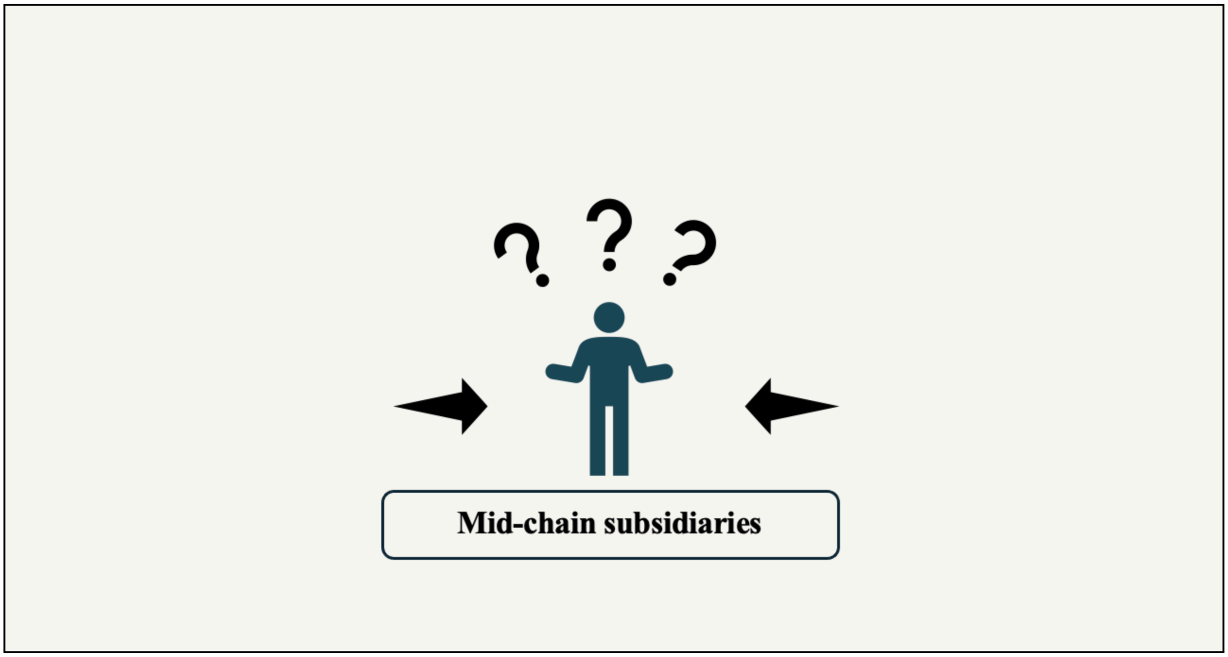

Stuck in the middle of the value chain

The investment company's role in mitigating its subsidiaries' circular challenges

Master's thesis in Management and Economics of Innovation

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Cover:
Confused mid-chain companies due to uncertainties of what the next steps are towards becoming circular.

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SUMMARY
Sustainability is receiving increasing attention, where the latest trend concerns circular economies and business models. Circular strategies are often dependent on the R-strategies, which are methods to become more circular e.g., repair, remanufacture, and recycle. The R-strategies are themself dependent on ownership of the product, and thus more applicable for companies positioned in the end and beginning of the value chain. Hence, companies positioned in the middle of the value chain (which we will call mid-chain companies) lack theoretical strategies and guidance in their circular transition. A parent company can possess different levels of ownership competence, where a higher one can result in more value creation for its subsidiaries. However, it does not include the aspects of neither circularity nor sustainability. Hence, we have investigated what circular challenges these mid-chain subsidiaries experience as well as what role a parent company can take to mitigate these.

We investigated nine subsidiaries which are active in the middle of the value chain and in adjacent markets to the steel industry. The challenges the subsidiaries experience are connected to their position in the value chain and them being a part of a corporate group. Moreover, as there is a lack of academic theories of how to proceed the circular transition for these companies, many experience an insight gap and high uncertainty. In addition, the investigated subsidiaries are SMEs, located in rural areas, and are thus deprioritized by regulating bodies and influential actors. The deprioritization results in a lack of required infrastructure, needed for the circular transition.

Consequently, to extend the ownership competence, to also include circularity, we recommend a parent company to possess four roles: Network Mobilizer, Institutional Builder, Information Hub, and Active Influencer. This is a long-term recommendation which is vital to enable long-term competitiveness. However, to even exist in the future, it is also important to focus on short-term actions such as marketing and knowledge exchange.

Keywords: subsidiaries, parent company, circular business models, sustainability, middle of the value chain.

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Julia Lundstedt & Nora Karlsson Kazeem

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Glossary and definitions

B2B
Business to Business

B2C
Business to Consumer

CBM
Circular Business Model

Environmental Product Declarations (EPD)
The EPDs present a number regarding the environmental footprint the product has had during its process.

ESG
Environmental, Social and Governance

FAQ
Frequently Asked Questions

GHG Emissions
Stands for Greenhouse Gas Emissions, it includes gasses that increase the greenhouse effect and contribute to climate change.

OEM
Original Equipment Manufacturer

Scope 1
Company’s direct emissions.

Scope 2
Indirect emissions from purchased energy.

Scope 3
Emissions from the value chain.

SME
Small and Medium- sized Enterprises

1. Introduction

Most economic systems in the world are currently linear, which is not a sustainable direction to continue with (UNDP, 2023). A linear economy means that companies turn raw material into products, and when reaching the end of their lifecycle, they are disposed of as waste. One method to minimize societies' waste and raw material usage, and to prolong both products' and raw materials' lifecycles is to transform economies into becoming more circular. Circular business models can have both economic and sustainable benefits by reducing the use of raw materials, creating new revenue streams, extending the product's lifespan, or closing the supply chain (Lüdeke-Freund et al., 2018). Circular economies are to reconsider how resources are used in a system (Bocken et al., 2016). The goal with circular systems is to get businesses to use resources in a more sustainable way, where the resources can be viable for a longer time by e.g., prolongment or recycling. Becoming more circular is essential to fight climate change as many resources are finite, and extraction and usage of materials stands for 70 percent of GHG emissions globally (UNDP, 2023).

Furthermore, in 2023, industrial companies accounted for one-third of Sweden's total GHG emissions (Naturvårdsverket, 2023). Thus, it is inevitable that companies' environmental sustainability initiatives can contribute to a positive change. Many regulatory bodies have incorporated sustainability measures and agreements that obliges companies and countries to reduce their emissions, which further shows that companies' can aid the negative climate trend. These initiatives e.g., the European Corporate Sustainability Reporting Directive (CSDR) law, obliges companies to disclose its environmental impact (European Commission, n.d.). Consequently, due to the increasing transparency, the pressure intensifies on companies to reduce their footprint to avoid damaging the business' brand and reputation. The more companies that become circular the better for the environment, which is why we have focused on investment companies and how they can facilitate their subsidiaries' circular transition.

An investment company can be seen as a network of actors in the form of subsidiaries, which are in most cases, financially controlled by its parent company, meaning they often work towards a common strategic direction and goals (Lexchart, n.d.). There exist many theories concerning the role of the parent company, but most focus on the traditional governance role e.g., ownership competence as explained by Foss et al. (2020). Most investment companies, acting as parent companies, focus on financial governance and risk limitations by diversification of the portfolio (CFI, n.d.). However, few theories cover the sustainability aspects of a parent company, and a potential complement to the common governance could be to contribute and aid the portfolio companies with its development of circular business models. Furthermore, few sustainability theories concern companies that are positioned in the middle of the value chain - which we will call mid-chain companies. Hence, potential barriers are unclear, and the subsidiaries experience high uncertainty on how they should proceed in the circular transition.

Studying how a parent company can help its mid-chain subsidiaries to innovate its business model to become more circular, sustainable, and attractive to customers, while ensuring and enhancing profitability, can provide incentives and tools for other investment companies to imitate. Therefore, it is of interest to study subsidiaries' resources, capabilities, and challenges to potentially enhance or change its current business models to become circular. Additionally, the role of the parent company needs to be investigated to enable identification of where and with what it can help its subsidiaries.

1.1 Aim and research questions

The aim of the study is to investigate the implementation of circular business models into subsidiaries positioned in the middle of the value chain. The research regards how circularity is currently included in the business models to help identify what potential challenges exist that hinders the integration of it, and how a parent company can mitigate these challenges.

To achieve our aim of the study the following two research questions have been developed:

RQ1: What are the key challenges of integrating circularity into the business model of a company positioned in the middle of the value chain?

RQ2: How can a parent company promote and realize circularity in the business models of companies positioned in the middle of the value chain?

1.2 Delimitations

The subsidiaries we are investigating are owned by the investment company Storskogen. As it has three business areas containing a total of 136 companies, the report will be limited to the industry area as well as to companies working with steel. It is motivated by the fact that this business area consists of companies involved in the Swedish steel industry and, due to the project having a limited time frame, similarities and differences could be identified more rapidly between the steel companies. In addition, when discussing sustainability, the word is often connected to ESG, standing for Environmental, Social and Governance. However, in this report the word sustainability is limited to the environmental aspect only.

2. Theory

The following chapter is divided into two sections starting with the role of a parent company. This section contains theory regarding a parent company's role, ownership competence and platform businesses. Thereafter, a section describing circular business models is presented containing narrowing, slowing, and closing business models, business models divided by R-strategies, servitization, and a chapter regarding companies positioned in the middle of the value chain.

2.1 The role of a parent company

The role of a parent company is to create more value for its subsidiaries than what its rivals can, if it does not, there is no purpose of the ownership, this is termed Parenting Advantage (Campbell et al., 1995-a; Goold & Campbell, 2002). What type of control and how much is exercised over the subsidiaries differ from company to company, but a common division of governance is: Strategic Planning, Strategic Control and Financial Control (Campbell et al., 1995-a). The fit of the different governance styles depends both on the subsidiary and the parent company. Campbell et al. (1995-a) mentions four ways a parent company can create value for its subsidiaries. The first way is to improve the performance of an individual subsidiary by e.g., setting targets and controlling it financially. Secondly, the parent company can establish better links between the subsidiaries. The third method is if the parent company can create more effective cost and functional management by centralizing overhead functions. Lastly, the parent company can create value by changing its own portfolio configuration, divesting, and investing in new and increasing the competitiveness of the existing ones. Hence, one could argue that the role of the parent company is to ensure its subsidiaries' survival.

To ensure survival, competitiveness, and relevance in the future, companies need to rejuvenate (Fredberg & Pregmark, 2018). Additionally, the current increasing pressure towards sustainability further requires companies to adapt to maintain their competitive advantage (Nidumolu et al., 2009; Wirtz et al., 2016). However, the transition towards becoming more sustainable is often dependent on innovation within the organization (Benn, 2022), which can create managerial challenges for the organization and the leadership (Fredberg & Pregmark, 2018; O'Reilly & Tushman, 2011), and thus also for the parent company. Innovation and ensuring relevance can create challenges as it requires companies to simultaneously exploit its core business and explore existing and future opportunities, termed ambidexterity (Fredberg & Pregmark, 2018; O'Reilly & Tushman, 2011).

However, managing innovation is not the only challenge, change itself has difficulties due to e.g., inertia and organizational culture (Fredberg & Pregmark, 2018). To succeed with change, leadership has an essential role, e.g., change usually requires leaders to set a clear vision and direction (Smith et al., 2010). Setting an overall clear vision and goals, that includes both the paradoxical strategies, can enhance employees' motivation. Another factor that can stimulate encouragement and commitment to change is to enhance the sense of purpose, which is also the managers' responsibility (Quinn & Thakor, 2018). If employees feel a higher sense of purpose, they will further understand the strategy and direction of the company and be more prone to think innovatively and make unexpected contributions due to e.g., increased collaboration and learning. Lastly, to ensure survival of the company, leaders need to establish a sense of urgency, to challenge the status quo of the company and convince the employees that change is needed (Fredberg & Pregmark, 2022, Kotter, 1995). Therefore, since a parent company needs to ensure its subsidiaries survival (Campbell et al., 1995-a), and as change and good leadership is a big part of survival (Smith et al., 2010; Fredberg & Pregmark, 2022, Kotter, 1995), the difficulty with change is also a challenge for the parent company.

Nevertheless, there also exist conditions for when a parent company can successfully create value for its subsidiaries (Campbell et al., 1995-b). First, the parent company can only add value if the portfolio contains "business opportunities", i.e., the subsidiaries are not performing at its optimum level. Second, the parent company must possess resources or capabilities that will add value to its subsidiaries, for example to improve its performance. Third, it is vital that the parent company has a thorough understanding of the business success factors to be able to create value. This understanding often develops over time and is fully conquered when the subsidiary has experienced a complete economic cycle. Successful parent companies are often characterized by having unusual insights regarding parent opportunities and through these insights create value for its subsidiaries. They also possess certain resources and skills, often superior to other similar parent companies, which fit well with these insights. Lastly, successful parent companies set up criteria defining which business fits in the portfolio, since they are aware of what businesses they can or cannot create value for.

2.1.1 Ownership competence

The term ownership competence refers to the skills with which the assets owner exercises matching, governance, and timing competence (Foss et al., 2020). By possessing superior skills regarding what to own (matching competence), how to own (governance competence), and when to own (timing competence), it will result in economic value. The matching competence is concerned about the owner having the capabilities to identify opportunities regarding valuable resource combinations. The combinations are identified to e.g., solve a unique problem or to achieve an intended and specific purpose. The governance competence requires skills in the form of acquiring the right management, applying budget, reporting policy, and implementing incentive programs in the form of stock-shares. In other words, maximizing the value creation with skills in applying appropriate incentives. The timing competence involves the skill-set of acquiring or divesting under- or overvalued resources and the capability in assessing if the current owner is still relevant and creates value. If the owner does not create value for a subsidiary, that subsidiary should be divested.

It is not unusual that individual owners have different levels of each competence (Foss et al., 2020). For instance, family offices often lack governance competence, and this is reflected in their difficulties of acquiring outside managers. Therefore, complementing a lacking competence by accessing it externally is an alternative to strengthen a business' value creation. However, the competences can be acquired through experience since they all are learnable. For example, experienced individual owners have shown higher levels of ownership competence.

Moreover, ownership competence's ability to create value depends on its context (Foss et al., 2020). One aspect concerns the ownership concentration, meaning, when the owner possesses a minority equity position it results in less influence and a constrained position to apply ownership competence. However, being a majority equity owner and not possessing ownership competence have also shown to decrease the value creation. The authors therefore conclude that a higher level of ownership concentration results in positive effects on competent owners. Another contextual aspect is that ownership competence depends on the subsidiary's location in its lifecycle. An enterprise located in the early stages of the lifecycle are more in need of matching competences due to the uncertain future value creation. In contrast, an enterprise currently located in the growth phase requires governance competence. While a maturing enterprise needs to consider resource allocation or divestment and therefore requires timing competence.

Environmental uncertainty also plays a vital role for the ownership competence (Foss et al., 2020). Uncertain environments require matching competence in terms of relying on judgment and intuition regarding business decisions, where the situations are unique and enforce subjective views regarding the firm's optimal strategy. Moreover, uncertain environments require governance competence to establish stability within the firm. For example, monitoring and providing contracts preventing production holdups. Lastly, timing competence is needed in uncertain environments due to resources may yield higher returns when reallocating them. Therefore, from a timing competence perspective, adapting strategic flexibility in an uncertain environment is valuable.

2.1.2 Platform businesses

A platform business is where at least two parties interact, where the parties need something from each other (Rochet & Tirole, 2002). The platform business acts as an intermediary for interaction and creates network effects, where if one party's size increases it has effects on the other party's benefits. A mall is e.g., a platform business, where the mall provides a place for stores and customers to meet (Evans & Schmalensee, 2008). The aim of a platform business is to decrease the transaction costs that would arise if the interaction was done outside the platform. Therefore, in one sense, a parent company could be viewed as a platform business composed of several subsidiaries that are forced to be on the parent's platform. Since they cannot leave the parent company, and thus, neither the platform, there has to be value connected to be owned, otherwise the subsidiary should be divested, as posited by Foss et al. (2020) regarding possessing ownership competence. Hence, theories concerning what a platform business is and how it creates value can aid the identification of a parent company's role.

The types of platforms can be divided in different ways, one division done by Hagel (n.d.) is to divide them into *Aggregation platforms*, *Social platforms* and *Mobilization platforms*, with a potential new one called *Learning platform.* The division is because these four different types have different goals and focuses. An *Aggregation platform's* goal is to help actors to connect with the optimal resources they need, thus the platform is more focused on transactions and tasks. Therefore, it is common that these platforms use hub-and-spoke models to facilitate interactions. *Social platforms* instead have a goal to accumulate individuals that can create long-term relationships with each other. Hence, a model suitable for these kinds of platforms is a network of relationships. A *Mobilization platform's* goal is to assemble and organize actors to move together to achieve a shared goal. In this case, the actors are seen as static, where they own a specific configuration of assets. Thus, a model used for these platforms are process networks e.g., supply networks. Lastly, *Learning platforms* focus on aiding learning, where the actors are not seen as static but instead dynamic as they can learn and change. *Learning platforms* are dependent on trust-based relationships that facilitate tacit knowledge sharing.

Some common goals companies have with using platforms is e.g., growth, performance improvements, innovation and shaping strategy (Hagel, n.d.). Growth arises by leveraging other platform actors' capabilities and increasing the customer value. Performance improvement stems from that a company can outsource activities and thus get more time to focus on its core business. By using a diverse platform companies can also access new ideas that can aid innovation. Lastly, a platform can mobilize the actors in the ecosystem to fundamentally change how the market works, also termed shaping strategy (Hagel, n.d.; Hagel et al., 2008). However, platform businesses have challenges, one important is e.g., how to fairly divide the captured value between the actors on the platform (Hagel, n.d.). It is not uncommon that platform businesses squeeze one company's margins to increase it for another.

2.2 Circular business models

Business models can be used as a managerial tool, where the model illustrates an overview and presentation of the company, its business and how it generates revenue (Wirtz et al., 2016). Moreover, business models determine the architecture of the business strategy and future direction (Bocken et al., 2016). It can also be disaggregated into a set of activities or transactions (Zott & Amit, 2010). The activities included in the business model can have substantial implications on the company's performance e.g., by affecting capital expenditures, margins, prices, competitors, and customers. Additionally, different business models lead to different outcomes regardless of companies having the same operations (Bocken et al., 2016).

When discussing business models, a common one used is the business model canvas (BMC) (Osterwalder & Pigneur, 2009). It contains nine building blocks who cover the main areas in a business such as offer, customers, financial viability, and infrastructure. The model is designed with a market perspective on the right-hand side, product on the left-hand side, and the value proposition dividing the two in the middle (Ching & Fauvel, 2013). Its design is meant to create discussion, mapping and innovate new business models.

However, as explained by the dominant business model logic, once the business model is set, many companies face difficulties changing and adapting it (Bocken et al., 2016). The dominant business model logic can also be compared by the more common theory of inertia, which also explains the challenges companies can experience whilst encountering changes (Zott & Amit, 2010). Moreover, business model innovation is the concept of reinvention of a company's business model (Wirtz et al., 2016). Although business model innovation can be difficult for companies, it can be a necessary response to external or internal changes that threaten the sustainability of a company's competitive advantage.

Additionally, transitioning from a linear business model into a circular business model (CBM) has many barriers both external and internal for manufacturing companies (Pieroni et al., 2020). Externally, CBM has not been widely adopted primarily due to regulations, the preference of customers, and the limitations of infrastructure. Internally, the companies lack capabilities required for CBM innovations. To succeed with the transition, manufacturing companies need e.g., guidance, evidence of successful cases and knowledge. Evidence could be in the form of best case practices which are necessary to decrease uncertainties that block the transition. It could also be beneficial to prioritize resource inefficiencies and waste.

The aim and benefits of circular economies is economic growth by reducing material costs, decreasing dependence on suppliers, creating work opportunities and new businesses, simultaneously as decreasing negative environmental effects (Kalmykova et al., 2018). Circular economies rely on companies utilizing circular business models (Lüdeke-Freund et al., 2018). According to Lüdeke-Freund and colleagues' typology there are more than four million design combinations of circular business models. However, these business models often include refurbish, repair, recover, recycle, re-use, remanufacture, repurpose, reduce, rethink and refuse; known as the 10 R-strategies (Morseletto, 2020).

2.2.1 Slowing, closing and narrowing business models

The aim with circular economies can also be explained as a method to maximize the value of the resources, either by slowing, closing, or narrowing resource flows (Bocken et al., 2016). Slowing resource flows means to prolong the product's lifecycle by e.g., designing for repair and remanufacturing. Closing means to bind together the spill and end stage of the product's lifecycle with the input stage of the production. Lastly, narrowing resource flows is to use less resources as input, thus increasing resource efficiency. However, narrowing resource flows does not incorporate the time dimension of resources. Consequently, using fewer resources can result in speeding up the usage and contradict the intended sustainable benefits.

Business models aiming to slow down the resource flows can be divided into four different models (Bocken et al., 2016). The four models are: *Access and Performance*, *Extending Product Value*, *Classic Long Life* and *Sufficiency*. *Access and Performance* refers to business models that offer a service or capability to users without requiring physical products. The business model enables companies to exploit opportunities created by circular economies that are not present in linear ones. With this business model companies create value by taking over ownership of services such as maintenance, to minimize the frictions the customer experiences. The value is captured by debiting the customer per service used. Hence, the cost of selling less products is offset by adding new revenue streams and fulfilling a broader scope of customers' needs.

Extending Product Value focuses on the products' residual value, e.g., a company takes ownership over remanufacturing or repair activities (Bocken et al., 2016). By remanufacturing the product, the company can extend its lifecycle and offer its customer upcycled products but often for a more affordable price. The company can capture value by decreasing material costs. However, remanufacturing and repair requires the company to have reverse logistics capabilities (Lüdeke-Freund et al., 2018). The third business model Bocken and colleagues (2016) explain is the *Classic Long Life*, which emphasizes the need to design for circularity e.g., for durability and repair. The value proposition and value creation are generated through offering customers products with prolonged lifecycles and access to services. In this case, the company often captures value by taking an initial premium price on the product. The last business model, *Sufficiency*, is like the *Classic Long Life*, where companies aim to reduce consumer consumption by producing products that are durable and complementing its offer with services.

According to Bocken and colleagues (2016), business models aimed at closing the resource flows can be divided into two types: *Extending Resource Value* and *Industrial Symbiosis*. *Extending Resource Value* concerns gathering resources that usually are considered as waste and transforming these into new valuables. By focusing on the residual value of the products, customers that are e.g., more interested in green alternatives might find these products more valuable, simultaneously as the company can decrease its material costs. Moreover, *Industrial Symbiosis* focuses on transforming output deemed as waste as input for a different process. Hence, the company can reduce its costs and create new businesses. The business model is however dependent on closeness in locations.

Nevertheless, to become circular requires companies to think innovative and rethink how value can be captured in the value chain, which can be a challenging task (Lüdeke-Freund et al., 2018). Circular business models can be considered to be a radical change, that is of strategic fit given that the company is pursuing a radical innovation. Regulating bodies have created initiatives to enhance companies' incentives to become circular e.g., EU's Circular Economy Action Plan (Calisto Friant et al., 2021). Some aims of the action plan is to reduce waste e.g., by forbidding it to go to landfill given it can be recovered or recycled, but also to reduce plastic and packaging usage. Another action is to require EU member states to develop programmes aimed to prevent waste, these programmes shall include e.g., creating initiatives for designing for durability, offering repair, limiting usage of critical raw materials and hazardous substances. Calisto Friant et al. (2021), however, emphasizes some critics against the initiatives, as it tries to combat the consequence instead of the cause, and focuses rather on sustainable growth than on the environmental footprint e.g., limiting waste instead of overconsumption. To create more effective initiatives that incentivize companies to become circular and help reduce the EU's ecological footprint, Calisto Friant et al. (2021) further mentions there may be a need for both more targets in more critical areas as well as mandatory ones.

2.2.2 Business models divided by R-strategies

The different R-strategies can be analyzed separately, see figure 1, it shows that the services differ in the degree of circularity and the ones higher up in the figure should be prioritized to maximize the positive effect on the environment (José et al., 2017). Circular business models can also according to Lüdeke-Freund et al. (2018) be divided into R-strategies segments i.e., *Repair & maintenance, Reuse & redistribution, Refurbishment & remanufacturing, Recycling,* and *Cascading & repurposing*. The first three business models focus on the prolonging of a product's lifecycle, the remaining ones focus more on reusing waste materials in the production chain.

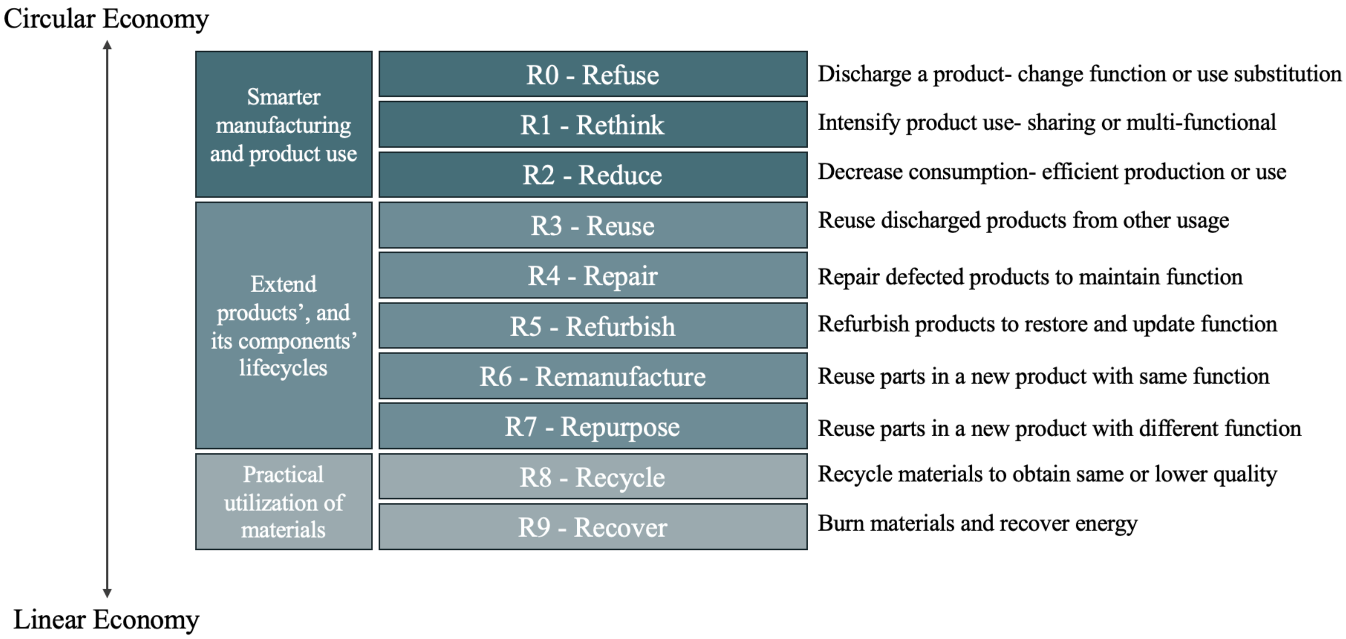

Figure 1: R-strategies' prioritization, inspired by Gaasbeek and Valencia (2018).

The *Repair & maintenance* business models contain the view of prolonging a product's lifecycle through offering repair and maintenance services (Lüdeke-Freund et al., 2018). For an OEM the business models result in offering warranties or additional services whereas for a non-OEM it functions as a stand-alone offering. The business models reflect a possibility of co-creating value with its customers and offering superior product experience instead of selling more products. However, a precondition for these models is that the products must be e.g., designed for dis-/re-assembly. The proposed value creation is how it reduces customers' need of purchasing new products and instead extend the lifecycle of the already produced ones, hence, leading to e.g., decreased virgin material costs. Other potential upsides are additional revenue streams when services can be extended to third-parties, enhanced reputation, and reduced waste handling costs. Nevertheless, concerns regarding if the revenue models can hold in the long-term are brought to light by the authors due to the uncertainties of having premium prices or service-contracts.

Moving forward, the *Reuse & redistribution* business models contain the value of enabling access to used products (Lüdeke-Freund et al., 2018). The products are market evaluated when purchased and if needed they can be modified or improved. Thereafter, a marketplace is created for these products, a concept which can both be pursued by OEMs e.g., creating their own platforms, or non-OEMs who can adopt a stand-alone offer. However, adopting such a concept requires the need for a reverse supply chain either by the OEM or a third-party. The proposed value for the customers is lower prices and prolonged access to products, and for the OEMs the value is less virgin material required and substitution for new products. Also, new customer segments and revenue sources can be identified with these models due to re-selling the product during several occasions. The main difference between the *Repair & maintenance* and *Reuse & redistribution* business models is that the latter one focuses on providing access to other products and not only extending the life of the already owned ones.

According to Lüdeke-Freund et al. (2018) the *Refurbishment & remanufacturing* business models are a combination of the previous two presented. As the models' goal is to improve the physical state of products and components, it requires technical and logistic capabilities such as establishing a reverse supply chain. If these capabilities are possessed the value proposition results in the customer using familiar products with "as-new" quality, which can increase the resale value. Another value distinguished is when customers "donate" its products back to the OEMs, resulting in free resources to remanufacture which entails less use of virgin materials, and the customers not having to handle their own waste. However, argumentation regarding the business models contribution, of reducing or slowing waste materials process and sparing natural resources, is countered by the argument of additional energy usage needed when implementing such business models, and that the entire lifecycle needs to be considered to understand the full environmental impact.

Recycling business models are heavily based on down- and upcycling to create value (Lüdeke-Freund et al., 2018). Downcycling refers to converting used materials into new ones with lower value, whereas upcycling increases the quality of the material and its functions. To implement a recycling model thorough knowledge regarding material science and product design is required and especially when products are composed of a variety of materials. If lacking, the models are difficult to implement due to its idea of regaining the base materials in the products. However, if implemented it can result in lower purchase of virgin materials and less use of natural resources, since it is substituted by waste material, resulting in lower production costs. The value proposition in these models is either green input, recycled materials used to produce new products offered by waste collectors, or products offered by manufacturers using recycled inputs. Another upside is the use of disposed materials and products which otherwise would have resulted in waste.

Finally, the purpose of *Cascading & Repurposing* business models is to create value through regaining the biological nutrients in waste, used materials and the product (Lüdeke-Freund et al., 2018). The models can offer a variety of green inputs and products and is a result of the models' ability to offer multiple and interlinked value propositions, and repurposing materials to different usage. To enable these value propositions, it often requires new and innovative collaboration between actors e.g., H&M cooperation with I:CO who handles H&M reverse supply and textile recycling chains. Similarly, to the *Recycling* ones, these models result in lower virgin material usage. However, these models provide a potential of higher efficiency and effectiveness due to the ability of adding additional cascades. Currently, the focus relies heavily on biological nutrient cycles, however, the authors also mention the future potential in technical nutrient cycles e.g., batteries', in electrical vehicles, potential of cascading and repurposing.

2.2.3 Servitization

Servitization is defined as businesses incorporating services into its business model to add value to its customers (Vandermerwe & Rada, 1988). In other words, the distinction between goods and services have faded and the customer offerings are bundled into packages containing goods, knowledge, support, services, and self-service. Vandermerwe and Rada (1988) coined the concept of servitization in 1988 where the authors saw a shift from traditional businesses, focusing solely on the product, to businesses incorporating services into its offerings. The shift toward servitization was partially driven by external forces such as globalization, technology, and deregulations, all of which contributed to an increasingly competitive landscape. Also, the customer is largely driving the servitization transition due to the shift from focusing on customer needs to customer relationship instead. For companies, innovating services is often driven by incentives such as growth and differentiation (Vargo et al., 2024).

The benefit of servitization is its possibility to be used as a competitive tool (Vandermerwe & Rada, 1988). Servitization can create barriers to competitors, third-parties, and customers through creating customer loyalty, offering what in a traditional business would be offered by a third-party is removed. Moreover, servitization can act as an enabler for circular business models (Lüdeke-Freund et al., 2018). It aims to provide functionality for the user (Tukker, 2013), which is also the aim for the R-strategies used in circular business models (Lüdeke-Freund et al., 2018). Hence, services and the R-strategies entails prolongment of the product's life and functionality.

The challenges with servitization include competing with new businesses, and could result in competing with its customer, its suppliers, or with other industries (Vandermerwe & Rada, 1988). Furthermore, the transition towards servitization, see figure 2, for goods-dominated companies can be difficult as it often requires pursuing an ambidextrous strategy (Oliva et al., 2012), as servitization is continuous and requires a tradeoff between services and products (Neu & Brown, 2005). One of the challenges with an ambidextrous strategy is to balance this tradeoff between the paradoxical strategies, e.g., by determining the appropriate organizational structure for it (Oliva et al., 2012; Fredberg & Pregmark, 2018).

Figure 2: The Tangible Goods-Services Continuum inspired by Neu and Brown (2005).

Increasing the importance of service in a company's value proposition is also linked to service innovation (Vargo et al., 2024). In service innovation, digitalization is an important part and entails that service ecosystems are created by a network of actors. As the development of service innovation is dependent on collaboration, and thus value co-creation within the ecosystem, it is highly affected by social structures i.e., institutions. Institutions create structures in terms of e.g., norms and rules which determine how the actors within the ecosystem collaborate, innovate, and behave. To succeed with digital service innovation, actors need to exploit institutional frictions, i.e., take into consideration the whole system, its interdependencies, norms, and regulations. Secondly, it requires actors to change their mindset, e.g., incentivizing exploration and experimentation. Lastly, the ecosystem needs to be transparent and encourage collaboration to have the preconditions for resource sharing within the value chain e.g., by having common standards and a co-creative culture. This collaboration is also emphasized by theories regarding circularity and thus, further discussed in the following chapter.

2.2.4 What is a mid-chain company and is it forgotten?

A company positioned in the middle of the value chain can be defined as a subcontractor. A subcontractor's role is to undertake a part of a project or product and is often based on a contractual agreement (Hayes, 2024). They are often hired due to their expertise or the lower costs in comparison to producing it in-house. Hence, a subcontractor does not possess any control of the end-product. However, the circular literature suggests strategies, hinders, and possibilities which are often dependent on companies possessing control over the end-product. For example, a majority of R-strategies is dependent on product ownership due to the requirement of reverse logistics capabilities (Lüdeke-Freund et al., 2018). Similarly, slowing, closing and narrowing business models emphasize the same requirements (Bocken et al., 2016), which is not surprising as they are dependent on the R-strategies.

In line with the previously mentioned requirements, Mont et al. (2006) e.g., investigated a B2C producer's ability to implement a product-service system, and specifically the possibilities of implementing a leasing model for the product. The goal with the leasing is to take back the product to restore it to “as-new” quality, and therefore the R-strategies such as repair are automatically needed. Moreover, Govindan and Hasanagic (2017) explains how one barrier for implementing circularity is not including the entire value chain and where literature for these subcontractors is lacking.

Transitioning towards circular strategies requires to both consider the consumer and the waste-phase when developing a product or service (Gaasbeek & Valencia, 2018). Additionally, phasing out waste is at the core of circularity, and it is often found at the value chain end, and this once again proves the lack of literature recognition for companies positioned in the middle of the value chain. It is therefore important with cooperation and knowledge sharing throughout the entire value chain, to enable communication about the product’s state, however, this cooperation is currently lacking. According to Gaasbeek and Valencia (2018), to become circular the entire value chain needs to cooperate, however, there is a lack of clear suggestions and strategies for subcontractors.

Since collaboration is suggested as a precondition, an essential action for the subcontractors is to collaborate vertically, this collaboration will be called vertical integration going forward. There exists extensive literature regarding vertical integration and its ability to enable circular systems (Hansen & Revellio, 2020). The authors underscore that vertical integration can result in higher degrees of closed-loop systems and it does not only consider the recycling strategies but all R-strategies. Moreover, when a company outsources specific components it often leads to open material loops, counteracting the circular transition. This highlights the importance of vertical integration and transparency when other actors positioned in the middle are present in the supply chain. Hool et al. (2022) further emphasizes how companies such as Rolls-Royce have implemented product-service systems, which according to the authors was feasible by having long-term and transparent relationships with the value chain actors. They highlight that vertical integration or implementing long-term contractual agreements can enhance these types of relationships.

3. Methodology

In this section an overview of the study's selected method will be presented and motivated. Starting by presenting the research strategy, sampling method, and context, to obtain an overview of the selected design and method used. Thereafter, methods for data collection and analysis are outlined and discussed. Lastly, the chapter contains a discussion and reflection regarding the method's trustworthiness.

3.1 Research strategy

When conducting research, the researchers are often faced with two main approaches: quantitative or qualitative (Bell et al., 2019). We have selected the qualitative method since this method has an inductive approach, which according to Bell et al. (2019), the theory evolves during the process and where words and images are of importance when collecting and analyzing data. In other words, the qualitative method focuses on understanding how individuals interpret their experiences and how they construct their world (Merriam & Tisdell, 2015). And since this study is of explorative nature, a qualitative method is therefore suitable. It is further motivated by the need for in-depth interviews to understand the subsidiaries' current business models, sustainability initiatives, and collaborations. In addition, a qualitative research method is suitable when exploring the behavior of individuals (Bell et al., 2019), which is relevant as the subsidiaries have control over the business model leading to subjective interpretations and perceptions. Figure 3 below illustrates this qualitative study's main steps and will be discussed later on in this chapter.

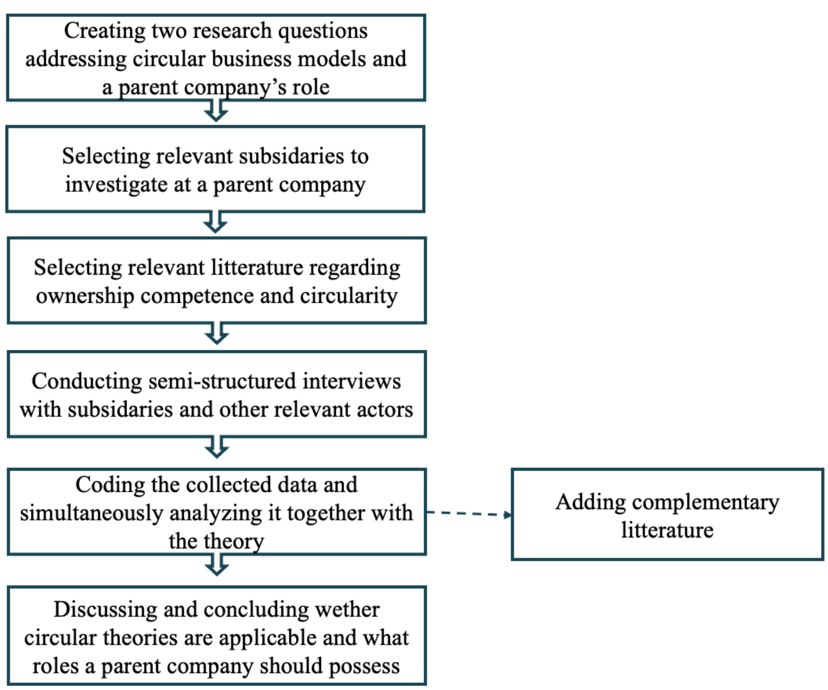

Figure 3: This study's main steps

3.2 Sampling method

Applying a qualitative method, one needs to consider the sampling method used to reduce the sampling error (Bell et al., 2019). In this case, a purposive sampling method was a relevant approach, where specific individuals were strategically targeted due to their relevance to the research questions. Starting off by selecting 9 subsidiaries related to the steel industry and thereafter approaching the CEOs for interviews or other relevant employees. Nevertheless, the selected sampling method limits the study in producing general assumptions due to the sample not being randomly selected and can therefore not represent a larger population.

The sample size in this study included a selected number of subsidiaries involved in the steel industry, with a possibility of extending the sample if other relevant companies can complement or help to achieve a business model more focused on circularity. In this case the sample was extended to include both Stena Recycling, Stena Stål and a few employees at Storskogen. As mentioned previously, the subsidiaries possess different business models and control the enterprises differently, thus, the sample size in our case is valid due to the different cases being compared to each other. Additionally, after the last interviews the content was repetitive, suggesting a theoretical saturation. Thus, the sample size was not too small, which Bell et al. (2019) argues is important in a qualitative study.

3.3 Research context

This study is in collaboration with Storskogen, an investment company. It started back in 2012 and has since then acquired over 130 small and medium-sized enterprises (SME) which have a leading position in its market (Storskogen, n.d.-a). The company focuses on long-term ownership of its subsidiaries with a mission to realize its subsidiaries' full potential and with a vision to become a leading international owner of SMEs. The company divides itself into three business areas: services, industry, and trade, and operates in the Nordics, the UK, Singapore and the Dach area (Storskogen, n.d.-b). The three business areas help diversify Storskogen's portfolio to hedge against economic fluctuations.

One of Storskogen values concerns keeping the entrepreneurial spirit within the subsidiaries after acquisition (Storskogen, n.d.-a). Therefore, Storskogen have adapted a decentralized business model, meaning its subsidiaries remain in the control over business decisions, results, and competence but where the economical governance needs to be adapted according to Storskogen's system. This adaptation is a result of Storskogen wanting to have similar economic systems and presentation to from a better point of view help its subsidiaries in realizing long-term profitability. Besides providing economical governance, Storskogen takes on active roles on the boards of subsidiaries. With its extensive knowledge across several business areas, Storskogen's role also includes acting as a sounding board for the subsidiaries' CEOs and ensuring a business model and a budget is in place.

The sustainability perspective is found throughout Storskogen's business (Storskogen, n.d.-c). It works from the three aspects: environmental, social and governance and helps the subsidiaries to increase and follow Storskogen's sustainability goals by providing education, tools, and network meetings. Within the three aspects several criterions have been identified and assessed regarding its vitality to the subsidiaries. A grading system consisting of *must*, *recommended*, and *nice* has been implemented to address the sustainability aspects and to map what criterions the subsidiaries must, and which ones are preferred to implement into its business models. Currently, circular business models are deemed as a *nice* criterion for its subsidiaries. Therefore, it is interesting to investigate the circular theme in combination with a parent company's role.

Storskogen's portfolio consists of various industries, however, we have selected to investigate the subsidiaries who work in or adjacent to the steel industry. Industrial companies accounted for one-third of Sweden's total GHG emission (Naturvårdsverket, 2023). Furthermore, steel stands for 7 percent of the world's total emission and 5 percent of Europe's emission, steel is therefore one of the world's biggest contributors to GHG emissions (Joint Research Centre, 2022). Therefore, there is a substantial gain in transitioning towards circular business models especially since, according to Axelsson (2019), steel is an infinite recyclable raw material.

The quality of the steel can also ensure that the steel producer is compliant with environmental regulations, although this often also entails higher prices (Tang, 2023). Steel consumers need to manage the tradeoff between quality and price because although steel is a commodity, suppliers differentiate, thus, e.g., doing due diligence on the suppliers, establishing long-term relationships, and actively negotiating with them, can help balancing the tradeoff. Moreover, having a lifecycle perspective on the procurement activity can give a better understanding of why sometimes a premium price can be more beneficial in the long term.

3.4 Literature review

In our case, the literature review process was iterative, and where we narrowed down the theoretical framework needed for the study, which is in line with Merriam and Tisdell (2015) views. Moreover, the literature review led to insights of "what is already known about the topic;", "what concepts and theories have been applied to it;" and "what research methods have been used to study it;" who Bell et al. (2019, p. 8) points out is important when conducting qualitative research. Lastly, the process led to a theoretical framework divided into two sections: the role of the parent company and circular business model.

3.5 Data collection

During the study the data collected was both from primary and secondary sources. The secondary data consisted of materials from Storskogen such as the subsidiaries business plans, sustainability reports and other vital documentation. This data was mainly used to generate an understanding of the subsidiaries current situation and created a base to answer the second research question. Moreover, secondary data such as articles from Scopus also contributed to the background knowledge for answering the research questions. The primary data collected consisted of semi-structured interviews (SSI) which helped to gain insights into potential challenges for environmental initiatives in the current business models.

The method is suitable for this study as the subsidiaries have separate business models and knowledge. Thus, the study needed a flexible method where the interviewees were allowed to divert from the script when required to. This aligns with the purpose of semi-structured interviews, which is to withdraw subjective responses to particular situations an individual has experienced (McIntosh & Morse, 2015). Moreover, it is a method used when objective data regarding the situation is accessible but subjective knowledge is missing. While the SSI method is flexible an interview guide was created consisting of a workshop activity regarding mapping out the interviewees' business model by using the business model canvas template, see figure 4, followed by two sections with a total of 18 open-ended questions first focusing on the firm level, i.e., the first research question. The second section included Storskogen's role as a parent company, connecting to the second research question. For example, questions such as "How does your company include environmental sustainability in its business model" and "Does your company collaborate with other subsidiaries within Storskogen". It is important that the questions are of open-ended nature, otherwise it is difficult to generate a discussion (McIntosh & Morse, 2015). To reassure that the interview guide would generate answers and had a reasonable length of circa one hour, a pilot-test was conducted with the CEO of Link, a subsidiary of Multiconsult, in the middle of February. The interview guide can be found in Appendix A. Other semi-structured interview guides were created for Stena Recycling, Stena Stål and Storskogen's employees. These ones can be found in Appendix B, C and D.

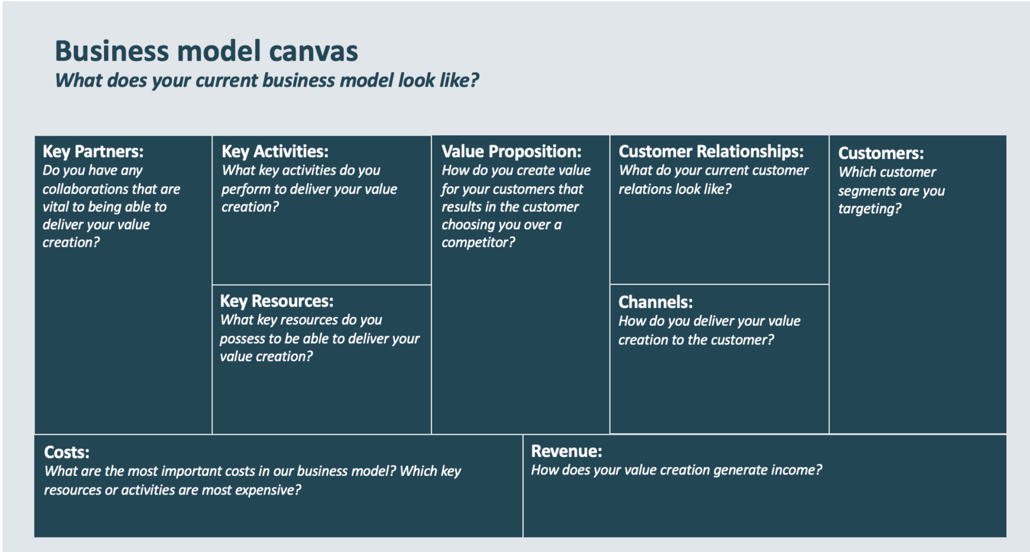

Figure 4: Workshop Business Model Canvas template.

The data collection started at the beginning of March after the interview guide had been tested. We visited the selected companies' facilities to gain a greater understanding of the production and to conduct the interviews. However, some interviews took place at Teams due to the long distance to its facilities. Before arriving at the facility, the interview guide was sent over email to the interviewees asking for it. This action was taken to prepare the interviewees who were not CEOs, and therefore needed more preparations. The data collection took place until the end of April when the interviews were completed.

Company	Position	Name	Date	Contact
Albin Components	Quality, Production manager	Christoffer Digerås, Robert Johansson	21/3-2024	Via Storskogen
Alfta Kvalitetslego	CEO	Niklas Näslund	12/3-2024	Via Storskogen
Gullängets Mekaniska Verkstad (GMV)	CEO	John Staberg	13/3-2024	Via Storskogen
Roslagsgjuteri	CEO	Ulrika Reimer	20/3-2024	Via Storskogen
Scandia Steel	CFO	Lena Cronhamn	18/3-2024	Via Storskogen
Storebrogjuteri	CEO	Olle Ahlström	3/4-2024	Via

				Storskogen
Stål & Rörmontage	CEO	Pär-Ola Gullberg	4/4-2024	Via Storskogen
Vinab	CEO, Founder-Business developer	Per Stöckel, Olle Henriksson	19/3-2024	Via Storskogen
ÅMV Production	CEO	Robert Ohlsson	13/3-2024	Via Storskogen
Stena Recycling	Account manager, Branch manager construction & demolition	Jacob Robbins Anders Malm	11/4-2024	Via contacts at Stena
Stena Stål	Head of Industry and Product, Environmental and sustainability specialist	Thomas Larsson Jacob Hedin	8/4-2024	Via contacts at Stena
Storskogen	Investment director	Mikael Jonsson	5/4-2024	Direct contact
Storskogen	Investment manager	Rebecca Johansson	8/4-2024	Direct contact
Storskogen	EVP head of business area industry	Fredrik Bergegård	25/4-2024	Direct contact
Storskogen	Head of sustainability	Amelie Nordin	24/4-2024	Direct contact

Table 1: Summarization of all interviews, when they were held and how the contact with the interviewees was established.

3.6 Data analysis

We conducted data collection and analysis simultaneously as it is recommended by Merriam and Tisdell (2015) since researchers have no knowledge in advance regarding every person they will interview or specific areas they might explore. To avoid confusion, which according to Bell et al. (2019) can emerge when obtaining large amounts of complex data and due to few well-established methods existing for analyzing qualitative data, we used an iterative approach where interviews were transcribed directly after the appointment. Transcribing the data forces the researchers to become familiar with the data and understand it in a larger context (Castleberry & Nolen, 2018).

The transcribed data was analyzed using a thematic analysis approach. We extracted the following themes by searching for repetitions in the collected data, and it is a well–established approach according to (Bell et al., 2019). For the first research question we extracted: Position in the value chain, Part of a corporate group, Insight gap, and Lack of infrastructure. For the second research question we extracted the themes: Network building, Information and knowledge platform, Institutional role, and Strategic oversight and governance. It is important to acknowledge that several other themes were discussed, however, it is impossible to explore all emerging themes. Instead, careful decisions were made regarding which themes were most relevant to answer the research questions.

3.7 Discussion and reflection on selected methodology

When assessing and establishing the quality of a research, the two criteria validity and reliability are important (Bell et al., 2019). However, the two criteria are more suitable for a quantitative study, thus, the corresponding criteria for a qualitative study are the following: credibility, transferability, dependability, and confirmability.

To ensure the credibility criterion was met, concerning if the participants point of view corresponds to the researchers' representation of the data (Bell et al., 2019), two actions were implemented. Firstly, both researchers participated in the interviews to ensure that similar interpretations were established. Moreover, the analysis of the data was also conducted together, to minimize the risk of not representing the data according to the interviewee. Secondly, the interview transcriptions were sent out to the interviewees to comment if they did not agree with the documentation. This action was also conducted to not falsely interpret the data.

To ensure transferability, a detailed description of selected methodology, including disclosing the interview guides in Appendix A, B, C and D, theory and empirical findings have been presented. Therefore, the transferability increases since a similar structure can be applied which Bell et al. (2019) emphasizes is important due to a qualitative study often having a unique context.

In this study, the research process with its documentation has been added to a separate appendix which can be obtained on request. In addition, throughout the process the study has been reviewed by the authors supervisor which has given feedback and redirected the study if believed it was necessary. This was done to ensure dependability which relates to the study's trustworthiness (Bell et al., 2019). By applying an "auditing" approach, i.e., disclosing the entire research process with documentations, field notes, selection of participants, and interview transcripts, peers can ensure and validate proper procedures have been conducted.

Lastly, objectivity is impossible to acquire, the authors must disclose to have been acted in good faith and not enabling personal values to affect the participants (Bell et al., 2019). Hence, to ensure confirmability we have throughout this study considered the risks of personal values at an early stage, e.g., the interview guide was constructed to not include overly complex academic concepts and instead use common concepts.

4. Results and analysis

The following section contains the results obtained from the data collection. The themes that have been identified for each research question are the once that are most repeated and relevant to the study. However, in the first chapter the writers have studied the subsidiaries current inclusion of sustainability to understand the circular challenges. In the second part the challenges the subsidiaries experience with becoming more circular is investigated. The following five challenges have been identified: insight gap, customers' preferences, lack of infrastructure, position in the value chain, and part of a corporate group. For the last part a parent company's role has been investigated, this part will start with the subsidiaries' opinions and will then proceed with the perspective and opinion of employees at a parent company. The roles are divided into the following four themes: network building, information and knowledge platform, institutional role, and strategic oversight and governance.

4.1 Current environmental sustainability activities

Since Storskogen is a public company, it is required to do both financial and environmental sustainability reporting, and it requires its subsidiaries to do the same. Many of the companies mention that as a consequence of it they have a good understanding of their situation and are in the frontier in their sustainability work compared to their competitors, especially if higher demands will be implemented in the industry as underlined by ÅMV Production's CEO. Hence, creating barriers to entry and a competitive advantage.

Furthermore, Storskogen also recommends its subsidiaries to apply for an ISO-14001, an environmental sustainability certification. All nine companies interviewed mention that they have an ISO-14001 certification. The interviewees commented that if it was not for Storskogen they maybe would not have applied for the certification, and thus not received the same amount of job propositions.

Sustainability themes:	**Examples of actions:**
Recycling	● Using Stena Recycling and its portal ● Internal recycling ● Use recycled material as input ● Products are fully recyclable
Quality and aiding customers' sustainability development	● Prolongment of products, less defects, and waste ● Quality is an indicator of sustainability ● Active choices of products to reduce maintenance ● Providing spare part to customers' aftermarket ● Providing sustainable alternatives to customers ● Providing data of products' CO_2 emissions

Minimizing internal resource usage	● Consolidate deliveries ● Leasing/ renting equipment ● Remanufacturing and reuse ● Giving improvements or modifying customers' products
Service	● Repair and maintenance services ● Renting services
Investment	● Investments in green alternative resources ● Employee dedicated to sustainability
Collaboration with local companies	● Framework agreements with and requirements on suppliers ● Choosing sustainable suppliers ● Industry specific initiatives
Internal education	● Educate the employees regarding sustainability ● Internal sustainability communication
Measurement	● Excel mapping CO2 footprint ● Audits- find the most severe sources of CO2 emissions ● Resource efficiency by using KPIs ● Energy mapping ● Digital aids such as Monetor ● Some industries require EPD

Table 2: Themes of subsidiaries' current inclusion of environmental sustainability.

Recycling

All selected subsidiaries are conducting recycling in its business as a consequence of both steel being a recyclable material and the financial benefits of it. However, the subsidiaries have different methods and collaboration partners for the process. The majority of them are using Stena Recycling as a collaboration partner since they provide reports containing data on e.g., the carbon dioxide footprint. Jacob at Stena Recycling mentions that they possess several solutions for various types of waste materials. However, GMV's CEO mentions the possibility of collaborating with other recycling partners, and both foundries comment that it is feasible for them to receive the waste materials directly from the subsidiaries. Lastly, all interviewees state that their products are fully recyclable but do not handle this themselves. However, a few of the subsidiaries have internal recycling. Albin Components recycles its steel cutting oil. The initiative has led to both a financial and an environmental gain. The foundries recycle both casting waste and the model sand. Storebrogjuteri's CEO mentions that a foundries production process is part of a circular system.

Quality and aiding customers' sustainability development

The next theme identified is quality which all nine interviewed subsidiaries emphasize the importance of. However, the subsidiaries have different recognition levels when it comes to identifying the link between quality and environmental sustainability. Some only see high quality as a requirement to get customers to choose them, while some express that quality is an important step in their sustainability development. ÅMV Production’s CEO mentions that quality and environmental sustainability is tightly linked, by exemplifying long guarantees on products is a stamp of quality but also sustainability. Other interviewees state that delivering a higher quality decreases the required customer service on, and prolongs the life expectancy of, the products. However, it is also related to financial incentives.

Linked to quality is aiding customers' sustainability development, as most of the subsidiaries do not produce end-products but rather components. Hence, by producing high quality components that prolongs the end-product life, the subsidiaries also aid their customers. However, aiding customer’s sustainability development is a broader theme. All interviewed subsidiaries mention that e.g., some of the articles they produce are spare parts to their customers. Roslagsgjuteriet’s CEO emphasizes that as it produces parts for an end-product, it practically already delivers to its customer aftermarket. Some subsidiaries also propose alternative offers that are more sustainable e.g., using electricity driven machinery instead of diesel, or more durable material. This has in some cases led to customers choosing the green alternatives instead. Additionally, to raise customers’ awareness of the products’ CO_2 footprint, some of the subsidiaries provide data on its invoices or EPDs.

Minimizing internal resource usage

A consistent theme for the subsidiaries is their concerns with minimizing internal resource usage. The argument lies in the ability to decrease costs but indirectly the subsidiaries work with environmental concerns. Most of the subsidiaries mention the importance of consolidating deliveries and transportations, as it is a large source of emissions. Some subsidiaries utilize circular strategies such as GMV that rethinks, by instead of purchasing a specific machine needed to conduct a specific task, it rents the machine from another producer in the area. GMV also repurpose the floodgates stand to produce its product Harpan once the floodgates are fully assembled. Vinab also uses circular strategies e.g., reuse. The founder explains how he identified a potential buyer for another customer’s equipment that was initially deemed as waste.

All interviewees work with minimizing waste, consumables, and cassation in the production process. Roslagsgjuteriet’s CEO e.g., specifically mentions lean management as a method, while Storebrogjuteri’s CEO emphasizes changing the employees’ mindset. Some also mention the importance of choosing the supplier with the lowest CO_2 footprint, due to steel production's high emission. However, steel’s price is volatile and constitutes a substantial cost factor, thus, the subsidiaries constantly work with resource inefficiencies.

The majority of the subsidiaries provide improvements on their customers' product specifications. The reasons for these actions are to reduce the use of materials, enhance the product's lifecycle, and its durability. However, the modification is not always expressed to be linked to environmental sustainability. Rather its due to prevent purchasing unnecessary equipment, decrease material costs, and delivery time.

Service

The subsidiaries have little, or no service implemented in its business models, one of the few that offers it is Vinab. Service in this case is defined as something connected to environmental sustainability, in other words, the company can provide services to increase a product's lifecycle such as providing maintenance and repairs, or to reduce new production. For example, by establishing repairs instead of producing new products, Vinab decreased the client's costs by 30%. Moreover, the foundries provide a model renting service, when not used in a year, the foundries charge a rental fee. This service is both to minimize stock costs and reduce the production of new models.

Investments

Most of the companies mention that they are looking at alternative resources and have invested in e.g., changing to LED-lamps, HVO fuel, or electrical vehicles. However, the sustainability work is capital intensive as emphasized by Roslagsjuteri's CEO, who compares its operation to internal foundries and states that they might be more sustainable, as they have completely different "muscles" to invest in new technology. The subsidiaries invest differently, some prioritize more sustainable technology while some prioritize to hire a sustainability employee.

Collaboration with local companies

Many of the subsidiaries collaborate with local companies to improve their sustainability work. Some subsidiaries mention that they put demands and requirements on their suppliers, either legal agreements or informal influences. Others emphasize the importance of local suppliers or those actively working with sustainability, as this creates an opportunity to piggy-back. The foundries have valuable collaboration with industry specific associations, who have facilitated their sustainability work e.g., by generating KPI's or with knowledge regarding technical developments. Additionally, there exist collaborations with companies that invest in sustainability initiatives, e.g., one of Scandia Steels suppliers invests in H2 Green Steel, or whose purpose is facilitating companies' sustainability work e.g., Stena Recycling.

Internal education

One aspect that differentiates the subsidiaries current environmental work is the internal education regarding sustainability. The majority expresses that awareness is important, but some have come further than others e.g., by writing a monthly letter containing sustainability issues, forwarding Storskogen's sustainability information, or actively educating their employees. In addition, Jacob from Stena Stål and Stål & Rörmontage's CEO highlights the value of possessing a lifecycle perspective when working with sustainability.

Measurements

The subsidiaries have measurements in their operations which are vital to control the flow of the processes and its efficiency. However, in relation to the environmental aspect the measurements are designed differently both in terms of digital aids e.g., using Excel or Monetor, the frequency e.g., monthly or yearly, and what is measured e.g., energy, cleanliness or using EPDs. It is also common for the subsidiaries to use KPI's for benchmarking.

4.2 The key challenges for mid-chain companies

The existence of strong environmental trends has also been extracted from the interviews. Thomas at Stena Stål emphasized that they have never seen such a strong trend which refuses to leave, since previously the most crucial factor has been price. He also acknowledges that different industries are at different levels when discussing environmental concerns and solutions. Pointing out that the steel industry is behind when compared to e.g., the construction industry. Jacob at Stena Recycling rather points out that the company's size plays a role in the development of sustainable initiatives, where large companies have higher requirements and demands regarding reporting, which forces them to implement sustainability in their agendas and business models. Lastly, the interviewees have distinguished the trend of customers starting to have higher demands on environmental conditions. Although the trends imply a positive change in the industry the subsidiaries still seem to experience numerous challenges with further development of their circular work. The following challenges have been identified.

Key challenges:	**Examples of causes:**
Position in the value chain	● Middle of the value chain - low bargaining power ● No ownership of end-product ● Green initiatives are prioritized in other industries ● Customers' preferences ● Sells B2B
Part of a corporate group	● Lack of investments ● IPO affecting the strategy ● Resource allocation ● New practices
Insight gap	● Servitization development

	● New pricing models ● Sustainability initiatives and reporting is an unclear subject ● Knowledge gap of the sustainability roadmap ● Marketing ● Identifying partners with common motives
Lack of infrastructure	● Located in rural areas ● Recycling centers limitations ● Municipalities prioritize differently ● Lack of green energy supply in Sweden

Table 3: Themes of subsidiaries' challenges.

Position in the value chain

The main challenge identified, which creates further challenges, is the subsidiaries position in the value chain. Since most of the subsidiaries are contract manufacturers, of smaller size, and have powerful customers, the companies experience they have low bargaining power. Hence, they must trust that their customers and suppliers are doing everything in their power to become more sustainable. For example, as the customers have the product ownership the subsidiaries trust that they take a responsibility in exploiting the R-strategies. Likewise, they need to trust the suppliers to choose the most sustainable option. However, some subsidiaries have closer collaborations with some actors where they have mutual exchanges e.g., knowledge sharing.

The trust of the customers to exploit the R-strategies are even more important due the subsidiaries own position in the value chain. Most of the subsidiaries are contract manufacturers and produce components B2B. Therefore, the subsidiaries do not control the end-product. Consequently, they all see little value in acquiring back their own products, to e.g., be remanufactured or reused due to it being cheaper to produce new ones as mentioned by the Production manager at Albin Components "[It is] cheaper to buy a new gear than to ship it [back] here. We are talking maybe hundreds of Swedish crowns for a gear", or implementing maintenance as it demands supply chain disintermediation, thus taking over a third-party's core business. However, the challenge to implement the R-strategies are not only a consequence of the position in the value chain but also due to the purpose of the products which are meant to last for several decades e.g., a bridge or foundation piles. Additionally, the current green initiatives that are developed in the steel industry do not consider or prioritize the subsidiaries operations. Rather the initiative focuses on the B2C industries, such as automotive, postponing the green steel supply for the subsidiaries in question and their circular transitions.

In general, the subsidiaries experience little sustainability pressure from the customers as the customers still prioritize price. The customers are often represented by the purchasing department who lacks the authority in choosing a sustainable option with a higher price. Additionally, the approaches for offering projects often lack personal communication since they use auctions or customer portals where the sustainability aspect is disregarded. This is further complicated by the intense competition and low margins, which eliminates the opportunity to charge for sustainability. Some industries are more challenging than others, Albin Components experience worsening relationships, as customers' tries to intensify the competition between the suppliers.

As the customer chooses based on price, some of the interviewees have managed this challenge by offering the customers alternatives, one cheap and one sustainable. However, they note that customers still often select the less sustainable alternative, which is in line with the previous argument. Some have therefore pushed their customers in choosing more sustainable alternatives by presenting the long-term positive effects such as reduced maintenance costs. Nevertheless, some customers have realized that choosing cheaper products has resulted in more defects and maintenance that is more expensive when considering the lifecycle perspective. Hence, in some cases the customers have started to select sustainable suppliers. Upcoming regulations are also believed to further pressure customers to choose sustainable alternatives e.g., the CSRD law. Jacob at Stena Recycling emphasizes that Swedish citizens often follow regulations and laws when applied in society. However, occasionally environmental regulations do not result in improvements.

Lastly, GMV and ÅMV Production both have a B2C division where they sell their own developed product, putting them in a different position in the value chain. Consequently, they are one of few that have the preconditions and see the potential of utilizing R-strategies, as it is easier to control the end-product.

Part of a corporate group

The fact that the subsidiaries are a part of a corporate group creates challenges in their sustainability work. Circular development is dependent on intense capital investments and the lack of investment is a challenge for some subsidiaries e.g., not affording specialized sustainability employees and needing to deprioritize initiatives. Many of the subsidiaries mention that the availability of investments depends on Storskogen's financial position. It has been expressed that the IPO has affected Storskogen's prospect of long-term ownership, and it is more prone to divest companies, and subsidiaries' investments are more regulated due to the low stock value. Hence, Storskogen prioritizes limiting working capital since it had a high debt ratio going into the current recession. Investments and working capital are something that the subsidiaries see as preconditions for further operational development. One subsidiary expressed the uncertainty regarding Storskogen's value creation and believes it is correlated to the current low stock price.

Moreover, investments and working capital is also connected to the resource allocation challenge. Some subsidiaries are content with the current level of investments and working capital, while others are not. This challenge may stem from Storskogen's need to allocate resources among its subsidiaries and decide who gets prioritized.

Lastly, one subsidiary mentioned that Storskogen sometimes rush into new practices which complicates their operations. It believes Storskogen sometimes trains in real-life situations which results in new practices becoming unclear and requires extra meetings and FAQ.

Insight gap

Another challenge identified is the insight gap. Servitization is tightly linked to environmental sustainability and CBM, however, many of the subsidiaries express that servitization development is difficult or not in their interest, implying signs of an insight gap. Some of the interviewees explain how they do not have enough resources to offer services or emphasize that it is not a part of their core offering. Hence, servitization has not been further explored. Others experience difficulties separating the service from the product and are thus not charging for the service e.g., by saving or changing customers' blueprints.

Few of the subsidiaries have explored new pricing models that are associated with CBM. Vinab is one that has explored it, by trying to implement monthly service agreements, but these have not been successful yet due to customers' lack of maturity. ÅMV Production, with its B2C division, has also investigated the implementation of services e.g., leasing its product.

Furthermore, many of the subsidiaries mentioned that sustainability initiatives and reporting is an unclear subject, as well as there seems to be lack of knowledge regarding sustainable alternatives and practical implementations. Vinab's CEO emphasizes that the sustainability goal is known but the road there seems complicated. The steel value chain is complex and expanding to Scope 3 reporting is a difficult task, and customers usually have different reporting processes, which is time consuming for the subsidiaries to manage. Reporting on a yearly basis has also been expressed to lack value since the numbers are historical. Moreover, Thomas at Stena Stål explains that what is sustainable today might not be considered sustainable in six months, reflecting the high uncertainty. Scandia Steel's CFO also states that the customers' demands change fast, and new demands appear during and after the project has been delivered. Therefore, she mentions the difficulty in navigating the market and the need for market specific knowledge to guide the company.

As mentioned before, several of the companies are in the frontier regarding sustainability compared to competitors, however, few of them advertise it. Many state that they currently do not dare to advertise reported numbers given by Storskogen, as they are aware that steel production is a substantial emitter and excluded in Scope 1 and 2. Alfta Kvalitetslego's CEO was impressed by Sandviken's sustainability marketing but also bewildered that it advertised obvious initiatives, e.g., that it recycled end pieces, which is a given practice among the interviewees. Stål & Rörmontage is one of few that advertise its sustainable projects, and it has resulted in new customers wanting similar solutions. Hence, marketing might be uncommon either due the fear of greenwashing, to the companies not knowing what to advertise, or the lack of understanding the opportunities connected to it.

After interviewing Stena Stål and Stena Recycling it is clear that some subsidiaries miss out on collaborating with partners in the value chain that possess common motives. As previously mentioned, sustainability is an unclear and uncertain subject which Stena Stål and Stena Recycling, by being a partner, can provide guidance in. The head of industry at Stena Stål emphasized the significant benefits of initiating collaboration and transparency early in a project. This approach not only facilitates the selection of steel types and suppliers based on price but also enhances sustainability. Different production methods can substantially impact the steel's environmental footprint, underscoring the importance of these early decisions. He further notes that the companies likely do not possess the production information related to sustainability, and sees Stena Stål only as a supplier, thus they do not seize this opportunity that requires an open dialogue. Nonetheless, most of the subsidiaries are contract manufacturers and express the fear of transparency and revealing their customers.

Thomas at Stena Stål further mentions that extending a hand and clarifying their demands is all that would be required to initiate a collaboration. However, some subsidiaries appear to misunderstand this potential and believe they lack influence over their suppliers. However, Stena Stål does not possess the similar market position as the subsidiaries, and Thomas underscores how it could terminate agreements with unsustainable suppliers and pressure customers' unsustainable practices by implementing fees. Additionally, Stena Recycling sees the value in close collaboration, as it then can adapt to customers' needs, identify unique solutions, and provide advisory. However, this collaboration requires mutual initiatives to reach the full potential. Similarly, to Stena Stål, Jacob at Stena Recycling emphasizes the importance of transparency as it facilitates a wider collaboration within Stena's network, thus, leveraging its customer base's knowledge and experiences.

Lack of infrastructure

The last challenge is the lack of infrastructure that hinders the subsidiaries circular journey. Storskogen's strategy is often to acquire companies in rural areas, thus, the challenge becomes more prevalent among the subsidiaries than in general. Since the infrastructure is not always provided in these rural areas e.g., HVO. Similarly, recycling centers' capabilities to handle different types of waste differ, and municipalities often prioritize private households rather than the industry, both in terms of recycling and community planning, which limits the subsidiaries sustainable alternatives. Lastly, many of the interviewees have mentioned the energy supply in Sweden as a challenge e.g., the scarcity of green electricity and the decommissioning of nuclear power plants. Hence, the infrastructure needed for the subsidiaries is not in place and creates barriers for their circular transition.

4.3 A parent company's role in mitigating these key challenges

Given the first research question, the subsidiaries experience several circular challenges. However, the subsidiaries are a part of a corporate group which could help mitigate some of them. To determine which challenges a parent company should address, we need to investigate the subsidiaries' perspectives on the topic. We have also interviewed employees at Storskogen to identify potential overlaps or gaps between the perspectives.

Roles:	**Examples of initiatives:**
Network building	● Gather smaller groups with similar companies ● Incorporate more roles ● Creating business opportunities ● Enable transparency
Information and knowledge platform	● Knowledge eXchange (KX) ● Providing sustainability seminars ● Initiate communication ● CEOs being part of several boards
Institutional role	● Setting rules and requirements ● Create valuable output from reporting ● Marketing tools ● Setting norms ● Pilot testing
Strategic oversight and governance	● Help setting strategy and possess managerial expertise ● Holistic perspective rather than micro-managing ● Exploiting the diversified portfolio ● Financial reliability and security ● Knowledge of administrative practices

Table 4: Themes of a parent company's roles.

Network building

As the main challenge is the subsidiaries position in the value chain, and their low bargaining power, many subsidiaries mention the need to collaborate, thus exploiting the network. Currently, Storskogen arranges yearly meetings with all its subsidiaries' CEOs, however, as Storskogen is a diverse company it is hard to exploit this opportunity fully. Several of the interviewees mentioned that they would like to gather smaller groups, with similar companies, to discuss potential synergies and collaborations, instead of gathering all CEOs. Alfta Kvalitetslego's CEO agrees by stating "Maybe Storskogen spends a lot of resources to gather all CEOs instead of gathering the right CEOs". Moreover, since these meetings exclude other positions, some of the interviewees have also mentioned the need to gather more diverse roles from the companies, to exchange experiences and best case practices broader than only on a management level.

Furthermore, some of the interviewees mention that Storskogen should and has the responsibility to create business opportunities for them. They all are aware that there exists a network, but not fully aware of the other companies' business models. Additionally, some think the network is not entirely exploited and see the potential of collaborating with other business areas within the corporate group. However, Storskogen has initiated projects e.g., Norrlandsprojektet, to exploit the sustainability initiatives happening in north of Sweden. As a result of the collaboration, the companies become a bigger entity, with more bargaining power, that can undertake larger projects and complement each other.

Moreover, the interviewees have stated that by being a part of Storskogen it entails opportunities to be more transparent to the other subsidiaries. The transparency has, according to the subsidiaries, helped them win both customers and suppliers, and fostered a culture where the subsidiaries can learn from each other, compared to what they can do in a typical customer-supplier relationship. Additionally, as mentioned, Thomas at Stena Stål emphasizes that he thinks the subsidiaries should be more transparent to them, however, he does not clarify if this should be the responsibility of the subsidiaries or their parent company.

Information and knowledge platform

The subsidiaries experience an insight gap regarding sustainability. Currently, Storskogen undertakes the role of providing information and knowledge through its shared platform KX. The platform provides both best case practices, education materials, frame agreements, templates, and contact information. However, the platform lacks sustainability material, and many subsidiaries state the need for best case practices regarding environmental solutions and practical guidance. The subsidiaries currently take their own initiatives to complement the gap of sustainability information on the KX platform e.g., by giving recommendations regarding new energy supplies.

Since the sustainability subject is unclear and constantly changing, one subsidiary mentions the need for new and updated seminars on these topics, to stay in the frontier. As well as providing clearer communication on which environmental demands are recommended and which are mandatory by the market. Some subsidiaries try to pass the information they come across from their customers or suppliers to other companies in Storskogen. Others mention how they possess strengths or experiences that could be shared but are not currently e.g., resource efficiency processes or internal cassations data. Moreover, it is explained that some CEOs are a part of several other subsidiaries' boards. The outcome is described as contributing with knowledge and experience to other companies as well as trying to identify possible synergies among the companies e.g., collaboration, discussing business models, challenges, upsides, pricing models, and supplier networks. And this has, according to Alfta Kvalitetslego's CEO, led to a broader perspective for the company.

Institutional role

Due to the experienced insight gap, the subsidiaries require guidance which Storskogen can mitigate by acting as an institution. Being an institution is defined as being responsible for social structures, such as setting norms and regulations to guide the subsidiaries collaboration, behavior, and prioritizations. The subsidiaries are currently required to report and are recommended to apply for ISO-14001 certification, which some interviewees mention is the only thing that has changed regarding their sustainability work since being acquired by Storskogen. Many express that this has resulted in them being at the forefront regarding sustainability compared to their competitors. However, the sustainability aspect is currently limited to administrative practices, where Storskogen facilitates the reporting by giving the subsidiaries the digital tool: World Favor. Although reporting is prioritized, many subsidiaries state that they do not see the value in doing it, rather it seems as if it is solely for Storskogen's purpose. ÅMV Production's CEO notes that the data from the reporting "disappears into a black hole". Storebrogjuteri's sustainability consultant explains that it is more valuable for them to do it monthly, rather than yearly, as it results in more actionable data.

Some of the interviewees propose that Storskogen should be responsible for marketing tools e.g., by providing ready-made material, or its own certification. Since Storskogen already has access to all the results from the subsidiaries' reporting. Creating a certification could, according to Scandia Steel's CFO, lead to greater credibility by leveraging the reputation of the larger parent company.

The institutional role also includes setting norms, which some of the interviewees have mentioned in terms of both encouraging analytical thinking and environmental awareness. Alfta Kvalitetslego's CEO mentions that Storskogen has made him more analytical as he now must discuss and analyze his statements more than what was required before the acquisition. Some subsidiaries express that they must internally discuss sustainability for it to become a part of everyday thinking and tasks rather than discussing it once a year. Furthermore, Storskogen has created framework agreements that are available, but not mandatory, for its subsidiaries to utilize. These agreements provide, according to the interviewees, a beneficial option for subsidiaries that find them advantageous. This would not be an option if they did not belong to a corporate group.

One rare challenge mentioned by Alfta Kvalitetslego's CEO is that Storskogen sometimes rush new practices. He therefore proposes that this could be solved by conducting pilot testing before launching requirements corporate wide.

Strategic oversight and governance

Most of the respondents underscores that one of Storskogen's contributions is strategic oversight e.g., managing their business plans, helping with HR-questions, and setting strategic goals. However, it is expressed that it would be beneficial if Storskogen possessed industry specific knowledge, such as laws and regulations. The subsidiaries are aware that this is complicated due to Storskogen's diverse portfolio, and some think that its general knowledge and perspective is what creates value since it then can act as a sounding board rather than micro-manage the operation.

The interviewees discuss whether Storskogen's diverse portfolio has reached its full potential. Having more companies in the same industry could simplify the process of identifying and exploiting opportunities e.g., find synergies, to benchmark, discuss market conditions, or common customers. Although these opportunities may exist in a diverse portfolio, the respondents comment on the difficulties in finding collaboration partners within the group.

In addition to strategic oversight, the traditional role of a parent company is to govern its portfolio companies. Many interviewees mentioned e.g., the reliability and security a parent company provides by supplying investments and resources. The subsidiaries can risk more and make investments that they might not have dared to do before the acquisition e.g., by utilizing a financially beneficial parent company guarantee.

According to the subsidiaries, Storskogen is also an expert at administrative practices such as financial statements, KPIs, regulations, and budgets. Stål & Rörmontage's CEO thinks it has received better governance and control of its finances due to Storskogen's ownership. Similarly, Vinab emphasized as it has grown organically during a short period it needed help with governance, and thus sold the company to Storskogen for this purpose. One respondent stated that Storskogen are experts on general regulations and new laws, which is beneficial as not each subsidiary has to be familiar with it.

Storskogen's perspective

The respondents at Storskogen emphasize that the company should be the best possible owner for the subsidiaries, to continue to grow and develop into a well-managed company that is still competitive in 20-30 years. Hence, they highlight its unique strategy of long-term ownership, decentralization and maintaining the entrepreneurial spirit, and thus its primary role to ensure business model resilience and achieving the subsidiaries full potential. To achieve full potential, the employees express that one of their roles is to build and exploit an internal network, and through this network create opportunities for the subsidiaries to deliver complete solutions e.g., Norrlandsprojektet. However, one employee mentions that Storskogen has improvement potential in this area, as currently it does not exploit the other business areas and synergies between them. Another employee sees the potential to create more partnership with earlier actors in the value chain to obtain and better manage the CO2 footprint of purchased material. Storskogen's employees also see the potential to realize external business opportunities for the subsidiaries, as they possess experiences and contacts in other industries. Nevertheless, creating opportunities by connecting one subsidiary's CEO with a personal contact requires trust, as it can risk the relationship with that person.

Additionally, because of Storskogen's network, the respondents note both the importance and the fact that the subsidiaries share information on their own initiative. Hence, the second role conveyed both from Storskogen's employees and the subsidiaries is the information and knowledge platform. Currently, the majority of the information and knowledge sharing is conducted within the business areas, and the employees at Storskogen mentions how this could be improved internally. Since Storskogen's employees note how the organization currently works in silos and thus, does not seize the opportunities e.g., engaging in other subsidiaries' boards. However, one employee emphasizes that implementing cross-collaboration presents significant challenges due to employees' strong commitment to their respective subsidiaries, and the uncertainty about who possesses valuable contacts and knowledge.

Moreover, as mentioned previously it could be beneficial if Storskogen possessed industry specific knowledge, one respondent mentioned to raise the internal knowledge Storskogen could start subscribing to industry specific magazines to complement and broaden the subsidiaries' perspective. However, all the respondents mention the willingness to be more operational but explain there exist resource limitations, and thus they need to prioritize a holistic view and the aspects with greatest impact. For example, it is highlighted that Storskogen provides strategic competence, experiences, and outside-in perspective, not possessed by the companies themselves. The sustainability responsible employee states that Storskogen already has an established and well-functioning process for managing industry specific questions e.g., referring to external consultants. Instead, Storskogen's employees mention how its role as a parent company is to provide a macro perspective that challenges the current ways of working and provide a succession; recruit CEOs that can realize the company's full potential. In line with this argument, it is further noted that its role does not include operating the subsidiary themselves but employing a CEO who can grow the company in the right direction.

The institutional approach at Storskogen involves a strategic balance between setting requirements, providing options, and cultivating an organizational culture, as noted by the employees. This role requires broad experience to effectively navigate the complexities of an institution and adapt to the unique needs of the subsidiaries. In terms of requirements, Storskogen has policy packages to ensure law-abidingness, these involve e.g., GDPR, sanctions, and anti-money laundering measures. Other requirements imposed by higher instances is sustainability reporting, which one of the respondents highlights lacks incentives that enhance commercial and operational value for the subsidiaries. However, one employee explains that there exists a differentiation opportunity by possessing sustainability data, especially for the companies that sell generic products. Moreover, the options according to the employees are e.g., the framework agreements established by Storskogen. Culturally, the employees also note that Storskogen tries to foster a norm of sustainability awareness and analytical thinking within the subsidiaries. This enhanced awareness has led the subsidiaries to set more defined goals and action plans.

The employees however underscore that Storskogen's sustainability work is also under progress and where they lack understanding, as the future is uncertain since new requirements and demands emerge constantly. Moreover, they state how they would like to work with sustainability on a more pragmatic level but how the subject in general has taken a bureaucratic turn. Additionally, the subsidiaries often lack the resources themselves to undertake the sustainability work ahead, and therefore it is important to find a pragmatic way to create value for them instead of only requiring reporting. This is underlined by the head of sustainability "I experience our competitors more mature, [and] have come a bit further in their processes given that we are younger as a company [...] the advantages of being a part of Storskogen is [that we are] less bureaucratic and tries to be more pragmatic".

Lastly, another aspect mentioned is resource allocation e.g., financial governance. Storskogen is responsible for investments and has a well-functioning process for it. Large investments are considered in conjunction with Storskogen's strategy, however, it is emphasized that all companies must receive investments otherwise it undermines the neglected companies. Additionally, it is expressed that resource allocation in terms of time is emphasized as important and complex due to the large and diverse portfolio.

5. Discussion

The result has culminated into two important discussion subjects. The first concerns that the subsidiaries' value chain position is challenging, and potential solutions are not covered by established circular theories. The second discussion subject is regarding a parent company's most important roles which it should undertake to mitigate mid-chain subsidiaries' challenges.

5.1 Identifying a need for more applicable circular theories

Dominant business model logic implies that companies face many difficulties when changing and adapting their business model (Bocken et al., 2016). Additionally, transforming into a CBM is further complicated by requiring innovation and rethinking the company's value creation (Lüdeke-Freund et al., 2018), and has external barriers such as regulation and lack of infrastructure (Pieroni et al, 2020). Hence, the subsidiaries which all lean toward a linear business model, experience as other companies, difficulties in changing it. Regulating bodies have initiated regulations to facilitate prioritization of sustainability for companies, such as CSRD (European Commission, n.d.) and EU's Circular Economy Action Plan (Calisto Friant et al., 2021). However, as mentioned by Calisto Friant et al. (2021) and by Jacob at Stena Recycling, regulations are not always effective, and some are more focused on the consequences of unsustainable practices rather than the source of it. In addition to regulations, there are many companies and organizations that invest in sustainable alternatives and initiatives. Nevertheless, these initiatives are prioritized to B2C, and more luxury deemed industries. In other words, not foundries and component manufacturers. Hence, this postpones their ability to decrease their CO2 footprint even though these companies drive most of the Swedish economy.

R-strategies

The majority of the CBM theory is dependent upon the R-strategies (Lüdeke-Freund et al., 2018). In the slowing business models, ownership of the service is sometimes a precondition, where the companies should be responsible for e.g., maintenance, remanufacturing, or repair (Bocken et al., 2016), in other words the R-strategies. Therefore, many of the R-strategies are dependent on aspects that companies positioned in the middle of the value chain lack e.g., product ownership and reverse logistics. It problematizes the initiatives of implementing R-strategies since the subsidiaries do not have the knowledge of where the product finally ends up. Additionally, most of the subsidiaries are in low-margin environments, producing lower price components where the customer, instead of repairing, rather purchases a new product. Resulting in low incentives to implement R-strategies due to it being more economically favorable to produce new ones. However, two of the subsidiaries have B2C models and where potential of implementing R-strategies has been considered but not realized. This further emphasizes the dominant business model logic (Bocken et al., 2016), and the difficulties connected to being positioned in the middle of the value chain.

Moreover, the R-strategies are also a form of servitization (Lüdeke-Freund et al., 2018). Servitization theory, being a hot topic in the sustainability agenda, sets examples of transitioning towards more sustainable business models by implementing services. The theory regarding servitization is not applicable for mid-chain companies, rather it seems like its focus is towards companies on the ends of the chain: producers of raw material and end-products. Therefore, it is not surprising that the subsidiaries might have low incentives and have not considered these service implementations since there is a lack of guidance within this area. In addition, Vandermerwe and Rada (1988) posits how establishing services can create barriers to entry. Our results implies that the services are instead managed by the customers or third-parties, hence, creating barriers for the subsidiaries since the competitors can set a lower price point or are closer located.

Since the customers have larger bargaining power, the subsidiaries mentioned how service-contract and other alternative price models are not debatable. However, most of the subsidiaries have some customer relationships that are both close and long. These customers might be the optimal ones to bring up the discussion without risking destroying the relationship. As Thomas at Stena Stål mentioned, companies need to discuss sustainability with their customers, educate customers, bring up sustainable propositions, and pressure the customers to choose more sustainable alternatives. Stål & Rörmontage is one of few subsidiaries that discuss this with their customers, likely due to its focus on the lifecycle perspective. The other subsidiaries could benefit from doing similar to Stål & Rörmontage; educating their customers about the benefits of possessing a lifecycle perspective and purchasing sustainable products.

Alternatively, establishing a closer collaboration with its suppliers and customers can mitigate the challenge of having a low bargaining power due to being positioned in the middle of the value chain. Without collaboration, this position causes them to trust and rely on these actors to take action and implement the R-strategies. Thus, instead of trusting them blindly, establishing relationships with the entire value chain can realize initiatives and development towards a more circular business model. There are partners available, on both ends of the value chain e.g., Stena Stål and Stena Recycling, who are interested in pushing these subsidiaries towards sustainable solutions. However, the identified insight gap hinders these subsidiaries to see the potential of establishing new collaborations and can be a consequence of contract manufacturers being afraid of disclosing its customers, suppliers, and processes. In addition, another upside of collaborating is the opportunity to split risks and costs among the actors since steel requires intensive capital investments.

Closed-loop theory

Closing lifecycles is another CBM which is problematic for companies positioned in the middle of the value chain. The aim of the business model is to link end stages with initial stages (Bocken et al., 2016), which might be easier to implement for companies located at these stages. Bocken et al. (2016) also suggests that the implementation requires closeness in location, which further complicates it, as the subsidiaries are located in rural areas. For example, the foundries purchase recycled raw materials and internally recycle their own cassation and waste as they are closer to the beginning of the chain and can exploit their own operation for closing the model. This implies once again that circular theory is not applicable for the investigated companies.

Additionally, Lüdeke-Freund et al. (2018) argues that CBM can result in improved reputation, and Bocken et al. (2016) suggests there exist customers that prioritize and are willing to pay for green alternatives. This further emphasizes the importance of the subsidiaries to advertise their sustainable practices to attract this customer segment. Although many of the investigated subsidiaries fear greenwashing, it might still be worthwhile to advertise sustainability but have a holistic lifecycle perspective. Since the steel producers' footprint is substantial (Joint Research Centre, 2022), it is important to be transparent. To enable transparency, the companies need to know the footprint in the first case and therefore, it might require collaboration with their material suppliers, as Thomas at Stena Stål emphasized. Additionally, Lüdeke-Freund et al. (2018) posits that CBM sometimes leads to requiring additional energy usage and thus a lifecycle perspective is needed, which further implies the importance of a holistic view, collaboration, and transparency.

Applicable theory

In contrast, some parts of the theories are relevant for the investigated subsidiaries. For example, a slowing business model can also entail designing for circularity i.e., enabling repair and prioritizing durability (Bocken et al., 2016). Many of the subsidiaries sell spare parts, which enables repair, and produces components or products that are meant to last for several decades, which implies durability. However, Bocken et al. (2016) suggests that the purpose is to create opportunities to offer services connected to this part of CBM, which the subsidiaries have not exploited. Hence, they have implemented parts of CBM, but it might not have been a conscious choice.

Additionally, all the subsidiaries focus on minimizing internal resources and becoming more resource efficient, which is tightly linked to the R-strategy: reduce, which is one of the more desired strategies to focus on according to Gaasbeck and Valencia (2018), and narrowing resource flows as explained by Bocken et al. (2016). However, the reduce strategy is dependent on also minimizing consumption to become more sustainable. Similarly, narrowing resource flows does not consider the time dimension, and it is thus not directly a sustainable practice, as it might result in the subsidiaries increasing their capacity and producing more products. Therefore, their resource efficiency practices can be argued to once again not be a conscious sustainability choice, but rather indirectly sustainable in best case scenario. It is important that companies are aware of what they choose and how it affects the environment, especially if they want to focus on the triple bottom line and exploit the opportunities connected to CBM.

Moreover, all the investigated subsidiaries recycle their waste and potential cassations, however, according to Gaasbeek and Valencia (2018) these R-strategies are closer to having a linear economy rather than a circular one. However, it is not surprising that the subsidiaries stand in this position due to the lack of theory for subcontractors as mentioned by Govindan and Hasanagic (2017). Articles regarding circular theory such as the ones presented by Mont et al. (2006), focuses on the manufacturers controlling the end-product. Thus, it gives little or no guidance to companies only producing components to a product. Nevertheless, some literature suggests that becoming vertically integrated enhances the possibilities of reaching closed-loop systems (Hansen & Revellio, 2020). In the case of the investigated subsidiaries, vertical integration can be a challenge since Storskogen emphasizes having decentralized governance and should therefore not interfere in their operations. However, Hool et al. (2022) emphasizes that companies can transition to circular systems by implementing long-term contractual agreements where transparency is vital. This can be realized for these subsidiaries as they already have some customer-supplier relationships with several other upstream and downstream subsidiaries in Storskogen's portfolio. Thus, increasing this collaboration and transparency could be an important step forward for these types of companies due to their otherwise restrained position.

In conclusion, the combination of being in the middle of the value chain and the lack of relevant circular theory, and thus guidance, results in an insight gap. It is therefore not surprising that the subsidiaries lack next step initiatives regarding circular solutions. However, as some subsidiaries have successfully pushed the sustainability initiatives further, by presenting green alternatives, it shows that it is not impossible to influence customers' preferences. It might not be feasible to become sustainable alone, rather the subsidiaries might need to collaborate and co-create with other actors, such as customers, suppliers, and its parent company, which possess common motives to proceed to the next steps. It is important to note that circularity is not the only method to becoming more sustainable. Once again collaboration with other companies or help from the parent company is necessary as it can result in larger bargaining power, which could result in opportunities to lobby influential actors to implement green initiatives for these entities. Lastly, the business model innovation theory by Wirtz et al. (2016) emphasizes the difficulties in changing a current model, however, since the sustainability trends are becoming stronger the subsidiaries need to respond to the external changes to sustain a competitive position.

5.2 Extending ownership competence to include circularity

The challenges the subsidiaries experience are many and intense. However, all challenges might not be easy for a parent company to solve, but it could lighten the burden of the challenges to some degree and simultaneously create value for its subsidiaries. One of the most intense challenges the investigated subsidiaries experience is due to their position in the middle of the value chain, creating hindrances in adapting current circular theory in its business models. Therefore, it is necessary to identify roles that a parent company needs to undertake to facilitate its subsidiaries' transitions. These roles are important for all parent companies as it can be seen as a method to extend ownership competence and become better parents to its subsidiaries. Since a parent company can be viewed as a platform business, it needs to create value in exchange for requiring its subsidiaries to be on its platform. The roles identified are presented in the figure below and are the following: *Network Mobilizer*, *Institutional Builder, Information Hub,* and *Active Influencer*.

Figure 5: A parent company's roles to create value and extend its ownership competence.

Storskogen in this context has a unique strategy that differs from traditional parent companies. For example, its strategy is to have long-term ownership, investing in companies in rural areas that are often family offices, and having a diverse portfolio, where its subsidiaries are active in very different industries. According to Campbell et al. (1995-a), a parent company has four traditional ways to create value: by improving an individual subsidiary's performance e.g., by controlling it financially and setting targets, by creating better connections between the subsidiaries, by establishing better cost and functional management, by centralizing overhead functions, and lastly, by changing the portfolio by investing and divesting. Storskogen is actively working with the first three value creations, however, as Storskogen's strategy is long-term ownership, it tries to not divest its companies. Hence, as one main method of value creation is lacking it must work even more intensely with other ways to create value compared to other parent companies.

Network Mobilizer

One possible role for a parent company to take on is *Network Mobilizer*. The aim of the role is to facilitate the creation of effective external networks, and internal ones to enable resource sharing in terms of both relationships and knowledge. As discussed in the previous chapter, subsidiaries positioned in the middle of the value chain experience little or no influence over its own value chain. This leaves them uncertain on both how to implement demands regarding sustainability, and how to proceed in their circular transition. As a parent company, it becomes therefore vital to act as a *Network Mobilizer*. One way to proceed with the subsidiaries' transformation is to establish collaborations with external actors who have common motives. Hence, acting as an *Aggregation* and *Social platform* (Hagel, n.d.) since the subsidiaries themselves seem to be unaware of the possibility to establish external collaborations. Therefore, it must act as a link and actively seek new collaboration partners to its subsidiaries, this can lead to connecting them with their optimal partners to realize long-term relationships.

Furthermore, some respondents mention that a parent company's role should include creating business opportunities i.e., finding new potential customers. However, since a parent company often has a large portfolio, it is demanding to investigate new potential customers for all its subsidiaries. Nonetheless, it is mentioned by employees at Storskogen that new business opportunities can emerge when given the opportunity but are not proactively sought. Therefore, the role should instead focus on creating internal collaborations within the portfolio, which in turn can result in new customers for the subsidiaries. Aligned with this argument is Foss et al. (2020) theory regarding matching competence. As an owner needs to possess the capabilities of identifying opportunities regarding resource combinations, it needs to address and focus on the possible opportunities that exist within the portfolio, to create value for its subsidiaries. Creating internal networks, as done at Storskogen and exemplified by Norrlandsprojektet, can result in several companies jointly creating solutions to customers. This resembles a *Mobilization platform* presented by Hagel (n.d.), where the goal includes assembling actors to achieve a shared goal. In this specific case, it resulted in the companies creating a larger entity which puts them in a more powerful position to bargain and set demands and requirements on its customers. Additionally, by encouraging collaborations such as Norrlandsprojektet, the subsidiaries can in turn focus on their core business and leverage each other's resources and capabilities, which in turn creates opportunities for holistic customer solutions. This aligns with Hagel (n.d.) argument regarding platform business goals of performance improvements and growth.

Circular systems are also dependent on collaboration, Hansen and Revellio (2020) emphasizes the importance of vertical collaborations and transparency across the value chain to realize circular transitions. Hence, this further highlights the essence of undertaking the role as a *Network Mobilizer*. A parent company, especially ones with diverse portfolios, can have the preconditions for enabling value chain transparency and collaborations due to owning subsidiaries in different positions in the value chain. This can be necessary guidance for subcontractors and a clearer role in the circular activities, as applicable circular theories currently are scarce. Since Storskogen's strategy is having a diverse portfolio, it could be in a better position to create these networks between actors in the value chain, to facilitate the adoption of circular business models forward e.g., with the foundries and the contract manufacturers, where they can disintermediate the waste-handler.

Additionally, resources can also be in terms of knowledge and capabilities, which is even more important when discussing the transition towards CBM. One suggestion provided by the interviewees is to create smaller group meetings with similar companies, where the possible outcome of such meetings can be new roadmaps regarding difficult tasks or identifying synergies. Moreover, the subsidiaries highlight the importance of examples, such as best case practices, from other companies who have implemented green initiatives to receive inspiration and real case evidence. This desire aligns with Pieroni et al. (2020) argument that context specific evidence is important to manage the uncertainty and enable circular transition. This underscores once again the crucial role the parent company plays in establishing internal networks.

According to Foss et al. (2020), once a parent company is in an uncertain environment it requires more matching competence than otherwise. For example, this is applicable to Storskogen, both due to the recession and its stock market value. Hence, Storskogen needs to be open to taking more advice from other actors both externally and internally to aid business decisions for its subsidiaries e.g., by establishing a collaboration with Stena Stål.

Institutional Builder

Another challenge the subsidiaries experience, partly due to their mid-value chain position and the lack of circular theories applicable to them, is high uncertainty regarding the circular transition roadmap. As mentioned, Pieroni et al. (2020) posits the vitality of guidance and evidence to mitigate the high uncertainty. Additionally, to have the preconditions for service innovation, institutions need to consider the entire system and its interdependencies, and set norms and rules, to encourage collaboration, transparency, and exploration (Vargo et al., 2024). Hence, another suggested role a parent company should undertake is *Institutional Builder*. The aim of this role is to provide a clear strategy and direction for the subsidiaries and foster a culture that encourages exploration and own initiatives.

A parent company is closely involved with its subsidiaries, and as mentioned by Storskogen's employees it is not uncommon to use the knowledge learned from one subsidiary's experience and apply it to another. Hence, a parent company possesses a holistic view of the system and is likely able to identify potential interdependencies and synergies. Additionally, as given by the result, it usually takes the role as an institution, and thus sets norms and regulations its subsidiaries should oblige. The majority of the respondents emphasizes the importance and value of its parent company's capabilities regarding traditional governance such as financial reporting, budgeting, succession, and KPIs. This governance competence, as suggested by Foss et al. (2020) is essential for companies to function, and especially important for family businesses that may lack this, and thus experience difficulties hiring external managers. In Storskogen's case, it has helped its subsidiaries set a strategic direction, implying governance competence. However, it seems as if it is not fully communicated to and understood by the subsidiaries, especially concerning sustainability. Thus, it might be necessary that the governance competence must be complemented by sustainable practices such as common standards and targets e.g., internal cassation. A parent company also needs to clarify the vision and direction, not only operationally but also circular sustainability wise. Nevertheless, as subsidiaries mention that new practices are sometimes rushed, therefore Storskogen needs to establish a functioning process for implementing new practices e.g., using pilot testing.

Moreover, it can be effective to also create a sense of purpose connected to sustainability. Since having a sense of purpose can, according to Quinn and Thakor (2018) result in employees thinking more innovatively and making unexpected contributions. Therefore, feeling purpose has an indirect result that can lead to the required exploration and thus potential solutions to circular challenges. Additionally, it can be beneficial to transform the subsidiaries sustainability work into something more purposeful e.g., not only burdening them with administrative tasks such as sustainability reporting, but rather make it valuable, by creating templates or useful graphs that can be used for marketing or in customer pitches. By creating purposeful sustainability work, a direct outcome valuable for the subsidiaries, is that it can lead to identification and attraction of customers that prioritize sustainability and have a higher willingness to pay. Furthermore, it is essential to foster a culture that encourages marketing and having discussions with customers regarding sustainability, as many subsidiaries state that customers prioritize price. To alter this dynamic, the subsidiaries need to challenge the status quo as suggested by Fredberg and Pregmark (2022), and thus reconsider their traditional view of their customer segments. This can facilitate a shift towards more sustainable practices, allowing the operations to better resonate in markets driven by cost concerns.

Challenging the status quo is not only needed in terms of customer segments but also concerning the whole organization. In general, a company needs to convey the urgency of change as explained by Fredberg and Pregmark (2022), as many of the companies will cease to exist if they are not sustainable in 20 years, as acknowledged by both subsidiaries and other actors in the value chain. Some of the subsidiaries e.g., emphasized that servitization is not a part of their core business, however, to ensure relevance in the future, companies need to manage ambidexterity and not dismiss the exploration of future opportunities as posited by Fredberg and Pregmark (2018), and O'Reilly and Tushman (2011). Storskogen challenges the subsidiaries status quo to some degree e.g., by pushing analytical thinking, but it might be necessary to challenge the corporate group's status quo, especially regarding sustainability opportunities e.g., cross-collaboration. Change is both difficult and time consuming, and thus the change has to start as soon as possible.

Information Hub

Besides having the roles as *Network Mobilizer* and *Institutional Builder,* another important aspect to ensure circular transformation is acknowledging having a role as an *Information Hub*. This role includes serving as an information collector and sharing knowledge through an effective learning platform accessible to all subsidiaries.

Storskogen e.g., is active in all its subsidiaries' boards and its employees have internal discussions with each other. Thus, they have access to information such as the subsidiaries strengths, weaknesses, and best case practices. Due to retaining this information it is also in a beneficial position to identify potential synergies; one subsidiary's strength might help another subsidiary's weakness, a best case practice in one industry might be applicable to another. Hence, parent companies should be responsible to collect and analyze this knowledge. However, there are divided opinions concerning industry specific knowledge and information. On one hand, if a parent company possesses industry specific knowledge, it can guide the subsidiaries more practically in their sustainability work. Additionally, for Storskogen, investing in education can show the subsidiaries that it still maintains a long-term ownership strategy. On the other hand, a parent company's role might be to provide a general perspective that challenges the subsidiaries' industry specific knowledge, as they already possess a deeper understanding of their industry and operations compared to their parent.

After gathering the information, it must be communicated out to the subsidiaries, which is not always done in Storskogen's case. For example, regarding reporting, as it is currently viewed as a side task by many subsidiaries, and its results are ambiguous, due to it not being actionable. As reporting is perceived challenging, it becomes the parent company's responsibility to clarify this ambiguity by providing clear communication and information regarding its value. Overall, when considering possessing a role as an *Information Hub* the need for clear communication is vital to prevent misinterpretations or conflict, with or within the parent company's portfolio. A prevailing example for Storskogen is regarding the allocation of financial resources, as the economic climate has shifted its ability to provide extensive investments without urgent cause. This can and have created frustrations among the subsidiaries who need investment capital for their sustainability development. According to Hagel (n.d.) this is a common challenge for platform businesses, who often experience difficulties dividing the captured value fairly. This further emphasizes the need for clear communication with the subsidiaries regarding how the parent company can provide other types of resources than capital to create value. For example, conveying the value in reporting or the value created connected to the other roles a parent company takes on such as an *Institutional Builder* or *Network Mobilizer*.

Communicating the information and knowledge can be facilitated by having an established process for it e.g., creating a learning platform. As mentioned previously, Storskogen has a knowledge exchange platform to share e.g., best case practices. This platform sets the preconditions for the companies to exploit the information and knowledge available in the companies, but the platform needs to be complemented further with sustainability related topics. This role aligns with Hagel (n.d.) theory concerning *Learning platform,* which focuses on aiding learning and is dependent on trust-based relationships that facilitate tacit knowledge sharing. Hence, a parent company must provide a two-sided platform with the opportunity to share information, ideas and knowledge for it and its portfolio companies. Providing these learning opportunities can in turn facilitate companies' developments, since sharing experiences and best case practices can result in inspiration and imitation. By functioning as an *Information Hub* and simplifying knowledge exchange, it can enable the subsidiaries to initiate their own contact or collaborations with other companies.

Moreover, Storskogen is more diverse, younger, and less bureaucratic compared to its more mature competitors. Although the diversity is mentioned as a challenge by the investigated subsidiaries, it can also become a competitive advantage if exploited correctly. According to Hagel (n.d.), diversity can aid innovation by enabling companies to access new ideas. Hence, establishing an effective learning platform and adopting the role as an Information Hub, can be one way to exploit it. Currently, Storskogen works in silos and does not fully exploit the potential of cross-collaboration. Additionally, Storskogen's competitors may possess higher levels of ownership competence since they are more mature and have been active through more economic cycles which according to Foss et al. (2020) increases the ownership competence. Hence, Storskogen can differentiate itself by taking advantage of the opportunity to be more pragmatic. As mentioned by the head of sustainability at Storskogen, being more pragmatic can help the subsidiaries' sustainability development further. Exploiting the opportunities Storskogen has, due to its unique parent company strategy, is valuable both for its subsidiaries and itself.

Active Influencer

However, the subsidiaries also experience many challenges that might be out of control both for them and its parent company. For example, the challenge regarding lack of infrastructure that arises due to actions of external actors such as politicians and municipalities. Hence, an important role to take on as a parent company is *Active Influencer*. This role's aim is to exploit the larger entity of a parent company to influence external actors such as politicians, municipalities, and companies. Despite endeavoring the role as *Active Influencer*, it might not entirely solve the challenge, rather lighten the difficulty and guide not only the subsidiaries but also the society in the right direction. Although the challenge might stem from external actors, the investigated subsidiaries' location further exacerbates it, which is to some extent Storskogen's unique strategy's cause, and makes this role even more important for them.

Moreover, since the investigated subsidiaries are SMEs their bargaining power are relatively small, not only as discussed earlier regarding influencing their value chain, but also on a societal level. If the parent company acted on its subsidiaries' behalf, it could get the size and power to realize change. The interviews with the subsidiaries insinuated that they often get deprioritized, and sustainable regulations, initiatives, and solutions are often aimed for other actors and sometimes at the subsidiaries' expense. The subsidiaries are likely deprioritized due to their position in the value chain and their small size, or the external actors might not be aware of how the initiatives affect them. Therefore, a larger bargaining power could be effective e.g., when lobbying governments and municipalities to consider these subsidiaries' operations, or to educate them on the potential consequences. This bargaining power can also be used to develop beneficial framework agreements with actors in the value chain such as with Stena Recycling for Storskogen, especially since circularity is an unclear subject and it likely requires both external and internal aid to achieve success.

Concludingly, sustainability is a shared goal, where many aim for the same results. Therefore, it becomes imperative to collaborate, and together identify and target the largest sources of emission, which offer the most significant opportunities for impact. This might require larger entities to lobby and educate other influential actors. Therefore, by collectively focusing the efforts, it can be ensured that no group, including SMEs, is left behind in the circular transition.

6. Conclusion and recommendations

Usually, the value contributed by a parent company regards more traditional methods of governance and creating a well configured portfolio. However, existing literature lacks explanations of how a parent company can help its subsidiaries' circular transition. Additionally, this challenge is further complicated by where the subsidiaries are located in the value chain, since circular literature does not cover strategies for companies positioned in the middle of the value chain. It is therefore of essence to identify what challenges middle positioned companies experience and how a parent company can facilitate these subsidiaries' circular transition.

Mid-chain subsidiaries experience a variety of challenges, which we have divided into four themes: Position in the value chain, Part of a corporate group, Insight gap, and Lack of infrastructure. The first challenge extracted is the most severe as it affects and is intensified by the other ones. It is also tightly connected to the lack of theoretical circular strategies applicable and feasible for the companies. The available literature is more focused on the end of the linear chains: companies producing raw material or ones selling to the end-customer. The acknowledged circular strategies such as R-strategies, are dependent on ownership of product and thus, control over either design or waste phase. Since circular systems need vertical integration or collaboration, mid-chain companies need to be involved in the strategies, but how and what they should be responsible for is unclear.

The position in the value chain challenge is exacerbated by being a part of a corporate group as it has control over the subsidiaries' finance and must allocate resources effectively between the portfolio companies. This can be a problem if investments are not accepted since sustainability development is capital expensive. Another challenge entailed by the position in the value chain is the insight gap. The subsidiaries experience high uncertainty of how to proceed in their circular development, due to environmental sustainability not having reached any dominant direction, lack best case practices, and there is no available circular literature applicable to them. Moreover, as the whole society tries to become more sustainable, it is difficult to prioritize actions and segments. Hence, these companies are often forgotten and thus experience a high degree of deprioritization, as initiatives are aimed to give, e.g., individuals more sustainable alternatives at the expense of the companies.

In general, the respondents agree upon what roles a company should possess, the roles extracted are: Network building, Information and knowledge platform, Institutional role, and Strategic oversight and governance. However, how a parent company executes the roles has divided opinions. For example, both sides are certain that a parent should create a network, the investigated parent gathers CEOs to accomplish this, but the subsidiaries emphasize the need for smaller groups to enhance synergy creation. Similar contradictions can be extracted for the other roles as well.

Given the challenges mid-chain companies experience, and the roles a parent company is responsible for, we have formulated a recommendation. The recommendation is in the form of four roles that will help a parent company extend its ownership competence. The roles are *Network Mobilizer*, *Institutional Builder, Information Hub,* and *Active Influencer*. These roles are applicable for all parent companies but even more advantageous for Storskogen. Since Storskogen has a unique strategy, diversified portfolio, and the opportunity to be more pragmatic, it both has a bigger need to adopt these roles, and in a better position to be successful at it.

It cannot be overlooked that these recommended roles for a parent company require extensive resources in terms of time and engagement from the parent company's employees. Therefore, these roles can be seen as a long-term goal, and sets the preconditions for a parent company to facilitate its subsidiaries transition to CBM. Nevertheless, we want to point out that short-term goals are also vital. Circular actions can be realized in this instant, where e.g., using marketing tools to advertise the subsidiaries' green actions, to both push their own customers' mindsets, or to find new customers who prioritize sustainable products. It is also important to start collaborating, to increase the transparency in the value chain, and collectively initiate the transition toward circular systems. Taking collaborative initiatives can be complemented by also discussing sustainability with customers, to counteract the subsidiaries' low bargaining power and problematic customer preferences. The last discovery we want to highlight is the several green actions already undertaken by the subsidiaries which are not shared within the portfolio and are therefore not exploited. The sustainable pressures are rising in the form of regulations and expectations, therefore, to not lose a competitive position companies need to exploit these opportunities. If not, these companies will cease to exist in 20 years.

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Appendix A: Interview guide for subsidiaries

Business model canvas:

- Map out the business model canvas

RQ 1 - Business model:

- How do you work with sustainability today?
- How can you incorporate sustainability into your business model?
- Where do you think there is best potential to implement sustainability into your business model?
- What sustainability trends have you seen in your industry?
- What does your supply chain for steel look like?
- To what degree are your end-products recyclable today?
- How do you view the offering of services to your customers?
- Have you investigated the potential to add revenue streams or implement alternative pricing models?
- How does your work with product return look like?
- How do you compare to your competitors concerning sustainability?
- How important do you think sustainability is on a scale from 0-10?
    - Why?

RQ 2 - Role of parent company:

- What does your collaboration with Storskogen look like today?
- What does your collaboration with Storskogen regarding sustainability look like?
- How do you benefit the most from being a part of Storskogen?
- What disadvantages do you see with being a part of Storskogen?
- What strengths and experiences do you have that you think you could contribute to the other subsidiaries within Storskogen?
- How has your work with sustainability looked like since you got acquired by Storskogen?
- What kind of support would you need from Storskogen regarding sustainability?
- Do you collaborate today or see the potential to collaborate with other companies owned by Storskogen?
- Anything you want to add to the interview?

Appendix B: Interview guide for Stena Recycling

- Could you introduce yourselves?
- Could you explain Stena Recycling's business?
- What makes your collaboration with customers successful?
- Do you have any demands on customers who recycle with you?
- Do you have examples of best case practices which customers can obtain?
- Do you see any value in collaborating with Storskogen or other parent companies?
- Could you exemplify the improvement work you undertake?
- What does your supply chain look like?
- Any demands on your customers regarding sustainability?
- How do you view the current collaborations, any pros or cons?
- How many competitors do you have?
- What do you think about current regulations?
- What kind of advice would you give to companies who want to become more circular?
- A lot of companies have mentioned that you initiate events for customers - could you explain these events?
- Looking from a holistic perspective - what do you believe is the way forward when discussing circularity and sustainability?
- Anything you want to add to the interview?

Appendix C: Interview guide for Stena Stål

- Could you explain Stena Stål’s business?
- Do you see any difference in customer preferences? Less / more demands?
- How large is Stena Stål’s market share compared to competitors?
- Why do customers choose Stena Stål?
- Tell us about your sustainable offers?
- What do you think about aiding customers' sustainability journey?
- Do you have centralized storage?
- How do your customer relationships look today?
- Do you give feedback on customers orders if they choose less sustainable material?
- Ordering from your website do you receive documentation on the steel's CO2 footprint?
- What demands regarding sustainability do you have on your suppliers?
- Do you have any demands regarding the level of recycled materials a supplier should have?
- What kind of advice would you give to companies who want to become more circular?
- What factors would you consider important if initiating a collaboration with Storskogen?
- Is there anything your customers could help you with?
- Looking from a holistic perspective - what do you believe is the way forward when discussing circularity and sustainability?
- Anything you want to add to the interview?

Appendix D: Interview guides for Storskogen

D.1 Interview questions to industry vertical employees

- What do you think is the purpose of a parent company's?
- What do you think you should contribute as a member on the subsidiaries' boards?
- Do you see any value in possessing deeper industry specific knowledge to contribute to the companies?
- What does your discussion/ collaboration between the business areas look like?
- Do you think there are any potential improvements with your way of handling board work/ way of leading?
- What do you think Storskogen does really well?
- Can you open doors to e.g., new clients for the subsidiaries?
- How do you think you have worked with sustainability at Storskogen?
- Anything you want to add to the interview?

D.2 Interview questions to the head of sustainability

- What do you think is the purpose of a parent company's?
- Could you specify your role at the company?
- What are the most common questions regarding sustainability?
- Do you see any value in possessing deeper industry specific knowledge to contribute to the companies?
- How do you think you have worked with sustainability at Storskogen?
- What do you think Storskogen does really well regarding sustainability?
- Do you think there are any potential improvements with your way of working with sustainability?
- Anything you would like to add to the interview?

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