide incentives to invest, innovate, and improve. Furniture industry operates in such a market where the demand is not driving the change and is therefore an environment where coopetition has potential to be a driving force complementary to legislative governance.

In relation to the 4R concept, the findings mainly focus on reduce, reuse, and repair. There are most likely business opportunities connected to recycling as well, but these appeared less central for the actors interviewed in this study. The findings therefore suggest that circular business value in this network is primarily connected to slowing product flows by keeping furniture in use, rather than closing material loops through recycling.

6.4 The effect of regulations on operations and CE popularization

The findings show that regulations influencing the network system can both support and constrain circular development. Regulations refer here to industry standards, procurement criteria, certifications, environmental documentation, DPPs, and similar requirements affecting the industry. These requirements can act as drivers by creating demand for circular products, making product information visible, and in other ways to support more informed decisions. Requirements can also become barriers when they are too complex, unclear, or poorly aligned with the practical conditions of the industry, aligned with Uvarova et al.'s discussion identification of challenges as lack of innovation and financial support.

Contrasting empirical results from Hoang et al. (2026) where regulations were not attributed to any significant driving force for CE transition, our results show that regulations are a key driver. Empirical data shows how regulations may shape stakeholder networks by facilitating a common ground for all actors, influencing what activities and resources become important. Hoang et al. explored CE from a developing economy perspective, while Sweden is considered developed. The impact and influence of regulations on societal and commercial interests may be explained by the differences in economic development and in priorities in national governance. Requirements for management of standards, data, and certifications create new activities for manufactures, such as gathering product information, verifying performances, additional documentation, and administration. These requirements can strengthen circularity, but the following additional activities put pressure on manufacturers and require resources in the form of labor and financial capacity. This becomes especially problematic when requirements create complementary activities without alignment to actual circular benefits. If documentation is produced mainly to satisfy formal requirements, but is not used by the actors it concerns, it risks becoming detached from the activities it is supposed to support. Data can exist as a resource, but weak activity links can prevent it from contributing to circular benefits. This points to the importance of actor bonds between those who formulate system requirements and those who implement them. With lacking dialogue and shared understanding, requirements become poorly aligned. Strong actor bonds between the actors will therefore support alignment between macro-level ambitions and capabilities on an organizational level. Geographical proximity of actors suggests

improved capabilities of collaboration, aligning with results by Chembessi et al. (2025) showing that regional development is nurtured by collaboration.

This illustrates tension between the macro-level, meso-level, and micro-level. Governance is often shaped at the macro-level through regulations, policies, and rules to follow. These requirements are meant to apply broadly, but firms' individual conditions differ. Alignment with the micro-level therefore becomes a challenge. The requirements become shared and operationalized at a meso-level, shaping the conditions of the network, which adds the challenge of translating system requirements into coordinated network activities.

The findings regarding lacking arenas and shared forums for meetings and discussions become relevant in this context. Dialogue between actors shaping system requirements and firms expected to operate according to them appears important for overcoming these level-related challenges. Stronger forums for interaction could support better alignment between ambitions, coordination, and implementation.

Together, the four discussion themes show that circular development in the Swedish furniture industry is not enabled by one actor, product feature, business model, or requirement alone. Rather, circularity depends on how product value, actor relationships, activities, resources, business models, and regulations are connected across the network. The findings suggest that circular potential often exists, but that it must be activated through coordinated activities, shared resources, and relationships between actors. This aligns with Wicaksono et al. (2025), who describe joint stakeholder activities as crucial for enabling CE. This means that collaboration facilitates circular strategies when it helps transform isolated initiatives into coordinated circular flows.

6.5 Methodological discussion

Bell et al. (2019, Chapter 3) state four criteria suitable for evaluating trustworthiness of a qualitative study; credibility, transferability, dependability, and confirmability. The credibility of our study is found in the data collected from a multitude and diverse set of actors. Results are compounded from heterogeneous data collected from a variety of actors in disparate professional roles. Through a transparent processing depicted in figure 3, the data was analyzed, summarized, and presented. Our study was geographically limited to companies based in Sweden, which limits transferability of the results. Generalization outside of the scope of

Sweden's distinct business culture, infrastructural practicalities, geographical consolidation of companies to certain regions, and social maturity in use of digitalized solutions is unreliable. Transferability may be possible to countries in the Nordics sharing commonalities in societal function and cultural expression. The results may in part find applicability in similar industries in Sweden, outside the context of furniture manufacturing. The dependability of the study is supported by the transparent description of the research process but should be understood in relation to the changing context of circular transition. The findings are likely to remain relevant as long as the furniture industry continues to face similar challenges related to circular transition. Our results will continue to be dependable if current linear business practices continue to dominate. The authors have, to their best intentions, avoided personal subjectivities. The intention of the research design, and what is presented in the results and discussions was to give a center of attention to the empirical data collected from interviewees. Our experiential approach was intended to find value in empirical data and interpret the data systematically and transparently. The methodology is transparent, traceable, and may be auditable or replicable using the authors collected raw empirical data from the interviews.

7 Conclusions

This study aimed to explore how Swedish furniture manufacturers and relevant network actors experience circular strategies, with a focus on challenges, opportunities, drivers, and collaboration. More specifically, the study examined how relationships between actors can support or limit circularity in the observed network. The main conclusion is that circularity is not mainly limited by individual firms' willingness to become more circular, but by whether resources, activities, and system requirements are connected in a way that makes circular flows possible.

In relation to RQ1, the study shows that actors in the network experience challenges across several areas: acceptance and value creation, knowledge and information gaps, coordination across the network, market conditions, product properties, and operations and logistics. Together, these challenges show that circularity is not limited by one isolated barrier, but by several interrelated issues that influence how circular strategies can be valued, understood, coordinated, and implemented. Contrary to barriers, we identified drivers and opportunities regarding circular development. These are connected to longevity as a foundation, design and storytelling, collaboration across the network, circular business opportunities, and procurement and regulations. Together, these findings suggest that circular development can be supported when furniture retains value over time, when this value is recognized and communicated by actors in the network, and when market and system conditions make circular alternatives practically and economically possible.

In relation to RQ2, the findings suggest that collaboration may facilitate the development and implementation of circular strategies when actors are able to combine complementary resources, competences, and activities. Manufacturers, architects, retailers, reuse actors, procurement actors, and support actors all contribute with different capabilities that become valuable when successfully connected across the network. Circularity does not require one actor to manage the entire circular flow alone. Instead, different actors contribute with complementary roles and business models that together make repair, reuse, refurbishment, redistribution, and other circular activities possible. This suggests that actors may benefit from shifting their perspective from what their own firm can do in isolation, towards what function their firm can fulfill in the wider circular network. In this sense, collaboration facilitates circular strategies when actors identify where they can create value in relation to

others, and when these complementary roles are connected into functioning circular flows.

The ARA perspective helped us explain circularity as a network issue rather than solely a firm-level issue. The findings suggest that resources such as product knowledge, repair competence, logistics, and existing furniture often already exist within the network. However, these resources do not automatically create circular outcomes. Instead, circular value is created when actors, resources, and activities are connected through business relationships.

The multi-level perspective helped us understand the tensions that arise between different levels of the system. The findings suggest that firms may have the willingness and capability to work with circular strategies at the micro level, while implementation is constrained by weak coordination at the meso-level or by macro-level conditions such as market expectations, procurement practices, and regulations. The findings therefore suggest that alignment between levels is an important condition for circular development.

7.1 Theoretical contributions

This study contributes to research on circular economy in limited, specific, settings (see for example Kulakovskaya et al., 2024; Re & Magnani, 2023; Uvarova et al., 2020; Chembessi et al., 2025). As with other context-specific studies of applied circular economy, the findings should not be understood as statistically generalizable. Variability in business culture across regions, countries and continents makes for a diverse set of complementing studies a necessity in inferring generalized conclusions. The study addresses a need to understand how Swedish furniture industry experience and acts in regard to increasing demand for CE transition, contributing by relaying experiences and insights from industry. The study contributes by increasing and strengthening knowledge in the attitudes of CE in a Swedish setting with SMEs in focus. We hope that our work will benefit the future of circular development and may bring clarity to extant perspectives in industry to advance research further in this field.

7.2 Practical contributions

The study provides practical implications for practitioners and managers in the industry. Collaboration is a key aspect of CE as both enabler and driver. The studied network shows limited inter-organizational collaboration and a low degree of coordination. Collaboration needs to be strengthened both broadly in the network to

create value-chain resilience and to co-develop structured and practical solutions for existing issues. Reverse logistics and take-back systems are currently inefficient, hindering expansion of material and product loops. Individual efforts for take-back and repair exist, but our results show that economies of scale cannot be exploited on an individual company basis. The cost of manual labor and transport is too high relative to possible profit from take-back. As one of the key practical challenges in allowing for CE, the problem of reverse logistics is of importance for actors all across the network. Through coordinated efforts and collaboration with clearly delineated responsibilities reverse logistics may receive increased economic viability. Processes for managing transport can be co-developed, and opportunities exist also for developing technical systems supporting actors in their transition. Manufacturers may need technical support in data management and in digital implementation of DPPs. Decision-support and knowledge databases help motivate businesses to change using internal data to present viability integrating circular strategies in the business. Interior architects may benefit from technical systems providing an easy-access cohesive database on available furniture for reuse. Refurbishment firms, retailers, and extant platforms can support both customers and suppliers by identifying needs and demands for developing FaaS-solutions supporting increased reuse.

Circular furniture is furniture in use. Continuing the practice of designing and producing high quality furniture with lasting, timeless design, manufactured for decades of wear and tear is necessary for allowing furniture to be reused time and time again. Fostering specialized competence in woodworking and material properties is important to meet future demand of furniture repair and to continue a tradition of manufacturing furniture locally, in Sweden.

Knowledge needs to increase for all actors within and outside the network, professional, public, commercial, or private customers. This also points to a need for platforms, forums, or other meeting arenas where actors can exchange knowledge, coordinate responsibilities, and develop joint solutions for circular flows. A greater understanding of the state of Swedish furniture industry today, what political instruments have created status quo, and how regulations affect individual actors, is crucial for appreciating the industry holistically. Recognition of the importance furniture SMEs have on rural Sweden must also be emphasized, appreciating the potential for regional development these actors possess.

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