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# CUSTOMER-PERCEIVED VALUE AND ITS COMPONENTS IN INDUSTRIAL SCALE CIRCULAR BUSINESS MODELS

## Comparison of Recycling and Reuse Settings Through a Multiple-Case Study

Master of Science Thesis
Faculty of Management and Business
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# ABSTRACT

Mikko Sairanen: Customer-Perceived Value and Its Components in Industrial Scale Circular Business Models – Comparison of Recycling and Reuse Settings Through a Multiple-Case Study
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Driven by growing environmental pressures, recent years have witnessed a powerful business transition towards the circular economy (CE) – an economic system regenerative by design that strives to conserve resources by narrowing, slowing, and closing material and energy loops. At the same time, the business customers' experiences and expectations are also in transition due to the new types of offerings and interactions brought forth by the CE, as well as the growing demands for sustainability, internally and/or from stakeholders' side. While the research on CE has generally bloomed, the customer perspective has so far been nearly absent in the literature. Especially the ways that business customers perceive value in the CE have been neglected, and no suggestions for classifications of customer-perceived value for the CE have been made. This leads to a situation where providers have troubles to develop and market circular offerings according to customers' preferences, which would be needed to accelerate the circularity transformation. Thus, the objective of this study is to identify the components of customer-perceived value in the CE, investigate how they behave with different types of circular business models, and explore what parts of customer-perceived value the providers still have difficulties to recognize.

To meet the research objective, an explorative multiple-case, cross-industry study with dyadic data collection was carried out. Case selection process was twofold, starting with a careful mapping of potential cases. In the end, innovative circular offerings from the fuel, workwear, lifting, and tools industries were selected. The cases represent three distinct categories of circular business models (recycle and reuse with transferred and retained product ownership) to enable a comparative analysis. The primary data consisted of provider and various customer interviews for each case and was supplemented by multi-sourced secondary data. A comprehensive literature review on earlier customer value research was also conducted and all the gathered data utilized in an abductive thematic analysis with the help of qualitative analysis software Atlas.ti.

The findings reveal the five main components of customer-perceived value in the CE (economic, product performance, service, symbolic, and ethical value) as well as the 16 subcomponents that these consist of. The constructed classification and the discussion demonstrate what kind of value is critical for industrial scale CE customers and where negative value perceptions may be created. The comparison analysis shows that economic customer value is highlighted in reuse context, whereas symbolic and ethical value are more critical in recycle context. Finally, the study reveals issues that providers have difficulties to grasp when interpreting customer-perceived value, related to for example offering's lifetime costs, infrastructural fit, or suitability to be sold as a service.

The study fills an important gap in the intersection of CE and customer value research streams. From a practical perspective, it gives managers robust tools for understanding what their customers value in circular business, how that value is structured, and how to avoid some typical pitfalls of interpreting the customer perceptions according to the type of business model. For customers, the results can serve as a tool for systematic supplier evaluation. In the future, the findings could be reviewed by conducting customer-centered studies with larger samples as well as by investigating the effect of customer-specific characteristics on value perceptions. The interconnectivity of value components and the dynamics of temporal change in value perceptions would also be important research avenues towards a full understanding of customer-perceived value in the CE.

Keywords: customer value, value component, circular economy, environmental sustainability, industrial business

# TIIVISTELMÄ

Mikko Sairanen: Asiakkaiden kokema arvo ja sen komponentit teollisen kokoluokan kiertotalousliiketoimintamalleissa – kierrätys- ja uudelleenkäyttötapausten vertailu monitapaustutkimuksella
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Kasvavien ympäristöllisten paineiden ajamana viime vuodet ovat nähneet voimakkaan taloussiirtymän kohti kiertotaloutta – talousjärjestelmää, joka uudistaa ja suojelee resursseja kaventaen, hidastaen ja sulkien materiaali- ja energiavirtoja. Samanaikaisesti yritysasiakkaiden kokemukset ja odotukset ovat myös muutoksessa, johtuen niin kiertotalouden tuomista uusista tarjoomista sekä vuorovaikutuksen muodoista, kuin myös sekä sisäisistä että sidosryhmien kasvavista kestävyysvaatimuksista. Vaikka tutkimus kiertotaloudesta on yleisesti ottaen kukoistanut, on asiakasperspektiivi jäänyt tutkimuksen kohteena lähes huomiotta. Etenkään tapoja, joilla yritysasiakkaat kokevat arvoa kiertotalousliiketoiminnassa ei ole tutkittu, eikä ehdotuksia asiakasarvon luokittelutavoista kiertotalousympäristössä ole tehty. Tämä johtaa tilanteeseen, jossa toimittajien on vaikeaa kehittää ja markkinoida kiertotaloustarjoomiaan asiakkaiden preferenssien mukaisesti, mitä tarvittaisiin kiertotalousmurroksen vauhdittamiseksi. Tämän tutkimuksen tavoitteena on paljastaa asiakkaiden kokeman arvon komponentit kiertotalousliiketoiminnassa, tutkia kuinka ne käyttäytyvät erityyppisten kiertotalousliiketoimintamallien yhteydessä ja kartoittaa mitä asiakasarvon osia toimittajilla vielä on vaikeuksia tunnistaa.

Tutkimustavoitteen saavuttamiseksi suoritettiin eri teollisuudenaloja leikkaava eksploratiivinen monitapaustutkimus dyadisella datan keruulla. Tutkittavat tapaukset valittiin kaksiosaisesti, alkaen potentiaalisten tapausten kartoituksella. Lopulta tutkittaviksi valittiin kiertotalouden edelläkävijäyrityksiä polttoaine-, työvaate-, nostolaite- ja työkaluteollisuudesta. Valitut tapaukset edustavat kolmea eri kiertotalousliiketoimintamallityyppiä (kierrätys sekä uudelleenkäyttö siirretyllä ja säilytetyllä tuotteen omistajuudella) vertailevan analyysin mahdollistamiseksi. Primääridata koostui toimittajien sekä useiden asiakkaiden haastatteluista ja sitä tuki useista lähteistä haettu sekundääridata. Lisäksi tehtiin laaja kirjallisuuskatsaus aiemmasta asiakasarvotutkimuksesta. Koottua dataa hyödynnettiin abduktiivisessa teema-analyysissä käyttäen apuna Atlas.ti-ohjelmistoa.

Tulokset paljastavat kiertotalouden asiakasarvon viisi pääkomponenttia (taloudellinen, tuotteen suorituskyvyn, palvelu-, symbolinen ja eettinen arvo) sekä näiden sisältämät 16 alakomponenttia. Rakennettu viitekehys ja keskustelu osoittavat minkä tyyppinen arvo on kriittistä teollisen kokoluokan kiertotalousasiakkaille ja missä negatiivista arvon kokemista voi ilmetä. Vertaileva analyysi näytti taloudellisen asiakasarvon korostuvan uudelleenkäytön yhteydessä, kun taas symbolinen ja eettinen arvo olivat kriittisempiä kierrätyksen yhteydessä. Lopuksi tutkimus selventää, missä asioissa toimittajilla on vaikeuksia ymmärtää asiakkaan arvon kokemista, liittyen esimerkiksi tarjooman elinkaarikustannuksiin, tekniseen yhteensopivuuteen tai tuotteen palvelullistamiseen.

Tutkimus täyttää tärkeän aukon kiertotalouden ja asiakasarvon tutkimuksen yhtymäkohdassa. Käytännössä se antaa yritysjohtajille työkaluja sen ymmärtämiseen, miten asiakkaat kokevat arvoa kiertotalousliiketoiminnassa, miten tämä arvo rakentuu ja kuinka välttää tyypilliset virheet asiakkaan kokemusten tulkitsemisessa, liiketoimintamallityypin mukaan. Asiakkaille viitekehys voi toimia työkaluna toimittajien systemaattiseen arviointiin. Tulevaisuudessa tuloksia tulisi arvioida asiakaskeskeisillä laajemman otoksen tutkimuksilla sekä tarkastelemalla asiakkaiden erilaisten ominaispiirteiden vaikutusta arvon kokemiseen. Arvokomponenttien linkittyminen toisiinsa sekä arvon kokemisen ajallinen muuttuminen olisivat myös tärkeitä tutkimuskohteita matkalla kohti täyttä ymmärrystä kiertotalouden asiakasarvosta.

Avainsanat: asiakasarvo, arvokomponentti, kiertotalous, ympäristöllinen kestävyys, teollinen liiketoiminta

# PREFACE

Writing a master's thesis has been a long project requiring commitment, proactive attitude, and passion towards the research topic. The shared ambition of myself and my supervisors led to a relatively broad and profound study which was carefully designed from the beginning. Even though the path to this point has had many bumps and turns, I can be very happy with the result and the overall process. I'm excited to have learned so much more about the topic of circular economy that I feel genuine professional passion for. I'm very thankful of all the people met and skills gained during the project. Due to exchange studies a big part of this thesis has been written in Mexican soil, and some even in South America, adding another little twist to the process.

Huge thank you to my supervisors professor Leena Aarikka-Stenroos and doctoral student Jenni Kaipainen for all the insights, inspiration, and feedback in all stages of the project. You facilitated a very supportive yet flexible environment to write this thesis. Thank you to all interviewees from partner companies for contributing to and enabling this work, as well as to everyone who provided their feedback and help during the project. Thank you to my wonderful friends, especially to Ryminä-group and the ones providing invaluable everyday peer support. And of course, the biggest thank you to my parents and whole family for everlasting help and care.

As completing this thesis marks the time to graduate for me, I want to say that my student journey from 2016 to these days has been the most amazing and precious journey for me. Countless unforgettable experiences have shaped me to be ready for any future challenge or opportunity. I would like to thank especially Indecs and ESTIEM and all the fantastic people I have met through and around these organizations for having been a part of my student life. This stage of my life is ending but will never disappear, providing inspiration for all the new adventures that are yet to come.

Monterrey, 10 February 2022

Mikko Sairanen

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# LIST OF SYMBOLS AND ABBREVIATIONS

| | |
|---|---|
| B2B | Business-to-business |
| CBM | Circular Business Model |
| CE | Circular Economy |
| CSR | Corporate Social Responsibility |
| EC | European Commission |
| EMF | Ellen MacArthur Foundation |
| PSS | Product-Service-System |
| UN | United Nations |

# 1. INTRODUCTION

## 1.1 Background of the study

In the global combat against climate change, resource depletion and biodiversity loss, one of the main focus areas nowadays are environmentally sound economic systems and sustainable logics of business. Spanning global (UN 2021), regional (EC 2021a; Restuccia et al. 2021) and industry-specific policymaking, as well as ambitions of both academics and practitioners (Geissdoerfer et al. 2017), the sustainability megatrend implies significant changes for businesses' value creation processes and customer requirements. As the global economy undergoes this sustainability transition, it is critical for companies to understand how their customers perceive value in the renewing environment to be able to create symbiotic links between environmental consciousness and profitable business. This study aims to fill an existing gap in understanding by taking customer value research to the modern sustainability-focused era of business, more specifically that of circular economy (CE).

Circular economy is a commonly used roof concept encompassing approaches to transition from an environmentally destructive 'take-make-dispose' linear economy to one that emphasizes mechanisms to close, slow, and narrow resource loops, thus enabling sustainable patterns of production and consumption (EMF 2013; Bocken et al. 2016; Merli et al. 2018). CE has become a central concept in environmental policymaking (Ghisellini 2016; EC 2021b) and is frequently cited by companies to aid the communication of their environmental responsibility strategies.

Even though CE research has become abundant in recent years and customer-perceived value (or shortly customer value) has been a hot topic in research for decades (Eggert et al. 2018; Zeithaml et al. 2020), the characteristics and formation of customer-perceived value from the perspective of CE research, considering circular business models (CBMs) has still not been systematically tackled. Generally, only a few publications focusing on customer value perceptions in CE context can be found (such as Antikainen et al. 2018; Aarikka-Stenroos et al. 2021; van Boerdonk et al. 2021), but even these have limitations regarding methodology or the CBMs or markets investigated. In particular, the existing research on CE customer value in industrial B2B markets is closely nonexistent. Importantly, there has not been any attempt to construct a new classification for customer-perceived value for the CE taking into account the features of circular business.

There is currently no comprehensive understanding of the customer value characteristics typical to CBMs, nor has there been sufficient research on the big-picture changes to the value formation that the transformation from a linear to a circular economy might set in motion. Some papers have studied consumer acceptance or certain drivers in specific CBMs (e.g. Hazen et al. 2017a; Camacho-Otero et al. 2019; Kuah & Wang 2020), but a holistic understanding of the value formation is missing, especially so regarding the industrial scale B2B market. Aarikka-Stenroos et al. (2021) have recently made a first exploration into the topic, however with a mixed B2B/B2C focus and by articulating the value through a model originally developed in linear business settings.

In general, there is a clear shortage of research from the customer or consumer perspective in the context of CE. The research is currently heavily focused on the point of view of the supplier or provider. Regarding value, this shows as a research emphasis on how the providers configure value propositions (e.g. Kristensen & Remmen 2019; Ranta et al. 2020), instead of studying how those propositions are received by customers. A gap also remains in comparing the customer perspectives and value formation of distinct major CBM types with each other. Neither has there been dyadic research conducted on provider companies' understanding of their customers' value perceptions in the CE context. For companies to understand what elements of the business and their offering are deemed crucial by their customers in circular business environments, more research focusing on the customer's perspective is urgently needed.

As it has been shown that environmental impact alone is not a sufficient pillar for a profitable CBM (Antikainen et al. 2018), industrial companies need to gain deeper understanding into how value manifests for their customers. This is crucial to obtain actionable insights, embed these into their CBMs and enhance their value capture potential. In a bigger scale, this would enable a deeper integration of economic and sustainability value, create incentives to bring sustainability in a strategically central role in industrial companies and therefore accelerate the transition into a greener economy.

This study's central purpose is to start building a systematic understanding of customer-perceived value in industrial scale CBMs with a focused empirical cross-industry case study. The aim is to address and compare most widely used approaches to carry out circular business, employing a strong customer perspective while also enabling comparison of perspectives with dyadic (providers + customers) data collection. The rest of this subchapter reviews principles and terminology of CE to build a strong base for the construction of the research design.

The circular economy can be implemented in various ways, each of which have their unique consequences for the customers' processes and experiences, thus affecting how value is perceived. There have been various classifications of the principles of circular economy (Kirchherr et al. 2017; Prieto-Sandoval et al. 2018), going into different degrees of detail. The most commonly used, simple definition is to distinguish between reducing, reusing, and recycling, dubbed 3R principles (employed by e.g. Su et al. 2013; Ghisellini et al. 2016; Ranta et al. 2018).

According to the review by Ghisellini et al. (2016), reducing refers to minimizing use of resources and creation of waste through e.g. energy and material efficiency, dematerialization and design practices for minimum material usage. Reusing implies recurrent usage of materials in product or component level for their original use purpose, which according to EMF & McKinsey (2015) can be achieved for example via repairs, upgrades, sharing, or service configurations. Recycling represents the recovery of materials in raw material level through various reprocessing techniques, which allows for utilization of waste streams and innovation regarding recycled and renewable products. (Ghisellini et al. 2016)

The 3R framework has been modified and expanded for some authors, up to a 9R framework by Potting et al. (2017). Also, a 4R terminology accommodating 'recover' as the fourth dimension is frequently cited by policies, but the threefold classification is significantly more popular (Kirchherr et al. 2017). Many studies, such as Bocken et al. (2016) use the terminology of narrowing, slowing, and closing resource loops in place of the 3R principles, essentially addressing the same concepts, respectively.

The reviewed classifications also act as a basis for the categorization of circular business models (CBMs). Business model describes the way a company generates value for its customers while ensuring profitability (Teece 2010), containing the elements of the business logic and their relationships (Osterwalder et al. 2005). The circular economy principles for preserving resources mean a transformation on these ways in which companies propose, create & deliver, and capture value. In recent years, CBMs have become a popular research topic and various literature reviews addressing CBMs from a spectrum of perspectives have emerged (e.g. Lewandowski 2016; Urbinati et al. 2017; Centobelli et al. 2020). Some of the most well-known typologies of CBM types are illustrated in Table 1, mapping their rough placements in the 3R framework.

***Table 1*** *CBM types and 3R framework*

| | Reduce | Reuse | Recycle |
|---|---|---|---|
| EMF & McKinsey 2015 | | Sharing<br>Maintaining / prolonging<br>Reusing / redistributing<br>Refurbishing / remanufacturing | Recycling<br>Cascading<br>Extraction of biochemical feedstock |
| Bocken et al. 2016 | Encourage sufficiency | Access and performance model<br>Extending product value<br>Classic long-life model | Extending resource value<br>Industrial symbiosis |
| Lüdeke-Freund et al. 2018 | | Repair & maintenance<br>Reuse & redistribution<br>Refurbishment & remanufacturing | Recycling<br>Cascading and repurposing<br>Extraction of biochemical feedstock |

It is rather easy to see that CBM innovation is highly focused around reuse and recycle principles. There are a couple of potential explanations to the absence of identified CBMs for the reduce-principle. Firstly, the reducing principle, dealing with material and energy efficiency, can be successfully implemented in a linear economy as well (Bocken et al. 2016). The issues relevant to the reducing principle are largely tackled in other literature streams, such as that of lean production, even though the principle can powerfully contribute to the targets of CE when supported by a holistic approach. Secondly, there might be a lack of ideas for concrete business models utilizing this principle because many of its applications, such as lowered total production, are not economically attractive for for-profit companies (Zink & Geyer 2017).

Inside the reuse-based realm of CBMs, there is an important CBM group that has started gaining significant attention. That group refers to those CBMs in which the ownership of a product is no more sold to customer. What is sold is rather the right to use and to obtain the service the product provides, or in a more advanced sense, the performance or end result desired by the customer (Lewandowski 2016). These CBMs in which ownership is maintained by the service provider, dubbed access and performance model by Bocken et al. (2016), are deemed crucial for a successful CE transformation by many authors (e.g. Tukker 2015; Urbinati et al. 2017; da Costa Fernandez et al. 2020). These CBMs are sometimes called product-service-systems (PSSs), but PSS more commonly refers in general to combinations of tangible products and intangible services (Tukker & Tischner 2006; Martinsuo et al. 2020). Thus, in this study they are referred to as reuse-based CBMs in which ownership is retained (by the provider).

All of the CBM types in Table 1 entail different ways to managing value. Companies must decide how to propose, create, and deliver customer-perceived value, whose amount then dictates the potential of value capture for the company itself. Teece (2010) states that business model essentially represents management's hypothesis on customer needs, what customers value and how to best organize to meet those needs in a profitable way. To support the CE transformation, research-based evidence of customer perceptions is much needed to improve the quality of those management hypotheses.

## 1.2 Research objective, questions, and scope

To help fill the discussed research gap, this study employs an explorative multiple-case, cross-industry study to investigate and map out the most prominent customer value components in CE context and specifically in B2B environment. Literature review of customer-perceived value with a focus on earlier identified value sources is first executed to enable the search for key changes in customer-perceived value when moving from a linear to a circular economy. These initial value sources are analyzed with empirical data in an abductive manner to reveal the components and their respective subcomponents of customer-perceived value in the CE. Thus, value sources refer to the information extracted from literature as a feed for the analysis, whereas components refer to the resulting structure of customer-perceived value in the CE. The value components will eventually be analyzed for each of the three chosen CBM categories and comparatively reviewed from both customer and provider perspective to bring the findings into a more practical and detailed level. Research is guided by threefold research questions that are discussed next.

Firstly, and most fundamentally, a general understanding of the formation of the customer-perceived value in the industrial CE context is needed. As discussed, the knowledge on how customers experience CE is scarce, with an especially apparent research gap regarding the components of customer-perceived value. Thus, the first research question reads as follows:

*RQ1: What constitutes customer-perceived value in industrial scale circular business?*

Even if not yet properly applied to CE, customer-perceived value forms a rich literature stream of its own. It is important to take advantage of the extant knowledge and identified sources of customer-perceived value, firstly to ensure the usability and compatibility of this study in the wider research context, and secondly to allow for understanding the critical changes in the structure of customer-perceived value brought forth by CE. This

is subsequently critical information for companies to facilitate a successful transformation to CE. Therefore, the first research question further entails two sub-questions:

*RQ1a: How are already recognized sources of customer-perceived value realized in industrial scale circular business settings?*

*RQ1b: What is original to the customer-perceived value in industrial scale circular business settings?*

After conclusions on the characteristics of customer-perceived value in CE have been made in a general level, the study design and case selection enable a comparison analysis between CBMs, to reveal differences in major CBM categories' value logics. The second research question is derived from this:

*RQ2: What differences in customer-perceived value can be found between different circular business models?*

The study's approach on CBM categories is based on the well-established 3R framework. As was seen in Table 1, the reuse and recycle principles offer the most fertile ground for CBM analysis, being also the principles in need of improved practical understanding and business model innovation. The study therefore focuses on CBM categories in reuse and recycle, while further dividing the former into two subcategories, as illustrated in the Figure 1 below.

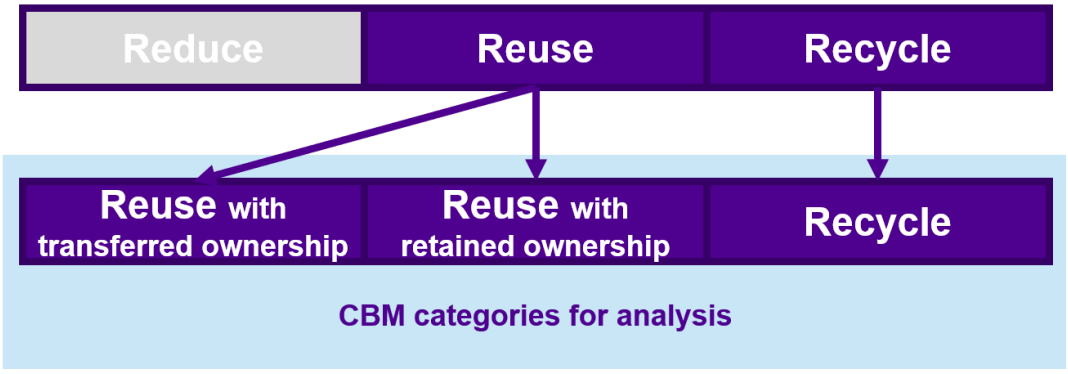


***Figure 1*** *The three CBM categories to be analyzed in this study*

Of these three categories for analysis, the first one, reuse with transferred ownership, refers to those CBMs that extend the lifecycle of the product within a traditional model of selling products, encompassing e.g. repairing, remanufacturing, and modernizing activities. The second category, reuse with retained ownership, encompasses similar CBMs with the exception that products are offered to customers as services, not sold in a traditional way. This category can additionally feature advanced service models, sharing platforms and the like. Finally, the recycle category encompasses e.g. use of recycled

and renewable materials, cascading of materials, and repurposing waste streams. The threefold CBM categorization acts as the basis for the sub-questions to the second research question:

*RQ2a: How does customer-perceived value differ in reuse- and recycle-centered circular business models?*

*RQ2b: How does customer-perceived value differ in reuse-based business models when ownership of a product is or is not transferred to the customer?*

The exact CBMs that the empirical part of the study covers for each category will be reviewed in chapter 5 with the case descriptions. Lastly, to take full advantage of the dyadic research design (interviews carried out both for the providers and the customers) and to raise the practical relevance and potential to generate impactful managerial implications, the provider and customer datasets are compared to identify where providers follow the customers' value perceptions seamlessly and where they are still in need of more awareness. Thus, the third and final research question is formulated as follows:

*RQ3: How well do providers recognize how their customers perceive value from the CE offering in each CBM category?*

Addressing these questions will significantly improve the understanding of the current research gap at the intersection of customer-perceived value and circular business models. The study's highly cross-industrial viewpoint and reflections in the light of previous customer value research allow for creating a strong foundation on which further, perhaps quantitative or more specific research of customer-perceived value in the CE can be built.

## 1.3 Structure of the study

This first chapter introduces the study's background and demonstrates its relevance, both in academic and practical terms. Research objective, questions, and scope are presented through discussion in this chapter. Chapter 2 is the first theory chapter, which tracks the literature on customer-perceived value, shows how the academic understanding of customer value has changed in the past decades, and reviews profoundly what is known about the potential sources of customer-perceived value. Chapter 3 continues the theory review by focusing on circular economy context. It demonstrates the scarcity of research in the intersection of customer value and CE, digs deeper into the research gaps and introduces how the existing customer value theories can be used to construct new knowledge for the CE context.

Chapter 4 focuses on the employed methodology. Research design and fundamental methodological choices are presented first, followed by sections for the case selection, data collection, and data analysis processes. Lastly in chapter 4, the methodology's validity and reliability are critically discussed. In chapter 5, the results are presented. The chapter includes introductions to the selected cases, presentation of the study's classification of customer-perceived value, as well as a detailed analytic discussion considering each of the research questions. The work is concluded in chapter 6 by contemplating the key findings, theoretical implications, managerial implications, limitations, and future research needs. References and appendixes are presented in the end.

# 2. UNDERSTANDING CUSTOMER VALUE

This chapter provides the theoretical basis for researching customer value and how it manifests itself. Subchapter 2.1 discusses how value has been conceptualized earlier through a couple of different perspectives and talks about an early distinguishment to value in exchange and value in use. This discussion is further deepened in subchapter 2.2 while narrowing the perspective into an industrial setting and taking service-dominant logic into consideration. Finally, subchapter 2.3 reviews the different sources of customer value recognized by research up to date, thus establishing a starting point of exploration of customer value in relation to circular economy for the following chapter.

## 2.1 Early conceptions of customer value: focus on value in exchange

To understand customer value, it is good to start with briefly reviewing what it means when something is deemed valuable. According to the resource-based theory, a resource, which might be for example a process, capability, asset, attribute, information, or knowledge, is valuable if it "exploits opportunities or neutralizes threats in a firm's environment" (Barney 1991). Alternatively, a valuable resource is one that enables customer needs to be better satisfied (Bogner & Thomas 1994).

*Customer* value is built upon these conceptions of value, with the added requirement of it being connected to the acquisition and use of a product or a service (Woodruff 1997). An important conceptual distinction is the one between value-in-exchange and value-in-use, that was first clearly defined by Adam Smith in 'The Wealth of Nations' (1776):

"The word value, it is to be observed, has two different meanings, and sometimes expresses the utility of some particular object, and sometimes the power of purchasing other goods which the possession of that object conveys. The one may be called 'value in use;' the other, 'value in exchange'." (Smith 1776, p. 42)

Roughly speaking, value-in-use is thus value relevant for the customer, representing everything the customer gets by processing or possessing the offering. Value-in-exchange, on the other hand, is determined by the provider or supplier, referring to the price of the offering and therefore received by the provider rather than the customer. In the traditional view of marketing, however, the role of the provider firm has been emphasized and value-in-use and especially the customer's role in value creation received less attention (Eggert et al. 2018).

From early on, customer value was seen as a trade-off between what is received and what is given (Zeithaml 1988), and while this view has been often repeated (e.g. Smith & Colgate 2007) and still largely persists, the understanding of what is included in the benefits and sacrifices experienced by the customer and how these are formed has changed and evolved significantly. Whereas the early literature highlights the role of price and offering's monetary worth, namely value-in-exchange, contemporary research has expanded the understanding to cover different value sources and explored dynamics of value-in-use, as reviewed in the next subchapters. Moreover, the nature of the benefits/sacrifices trade-offs is also debatable, as for instance whether customer value is summative (benefits less sacrifices) or a ratio (benefits divided by sacrifices) (Parasuraman 1997; Smith & Colgate 2007).

Calls to renew the theoretical perspectives on the dynamics of value creation grew stronger and more frequent around the change of the millennia. For instance, Prahalad and Ramaswamy (2000) described how products are subordinates to the use experience and Haeckel (1999) noted the change from 'make-and-sell' to 'sense-and-respond' strategies. This growing body of research laid the foundation to new conceptualizations of value creation from the perspectives of both the customer and the providing firm. These views emphasize the subjectivity of value and role of service and will be reviewed in the following subchapter.

## 2.2 Modern view of customer value: focus on value-in-use

The academic conceptualizations of customer value have gradually moved from focusing on objective benefits and sacrifices to focusing on relationship value and most recently on the co-creation of value (Eggert et al. 2018). An early, popular consolidating definition of customer value by Woodruff (1997) already hints at the changes in the research field:

> "Customer value is a customer's perceived preference for and evaluation of those product attributes, attribute performances, and consequences arising from use that facilitate (or block) achieving the customer's goals and purposes in use situations." (Woodruff 1997)

Woodruff's definition was indicative of contemporary research because it emphasized that value is not created for the customer before the offering is being used. This is central to the service-dominant logic (S-D logic) (Vargo & Lusch 2004, 2008). The S-D logic argues that the fundamental unit of exchange where value is bound is the application of skills and knowledge, defined as 'service', rather than a good. Service thus means that the exchange of specialized skills or knowledge and physical goods act as distribution

mechanisms of service to their users (Vargo & Lusch 2004). For example, a service provided by a toolkit is to make construction work faster and that of an invoicing software is to replace manual work and free up working time. Additionally, products can provide satisfaction for individuals' higher-order needs such as feelings of happiness, security, or accomplishment, as found by Gutman (1982) and recognized by Vargo & Lusch (2004).

The service-based nature of products has been recognized by academics for a longer time (e.g. Kotler 1977, p. 8), but made widely recognized by the S-D logic conceptualization (Vargo & Lusch 2004, 2008), perhaps boosted by the growing environmental pressures to redesign the manufacturing-based economy, among other factors. When this perspective is applied to understanding customer value, the focus clearly shifts from the pre-determined product attributes to the use and delivery of the offering. The interaction between the customer and service provider becomes critical, as it defines how well the original service need of the customer is fulfilled.

Therefore, the introduction of S-D logic has again emphasized the difference between previously discussed value-in-exchange and value-in-use. The main attention of modern research when analyzing *customer* value has been in value-in-use (Eggert et al. 2018). That is because the production process of a product or a service can only create potential value (value proposition), and it is only through customer action in the usage phase of the offering that value can be actualized and created (Vargo & Lusch 2004, 2008; Grönroos & Voima 2013). The earlier discussed value-in-exchange is directly related to the pricing of the offering and is in fact compared against the experienced value-in-use by the customer in the purchasing situation. Value-in-exchange can thus also be considered a derivative of value-in use. This approach was in fact already employed in Aristotle's *Value theory* (Gordon 1964).

Directly from these considerations stems the concept of value co-creation. Basing on S-D logic, tangible goods too are mediators for services, but for these services to be delivered the customer always needs to learn to use, maintain, repair, and adapt the product according to their unique needs and situation (Vargo & Lusch 2004). Therefore, the co-creation perspective further emphasizes that customer value can only be created with the customer involved in the process, and that value is always uniquely determined by the customer (Vargo & Lusch 2008). This is also affected by the fact that such value-in-use is dependent not only on capabilities of the supplier but also on those of the customer themselves (Macdonald et al. 2016).

While Vargo & Lusch (2004, 2008) argued that the customer is always a co-creator of value, Grönroos & Voima (2013) take it a step further by stating that customer is the value creator and not always is the firm even involved, basing their view on the strict definition of customer value as value-in-use. Figure 2 illustrates the different spheres of value creation according to Grönroos & Voima (2013). Value is facilitated in the provider sphere but realized either in the joint sphere or independently by the customer.

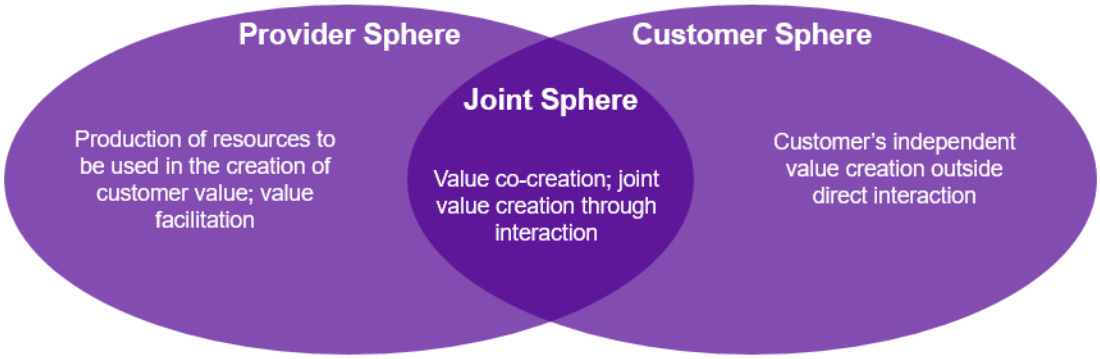


***Figure 2*** *Spheres of value creation (adapted from Grönroos & Voima 2013).*

Aarikka-Stenroos & Jaakkola's (2012) study on supplier and customer roles and activities in value co-creation processes addresses the joint process to even more detail and acknowledges that the supplier and customer may have different views on the value creation and mutual diagnosis is needed to align perceptions. According to them, the supplier's role which Grönroos & Voima call facilitation may be value option advisor, value process organizer, value amplifier, and/or value experience supporter. The customer, on the other hand, may assume the roles of co-diagnoser, co-designer, co-producer, and/or co-implementor. Aarikka-Stenroos & Jaakkola (2012) define the activities that take place in the joint co-creation space of value-in-use as:

1. Diagnosing needs
2. Designing and producing the solution
3. Organizing process and resources
4. Managing value conflicts
5. Implementing the solution

In this co-creation setting, the customer experiences the relationship with the provider on three different levels: cognitional, emotional, and behavioral (Payne et al. 2008). Value co-creation processes and activities are temporally dynamic and affected by customer learning as well as provider organization's learning (Payne et al. 2008). The critical role of collaboration and interaction in the co-creation of value has also led scholars to

emphasize the importance of providers' good B2B communication skills in the recent decades (e.g., Ballantyne and Varey 2006; Haumann et al. 2015; Heinonen & Strandvik 2015). Systematic planning and mapping of the interactions with customers in the joint sphere is likely to foster value co-creation (Payne et al. 2008), although the provider has to be careful not to destroy value by conducting customer interactions carelessly (Grönroos & Voima 2013). The co-creation viewpoint of value also implies a heightened emphasis on long-term communications strategy and introduction or teaching of new value co-creation opportunities for the customer (Payne et al. 2008).

This study defines customer value following the definition of Grönroos & Voima (2013) to facilitate a systematic analysis:

"…we define value as value-in-use, created by the user (individually and socially), during usage of resources and processes (and their outcomes). Usage can be a physical, virtual, or mental process, or it can be mere possession." (Grönroos & Voima 2013)

In the empirical part of this study the terms 'customer value' and 'customer-perceived value' are used as synonyms, to be able to highlight the strong customer perspective of this definition. On the contrary, value that a provider aims to deliver but that fails to be perceived or created by the customer is referred to as 'potential value'.

Employing the value-in-use concept provides a clear definition that is strongly aligned with the latest research. This allows for explicit analysis to be carried out without entangling oneself in contradictory views of value in the process.

## 2.3 Sources of customer-perceived value

Even when the nature of customer value is well-defined, its classification, quantification, and assessment are usually not straightforward. Customer value is typically difficult to evaluate (Lindberg & Nordin 2008; Keränen & Jalkala 2013), which may present a significant obstacle for e.g. the employment of value-based pricing (Hinterhuber 2008) or comparing different offerings with each other. To enhance deeper understanding of value and to enable creation of practical benefits, identifying and conceptualizing the exact ways in which customer perceives value is crucial (Woodruff 1997). This subchapter explores the extant classifications of customer value with the aim of uncovering and bundling together the sources of customer value that are commonly being referred to in literature. These value sources are also commonly dubbed dimensions or types, but in this study the term source is reserved for the examination of extant literature and the term component for the newly constructed theory.

Whereas the early value literature saw value mostly as a trade-off between overall received product utility or quality and sacrifices made, often simply meaning price (Ulaga & Chacour 2001; Eggert et al. 2018; Zeithaml et al. 2020), more comprehensive perspectives on the elements of value have started to gain more attention especially after the introduction of the S-D logic and value co-creation concepts. Many suggestions on how to categorize or group sources of customer-perceived value in different (general or specific) contexts have been presented in the literature, some of which will be reviewed in this chapter.

Classifications and typologies however differ a lot (Lusch & Vargo 2006, p. 186; Zeithaml et al. 2020) and currently there does not seem to be one standardized way to distinguish between the sources of customer value in either B2B or B2C settings, which could be due to at least the situation-specificity of customer value (Leroi-Werelds 2019). A literature review supported by recent comprehensive reviews on the topic (Leroi-Werelds 2019; Zeithaml et al. 2020) was executed to map the current understanding of potential sources of customer-perceived value. A selected, non-exhaustive collection of commonly cited, yet different approaches to classifying customer value sources is presented in Table 2, followed by discussion.

In total seven different sources of value were identified from the literature review. The Table 2 illustrates how the typology of each study supports this bundling. In addition to the sources of customer value, the table also clarifies the studies' approach to some common divisive problems: consideration of competitive alternatives of the customer, stance on price, and the method of analyzing negative value. The approach used to bundle the sources of customer-perceived value is illustrative and opens opportunities for further analysis, even though not all the detail and richness of analysis of the previous papers can naturally be presented in a rough categorization like this.

***Table 2*** *Mapping of customer value sources based on selected studies*

| Study | Value related to financial performance | Value related to offering performance | Value related to ease of use or doing business, and relationship strength | Value related to supplier's capabilities for business development | Value related to offering's meanings other than the core function | Value related to subjective feelings or emotions | Value related to ethics or intrinsic 'goodness' | Consideration of competitive alternatives? | Price included in the value dimensions? | Negative value: embedded / defined separately / not considered? |
|---|---|---|---|---|---|---|---|---|---|---|
| Sheth et al. 1991 | *Functional value* | | - | - | *Social value* | *Emotional value*<br>*Epistemic value* | - | *Conditional value* | Included | Embedded |
| Anderson & Narus 1998 | *Economic value* | *Technical value*<br>*Service value* | *Social value* | - | - | - | - | Considered, but not a dimension | Excluded | Embedded |
| Holbrook 1999 | - | *Excellence* | *Efficiency* | - | *Status*<br>*Esteem* | *Play*<br>*Aesthetics*<br>*Spirituality* | *Ethics* | Not considered | Excluded | Not considered |
| Lapierre 2000 | - | *Alternative solutions*<br>*Product customization* | *Responsiveness*<br>*Flexibility*<br>*Reliability*<br>*Trust*<br>*Solidarity* | *Technical competence* | *Image* | - | - | *Alternative solutions* | Included in the negative value types | Defined separately |
| Ulaga 2003 | *Direct product costs*<br>*Process costs* | *Product quality* | *Service support*<br>*Delivery*<br>*Time-to-market*<br>*Personal Interaction* | *Supplier know-how* | - | - | - | Considered as part of the price | Included | Embedded |
| Holbrook 2006 | *Economic value* | | - | - | *Social value* | *Hedonic value* | *Altruistic value* | Not considered | Excluded | Not considered |
| Smith & Colgate 2007 | *Cost / sacrifice value (1/2)* | *Functional / instrumental value (1/3)* | *Functional / instrumental value (2/3)*<br>*Cost / sacrifice value (2/2)* | *Functional / instrumental value (3/3)* | *Symbolic / expressive value* | *Experiential / hedonic value* | - | Not considered | Included | Embedded |
| Rintamäki et al. 2007 | *Economic value* | *Functional value* | | - | *Symbolic value* | *Emotional value* | - | Not considered | Included | Embedded |
| Plewa et al. 2015 | *Expertise value* | | *Convenience value*<br>*Relationship value* | *Education value* | - | *Support value*<br>*Motivation value* | - | Not considered | Included in the negative value types | Defined separately |
| Leroi-Werelds 2019 (update to Holbrook 1999) | - | *Excellence*<br>*Personalization* | *Convenience*<br>*Control* | - | *Status*<br>*Social benefits*<br>*Relational benefits* | *Enjoyment*<br>*Self-esteem*<br>*Aesthetics*<br>*Escapism*<br>*Novelty* | *Ecological benefits*<br>*Societal benefits* | Not considered | Included in the negative value types | Defined separately |

Before analyzing the Table 2 in depth, it is important to understand that not all of these studies aim for similar, fully generalizable customer value conceptualizations. Some were initially developed for industry-specific context, namely Rintamäki's et al. (2007) (retail industry) and Plewa's et al. (2015) (banking industry) studies. Additionally, although not always explicitly stated, some frameworks such as those of Sheth et al. (1991) and Holbrook (1999) were developed primarily basing on B2C environments, whereas Anderson & Narus (1998) and Ulaga (2003) focus mainly on B2B settings. These emphases then affect which sources of value are deemed most relevant in each framework.

There is also some context-related variance in terminology. Studies focused on B2B sometimes use the term relationship value quite interchangeably with customer value (Ulaga 2003, also e.g. Ruis-Martínez et al. 2019), but relationship value has also been analyzed as a separate concept with a slightly narrower scope (e.g. Biggemann & Buttle 2012). Some terms may have different meanings depending on the study, such as social value for Sheth et al. (1991), Anderson & Narus (1998) and Holbrook (2006). Furthermore, some potential value items are very elusive and thus differently defined by various authors. As an example, trust can be seen as an outcome (Plewa et al. 2015) or as a type of perceived value in itself (Lapierre 2000).

The first identified source of value is connected to the financial performance of the customer. Many studies (Ulaga 2003; Smith & Colgate 2007; Rintamäki 2007) see the price of the offering as a dominant factor in this category, but it can also be seen as something separate from value, as discussed later in this chapter. If price is left aside as it is in this study, the perceived economic value would instead consist of cost or revenue changes in own processes, predictability of cash flow, released capital, or lowered financial risks. This value source is generally deemed more relevant in B2B than B2C centered studies. To illustrate each value source, let's consider a circular business example of replacing self-owned office laptops with ones from a company that leases new and refurbished laptops for workplaces. In this case, economic value could be perceived as released capital from office equipment and possibly as free-of-charge replacements of defective laptops.

The second source of value is connected to the performance of the offering, in a traditional sense it is understood as the quality of a product or a service. This encompasses desired and appropriate attributes and performance (e.g. Sheth et al. 1991; Narus & Anderson 1998; Smith & Colgate 2007) as well as customization and personalization of the offering (Lapierre 2000; Leroi-Werelds 2019). In the case of leased laptops, this value would appear as desired performance and durability of the equipment, and for example as timely execution of shipping and pick-up as mutually agreed.

Thirdly, value may arise from the ease of using the offering, ease of doing business with the provider, or from the dynamics of the business relationship. The ease of buying and using, time savings, and simplification of processes may play a big role in the perceived value of both business customers (Anderson & Narus 1998; Ulaga 2003; Rintamäki et al. 2007) and consumers (Plewa et al. 2015; Leroi-Werelds 2019). Closely connected with this is the state of interaction between the customer and the provider, including responsiveness, flexibility, reliability and personal connections, which may either create (Lapierre 2000, Ulaga 2003, Plewa et al. 2015) or destroy (Grönroos & Voima 2013) value. In the example of laptop leasing this value source could mean the removed need for own procurement and disposal processes, the improved availability of data of office equipment, and quick problem-solving through active customer service.

The next source of value is related to the provider's capabilities to develop customer's business. This value source is more relevant in B2B context although also found in some B2C settings (Plewa et al. 2015). It may refer to the provider proactively educating the customer on how to use the current offering better (Lapierre 2000) and to utilize it in new or more effective ways, or the provider helping the customer to improve their business in a wider sense, by providing ideas, resources, or skills new to the customer (Ulaga 2003). This type of value could be perceived in our case example if for instance the laptop provider would start to make recommendations and pre-installations of useful software for its customer businesses.

The fifth source of value especially reflects how customer experiences the use of a product or service to affect their image in their business ecosystem. This is called symbolic value dimension by some authors, social value dimension by some others. Simply put, it encompasses the meanings that are related to the use of the offering and can be communicated to the stakeholders of the company. As Rintamäki et al. (2007) note: "Symbolic value is created from representing something other than the obvious function of the product." In the featured example, symbolic value could appear as having a more modern or environmentally friendly image by including the leasing practices into the company's marketing materials or corporate responsibility report.

The sixth source of value is one generated by emotions and feelings. It has been studied extensively especially in B2C contexts. This is presumably due to higher importance that various feelings have in decision-making in consumer business, as well as the subjectivity of evaluation of emotional value. Many feelings have been recognized and conceptualized separately under this broad value source, such as curiosity and novelty (Sheth et al. 1991; Leroi-Werelds 2019), enjoyment and hedonism (Holbrook 2006; Smith & Colgate 2007; Leroi-Werelds 2019), spirituality or escapism (Holbrook 1999), or safety

and support (Plewa et al. 2015). Emotional value in the leasing of laptops could result for instance from the curiosity experienced by purchasing manager or firm employees.

Lastly, there is intrinsic value in 'doing the right thing'. The seventh source of value encompasses the ethics affecting decision-making and experienced social and environmental benefits (or sacrifices). This source of value is directly addressed by only a few of the selected studies (Holbrook 1999, 2006; Leroi-Werelds 2019), and in some classifications it could perhaps fall in the scope of emotional value. However, with the globally growing emphasis on more sustainable and ethical business and the expansion of triple bottom line thinking (Elkington & Rowlands 1999), there is a good reason to recognize this source of customer value as its own. For a company leasing refurbished laptops, the ethical value would result from the ability to save some virgin materials and help the circulation of critical rare elements found in electronics.

Together, these seven sources of customer-perceived value form an a priori framework to be used in the study's theory construction. Figure 3 below presents this simple framework.


***Figure 3*** *A priori framework of customer-perceived value sources*

In addition to mapping the value sources identified in each study, three differentiating key issues, namely competitive alternatives, price, and negative value were addressed in Table 2. Anderson & Narus (1998) pointed out that value is always experienced within a context. They argue that for a purchase to occur, the customer needs to perceive a greater incentive (which is value minus price) to buy the supplier's offering compared to that of the available alternatives. Sheth et al. (1991) singled this phenomenon out calling it conditional value. Ulaga (2003) considers competition especially from the perspective of pricing, but the rest of the selected studies do not include consideration of alternatives into their scope.

One of the critical issues to consider in defining and assessing value sources is the view on price. This role of price as a source of customer value has been disputed in literature (Eggert et al. 2018), which is also visible in the analyzed sample of studies. Many authors, such as Ulaga (2003), Smith & Colgate (2007) and Rintamäki et al. (2007) consider price as an important part of the customer-perceived value. However, an opposing view

is the one first presented by Anderson & Narus (1998). According to them, price is not a part of value, difference between value and price being the customer's incentive to purchase the offering.

In the context of this study, this perspective of Anderson & Narus (1998) and Anderson et al. (2009) is adopted. Because this study considers customer value as value-in-use as previously stated, it does not consider price as an element of customer value per se. As previously discussed, price does function as an indicator of the total customer value but in itself it represents exchange value, which is captured by the provider. If a customer states that low price is among their main reasons to buy, it only implies that the experienced value-in-use is considerably higher than the exchange value set by the provider. However, on the contrary to the price paid to the provider, other possible monetary costs incurred by the customer due to the usage of the offering are parts of the experienced customer value and are taken into account in the analysis as they can be seen as essential parts of the value-in-use.

Lastly, different approaches have been taken to consider the creation of negative value or value destruction. Many studies such as Smith & Colgate (2007) embed creation of negative value into the same sources as positive value. Some studies such as Plewa et al. (2015) define negative value sources, or sacrifice dimensions, as separate ones, while Holbrook (1999, 2006) decides not to consider negative value in his analyses. This study takes the first approach, considering also negative value items inside each of the defined value components.

This literature mapping sheds light on the background of customer value classifications before turning the attention to the potential changes that customer value formation faces as the world economy is experiencing a rapid transition from linear to circular. It is to be noted that the sources of value distinguished here do not represent the only way they can be perceived. Obviously, the sources are very interconnected and may overlap for some specific value items. Gaps may remain and some concepts may appear more generalized than in the original studies. This mapping is however an attempt to catch as many of the various researched sources of customer value as possible without going into an extensive amount of detail. In the following chapter, the mapping is used to analyse customer value in the age of circular economy.

# 3. CUSTOMER VALUE IN CIRCULAR ECONOMY

This second theory chapter reviews how customer value has so far been tackled specifically in the context of circular economy. Subchapter 3.1 demonstrates the scarcity of research on this intersection of the two topics and outlines which perspectives have been tackled so far, while subchapter 3.2 reviews the theoretical knowledge gaps in comparing customer value perceptions between different CBM categories as well as comparing the perceptions between providers and customers, both of which will be tackled by in the empirical part of this study. Subchapter 3.3 explores the relevance of different customer-perceived value sources in CE based on existing knowledge, thus acting as a foundation for building the classification of customer-perceived value in the CE in the empirical section of the study.

## 3.1 Customer value in the circularity transition: scarcity of understanding

As shown in chapter 2, customer value has attracted prominent academic attention already for decades. It has been studied from multiple perspectives and while the concept has evolved, it has also become more multifaceted and complex (Zeithaml 2020). The temporal development of customer value publications is presented in Figure 5 on the left.

Circular economy literature, on the other hand, has developed more recently. However, the expansion of research on the topic has been exponential. The surge in publications shows well in Figure 4 on the right. According to Scopus, in business and management sciences alone the first 10 months of 2021 have seen about 600 new publications.

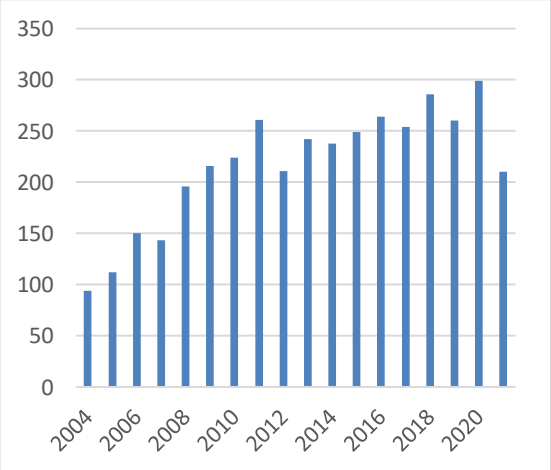


***Figure 5*** *Search results on "customer value" in Scopus (October 2021)*

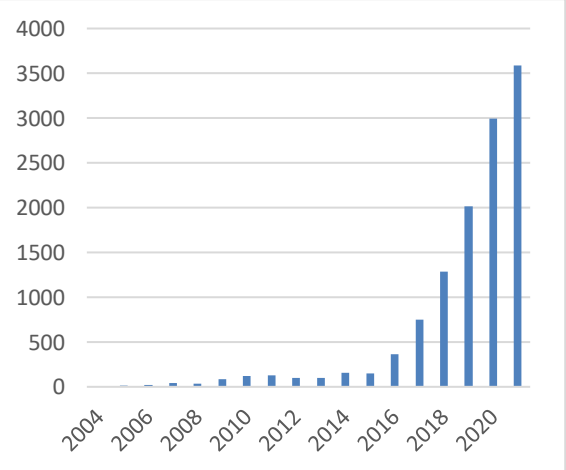


***Figure 4*** *Search results on "circular economy in Scopus (October 2021)*

With such great amounts of CE-related literature being published at the moment, it can get challenging to identify the exact focus areas of the current research. However, in the context of this study, a very important and rather surprising research gap stands out. There is still very little research conducted in the interface of these two hot themes of customer value and circular economy. Figure 6 below illustrates this scarcity, with only a handful of search results coming up by combining the earlier search terms.

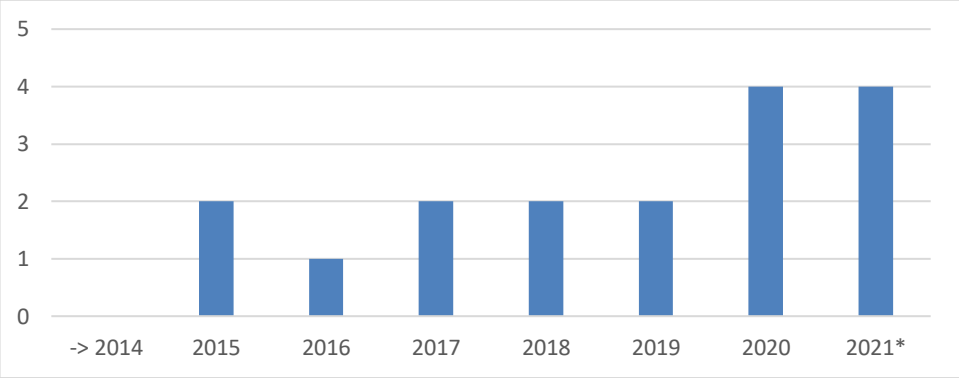


***Figure 6*** *Search results on "customer value" AND "circular economy" in Scopus (October 2021)*

Table 3 lists the few extant studies that consider customer perspective in the context of CE or environmentally sustainable business, dividing them by their focus on B2B or B2C environments. The body of research is very narrow and methodologically limited, as surveys have been used clearly more than focused qualitative techniques. Of special interest is that this research is almost non-existent on the B2B-environment. Only a few studies can be found using the major search engines (refer to Table 8 for used literature review methodology), and focused case studies on the customer-perceived value are missing almost completely. Aarikka-Stenroos et al. (2021) have conducted the only identified CE study that considers dimensions of value from customer perspective, however missing a strict B2B focus and without investigating the need for renewed classifications of customer value for the CE. Van Boerdonk et al. (2021) also utilize value dimensions to some extent in their study of circular touch points in the healthcare industry. All in all, this study fills an important gap by tackling B2B customer value in circular business models in a holistic manner, yet taking an in-depth perspective through focused case studies.

In the B2C environment there is a little bit more research from customer perspective available. The biggest focus seems to lie on customer acceptance. Nevertheless, research that aims to identify and differentiate between the components of customer-perceived value is very scarce also in circular B2C settings, tackled perhaps most notably by Antikainen et al. (2018) and Aarikka-Stenroos et al. (2021). The listing of B2C studies addressing customer perspective of circular economy in Table 3 is non-exhaustive and could be supplemented for example with studies by Wang & Hazen (2016), Abuabara et

al. (2019), and Julião et al. (2020), which however have rather restricted contextual focuses as well.

***Table 3*** *Extant studies from customer perspective in the context of circular economy*

| Authors | Year | Title | Perspective on customer value | Approach / methodology |
|---|---|---|---|---|
| **B2B** (exhaustive list at the time of writing) | | | | |
| Aarikka-Stenroos, L., Welathanthri, M. & Ranta, V. | 2021 | What is the customer value of circular economy? Cross-industry exploration of diverse values perceived by consumers and business customers | Includes both B2B and B2C; economic, functional, symbolic and emotional value dimensions from customer perspective | Empirical; explorative multiple-case study with 5 provider cases, 6 business customers and 4 consumers |
| van Boerdonk, P.J.M., Krikke, H.R. & Lambrechts, W. | 2021 | New business models in circular economy: A multiple case study into touch points creating customer values in health care | Economic, environmental and service value dimensions from customer perspective | Empirical; customer interviews (10 hospitals) |
| Pekorari, P.M. & Lima, C.R.C. | 2021 | Correlation of customer experience with the acceptance of product-service systems and circular economy | Customer experience and acceptance of PSS models | Empirical; survey for B2B customers (sample size 154) |
| Wang, X., Zhao, Y., & Hou, L. | 2020 | How does green innovation affect supplier-customer relationships? A study on customer and relationship contingencies | How provider's green innovation activities affect customer-perceived relationship value | Empirical; survey for B2B customers (sample size 196) |
| **B2C** (selected studies) | | | | |
| Antikainen, M., Lammi, M. & Hakanen, T. | 2018 | Consumer service innovation in a circular economy - the customer value perspective | Types of consumer benefits in rental-based CBMs | Empirical: consumer group interviews |
| Borrello, M., Caracciolo, F., Lombardi, A., Pascucci, S. & Cembalo, L. | 2017 | Consumers' Perspective on Circular Economy Strategy for Reducing Food Waste | Consumer acceptance of participating in reverse logistics in food industry | Empirical; survey for consumers (sample size 1270) |
| Camacho-Otero, J., Boks, C. & Petterssen, I.N. | 2019 | User acceptance and adoption of circular offerings in the fashion sector: Insights from user-generated online reviews | Consumer acceptance and experience of circular fashion offerings | Empirical; online review data |
| Gazzola, P., Pavione, E., Pezzetti, R. & Grechi, D. | 2020 | Trends in the Fashion Industry. The Perception of Sustainability and Circular Economy: A Gender/Generation Quantitative Approach | Consumer valuation of sustainability | Empirical; survey for consumers (sample size 1238) |
| Hazen, B., Mollenkopf, D. & Wang, Y. | 2017 | Remanufacturing for the Circular Economy: An Examination of Consumer Switching Behavior | Consumer attitudes and acceptance towards remanufacturing | Empirical; survey for consumers (two samples of around 450 responses) |
| Lieder, M., Asif, F.M.A., Rashid, A., Mihelic, A. & Kotnik, S. | 2018 | A conjoint analysis of circular economy value propositions for consumers: Using "washing machines in Stockholm" as a case study | Consumer preferences between price and payment, environmental friendliness and service level | Empirical; conjoint analysis (sample size 150) |

Customers are, quite naturally, being considered in different ways in various main streams of CE literature. Viewpoints and degree of customer embeddedness vary among these streams and individual studies, but direct integration of customers' perceptions on value is difficult to find, as shown by the limited size of Table 3.

Rapidly growing circular supply chain literature can be taken as an example of this phenomenon. Many recent studies in this field have put attention onto how customer relationships need to become closer (De Angelis et al. 2018; González-Sanchez et al. 2020)

when implementing circularity, and how customer collaboration and partnerships should increase and value co-creation opportunities built (Hazen et al. 2020; Aloini et al. 2020). Interestingly, most of the studies refer similarly to the development of the focal firm's business relationships towards both its customers and suppliers, latter of which sets the studied firm into customer's role. Nevertheless, these studies do not go as far as to empirically examine the perceived value of such changes in the firms in question. Closest touchpoint to customer-perceived value in the circular supply chain literature stream is Bressanelli's et al. (2019) study which includes consideration of ownership's meaning to customers' value perceptions and of price as a barrier to accept circular offering.

## 3.2 Missing perspectives on circular customer value

The presented literature review shows that the literature addressing customer-perceived value in the age of CE, its different forms, and its ultimate components in everyday business is extremely scarce. The topic is mostly being discussed as a side note in some studies on circular business models, value proposition strategies, and supply chains. In the consumer business side, some studies exist on consumer acceptance, but all in all the focus has been in very specific cases and CBM types (Camacho-Otero et al. 2018).

In addition to building a classification to describe the customer-perceived value of the CE, this study strives to build a first understanding of two subordinate research dilemmas with high practical importance (RQ2 and RQ3). Firstly, it sheds light on the key differences of value perceptions on recycle- and reuse-based CBMs, both of which have their typical characteristics. As the CE is a roof concept for such a big variety of business models, it would be risky not to look into how value perceptions differ according to the CBM category. Secondly, dyadic data is used to investigate circular providers' ability to interpret customer value perceptions and search for common misunderstandings. This can help companies to critically examine their value propositions and thus accelerate the CE transition. The theoretical relevance and existing knowledge gaps of these two topics in the CE context are briefly addressed in the following.

### 3.2.1 Comparison of recycle- and reuse-based CBMs

Because recycle-based CBMs aim to close material flows whereas reuse-based CBMs aim to slow the material flows down (Lüdeke-Freund et al. 2018), each one requires its own kind of adaptation from the business partners regarding for example logistics, communication, and new partnerships. Value creation (Ranta et al. 2018) and various other concepts in CE have been studied earlier basing on the division between recycling and reusing CBMs (and sometimes also reducing, which however has been left out of the

scope of this study). By exploring customer-perceived value specifically for each of these CBM categories, this study provides a logical next step to deepen the theoretical and practical knowledge on these two distinct forms of implementing the CE.

As outlined in the introduction, the study takes things one step further by considering a particularly relevant and distinctive subcategory of reuse-based CBMs, namely those in which the ownership of the product is retained by the provider. This characteristic has diverse implications for logistics, product lifecycle control, and distribution of risk, among other things. As mentioned earlier, this subcategory of CBMs has been targeted and highlighted by research broadly in recent years (such as Bocken et al. 2016; Haber & Fargnoli 2019; Kim & Hong 2019; da Costa Fernandez et al. 2020). Therefore, it is a fascinating addition to the scope of this study to conduct a first investigation on what possible changes to value perceptions does this more and more common ownership retention model bring.

### 3.2.2 Comparison of customer and provider perceptions

As reviewed in the introduction, the extant CE research is heavily centered on studying the perspective of the provider or supplier. When it comes to value creation in the customer interface, this trend has created a biased body of research that addresses firms' value propositions well but does little to explore the reception of those propositions by the customers. Good examples of studies on CE value propositions include Lieder et al. (2018), Kristensen & Remmen (2019), da Costa Fernandes et al. (2020) & Ranta et al. (2020). However, as providers and customers tend to perceive value differently as empirically proved by Aarikka-Stenroos & Jaakkola (2012), research from the customer perspective has the potential to increase understanding of both value propositions and the perceived, realized customer value.

This study not only addresses the research gap by focusing on customer-perceived value with customer-bound data but does it while retaining the provider perspective on the side. Asking similar questions about the customer-value formation to the providers as to their customers enables an analysis of the transparency of the different components of the customer-perceived value towards the providers as well as the creation of practical implications with high relevance. It can also support more profound investigations of circular value co-creation processes and activities, as both the perspectives of the provider and customer need to be understood to accurately depict the creation of value-in-use (Aarikka-Stenroos & Jaakkola 2012; Grönroos & Voima 2013).

## 3.3 Relevance of the extant customer value sources for the CE

Circular economy is changing the way we think about value creation, supply chain management, and business ecosystem roles. However, it is still being applied inside the same global economic and financial system. Thus, we can expect that transitioning to circular business models will change certain aspects in the way that business customers perceive value, but it is likely that the main sources of customer value identified by earlier literature stay more or less valid also in the age of circularity.

The cooperative, multi-actor systems that CE entails (Lieder & Rashid 2016; Geissdoerfer et al. 2017) are likely a key to understand many potential changes in the customer-perceived value caused by the CE. For business customers joining circular activities, aspects such as effective communication with the provider, help in process adaptation, and easiness of operations are likely to become more and more important. Secondly, as the CE owes its popularity to the growing environmental challenges (Geissdoerfer et al. 2017) and the environmental consciousness grows rapidly in societies in general (OECD 2016; EC 2021a), clearly the intrinsic value of being more sustainable gains importance for the business customers, as well as the associated sustainability brand value.

Next, the implications of the circular transformation are briefly considered for each of the literature-derived sources of customer-perceived value presented in chapter 2.3. To aid the discussion, Figure 7 below illustrates how the previously constructed a priori framework combined with the distinct characteristics of CBMs (extracted via the empirical cases) can construct the components of customer-perceived value in the CE. The arrows of the figure represent drafts on how the different customer value sources could influence the yet unknown CE classification, explained in more detail in the discussion that follows.

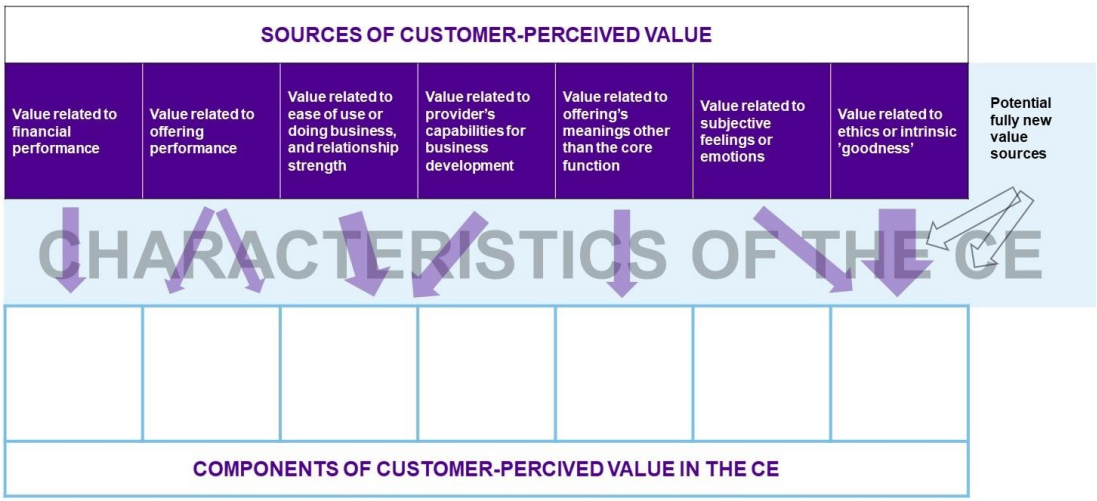


***Figure 7*** *From customer-perceived value sources towards components of customer-perceived value in the CE*

Firstly, the value source of financial performance clearly stays relevant in circular contexts (Lieder & Rashid 2016). Circular solutions are not only bought and implemented for their sustainability benefits, but also to increase profits and minimize costs. Profitability potential of different CBMs, also for customers, is frequently pointed out in the literature, as for example for the reuse-based CBMs with retained ownership by Bocken et al. (2016) and reuse-based CBMs in general by Esain et al. (2016). It can also be assumed that customers have a possibility to acquire various cost saving benefits through minimized resource and energy consumption, reduced workload, and process optimization.

Customer value related to offering performance is not expected to change radically in CBMs compared to linear business models. The product or service, whether acquired and executed in a circular fashion or not, must always fulfil its role in the customer company's operations with the best possible quality. However, the division between product and service performance has to be carefully considered to model the customer-perceived value of the CE in a practical and useful way.

Thirdly, there is the value source related to ease of use or doing business and relationship strength. As stated earlier, the interconnectedness and cooperativeness of circular value chains is likely to raise the importance of this value source. It could also become even more interconnected with the previous value source, offering performance, as the performance might in many cases depend on the constant cooperation with and support from the provider side. On the other hand, the fourth value source tackling the provider's capabilities for customer business development will closely link with this one too as new kind of CBMs accompanied by more or less radical changes to various operations such as logistics are implemented. Formulating these communication and collaboration related aspects into clearly distinguishable and applicable customer value components in the circular context is a considerable challenge that this study aims to resolve with the help of extensive empirical data.

The fifth value source, which deals with the acquired symbolic or brand value, remains undoubtedly important in the circular environment. Connected to the societal awareness increase and the economic value potential, the customer companies need to be able to communicate their sustainability efforts clearly to their value chain. This is something that the provider can help a lot with by providing desired data and marketing materials. The potential of sustainability branding for social and financial benefits has been demonstrated by research for the B2B markets too, for example by Sheth & Sinha (2015).

The sixth value source, the one related to subjective feelings and emotions, is not going to lose importance either, as these personal aspects will always have a role in purchasing

behaviour. On the contrary, the growing anxiety on the state of the environment can even raise the importance of the emotional aspects. However, this study is directed to the B2B markets, in which individuals' feelings or emotions typically affect the buying decisions much less. Based on the previous, it can be assumed that the strongest effect that comes from personal views, thoughts, and emotions in the circular B2B context is that of the ethics. Thus, this value source could possibly be integrated to the final value source, value related to ethics or intrinsic goodness. As discussed in the beginning of the sub-chapter, the added corporate sustainability is at the heart of the circular customer value, and thus this value source is expected to grow in importance rather rapidly as environmental consciousness grows, societal demand for sustainability increases and circularity becomes a new norm in making business.

Of course, as almost no studies on the customer value in CBMs exist yet, it is possible that totally new avenues of perceived value could also be found, as the right side of Figure 7 suggests. However, customer value as a concept has been researched extensively as shown and thus it can be expected that the value sources extracted from the synthesis of earlier literature offer a solid base to also describe the customer value of the CE.

All in all, an urgent need for a holistic, empirically grounded approach on the customer-perceived value of CE can be easily identified. Customer value plays a critical role in creating viable business both in business and consumer markets (Anderson & Narus 1998) and ignoring the research on customer perceptions could thus become a major threat for the effective expansion of CE and the global sustainable business transformation as a whole. A central objective of this study is therefore to build a first ground for a broad and complete understanding of customer-perceived value in CE. The theory overview of this chapter 3 is combined with the empirical dataset in chapter 5.2 to abductively discover the classification of customer-perceived value in the CE. In this way the study integrates earlier research on the potential sources of customer value, current insights of CE characteristics and a strong empirical cross-industry B2B customer dataset in an effort to create a comprehensive and widely applicable classification of customer-perceived value in the CE.

# 4. RESEARCH METHODOLOGY

This chapter discusses the research methodology employed by the study to reach its research objectives that concern understanding customer-perceived value in CBMs. Subchapter 3.1 discusses fundamental methodological choices by presenting research approach and strategy, and the overall design of the research. Subchapter 3.2 reviews case selection process showing criteria for tentative case considerations and final selections, subchapter 3.3 lays out data collection methods and processes, and subchapter 3.4 focuses on the data analysis strategies utilized in the study. Finally, subchapter 3.5 discusses the validity and reliability of the chosen methodology.

## 4.1 Research design

As previously shown, customer-perceived value has been a popular research topic, just not yet in the field of circular economy. Multiple theories and frameworks of customer-perceived value construction exist (Table 2), which this research is reorganizing to enable the study of the characteristics of customer-perceived value in the distinctive CBM context (Figure 7). Therefore, the existing theory is used as a guideline but not one that is limiting, i.e. used frameworks are being strongly shaped through the empirical data that is gathered. This set-up means that the study is employing an abductive research approach.

Abductive theory building moves back and forth between theory and empirical data, combining deduction and induction, with an aim to expand or modify existing theory (Saunders et al. 2019, p. 155). It has been acknowledged as a useful approach for case study research (Patton 1990, p. 99; Dubois & Gadde 2002), which is the chosen strategy for this study. Whereas case studies in purely inductive research are sometimes left as sole descriptions of specific events that provide little room for generalizable conclusions, a stronger reliance on extant theory enables drawing more robust and focused conclusions from complex case datasets (Weick 1979, p 38; Dubois & Gadde 2002). Ideally, empirical observations from cases and development of the theoretical framework direct each other in an interactive way (Dubois & Gadde 2002).

As stated, very little is yet known about the ways in which customer-perceived value manifests itself in CBMs. Thus, this study has an exploratory purpose. This supports the use of qualitative research methodology, which facilitates big-picture understanding of the research target while still effectively revealing new information (Hirsjärvi et al 2009,

pp. 161-166). Qualitative research is based on openly observing the world and searching for meanings (Patton 1990, pp. 139-140), which are principles closely tied to exploratory research.

This study conducts four case studies to facilitate the qualitative analysis. Voss et al. (2002) show that case study method supports exploratory research and theory building well. Dubois & Araujo (2004, pp. 224-225) conclude that the method is especially suitable in the complex, network-based environments of industrial business, in which research is often highly iterative. They see that case studies allow the research to start from a somewhat fuzzy position, with the case, theory, and research objectives all evolving together as the research progresses. Multiple-case research strategy with purposive sampling fits the study's purpose of examining various CBM categories and comparing these with each other to identify common patterns and key differences. This enables a detailed analysis of carefully chosen typical representatives of the major CBM categories identified. Lastly, as the study's primary aim is to understand the current situation of customer-perceived value in CBMs, instead of exploring temporal changes, a cross-sectional time horizon is adopted in the analysis.

## 4.2 Case selection

The sampling method used for the study was purposive sampling (Saunders et al. 2019, pp. 321), a popular method for case study research (Eisenhardt 1989). In a more detailed level, the sampling included elements of maximum variation sampling, typical case sampling, and critical case sampling (Patton 1990, pp. 169-181; Saunders et al. 2019, pp. 321-322). Cases were selected so that together they fully cover the targeted CBM categories (maximum variation), they are highly illustrative of their respective CBMs (typicality), but due to the newness of pure CBMs in the market, they are similarly some of the first advanced representatives of the respective CBMs and thus paving the way for future businesses (criticality). A case in this study is defined as the circular offering encompassing a provider's circular business model needed to deliver it, as well as the different customers' receiving, using, and evaluating the offering. The cases are named according to the provider companies to increase clarity.

The case sampling process was carried out in two phases: case identification and case selection. In the first phase, a comprehensive listing of potential circular offerings in the desired CBM categories was formed, which then acted as the target population for final case selections. Data sources for the initial case identification process included various websites, online reports, informal discussions in the research group, and previous case

studies related to CBMs. Due to the information availability for the researcher and research group, the listing of identified cases is geographically focused in Finland but includes many multinational companies. Finland is however an excellent geographical region to sample front-runner CE companies due to the strategic focus on the CE in national policies (Finnish Ministry of Environment, 2021).

Beginning case sampling by identifying a manageable target population enables an effective selection process while still ensuring good representativeness of the sampling frame (Saunders et al. 2019, pp. 295-296). In this research setting, the total case population encompassing various CBMs is obviously big and complicated, which further emphasizes the importance of the preliminary case identification.

The identified target population can be found below from Table 4, and details about the circular offering of each of these cases are shown in Appendix B. Each circular offering in this target population represents one of the analyzed CBM categories as shown by the Table 4. It was made sure that cases were identified from provider companies of different sizes, development backgrounds, and industries to maintain the scope of the population for the final case selections. In total, 26 cases were identified.

***Table 4*** *Identified cases (see Appendix B for details of the circular offerings)*

| Recycle | Reuse |
|---|---|
| Neste | *Transferred ownership* |
| Kiilto | Konecranes |
| Kemira | Ponsse |
| Forchem | Valtra |
| Stora Enso | Pa-Ri Materia |
| UPM | Netlet |
| Kotkamills | *Retained ownership* |
| Metsä Group | Industrial Tools |
| Touchpoint | Tamturbo |
| ZenRobotics | Lem-Kem |
| Huhtamäki | 3StepIT |
| Tarpaper Recycling | Innorent |
| DestaClean | |
| Spinnova | |
| Arctic Biomaterials | |
| Betolar | |

The case selections were subsequently conducted from this target population following the sampling criteria presented in the first paragraph of this chapter. The selection process led to a sample of four innovative circular offerings by four well-known industry players that have adopted CBMs in their core business. Selected cases were case Neste, case Touchpoint, case Konecranes, and case Industrial Tools. Selected cases

include two recycle cases (Neste & Touchpoint), one reuse case with transferred ownership (case Konecranes) and one reuse case with retained ownership (case Industrial Tools) (maximum variation). They represent most commonly repeating business models on the market inside their respective categories such as use of renewable materials (Neste), recycling through takeback systems (Touchpoint) and industrial predictive maintenance (Konecranes) (typicality) but have simultaneously been innovative pioneer cases on the market, as for example high technology renewable diesel (Neste) or one of the first industrial product-as-a-service applications (Industrial Tools) (criticality).

Access to the customer interface was afterwards acquired through the provider companies. Figure 8 shows a visual overview of the cases including both provider and customer companies and how they cover the theoretical research framework. Case selections are also listed in Table 5 with some more company information. Reasoning for the selections is briefly explained below but more complete introductions to the cases can be found from the beginning of chapter 5.

Neste is a transformative oil refining company that is currently the world's biggest producer of renewable diesel (Neste Oyj 2021a). Having been ranked among the world's most sustainable companies for years in Corporate Knights' annual listing, studying the customer perceptions on Neste's renewable diesel gives an excellent view on the drivers and motivations of businesses to switch to cleaner energy. With this case and the following case of Touchpoint, the study is able to cover CBMs that are closing the resource loops both in terms of materials and energy.

Touchpoint is a pioneer in sustainable B2B textiles industry. They manufacture a significant part of their products using either recycled (polyester and cotton), leftover or innovative renewable materials, always maintaining high transparency throughout the supply chain (Touchpoint 2020). To complete their circular offering, they have recently commenced a takeback-service of workwear with the aim to recycle the textiles back to various products for their customers using a new, state-of-the-art recycling facility located in Finland. This case allows for in-depth understanding of what a modern, complete recycling scheme means for business customers and what values are perceived in using recycled products.

Konecranes is a leading company in the cranes and lifting industry that has a long and impressive history of service development. Their circular service portfolio contributes to the extension of product lifetimes in a comprehensive way, through for example modernizations, retrofits, predictive maintenance, and remote monitoring. Their customers are typically big industrial players and studying this case will enable analysis of the reasons

that incentivize the manufacturing industry to hold on to their equipment, extending the lifetime of machines instead of replacing them. As illustrated in Table 1, this extension of product value by slowing down the flow of resources is a traditional, central CBM in the reuse principle.

Finally, Industrial Tools (name changed) is a globally known provider of high-quality tools and machinery for construction, maintenance, energy, and manufacturing industries. In their highly digitalized service portfolio, one of the long-time success stories has been the Tool Service (name changed) that incorporates rental tools, their maintenance, repairs, and warranties into a monthly fee. This highly developed case of product as a service offering gives the study an excellent empirical basis to tackle the third chosen CBM category, reuse with retained ownership.

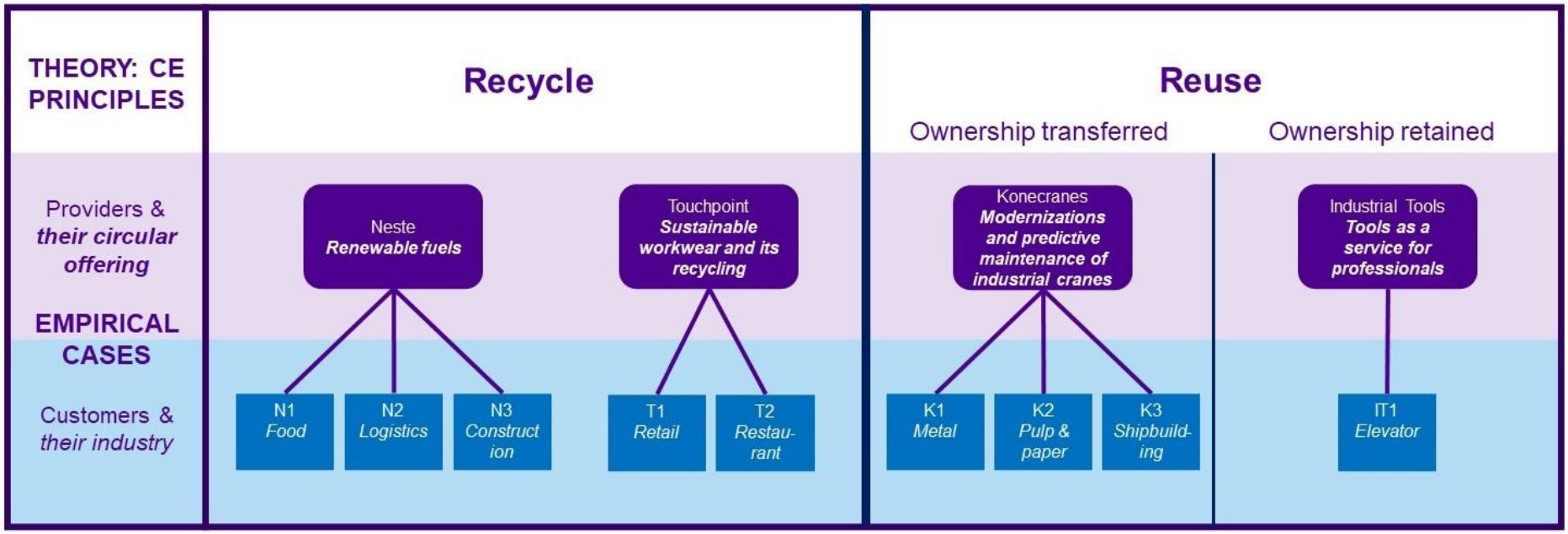


***Figure 8*** *Selected cases in relation to the theoretical framework*

***Table 5*** *Selected cases (for case data information, refer to tables 6 & 9)*

| Case name | Circular offering / CBM category | Organization | Industry | Size |
|---|---|---|---|---|
| **Neste** | Production and sales of high-quality renewable fuels / Recycle | *Provider: Neste* | Renewable fuels | Big (turnover > 1B€) |
| | | *Customer N1* | Food | Big |
| | | *Customer N2* | Logistics | Big |
| | | *Customer N3* | Construction | Big |
| **Touchpoint** | Workwear from renewable and recycled raw materials, take-back system for textile recycling / Recycle | *Provider: Touchpoint* | Workwear | Small (turnover < 10M€) |
| | | *Customer T1* | Retail | Big |
| | | *Customer T2* | Restaurant | Medium (turnover between 10M€ and 1B€) |
| **Konecranes** | Crane modernizations & predictive maintenance / Reuse with transferred ownership | *Provider: Konecranes* | Cranes & lifting equipment | Big |
| | | *Customer K1* | Metal | Big |
| | | *Customer K2* | Pulp & paper | Big |
| | | *Customer K3* | Shipbuilding | Big |
| **Industrial Tools** | Tools as a service – business model / Reuse with retained ownership | *Provider: Industrial Tools* | Professional tools | Big |
| | | *Customer IT1* | Elevator | Big |

Together these four cases support the research of the selected CBM categories in a balanced way. They provide a comprehensive selection of industries and company backgrounds, thus reducing the bias of observing the customer value formation from too constrained perspectives. While preserving comprehensiveness, the number of cases is kept at a low enough level to allow an in-depth analysis of each with sufficient resources for the data collection and analysis for both the provider companies and their selected customers.

As also shown in the subsequent chapter, access to the customer interface was an important case selection criterion, as being able to directly study the customer perceptions is critical to be able to answer the research questions. The customers to be studied in

each case were purposively sampled as well, mapping out customers that represent important segments for the providers. When the CBM or some aspect of it was very new, pioneering customers involved in the development of these CBMs were sought out to be studied for their broader experience. This latter approach was mostly adopted for case Touchpoint.

## 4.3 Data collection

Data collection of each case commenced early on in the research process with the construction of the list of identified cases. Once the cases to be included in the study were selected, primary data was collected by organizing *semi-structured interviews* with each of the provider companies and their selected customers, thus employing a dyadic approach in data collection. Interviewing enables the collection of valid primary data, allowing for mapping of points of interest and meanings (Saunders et al. 2019, pp. 434-435), thus building the basis of understanding customer value formation in this study. In addition to interviews, case studies often combine different data collection methods, such as observations, archives, or other types of secondary data (Eisenhardt 1989; Yin 2003, p. 83). Incorporating multiple data sources to support the findings with data triangulation will increase the quality and reliability of the case study (Yin 2003, p. 83). This study too supplemented the interview data by various secondary data sources to enhance and validate the datasets. These included primarily *non-financial reports, company webpages, news articles, and presentation material*. Table 6 gives an overview of the data sources for all four cases, embodying data sources for both the provider and customers researched in each case. The table is followed by more detailed description of the data collection methodologies.

***Table 6*** *Data source overview*

| Data source | Case Neste | Case Touchpoint | Case Konecranes | Case Industrial Tools |
|---|---|---|---|---|
| *Provider interviews* | 1 interview | 1 interview | 2 interviews | 1 interview |
| *Customer interviews & number of customers* | 3 interviews / 3 customers | 2 interviews / 2 customers | 4 interviews / 3 customers | 1 interview / 1 customer |
| *Reports and presentations* | Annual report (1) Sustainability report (1) | Sustainability report (1) | Sustainability report (1) Video presentation (1) | Sustainability report (1) |
| *Webpages and media sources* | Podcast (1) Webpages (9) | Webpages (6) | Webpages (8) | Webpages (2) |

To obtain a focused approach to the data collection, it is important to have initial research questions defined, as well as some tentative ideas of important constructs from previous literature (Eisenhardt 1989). In this study the different value sources play the role of these constructs, and the interview guides were strongly inspired by the ideas from previous literature, in accordance with the abductive approach and Eisenhardt's (1989) recommendations. Table 2 demonstrated the results of this literature review on customer-perceived value, which heavily influenced the construction of the interview guide (Appendix C). Literature was explored in a systematical way, with Table 7 showing the literature review methodology for mapping out the recognized sources of customer value. Table 8 shows the same for exploring the research gap by reviewing the extant literature that tackles both customer value and circularity. Systematic approach was selected to obtain as comprehensive understanding of the extant customer value constructs and terminology as possible.

***Table 7*** *Literature review methodology for customer value source mapping*

| Search engines | Search strings | Results included | Timing of the searches | Additional methods |
|---|---|---|---|---|
| Scopus<br>Web of Science<br>Andor | 1. perceived customer value<br>2. ("customer value" OR "relationship value") AND (types OR dimensions)<br>3. ("customer value" OR "relationship value") AND (B2B OR business-to-business) | Sort by a) relevance and b) times cited, first 30 results of each search considered | February 2021 | Snowballing from key sources |

***Table 8*** *Literature review methodology for reviewing extant literature on customer value in circular contexts*

| Search engines | Search strings | Results included | Timing of the searches | Additional methods |
|---|---|---|---|---|
| Scopus<br>Web of Science<br>Andor | 1. "customer value" AND ("circular economy" OR circular*)<br>2. customer AND (B2B OR business-to-business) AND circular* | Sort by a) relevance and b) times cited, first 30 results of each search considered | June 2021 | Snowballing from key sources<br>Tables and summaries from colleagues |

Interviews are an essential data source in case study research (Yin 2003, p. 92). Saunders et al. (2019, pp. 144-145) recommend using semi-structured interviews in exploratory studies and in situations where questions may be complex, and their order or logic

varied. Therefore, and because of the good fit with the overall research design, semi-structured interviews were the most appropriate choice for this study. The interview questions were built around topics of circular economy, provider-customer relationships and most importantly possible sources, drivers, and barriers of customer-perceived value. Provider and customer companies had their own, slightly different interview guides (see Appendix C for details). The interviewees were selected purposively, with the aim of interviewing persons that have first-hand information on the customer interface (providers) or purchasing logic (customers), and most of whom would work at least in managerial roles to also have a good comprehension on the strategic objectives and values of their respective companies. In some cases, an effective way to achieve these goals was to organize group interviews with persons from different levels and functions of the firm.

Detailed data of the interviews is presented in Table 9. Due to the ongoing pandemic situation the interviews were conducted with videocalls in Microsoft Teams. All interviews were recorded with interviewees' permission. In almost all of the interviews, a second researcher was present to enable researcher triangulation, to ask clarifying questions, and to enable more efficient note taking, which is recommended alongside recording by Saunders et al. (2019, p. 461). The recordings were transcribed for analysis, some by external transcribers and some by the researcher himself.

Before the interviews, the interview themes were shared with the interviewees to enable them to gather necessary information, as well as perspectives from elsewhere in the organization. During the interviews, attention was paid to maintaining an objective stance, not leading the interviewees while still establishing rapport and encouraging rich descriptions by making follow-up, clarifying and reflective questions as recommended by Saunders et al. (2019, pp. 451, 460). Memos were written down during the interviews to support the discussion and getting the subsequent analysis started. After each interview, a short document compiled by the researcher summarizing the key insights was sent to interviewees to support early participant validation of the data and kick-off of the analysis for the researcher. This kind of summarizing is an effective method to minimize especially the interviewee bias (Saunders et al. 2019, p. 461).

***Table 9*** *Interview data*

| Interviewees | Date | Organization | Interviewee level | Duration |
|---|---|---|---|---|
| *I1* | 15.3.2021 | Neste | Manager | 62 min |
| *I2* | 26.3.2021 | Industrial Tools | Manager | 76 min |
| *I3 & I4 (group interview)* | 26.3.2021 | Touchpoint | Director (I3) & Manager (I4) | 76 min |
| *I5* | 13.4.2021 | Customer T1 | Manager | 48 min |

| | | | | |
|---|---|---|---|---|
| *I6, I7, & I8 (group interview)* | 29.4.2021 | Konecranes | Director (I6) & Managers (I7, I8) | 54 min |
| *I9* | 6.5.2021 | Konecranes | Director | 52 min |
| *I10 & I11 (group interview)* | 10.5.2021 | Customer T2 | Manager (I10) & Employee (I11) | 83 min |
| *I12* | 24.5.2021 | Customer IT1 | Manager | 49 min |
| *I13* | 25.5.2021 | Customer K1 | Manager | 55 min |
| *I14* | 26.5.2021 | Customer K2 | Employee | 43 min |
| *I15* | 28.5.2021 | Customer K2 | Employee | 40 min |
| *I16* | 28.5.2021 | Customer K3 | Manager | 49 min |
| *I17* | 28.6.2021 | Customer N1 | Manager | 80 min |
| *I18 & I19 (group interview)* | 28.6.2021 | Customer N2 | Director (I18) & Manager (I19) | 54 min |
| *I20* | 29.6.2021 | Customer N3 | Manager | 76 min |

To deepen and verify the data regarding both the providers and their customers, comprehensive secondary data were gathered simultaneously with the interviewing process. This included for example non-financial reports and web page information, with the different types of secondary data summarized in Table 6. Because interviews, being verbal records, are always subject to biases, poor recall, and inaccuracies, having additional data sources for verification and supplementary purposes is important (Yin 2003, p. 92).

## 4.4 Data analysis

The data was analyzed in multiple stages and in a systematic way. Data collection was not fully separate from the data analysis phase, but instead the two stages of the research overlapped. By conducting data collection and analysis partly simultaneously, it is possible not only to integrate the insights more effectively, but also to adjust data collection process according to the information harvested from the data (Glaser & Strauss 1967; Eisenhardt 1989). As recommended by Saunders et al. (2019, p. 652), all data was first familiarized with, primarily through writing memos and summaries. Initial familiarization that was highly overlapping with data collection was followed by thematic analysis, with the whole analysis process presented in Figure 9.

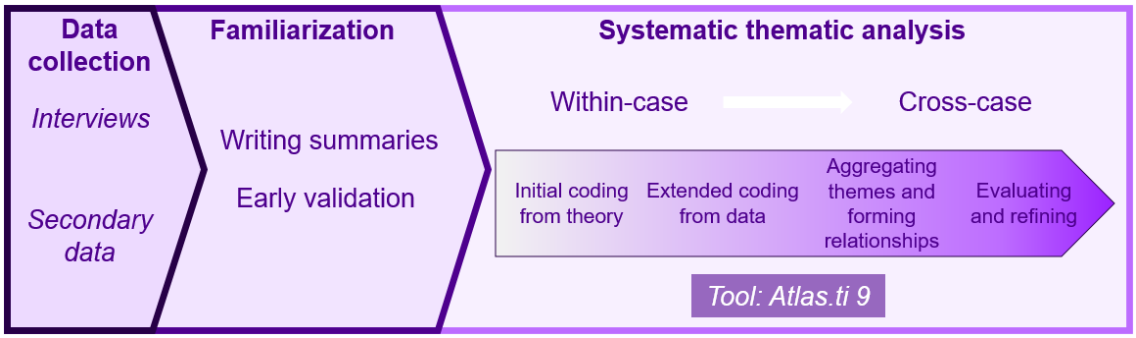


***Figure 9*** *Data analysis process*

Thematic analysis, described by Saunders et al. (2019, pp. 651-652) as a broad, systematic, and flexible approach of analyzing qualitative data that allows including both inductive and deductive methods, was selected as the guiding approach for the analysis phase. In accordance with the chosen abductive theory-building strategy, the coding included both theory-driven and data-driven stages. Firstly, an initial list of codes was derived from the existing theories of customer value and its sources, based largely on Table 2. However, while coding, these codes were supplemented by data-driven additions whenever the theory-driven code list did not ideally fit the data. This process allowed for subsequent recognition of potential differences in customer value formation between linear and circular business models, thus enabling answering research questions RQ1a and RQ1b profoundly.

The analysis proceeded from within-case analysis to cross-case analysis as recommended by Eisenhardt (1989). By first summarizing and familiarizing with each standalone case, it is possible to obtain a deep understanding of the unique patterns in each case, which is crucial for successful generalization attempts in the cross-case comparison stage (Eisenhardt 1989). Therefore, in addition to writing initial case summaries quickly after data collection, data of each case were coded one-by-one and initial exploration of the coded data per case made before combining the case datasets for the final analysis.

As the last steps in preparation for writing the results, the case data was combined and processed into a holistic data structure, and different cross-case analyses were carried out. The data was decided to be structured as recommended by Gioia et al. (2012), with a process of moving from initial, detailed 1$^{st}$ order concepts into 2$^{nd}$ order themes and finally aggregate dimensions, which in this study came to be the five components of customer-perceived value in CE, presented later in chapter 5. This analysis process guaranteed that the inductive aspect was included in the abductive methodology of theory building of the study, wherein the deductive aspect was the literature-based considerations of customer value formation.

What comes to cross-case analysis methods, cases were grouped not only based on the research framework's CBM categories, but also reviewed as pairs and by criteria that could possibly influence the results, such as industry type, as recommended by e.g. Eisenhardt (1989) and Yin (2003, p. 137). Alternative explanations to findings were actively sought for and data from different sources were compared with each other to strengthen results' validity via data triangulation. Different summary tables, issue-specific tables and matrices were compiled and refined to filter out all relevant insights from the data (Miles

& Huberman 1994, pp. 240-245). The careful cross-case analysis strengthened the understanding of the results as a whole and especially enabled answering RQ2 concerning differences between CBM categories in depth.

On a practical level, the main part of the analysis was carried out in qualitative data analysis software Atlas.ti 9. Even though such software can never guarantee a study's quality, it brings many advantages to conducting the analysis, such as flexibility and easiness in storing and processing data, sophisticated and quick search and analysis tools and visualizations, as well as smooth documentation of the thinking and research processes themselves (Laajalahti & Herkama 2018). When used correctly, qualitative data analysis software may solve methodological challenges and increase the overall quality of a study (Salmona & Kaczynski 2016). In this study, the primary and secondary data were fed into Atlas.ti, coded with over 100 individual codes, and categorized according to various criteria. While conducting the analysis in the previously described manner, the data was processed using Atlas.ti's tools in a comprehensive way, executing detailed searches and extracting visual overviews. The sophisticated analysis tools of the software were also taken advantage of, as for example the code-document tables in carrying out the comparison analysis for RQ2 and RQ3 with maximal quality and accuracy.

## 4.5 Validity and reliability of methodology

Validity of a study refers to the accuracy of the analysis (internal validity) and generalisability of the findings (external validity), as well as the appropriateness of the measures used (measurement validity). Reliability refers to a consistent and replicable study design. In this type of highly qualitative research with interpretivist assumptions, internal validity is sometimes referred to as credibility, external validity as transferability, and reliability as dependability to highlight differences in how the quality of this type of research should be judged. (Saunders et al. 2019, pp. 213-217) In this evaluation, the familiar terms of validity and reliability are adapted. It is essential to critically assess these aspects to ensure the high quality of the study.

Several validation methods were applied in the research to increase its internal validity. Firstly, both data and researcher triangulation were used. Triangulation means combining methodologies in the study of the same phenomena to improve the accuracy of the analysis (Patton 1990, p. 187). Data triangulation was achieved by supporting the interview data with a wide variety of secondary data sources. Researcher triangulation was achieved by having multiple interviewers present in most interviews and actively discussing the analysis and interpretations in the research group. These discussions in the re-

search group meetings enabled evolving and sharpening the case analyses through discussion, which Dubois & Gadde (2002) point out as critical process in establishing clarity to the analysis.

Another validation method highlighted by Saunders et al. (2019, p. 218) is participant validation, in which the collected data is sent back to the research participants thus enabling them to comment or correct it. A two-stage participant validation process was applied in the study. Firstly, compact summaries of each interview were written which were sent to the participants soon after the interviews along with interview transcripts and a question if they spotted anything to add or to change. Secondly, the participants were able to see and comment on the findings before their publication. These practices not only increased internal validity, but also supported reliability by reducing both participant and researcher error.

Regarding data collection, many measures were taken to proactively improve the validity of the data. The interviewees received the interview themes in advance so that they were able to prepare and gather information in advance. When conducting interviews, both audio recordings and notes were taken to minimize biases in the analysis. Although the use of recording improves the accuracy of the analysis, it may in some cases hinder reliability if the interviewees are less open due to being recorded (Saunders et al. 2019, p. 463). Interviews were conducted in the participants' native language, which in all cases was Finnish, to avoid any linguistic misunderstandings and make the interview as convenient as possible for the interviewees.

Sampling error in the sampling of the cases was reduced by first constructing a manageable target population with good representativeness of the whole population. In interviewee sampling, the potential errors were lowered through selecting interviewees from multiple functions and roles. These practices improve the external validity of the study. Naturally, with such small sample sizes the selections are still prone to subjective bias, but that is difficult to measure.

Thematic analysis is highly subjective by nature. This poses challenges for both validity and reliability, but those were mitigated by applying verified analysis strategies recommended by well-known methodology authors of management research, such as Eisenhardt (1989), Yin (2003), and Saunders et al. (2019). Additionally, the analysis steps were documented carefully and Atlas.ti 9 software was used to enable a more efficient and systematic analysis process.

Reliability of a study is threatened by participant error, participant bias, researcher error, and researcher bias (Saunders et al. 2019, p. 214). As mentioned, some of the measures

to improve validity also had a positive impact on reliability. Among these are participant validation and two-stage case sampling. Additionally, the abductive theory-building approach helped to combat researcher bias in comparison to using purely inductive approach, as the analysis was largely grounded on earlier work in the field of customer-perceived value carried out by dozens of different researchers. Lastly, the careful documentation of the research process and tools has a significant role in increasing the reliability of a study (Yin 2003, p. 38). From the literature review to the final stages of analysis, the research was documented carefully and as transparently as possible. Precise documentation also enables conducting a similar study in another context, i.e. increases the study's transferability.

# 5. RESULTS

This chapter presents the results of the multiple-case study according to the research questions. Starting with explanations of the settings of value creation in the cases, the chapter then constructs a classification of customer-perceived value in the CE and analyses that in detail. Subsequently the focus shifts into comparisons of the CBM categories and ultimately that of provider and customer perspectives.

As in each case value is produced and perceived in unique ways and in a specific setting, subchapter 4.1 introduces each case by shedding light on the nature of the circular offering, its provider company and investigated customers. This enables the reader to understand in which conditions the value perceptions are observed and how they are affected by the business partners and type of their relationship. Subchapters 4.2-4.4 address the research questions. RQ1 (subchapter 5.2) is tackled directly through an integrated cross-case approach, where the abductively built classification of customer-perceived value in the CE is first presented and subsequently analyzed in a deeper level. For RQ2 (subchapter 5.3.1) results are first presented per CBM category according to the research framework, followed by a cross-case analysis exploring differences and similarities between the categories. RQ3 (subchapter 5.3.2) is analyzed as per value component based on the earlier results. The results are synthetized into one guiding visualization in subchapter 5.4.

In this and the following chapters, interview data is referred to with I#-marking, where # is a number identifying the interviewee according to Table 9. Please also note that secondary data sources such as web pages, presentations, or reports form their separate lists of references in Appendix A.

## 5.1 Value creation settings in cases

**Case Neste**

Neste Oyj is currently the world's largest producer of renewable diesel and sustainable aviation fuels. They are also introducing renewable solutions into the polymer and chemical industries. (Neste Oyj 2021a) Founded in 1948, Neste has transformed from a fossil fuel refiner into a recognized technology leader in renewable fuels (Neste Oyj 2021b). In 2020, Neste's revenue was 11.8 billion euros, operating profit 1.41 billion euros, and staff count around 4800 employees. The focus on creating value from renewable products is

evident, as they formed 94% of the company's profits. Neste's production is located in Finland, the Netherlands and Singapore. (Neste Oyj 2021a)

A key enabler of Neste's transformation journey has been the development of the NEXBTL technology and the bold investments made into the early expansions of its production (Kaipainen et al. 2020; Kaipainen & Aarikka-Stenroos 2021). With this technology, Neste is able to convert various renewable feedstocks, including waste and residue, into hydrotreated vegetable oils (HVOs), which are chemically pure hydrocarbons just like any conventional fossil fuels. (Neste Oyj 2021c) This marks a key difference to the traditional biofuels because unlike them, Neste's products can be used in all motors and infrastructure designed for fossil fuels. They can even be blended with fossil fuels in any ratio (I1), thus producing significant added value for their customers. HVOs like NEXBTL are also proven to have many advantages over ester-based biodiesels regarding environmental safety, such as no increase in NOx emissions, no storage stability issues and good cold properties (I1, Aaltola et al. 2009). They have potential to offer a sustainable alternative not only for roads and aviation but also for forklifts and mining machinery (Aaltola et al. 2009).

Neste sells to both big distributor and oil industry customers in wholesale markets and to smaller B2B customers through their Marketing and Services function. In this study the focus is on the individual B2B customers sourcing Neste's renewable diesel directly from Neste. As Neste MY Renewable Diesel lowers fuel lifecycle emissions 90% compared to fossil diesel (Neste Oyj 2021d), it is a prime example of a CBM founded on the recycle-principle. More accurately, Neste's model of producing and selling renewable fuels would drop under 'extraction of biochemical feedstock' CBM in EMF & McKinsey's (2015) and Lüdeke-Freund's et al. (2018) classifications, and under 'extending resource value' CBM in Bocken's et al. (2016) classification.

First customer interviewed for case Neste, coded as customer N1, is Paulig, a family business founded in 1876 that is best known for their coffee and Tex-Mex products but that also produces spices, plant-based foods, and snacks. Paulig operates in 13 countries and in 2020 they employed over 2100 people, had a revenue of 920 million euros, and an operating profit of 88 million euros. (Paulig 2021a)

Neste became Paulig's supplier with their renewable diesel in the beginning of 2021, when the fuel was introduced to be used in internal logistics between Vuosaari port and the nearby Paulig production site. To be exact, Paulig does not own their fleet, which means that the logistics provider (which is Transval in Vuosaari) needs to be involved in any collaboration project with Neste. So far, the Vuosaari site is the only application of

renewable fuels for Paulig but plans to expand the collaboration are underway. Paulig has always had strong internal support for sustainability work and there is an ambitious official target of cutting own emissions by 80% and value chain emissions by 50% by 2030 in place. (I17, Paulig 2021b)

The three-party collaboration has some implications into the formation of customer value in Paulig's case, as they have to convince their logistics providers of the value of the renewable diesel, and carefully consider how the added costs are divided between the supply chain parties in a just way. The use of service providers thus makes some value items more straightforward and less critical for Paulig, such as those related to the use of the product, while some others become more complicated and decisive such as those related to financial effects. Other notable characteristic of the Paulig customer case is that they are a B2C company, which can be seen as added importance of branding considerations in the sourcing of circular solutions.

Customer N2 is Posti Group, shortly Posti. Posti is the leading postal and logistics service provider in Finland with operations in eight countries. Postal services, parcels, e-commerce, and logistics solutions form the core of their business. Posti's history in the region goes back by almost 400 years and the corporation is owned by the Finnish state. Today they employ about 21 000 people and had a revenue of 1.6 billion euros with an operating profit of 66.1 million euros in 2020. (Posti 2021a)

Neste and Posti have been doing business for a longer time already, but renewable fuels were introduced in the Posti fleet in 2020, as a part of Posti's 10-year roadmap towards zero emissions in 2030. Posti's recent history demonstrates their sustainability ambitions, as Posti became the world's first carbon neutral postal service in 2011 through emission compensations. (I18, Posti 2021b) Neste MY Renewable Diesel is currently being used in almost all of Posti's parcel distribution vehicles (I18).

Third and last Neste customer (N3) is GRK Infra Oy, part of GRK Corporation. GRK builds infrastructure, including railways, in Finland, Sweden, and Estonia. The company was founded in 1983 in Finland. In 2020, GRK Corporation had about 800 employees with a revenue of 390 million euros and an operating profit of 22.3 million euros. (GRK 2021)

Neste has been a fuel supplier of GRK already for years, but renewables came into play when GRK got to know of Neste's new product, Neste MY Renewable Fuel Oil which can be used in heavy machinery. GRK began to source Neste's renewable fuel oil for construction machines and renewable diesel for their cars at the same time in 2021. GRK

too has been actively working with sustainability initiatives. They have dedicated construction sites for CE pilot projects, they are actively seeking low-carbon solutions, and developing emission measurement systems for the construction industry. (I20)

**Case Touchpoint**

Touchpoint is a Finnish workwear provider that has had a strong focus on creating value from ecological and responsible products since being founded in 2008. In 2020, Touchpoint had a revenue of around 12.5 million euros and employed 16 people. Production is located primarily in Baltics, with some of it taking place in Vietnam, China, and Ukraine as well. Ecological and recycled materials have always been in the core of Touchpoint's value creation strategy (I3, Touchpoint 2021). These include certified and naturally produced cotton, recycled cotton, recycled polyester, cellulose-based fibres, and leftover fabrics (Touchpoint 2020). According to customers' wishes, Touchpoint then utilizes these to create sustainable collections while also producing information on the gained environmental savings for the customer companies.

Recently, Touchpoint has begun to tackle the problem of textile waste too with a big investment into a textile recovery plant, first of its kind in the Nordic countries. A separate company called Rester has been founded to carry out the project. The plant which is located in Paimio began to process textile waste in the summer of 2021, but Touchpoint had already started the takeback services of textile waste a year in advance, in preparation for the plant's completion (I3, I4). Thus, it was possible to study both the customer-perceived value of ecological and sustainable materials as well as the takeback service for closed loop recycling in the scope of this study. Case Touchpoint neatly covers both the front end and end-of-life treatment of a traditional recycling-based CBM, and how those are perceived by the B2B customers. Customers of Touchpoint come from multiple industries, but demand for ecological workwear solutions is especially high in the service sector, for whom workwear is a very visible part of their business and brand (I3), which can be seen to impact their value perceptions too.

Two big customers of Touchpoint participated in the study. Firstly, customer T1 is SOK, which is the central company of a Finnish cooperative (customer-owned) retail organization called S Group (S-Ryhmä 2021a). S Group is a market leader in Finnish retail with a market share of around 45%. In addition to supermarkets, S Group's 1849 outlets in Finland also include a range of restaurants, hotels, gas stations, hardware stores and specialty stores with some operations also in Russia and Estonia (S-Ryhmä 2021b). In 2020, S Group employed over 38 000 people, had a revenue of 11.6 billion euros and operating profit of 196 million euros (S-Ryhmä 2021c).

With SOK the research focus was especially on the takeback-service of used workwear, which SOK has recently started piloting in their hotel and restaurant businesses. The move is a little but fascinating part in a larger transition towards an everyday environment of sustainable consumption. At the time of data collection, SOK focused on collecting experiences and configuring operations in the pilot so that they would become easily scalable soon, paying especially close attention to the development of logistics. (I5)

The second customer that was studied (T2) is Kotipizza Group, who owns Kotipizza Oy. Operating in Finland, Kotipizza is the largest pizza restaurant chain in the Nordic countries. The Kotipizza Group also owns a burger chain The Social Burger Joint Oy and logistics organization Helsinki Foodstock Oy. Kotipizza restaurants operate with franchising business model, and currently there are more than 290 restaurants in Finland, whose combined revenue was 151.4 million euros in 2020. (Kotipizza 2021)

Kotipizza chose Touchpoint as their new workwear provider in the beginning of 2020 and the clothes were mostly updated during 2020. In this latest tendering process, sustainability issues received more attention than ever before and thus Touchpoint was chosen as the supplier. Kotipizza has some pieces of workwear in their collection produced exclusively from recycled fibres. Besides utilizing the sustainable materials, they have also eagerly piloted the takeback-service as soon as the opportunity arose. Like SOK, they are still in the early phases of operations and logistics development to get the most out of the takeback-service once it becomes a routine mode of operation. (I10 & I11)

**Case Konecranes**

Konecranes is among the biggest providers of industrial lifting-related products and services globally. They offer a variety of industrial cranes, hoists, and lift trucks, also for shipyard automation, along with a comprehensive range of modern services. Indeed, services are currently the biggest business area for Konecranes with the other two, industrial equipment and port solutions, following closely behind (Konecranes 2021a). Konecranes' roots are in 1910s, and it became independent from KONE Corporation in 1994 (Konecranes 2021b). Nowadays, after several acquisitions, Konecranes employs around 16 900 people in 50 countries and had a revenue of 3.2 billion euros and an operating profit of 173 million euros in 2020 (Konecranes 2021c).

Konecranes puts a lot of effort into extending their products' lifetimes to the maximum through careful and comprehensive service planning, thus demonstrating an excellent example of repair and maintenance (EMF & McKinsey 2015; Lüdeke-Freund et al. 2018) or extending product value (Bocken et al. 2016) CBM that is based on the reuse-princi-

ple. Figure 8 shows Konecranes' view on service evolution. The current state of progress, according to Konecranes' regional service director is that there is very little reactive maintenance left, with 90% of services happening in the preventive sphere. Some 10% is already predictive maintenance, and eventually the vision is to reach a prescriptive level of service, which would optimize the product lifetime and minimize downtimes to the extent that is possible (I6).

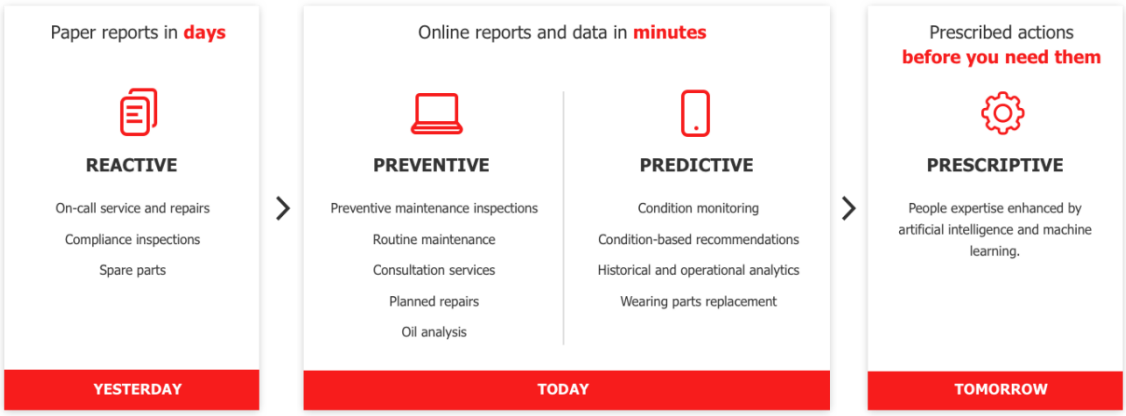


***Figure 10*** *Konecranes' approach to services (from Konecranes 2021a)*

Konecranes has bundled their services under the concept of Lifecycle Care, which may include predictive maintenance, modernizations and retrofits, consultation, remote monitoring, spare parts service and more (Konecranes 2021d). Services are sold in a modular way and tailored to each customer's needs (I6). In the context of this study, the main focus was restricted to predictive maintenance and modernization services, as those were seen to have an especially high impact potential in prolonging product lifetimes, as well as topical practical relevance.

First Konecranes customer (K1) is Outokumpu Oyj, which is a stainless-steel producer operating in 30 countries with a global market share of about 6% in cold-rolled products. Outokumpu's roots date back to a discovery of copper in Finland in 1910, but nowadays the focus is solely on stainless steel. Outokumpu employed some 10 000 people and made a revenue of 5.6 billion euros with slightly negative operating profit in 2020. (Outokumpu 2021a) Outokumpu produces steel with the lowest carbon footprint in the industry, with an aim to use as much recycled raw materials as possible, among other sustainability initiatives (Outokumpu 2021b).

Konecranes and Outokumpu have a decades long business relationship, and many of the cranes still in use today date back to the 1970s. Altogether, there are hundreds of Konecranes machines in use in Outokumpu production sites (I13). Outokumpu does not

buy maintenance services from Konecranes but utilizes their own maintenance personnel for routine tasks instead (I9). However, Outokumpu frequently orders modernization and retrofit services from Konecranes, which were thus the research focus with this customer.

Customer K2 is Pulp & Paper (name changed), a globally operating producer of wood-based materials. In this study's classification they are a big company, having an annual revenue of over one billion euros. In this research the focus was on a mill in the south of Finland producing paper products.

Konecranes has been Pulp & Paper's principal crane supplier in European sites for a long time, with the site investigated having some dozens of Konecranes machines in operation. There is a broad service contract made with Konecranes and thus all maintenance, including more advanced predictive services are outsourced to Konecranes. Additionally, modernizations and retrofits are carried out frequently. (I14)

Last interviewed Konecranes customer (K3) is Shipyard Co. (name changed), a shipbuilding company operating in Finland. The company has built many large cruise ships as well as many other types of ships in its long history. It is also considered a big company in the study with an annual revenue of over one billion euros.

Shipyard Co. has hundreds of Konecranes' cranes in use whose maintenance and upgrades naturally require massive efforts service-wise. Konecranes has a contract to carry out most of this work. As with previous customers, modernizations and retrofits by Konecranes are also a routine part of the business. What separates Shipyard Co. from the other two Konecranes customers is that they work in project business instead of process business, which was seen to modify the business relationship dynamics. (I16)

**Case Industrial Tools**

The provider company of the final case is Industrial Tools (name changed). It is a multinational company that provides tools, systems, and related services to construction, energy, and manufacturing industries, mainly to professional use. Industrial Tools is a big company, which in this study's classification means an annual revenue of over one billion euros.

Industrial Tools offers a wide variety of services and utilizes digital tools excellently in their portfolio, but in the scope of this research the focus is specifically on service called Tool Service (name changed). In Tool Service, the tools are rented out to the customer against a monthly fee, which also covers all repair and service costs, as well as possible theft. The Tool Service contract covers a package of tools used by the customer and is always agreed for a fixed period, which is typically several years. In case of defects or

maintenance needs, the customer also gets a replacement tool for the duration of the repair. The Tool Service has existed for a relatively long time, having been a pioneer case of industrial as-a-service business model. The service nowadays forms an essential part of Industrial Tool's business. (I2)

After the tools have been recovered at the end of the fixed rent period, Industrial Tools tries to take advantage of any potential leftover usage potential by offering contract extensions in some markets, reusing spare parts, or donating used tools for charitable purposes. When no reuse opportunity exists, the tools are delivered to authorized recycling partners. Additional environmental savings occur due to the decreased total amount of tools in use, as Industrial Tools optimizes the customer's tool fleet to be as economical and productive as possible when a contract is made. It is to be noted that this research was conducted in the Finnish market area, where reuse opportunities seemed yet to be scarce, which is reflected in the customer value perceptions. Based on its characteristics, the Tool Service belongs to the reuse & redistribution (EMF & McKinsey 2015, Lüdeke-Freund et al. 2018) or access and performance model (Bocken et al. 2016) CBMs under the reuse-principle.

Equally importantly, the Tool Service is an excellent case of producing value through offering products as a service in B2B settings, retaining the products' ownership over their lifecycle. As discussed before, this change in ownership structure is expected to be one key enabler of an accelerating circular economy, which makes it fascinating to study how customers perceive it compared to the traditional method of selling. Therefore, the Industrial Tools case represents the study's final CBM category, reuse – ownership retained.

Elevators Co. (name changed) was selected as the customer for the case Industrial Tools. They are a globally operating significant provider of elevators, escalators, and related solutions. With an annual revenue of over one billion euros, the company counts as a big one in the context of this study.

Industrial Tools has been Elevators Co.'s tool supplier for decades, with the Tool Service in use pretty much since its introduction. Elevators Co. has aimed for functional benefits by centralizing a big part of their tool needs to be sourced from Industrial Tools. There is continuously ongoing communication due to the Tool Service between the two companies and the business practices are well established. (I12)

## 5.2 Customer-perceived value and its components in the CE

The results answering RQ1 are twofold. First, in subchapter 5.2.1 the classification of customer-perceived value in the CE is presented. This classification is constructed abductively and lays the base for more detailed analysis, which follows value component by value component in the following subchapters. Here, a data-driven analysis breaks the classification down to more subtle level of value items while adding practical examples to strengthen and justify the classification.

The approach to answer RQ1 is a cross-case approach, meaning that no detailed distinguishments between case characteristics are yet made, as the objective here is to gain a comprehensive view on the formation of customer-perceived value of the CE in general. After reviewing results for each value component, the subchapter 5.2.7 finalizes this section with an analysis of the similarities and differences of the composition of customer-perceived value in the CE compared to earlier studies carried out in linear business settings. This will summarize answers to RQ1a and RQ1b in an explicit way.

### 5.2.1 Classification of customer-perceived value in the CE

Combining existing knowledge with the empirical data, this subchapter focuses on revealing five clear, relevant, and comprehensive customer-perceived value components and their subcomponents that act as the spine of the customer-perceived value in the CE. Establishing a structured classification consisting of clearly defined value components will ease identifying differences between the value perceptions of different CBMs, as well as potentially unify future research on the customer value of the CE.

The classification of customer-perceived value in the CE, shown below in Figure 11, presents the components and subcomponents of the customer-perceived value in the CE, and the principle with which they have been derived from the a priori framework of customer-perceived value sources and the empirical data of the study. The arrows on the upper part of the figure demonstrate how the previously identified value sources show in the newly constructed components and the case data symbols in each subcomponent show where the principal case evidence for each of them is bound. For complete explanations of the linkages between the cases and the classification, see Appendix D, as well as the following subchapters. The justifications, scopes, and literature-driven part of the evidence for the five main components are discussed immediately after the figure, whereas the subcomponent level is clarified within the detailed component-specific analyses of the following subchapters.

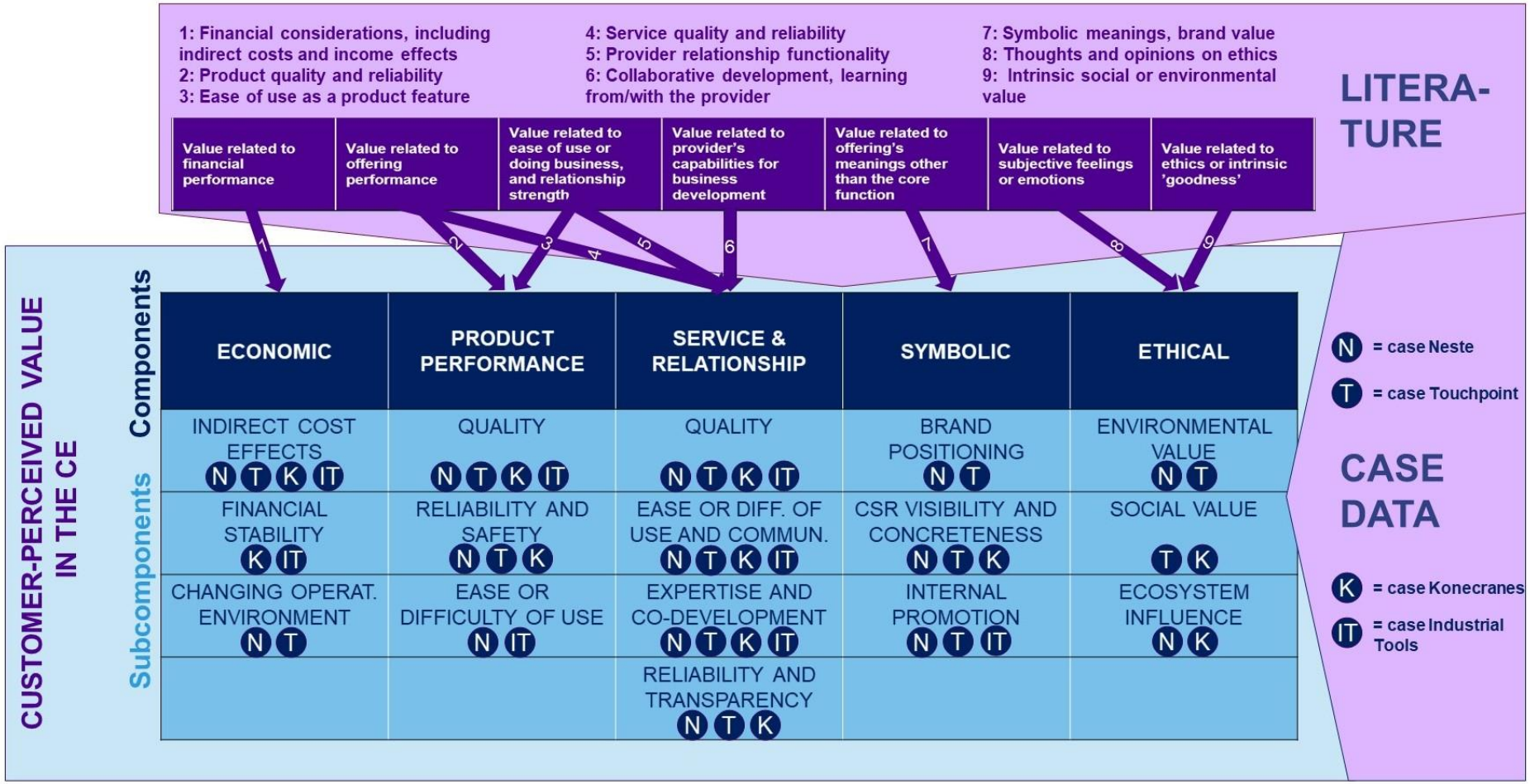


***Figure 11*** *Classification of customer-perceived value in the CE*

First component of customer-perceived value in the CE is defined as economic value. This component is derived directly from existing customer value literature (e.g. Anderson & Narus 1998; Ulaga 2003; Smith & Colgate 2007). Economic implications of taking a product or a service into use have been deemed as a key source of value time and again and should not be undermined in circular settings either. Circular offerings often have implications to the customers' resource efficiency, operation quality, or logistics that could entail significant financial effects, for better or worse. Economic considerations were repeatedly cited in the customer interviews.

The economic aspect has been identified as one of the main drivers/barriers of CE (Tura et al. 2019), and economic drivers as the most attractive ones for 'linear companies' to adopt CBMs (Gusmerotti et al. 2019). Economic implications of CE concern the whole value chain, being extremely relevant from the customer perspective as well. Especially in B2B markets economic value is emphasized in providers' value propositions (Anderson et al. 2006), which stays true also in CE settings (Ranta et al. 2020). Therefore, the managerial implications of studying how customers perceive this value component could be significant. Moreover, economic value of CE has been studied in the provider level with Ranta et al. (2018) concluding that the recycle-principle currently withholds most potential to create economic value for the provider. It is interesting to explore whether this is reflected to the customers' value perceptions as well.

When value-in-exchange related offering price is excluded, the economic value component encompasses aspects related to indirect cost or income effects due to the employment of the circular offering (indirect cost effects subcomponent), predictability of cash flows, effects on tied up capital, and effects on financial risk levels (financial stability). It is also driven by regulatory and value chain drivers that offer added financial incentives to adopt circularity into business (Tura et al. 2019) (changing operating environment). Detailed contents with empirical proof, as for all the components, are presented in the following subchapters.

The second and third components of customer-perceived value in CE are to some extent intertwined. The second component is named as product performance value. This component withholds everything that relates to the delivered product's perceived quality (including e.g. measurable performance, customizability, and specific characteristics), reliability and safety, and ease of use (related to operational ease or product's fit with its use environment) (arrows 2 & 3). On the contrary, service performance, which contains aspects such as service characteristics, speed, flexibility, and convenience of use, is located in the third value component, service value, as the quality subcomponent (arrow 4).

The key motive to differentiate between product and service performance and place them in separate value components is related to the slightly different mechanisms in which perceived product and service performance in CBMs is created. Whereas product performance is often connected to the provider's innovations such as the use of new, more sustainable materials, successful service implementation typically stems from collaboration and depends on the relationship quality between the provider and customer (Vaittinen & Martinsuo 2019). Naturally, there are exceptions to this division, as for example modernization services carried out in collaboration end up influencing the product performance too, and digitalization-related provider innovations can sometimes raise service performance without much change on the interaction between the firms. Products and services have a very close relationship in circular economy, and it is sometimes difficult to define explicitly where the product ends and the service starts.

Thus, possible critic to the selected approach can be justified, but it was deemed that there is a need to separate the massive value source of offering performance into smaller and more analyzable parts. Empirical data tells that maintaining product performance plays a key role in customers' value perceptions, which justifies separating it into its own analysis component. Differentiating between the perceived quality of products and services is likely to bring up opportunities to study their fascinating interplay in circular settings in detail, with possible contributions to many other CE literature streams as well. Moreover, extant research already shows intriguing differences between product and service quality or performance, for example that in some settings the former promotes company's ethical brand, while the latter one does not (Alwi et al. 2017).

The third component, service value, is more multifaceted than the relatively straightforward product performance value. In addition to the already mentioned service quality, this component covers the relationship with the provider firm, meaning any perceived (dis)advantages to the customer resulting from the interaction with the provider or implied by the existence of the business relationship (ease or difficulty of use and communication & expertise and co-development subcomponents). As arrow 6 in Figure 11 shows, an important type of this kind of advantage is collaborative business development, as also emphasized by various interviewees. Employing and developing CBMs typically requires intense collaboration along the value chain (De Angelis et al. 2018; Leising et al. 2018; Hazen et al. 2020), critical aspects being related to e.g. customer engagement (Oghazi & Mostaghel 2018), involving the correct people from each organization, aligning strategic goals (Brown et al. 2021), or establishing sufficient transparency (Tura et al. 2019), which may then quickly alter the customer-perceived value. As for example shared innovation efforts usually have implications for interaction intensity and can result in improved

service experience, it makes sense to bundle these aspects into the same value component of service value. In addition, as a highlighted aspect the reliability and transparency of the provider form their own subcomponent in service value since the empiric data suggests that these characteristics gain significant importance in CE environment, especially regarding reporting on environmental effects.

The fourth component of customer-perceived value in CE is symbolic value. This one is maintained unchanged in the classification from the earlier identified sources of customer value as shown by arrow 7. The component refers to all of those meanings of using the circular offering that are conveyed to stakeholders. Any resulting benefits or unwanted effects to the brand value or image that are perceived by external partners and direct customers form the core of this value component (brand positioning subcomponent). To be noted with special importance in CE context is the customer's desire to verify and make visible their efforts regarding corporate social responsibility (CSR), or even to establish a pioneer position in the circular transformation in order to gain competitive advantage through customer recognition (CSR visibility and concreteness). Additionally, similar value items towards internal stakeholders like employees are included in this component (internal promotion).

Literature has explored how sustainability can generate brand value (Kumar & Christodoulopoulou 2014; Kapitan et al. 2019), and specifically a positive effect of adopting CBMs to the brand value has been found in some earlier studies (such as Oghazi & Mostaghel 2018). It has however not been investigated before which kind of CBMs result in added brand value for the customer company. Thus, including symbolic value to the classification as its own component creates opportunities to study how well customer companies are able to utilize the brand value of circular sourcing, and what actions connected to CBMs are most powerful in growing B2B brand value. The empirical data very clearly shows that branding aspects are carefully considered by customers when making circular product or service acquisitions.

The fifth and final component of customer-perceived value in the CE is ethical value. It comes down largely to the fundamental driver of the circular transformation, diminishing the stress on the environment, and what intrinsic value that has to each customer. But ethical value also encompasses social and legal responsibility, latter of which refers to compliance with the law, transparent tax management, etc. Additionally, the ecosystem influence subcomponent highlights companies' desires to contribute to systemic changes and how sourcing circular offerings can help support these ambitions. This component relates to triple bottom line thinking and aims to clarify how important it is deemed in customer companies not only to strive for economic profits but also for environmentally

and socially responsible corporate citizenship, although these three have been shown to support each other (Karim et al. 2016; Walker et al. 2020). The positive impact of ethical brand reputation (Mulki & Jaramillo 2011) and CSR initiatives (Jensen et al. 2018) for customer-perceived value has been shown in B2C markets, but studies in B2B environment are hard to find.

It is highly interesting to study to which extent sustainability generates intrinsic value among CBM customers, but this value component is at the same time difficult to measure and distinguish, as there are multiple connection points to for example symbolic and economic value components. Sometimes it might be complicated to understand for example whether material consumption is reduced primarily for environmental or cost saving reasons or if intrinsic sustainability or public attention weigh more in decision-making when launching a green initiative. Additionally, even though environmental and social merits are increasingly being written in the strategic objectives of companies (Geissdoerfer et al. 2017), the valuation of for example lessened emissions is often vague and answers may be highly subjective. Therefore, ethical value is seen to be built also from subjective and emotional factors (arrow 8), besides those that are objectively stated (arrow 9).

This classification with its five components of customer-perceived value in CE, economic, product performance, service, symbolic, and ethical value form the basis for analysis. Being derived from literature in the fields of customer value, circular economy and sustainability as well as from an extensive amount of empirical data, they enable comprehensive understanding of the sometimes-elusive composition of customer-perceived value in an industrial CE context.

As shown, each of the components consists of subcomponents, which were in turn constructed from specific concepts arising from the data, called value items. For each component, a summary table enfolding these subcomponents and value items is next presented in its respective subchapter, followed by a more detailed discussion on the subcomponents and value items. The types of the perceived value are also included in these tables, as each value item can be seen either as a positive or a negative factor by the customers. There are also cases in which a potential value item of the CE solution is not perceived by the customer, which are referred to as ‘not perceived’ in the tables.

Additionally, to be noted is that this classification is built primarily for industrial B2B environment which is also reflected in the relevance of certain earlier recognized value sources. It is perhaps most clearly shown in the treatment of the subjective or emotional

value source. As emotions guide decision-making more in the consumer than the organisation level, this value source has mainly been picked up in B2C studies (e.g. Rintamäki et al. 2007; Leroi-Werelds 2019). Here, it is being primarily seen as a potential source of ethical value perceptions, although similarly it is acknowledged that subjective views of the interviewees do influence all of the defined value components at least to a minor extent.

Lastly, it is good to notice that even though the classification is built for CBMs specifically, not every value item is dependent on the solution being circular as the classification aims to give a complete picture of the customer-perceived value and some value items significantly overlap or are the same both in linear and circular settings. Value items with the least dependence on the circularity of the offering are marked with an asterisk (*) after their name to clarify this issue. The complete data structure table can be found as Appendix D.

### 5.2.2 Economic value component

***Table 10*** *Customer-perceived value in CE: economic value component*

| **Subcomponent** | *Value item* | Case example(s) | Types of perceived value | Additional explanations |
|---|---|---|---|---|
| **Indirect cost effects** | *Cost effect of reduced material use* | Cost savings from modernizing cranes instead of buying new ones (case Konecranes) | Usually perceived positively, sometimes potential value not perceived | Value not perceived if there's lack of awareness or buyers are only interested in purchase costs instead of lifecycle costs |
| | *Cost effect of reduced workload* | Purchase price is only 20% of total price of ownership of tools (case Industrial Tools) | Usually perceived positively, sometimes negatively | Negative value perceived when not understood properly, and when the service price is deemed high |
| | *Optimized service schedule* | Data-based predictive maintenance of crane parts (case Konecranes) | Perceived positively | |

| | | | | |
|---|---|---|---|---|
| | *Optimized fleet size* | Analyses of optimal fleet to be leased based on customer needs (case Industrial Tools) | Perceived positively | |
| | *Cost effect of logistics* | Takeback logistics of workwear (case Touchpoint) | Can be perceived either positively or negatively | Positive value perceived if there are savings from e.g. waste management costs Negative value perceived when added costs are significant |
| | *Performance-related cost effect** | Improved energy efficiency of cranes (case Konecranes) | Perceived positively | |
| **Financial stability** | *Production risk management* | Modernizing and maintaining production-critical cranes to manage risks (case Konecranes) | Perceived positively | |
| | *Cash flow predictability* | Tool Service with fixed monthly price eliminates surprise expenses (case Industrial Tools) | Perceived positively | |
| | *Ease or difficulty of investing** | Difficulties to invest in big modernization projects (case Konecranes) / Lowered investment costs (case Industrial Tools) | Can be perceived either positively or negatively | Value type depends on the solution, see case examples |
| **Changing operating** | *Foreseeing regulatory development* | Avoiding need for future costly ad-hoc adaptation when regulation develops | Perceived positively | |

| | | | | |
|---|---|---|---|---|
| **environment** | | (case Neste, Touchpoint) | | |
| | *Increasing willingness to pay for sustainability in value chain* | Consumers are ready to spend more for responsibly produced products (case Neste) | Perceived positively, except if not realized as expected | Negative value perceived if value chain's WTP not realized as expected |

First sub-component of economic value is **indirect cost effects**. This is a multifaceted sub-component which further contains diverse value items, principally positive ones (indirect cost decreases) but also negative ones (indirect cost increases). As explained in subchapter 2.3, offering price itself is not considered part of the value perceived by the customer in the analysis (value-in-use), but multiple other mechanisms were identified in which a circular offering affects the financial costs incurred by the customer.

Firstly, prolonging product's lifetime via repair or remanufacturing is often significantly cheaper than having to buy a new product. This is further highlighted when the products are big and expensive. As Konecranes' customers state:

*"The central reason for modernizing machinery is that often it is much cheaper to maintain the existing fleet. It makes no sense for us to drive our cranes up to a state in which they have to be entirely replaced. There is financial sense in maintaining and repairing existing machinery just as each of us maintains and repairs our personal cars."* (I13 / customer K1)

*"It is a clear fact that if we disassemble a crane and construct a new one from scratch, the cost of such an operation is big. When it comes to cranes the steel's share of the cost is so significant that utilizing existing structures creates big financial savings."* (I14 / K2)

Even though the financial long-term benefits of utilizing comprehensive services to prolong product lifetime are clear and easy to prove, the customers still frequently feel that the price of modernization projects is high (I9). Therefore, the financial value is not always perceived in its full scope. Moreover, industrial buyers do not sometimes pay attention on the facts on lifecycle costs as their buying incentives might be grounded on pure unit or hourly price. This creates an unnecessary barrier for selling circular services in an industrial context. (I6, I7) There is also a risk of uncomplete communication or understanding of the lifecycle costs:

*"It is not quite clear for us how the modernizations affect our total costs. We currently carry out the projects when we have to, but naturally additional info and calculations would be very welcome. I don't think we have the knowledge ourselves to calculate a payback time for that kind of work."* (I16 / K3)

Secondly, time savings that a circular service may enable customers to have are realized as monetary savings. This is well demonstrated in 'as a service' business models as case Industrial Tools shows:

*"There are many hidden costs related to maintenance, deficit, sudden defects, etc. of the tools. If these processes are not outsourced, someone always needs to use time to figure out how to repair the tools, where, and how to work while the tool is being repaired, which generates significant costs."* (I2 / Industrial Tools)

However, this potential value item can be tricky to turn into positive customer-perceived value. Even though Industrial Tools has estimated that usually the initial purchase cost is only about 20% of a tool's lifetime costs (I2), there is occasional difficulty in communicating this to the customers. If this value is not perceived by the customer, it is not affecting the customer's decision-making and not generating competitive advantage to the provider. This value item can in the worst case be perceived as one generating negative value:

*"Still today some of the customers tell us that 'This tool's purchase price is X euros and in the Tool Service it would be X euros more in 3 years. It is much more expensive, why?' And then we explain the costs related to maintenance, repairs, theft, loan tools, etc."* (I2 / Industrial Tools)

Another problem is that in an 'as a service' CBM (ownership retained) both the perceived economic and environmental value depend heavily on how critical and how frequently used the products included in the service are (I12). As Industrial Tools customer IT1 explains:

*"What I have never been totally convinced about is that we have some tools in the Tool Service contract that are needed occasionally and are good to have but not critical for us. And even though we save some money by having them available and services included, it could happen that we use a certain tool for example 25 times during a five-year lease period, for which we eventually pay the full price of the tool and after which the tool gets recycled as material. If we would own it, the mechanic could be able to use it for 20 years without any maintenance, which would make much more economic and ecological sense."* (I12 / IT1)

The next value item, cost savings from optimization of service frequency and timing is closely related to the previous, as it also generates savings by easing processes in the customer's end (thus it is also closely connected to service value component). This value item is however not about assuming responsibilities from the customer, but rather about doing things smarter by considering data-based evidence and customers' own processes. Savings then result from the optimized uptime of the products through both reduced time taken up by maintenance work and reduced number of surprise defects:

*"For example, when a customer asked us to reduce the number of unscheduled repairs required, we utilized ERP data to forecast the frequencies of their top 10 defects and optimized the service schedule according to that. A case in point are radio defects that are practically impossible to forecast one by one. However, by forecasting the defect frequency from data, we were able to reduce maintenance visits by 1/3 and radio defects by up to 95%."* (I9 / Konecranes)

As can be seen, digitalization and big data play a significant part in enabling these benefits to the customer. The same applies to the next value item, optimization of the fleet size. By analyzing the customer's individual needs in-depth in connection with the implementation of circular services, it is possible to decrease the amount of either products or spare parts that the customer needs to manage, naturally leading to lowered total costs.

*"In fact, the total number of tools has decreased [due to starting to use the Tool Service]. There are more and more tools whose usage is so occasional that it does not make sense for you to have your own. As an example, back in the days every mechanic had their own angle grinder, and nowadays typical is to have one per six or eight mechanics."* (I12 / I1)

A specific case of this type of customer-perceived value is the increased accountability of products that an 'as a service' business model may enable. As the machines can be addressed to specific person(s), managers see the potential of the Tool Service in bringing added responsibility to the handling of the tools and in raising the threshold in discarding defect tools (I2). Moreover, the spare parts can be sold against serial numbers, which makes Industrial Tools' products unattractive to steal, leading to reduced deficit as well (I12).

Second-last value item in this broad subcomponent is the cost effects on company logistics, which was especially important discussion topic regarding takeback-logistics. Implementation of circular operations may enable savings in waste disposal costs, but on the other hand new costs might be generated from the takeback logistics if they are not planned carefully. The issue seems to be very-customer specific, with the company

structure and existing logistics organization needing to be considered. Touchpoint customers give excellent examples:

*"We are a big chain and we own our logistics organization which makes it easier to establish the collaboration [with Touchpoint]. - - - We're able to centralize the logistics and take advantage of our existing process, so that we can effectively and sensibly implement the takeback logistics. - - - If we would need to visit every single shop separately for this, it would not work."* (I5 / T1)

"*Currently, we're in the process of figuring out what is the process of collecting and sending back individual garments. Somehow, we should collect them from nearly 300 [franchising] restaurants all over the country and deliver them to Touchpoint without creating a polluting logistical chaos. We are trying to come up with some kind of postal service for the restaurants. - - - The restaurants can generate savings in waste management costs due to this, but if the costs of delivering the clothes back to Touchpoint are higher, they won't be motivated to take that action. The cost savings have to be realized as well."* (I10 / T2)

Last value item of the subcomponent of indirect cost effects is related to product performance and is thus closely connected to the second main component of customer-perceived value. A couple of ways in which performance generates cost savings were identified, although similarly it should be remembered that low quality products or services may lead in cost increases. The first one is about better compatibility. Neste's renewable fuels have lower NOx and microparticle emissions than fossil fuels, which can cause a slightly longer maintenance interval for motors using it (I1). When used in big volumes, this can generate meaningful cost savings. The second aspect of performance-related cost savings is related to energy efficiency:

*"Maybe the benefit that is the easiest to monetize are the energy savings. If we can save for example 20% in the energy consumption of a crane through a modernization, it is a concrete and measurable benefit. But of course, we need to take into account the big picture and that the energy consumption of the cranes is marginal compared to the process of paper-making."* (I14 / K2)

The second subcomponent in the sphere of economic value is **financial stability**. This subcomponent contains three value items, first of which is production risk management. As circularity-enhancing services often increase the products' reliability, the added security can be among the key motivations of the customer to use the service. This is especially emphasized in production-critical products, such as Konecranes' cranes:

*"When that 120 metres high crane is not working, that costs us tens of thousands of euros per hour, as the effect multiplies towards the front end of the production. This is one of our most critical machines on the site. On the other hand, there are also those that can be broken for several weeks without interfering with the production schedule."* (I16 / K3)

The level of criticality is directly reflected in the demand of predictive maintenance and advanced services (I9). Even when the money is tight, the production security needs to be guaranteed (I14).

The latter two value items of the subcomponent, predictability of cash flows and ease or difficulty of investing are somewhat related. Customers have their individual preferences when it comes to financing purchases, with some of them wanting to get rid of any unnecessary tied up capital, some placing importance on steady cash flows and low risk of surprise costs, and some valuating the ownership of certain products too much to purchase them as a service (I2). Cash flow predictability was mostly identified as a perceived value in the 'as a service' CBM, but investment considerations were more all-encompassing in the cases. Difficulties are experienced with ordering big infrequent services such as modernizations:

*"The difficulties start usually if the customer doesn't have the investment budget. At that point even if I prove them that they'll save exactly this much in five years, that's of little help as long as the customer can't make the investment. However, for each customer we build the investment plan proactively with them as a part of the business review."* (I9 / Konecranes)

*"Of course there are always presentations and calculations coming, but with our investment policy the projects that are started purely on financial grounds have to have very short payback times. Therefore, that's rarely the key reason for modernization investments, and instead money is used where it is necessary and acute to use."* (I14 / K2)

On the contrary, positive customer value in the investment respect can be generated both through CBM configuration itself or product characteristics:

*"This service [Tool Service] helps if someone wants to found a construction company and needs to keep the initial investment as low as possible. This is one of the reasons why we have also small companies as customers of the Tool Service."* (I2 / Industrial Tools)

*"This product is very easy to take into use as it does not require big investments in the vehicle fleet [like changes of power source usually do]. Renewal of the fleet is the biggest possible investment for the small logistics companies. They have to take a lot of loan*

*and they do not make that investment unless they can be absolutely sure that it pays itself back."* (I17 / N1)

The third subcomponent is called **changing operating environment** and is of a more dynamic nature than the previous two. This subcomponent stems from the fact that the societal demand for sustainability is slowly but rather steadily starting to affect companies' financial results through multiple channels, such as regulation and value chain demand. It became clear in the interviews that in order to keep their businesses economically healthy, customer companies need to sense, predict and take advantage of the societal and industry-specific changes when it comes to pricing environmental impacts.

Identified value items of this subcomponent were connected to regulation and the downstream value chain. Many customer companies highlighted that they want to stay ahead of regulatory development to avoid costly last-minute changes in processes as the environmental regulation changes and laws become stricter:

*"If you're running behind and the regulation strikes into effect, you will be in a terrible hurry and then it is twice as expensive to implement those changes when the panic is on."* (I10 / T1)

*"That's how the emission calculations of our logistics began when we started to anticipate that EU will soon implement some kind of carbon tax or something like that, and we want our own calculation capabilities to then be already sufficient so that we know where we are and that we do not take big hits financially at that point. Additionally, accurate calculations allow us to also achieve our sustainability targets more efficiently."* (I17 / N1)

Another highly important perspective that also carries intertwined symbolic and economic implications is that of the value chain, and especially the requirements or wishes coming from the studied case customers' customers. Some companies can already verify that some of the added price paid for sustainability can be attributed to the end customer price, whereas some are taking actions in an anticipative manner with the belief that the payoffs are realized in the near future:

*"We already have studies that show that consumers are ready to pay some premium for knowing that the product is responsibly and sustainably produced. That allows us to incorporate some of the added costs to the consumer price as well.* (I17 / N1)

*"As an added cost this is significant and the clients do not yet value this choice as any added bonus in tendering processes. But we see it as an investment for the future. - - - I would say that everything will go smoothly as long as this investment will be helping us to score more contracts in the future. If the personnel feels that this cost is only a minus to their performance bonuses and does not bring future work security, then they won't*

*see the sense in it. And that's why this [front end investing without immediate financial benefit] has to be a transition phase that changes sooner or later."* (I20 / N3)

The data hints that consumers might currently be more consistently willing to pay premium for environmental sustainability than business customers, although the case data is limited on that respect. Nevertheless, resistance from stakeholders to pay any premiums for added sustainability might also appear (I17). Touchpoint has observed differences between close-to-consumer service industry customers who incorporate extensive sustainability-based buying criteria and public organizations who are principally concerned about the price and have more rigid product specifications (I3, I4).

### 5.2.3 Product performance value component

***Table 11*** *Customer-perceived value in CE: product performance value component*

| **Subcomponent** | *Value item* | Case example(s) | Types of perceived value | Additional explanations |
|---|---|---|---|---|
| **Quality** | *Performance enabled by product characteristics** | Renewable fuel burns cleanlier than regular fossil-based fuel (case Neste) | Can be perceived either positively or negatively | Depends on if the performance is better or worse than that of alternatives, as well as on customer attitudes and communication |
| | *Product performance enabled by services* | Performance upgrades from modernizations (case Konecranes) | Perceived positively | Typically perceived with rather low importance |
| | *Customizability** | Restricted availability of recycled materials (case Touchpoint) | Can be perceived either positively or negatively | Positive perceptions from valuable customization options<br>Negative perceptions mainly occur due to limited availability of sustainable raw materials |
| | *Appearance** | Looks of sustainably produced workwear | Can be perceived either | |

| | | | | |
|---|---|---|---|---|
| | | (case Touch-point) | positively or negatively | |
| **Reliability and safety** | *Durability** | Workwear should last long in use (case Touchpoint) | Can be perceived either positively or negatively | Depending on the perceived durability in relation to the expectations and that of alternatives |
| | *Functional reliability** | Reliability of a fuel is critical especially in professional use (case Neste)<br><br>Securing production by taking care of cranes (case Konecranes) | Can be perceived either positively or negatively | Critically important for business-critical products<br><br>Negative value perceived if there are reliability issues or doubtful attitudes that affect the perceptions |
| | *Operational safety** | Cranes have to meet safety regulations, for which circular services are frequently used (case Konecranes) | Can be perceived either positively or negatively | Negative perceptions rare but possible due to the occasional doubtful attitudes towards recycled/renewable materials |
| **Ease or difficulty of use** | *Infrastructural fit* | Neste MY fuel works in normal diesel engines (case Neste)<br><br>Some machines prohibit use of all bio-based fuels (case Neste) | Can be perceived either positively or negatively | Positive perceptions if e.g. no need to change equipment or business partners<br>Negative perceptions due to e.g. extra work, costs, or complexity caused by misfit with current equipment/regulation/stakeholders |
| | *Operational ease or difficulty** | Less maintenance work of products needed in leasing (case Industrial Tools) | Usually perceived positively, could also be perceived negatively | Negative value perceived if the circular product is harder to use |

For product performance value, the first and probably most significant subcomponent is **quality**. To begin with, it withholds the general performance factors of a product. The added performance can be formed either due to the innate characteristics of the circular product, or as a result of a circular service being applied to the product. The first value item considers the former, which was discussed a lot in the recycle-cases of Neste and Touchpoint. Clearly, a sustainable product may offer added value for customer also through performing better than alternatives in its main job:

*"Our product burns cleanlier than a conventional diesel, and when we consider big logistics customers that have a fleet of hundreds of vehicles, it does matter if a fuel burns cleanlier, possibly reducing need for maintenance."* (I1 / Neste)

*"As we have used the Neste MY Renewable Diesel in closed-area transportation, the lowered NOx and microparticle emissions have had a positive impact on air quality."* (I17 / N1)

*"A couple of years back customers were not yet confident to try recycled materials in their workwear, they didn't trust the quality. But now they have become durable, quality-wise as good as virgin materials, if not even better in some respects like durability. And this is seen by the customers, who are now asking for recycled materials much more."* (I3 / Touchpoint)

However, there are also risks that at least some of the customers do not perceive this kind of added value if they hold deeply rooted suspicions towards the new sustainable alternatives (I17). And naturally, sometimes the circular products do have disadvantages to conventional ones in some respects of performance:

*"In the restaurants there have been some troubles to understand the formation of little points or pimples in the clothes which is a characteristic of the recycled materials. And it might be perceived as bad quality even though the clothes would work exactly as they should."* (I10 / T2)

In the end, the high importance of the performance of recycled products is excellently summarized by Touchpoint customer SOK:

*"When products are made of recycled materials, they can't be any worse in quality as the virgin alternatives. - - - Demand for recycled products has taken off once the performance has risen to an equal level [with virgin products]. But for that to happen in any product segment, equal or better performance is required."* (I5 / T1)

Circular services can improve product's performance in both reuse-based CBMs where the product ownership is transferred to the customer or retained by the provider. Case Konecranes shows that product performance can be improved in connection with lifetime extension services, as the modernizations and predictive maintenance services do result in for example capacity or operation speed improvements (I6, I9). Case Industrial Tools, in turn, revealed the importance that constantly having newest products and features has for some customers (I2), although the compatibility of this value item with the possible circular sustainability ambitions can be questioned. But 'as a service'-concepts may also include additional elements that improve product performance, such as laser calibration service in the case of Industrial Tools (I2).

*"Having the Tool Service creates value for our customers' employees too. The tools are automatically renewed every couple of years and for some customers it is really important to always have the newest ones in use."* (I2 / Industrial Tools)

It is however to be noted that the product performance upgrades might not typically be among the most important motives to acquire circular services. These aspects often lose in importance to guaranteeing reliability. This is affected by what role the product plays in the customer's business:

*"Principally we look at what has to be done to guarantee production security instead of performance considerations. The cranes need to be able to complete their tasks reliably, but they do not really affect the process or results of the paper-making process."* (I14 / K2)

Third value item of the first subcomponent is fit and customizability. Customers might have specific needs and if the provider manages to meet them with flexibility, the acceptance of the product improves. For example, being able to listen to even small wishes about crane configuration can significantly improve how operators feel about modernization projects (I15). On the other hand, when bringing circular products to the market, their availability might first be restricted which could be perceived badly:

*"The central difference [for the customer in using recycled vs virgin materials] is that recycled materials are not so widely available yet and we're not able to solve every need or wish of our customers. For example, not all the colours might be available for a product. But these things are improving fast."* (I3 / Touchpoint)

Lastly in the quality subcomponent, there is the distinct value item of appearance. This value item is highly product-dependent and has relevance mainly when the product has

to do with the branding and image of the customer company. This is the case for Touchpoint, with the appearance of the clothes being mentioned as among the key buying criteria for many of the customers (I3).

Second subcomponent of the product performance value is **reliability and safety**. This topic came up in multiple contexts across the cases. Being able to trust that the product endures use while maintaining its performance and diminishing any possible disturbances to business was identified as an important value item across the CBM categories. The issue of reliability is divided into the value items of durability and functional reliability, as these are the two main issues to be tackled to guarantee product's reliability.

Durability is ideally inherent to the product, embedded in its characteristics. It becomes a key value item especially with products that are used, not consumed. The quality demands for recycled products discussed with the previous subcomponent apply strongly to the product durability too (I3, I4). Touchpoint sees durability as a critical product characteristic to guarantee customer satisfaction:

*"Customers want to ensure the durability and functionality of the clothes before the purchase. - - - We don't send the customer products which will be sent back as reclamations when they do not last in use. We take care of that through careful testing."* (I3 / Touchpoint)

Functional reliability is critical in reuse-based CBMs where product lifetime is extended through services and in recycle-based CBMs that deal with consumable products. In the case Neste, the reliability of the renewable fuel was mentioned as a critical issue (I1), and in the case Industrial Tools the added reliability of critical tools enabled by the automated renewals was brought up among the main motivations to buy the service (I12). As already analyzed with the economic value component, Konecranes customers too state the service-enabled reliability as a top value and motive to buy:

*"Safety is the number one thing, but functional reliability comes right after. Whenever it seems like there start to appear any disturbances to production, we have to act."* (I14 / K2)

This quote works as a smooth lead-up to the final value item of this subcomponent, which is operational safety. The importance of safety is naturally not dependent on if the products comply with circular principles, but it was recognized as a major value item in some contexts, which the circular provider has to always take into account. Especially important operational safety is in heavy industrial environment and was thus highly emphasized by Konecranes customers. Safety has become integrated into all work during the

last decades, and in multiple interviews the idea of sustainability consciousness being on the same track but about a decade behind came up (I6, I13, I14).

*"When sourcing and tendering cranes, the sustainability criteria are not yet integrated in the sourcing process. Safety is there already as a standard point, and safety issues are always discussed through with each supplier. I can see that carbon-footprint and environmental issues are rapidly becoming more important in sourcing as Outokumpu has the target to be the end customer's first choice in sustainable steel. Also internally we calculate C02-impacts in the decision-making processes."* (I13 / K1)

*"Safety is what guides our actions."* (I14 / K2).

There are also underlying regulative elements further enhancing the perceived safety value. If there for example is an accident involving a crane which has not been maintained as requested by law, the company loses any insurance coverages (I9). Moreover, circular services can reduce the workload of taking care of complying with safety regulations, as is the case with Industrial Tools' Tool Service's frequent product renewals (I2).

Lastly, the product performance value component withholds the perceived **ease or difficulty of use** subcomponent. This is further divided into the value items of infrastructural fit and operational ease or difficulty. The first one of these, infrastructural fit, means if the employment of the circular product requires any changes to the existing equipment of the customer. The value item in question is also partly covered in the economic value section as easiness of investing, but as it directly deals with product characteristics, circular adaptation, and was identified as a critical value item in the Neste case, it is also considered as a separate part of the product performance value.

Neste's renewable fuels work perfectly well in conventional diesel engines, whereas the traditional biofuels require big modifications to the engines, and therefore to the fleet. Neste customers talk about how this connects to their circularity strategies:

*"This renewable diesel came up [in a 10-year technology roadmap] as a quickly available technology with which we can practically instantly lower the lifecycle emissions by 90%. - - - A key reason to start using the product was that no new vehicle technology was required but instead the product works in the existing fleet."* (I18 / N2)

Sometimes there can be infrastructural misfit because of lack of awareness or ecosystem maturity. Neste customer GRK was unable to use the renewable fuel in some machines due to restrictions set by machine manufacturers, even though the fuel would have been technically compatible (I20).

Operational ease refers to for example lessened workload and reduced complexity of operating the product or managing the product fleet. Characteristics that increase the perceived value in this respect can be for example maintainability (I3) or low number of needed products (I2). As also pointed out in economic value component, circular service models have potential to produce added customer value by reducing workload of the customer:

*"The easy thing is indeed that mechanics get their tools frequently renewed, and usually the possible early-stage issues in the tools get solved automatically by that."* (I12 / IT1)

*"If a customer simply buys the tools without having any processes for managing them, they have to use much of their time to manage the tool fleet, and that generates significant costs. What we usually tell our customers is that 'let us manage your tools so that you can focus on your core business and on what is productive for you."* (I2 / Industrial Tools)

### 5.2.4 Service value component

***Table 12*** *Customer-perceived value in CE: service value component*

| **Subcomponent** | *Value item* | Case example(s) | Types of perceived value | Additional explanations |
|---|---|---|---|---|
| **Quality** | *Customizability* | Modularized way of selling Life Cycle service (case Konecranes) | Perceived positively | Negative value could possibly result if the service is deemed too rigid, but this was not observed in cases |
| | *Change in total complexity* | Tool Service enables reducing the total number of tools to be managed (case Industrial Tools)<br><br>Complicated multiparty take-back logistics (case Touchpoint) | Can be perceived either positively or negatively | Depending on if complexity decreases or increases, or if it is perceived as big or small |
| | | Versatility: Tool Service includes | | |

| | | | | |
|---|---|---|---|---|
| | *Other performance characteristics* | free laser calibrations (case Industrial Tools)<br><br>Digital platforms: Precise fuel consumption data portal for B2B customers (case Neste)<br><br>Accurate specifications: Well-holding estimations of project durations (case Konecranes) | Can be perceived positively or negatively, sometimes potential value not perceived | Depends on the characteristic and customer awareness of it |
| **Ease or difficulty of use and communication** | *Change in total workload* | Customer can follow the progress of crane modernization from a mobile app without having to do anything (case Konecranes) | Can be perceived either positively or negatively | Depending on if workload decreases or increases, or if it is perceived as big or small. Often perceived with high importance. |
| | *Communication fluency** | Systematic (+) but insufficiently customized (-) meeting practices (case Konecranes) | Can be perceived either positively or negatively | Often perceived with high importance |
| | *Customer service experience** | Delivering extra materials and support upon request (cases Touchpoint & Neste) | Usually perceived positively, could also be perceived negatively | In the cases the service experiences were positive, but bad service would result in negative value |
| **Expertise and co-development** | *Innovation and technological capabilities* | Frequent product innovations stemming from big R&D resources (case Industrial Tools) | Perceived positively | |
| | *Business co-development* | Active co-development of take-back process (case Touchpoint) | Perceived positively | |

| | | | | |
|---|---|---|---|---|
| | *Multi-level collaboration* | Bringing regular meetings with the R&D team a part of the customer relationship (case Neste) | Can be perceived either positively or negatively | Most new communication touchpoints between companies provide extra potential for co-development (pos. value), but problems in one of these touchpoints can easily hamper the whole collaboration (neg. value) |
| **Reliability and transparency** | *Service reliability and safety** | Timely service deliveries (case Konecranes) | Can be perceived either positively or negatively | Service safety is usually assumed (neutral perception), if there would be lack of it, that could have a big negative effect |
| | *Provider reliability** | Perceptions of provider as one who always fulfil their responsibilities (various cases) | Can be perceived either positively or negatively | |
| | *Reporting and data availability* | Transparent supply chain data and regularly calculated emission factors available for customers (case Neste) | Can be perceived either positively or negatively | Rather important value item. Expectations on reporting are often quite high; negative value perceptions might occur if they are not fulfilled |

The service value component consists of the perceived value related to the circular service experience and interaction with the provider, including aspects of communication fluency, provider expertise and provider reliability. First subcomponent is **quality**, just as for product performance value. That consists of the value items of customizability, change in total complexity, and other performance characteristics. Customizability of services normally manifests itself as modularized service design. This was the case for both Konecranes and Industrial Tools, and the ability to receive tailored and optimized service solutions and packages was deemed useful by the customers.

Second value item of the subcomponent is change in total complexity when it comes to dealing with the service. Both positive and negative experiences were observed in this respect, with the former being related to the service assuming tasks from the customer or making processes more straightforward, and the latter to the complex organization of takeback-logistics as well as to difficulties in finding time and resources for the service implementation in cases Touchpoint and Konecranes:

*"We have nearly 300 restaurants all over Finland and there surely isn't any truck that's going to tour around picking up the clothes, so we would need some local collection points or postal service. But so far there has been little discussion of such logistics infrastructure."* (I11 / T2)

*"Our production channel is so long that each little change will have big impacts along the chain. Crane modernizations are very difficult to schedule in this environment. For example, we are starting a nine-day reparation of one crane, and it took several months of internal planning, requesting and reminding here to get it scheduled."* (I16 / K3)

Lastly for quality subcomponent, the other performance characteristics include all additional things that affect the perceived quality of a service for better or for worse. Availability and versatility are positive examples of such characteristics, whereas problems in data quality is a characteristic that quickly generates negative perceptions (I14). One significant quality-enforcing characteristic that already hints to the importance of communication is accuracy in service specifications and planning:

*"When we ask Konecranes for an offer for certain repairs or modernizations, their estimations of the required time hold usually very well. I don't think we would be able to generate such accurate estimations ourselves and would end up over- or underbudgeting for the projects."* (I16 / K3)

This value item can also include the potential added value of digital platforms and tools related to circular services. Neste provides an excellent example with their newly implemented customer portal for tracking detailed fuel consumption data:

*"The newly presented digital tool in MY Neste -platform has been a positive surprise. We can track our fuel consumption regionally and we will also be able to see the emission data. - - - The quality and content surprised me positively, you can see a lot of data and filter by geographical area which is really useful in my opinion."* (I20 / N3)

The second sub-component is **ease or difficulty of use and communication**. It deals with required customer effort to maintain the relationship, interaction dynamics with the provider, and smoothness of the service delivery. Some aspects are closely related to

the subcomponent of quality, but this subcomponent exists due to the perceived importance of the ease of implementing and managing the comprehensive circular service process. Engaging in circular service business often entails a requirement to start communicating more actively with the customers, as some provider firms had learned by doing (I2). The first value item of this category is change in total workload. Aspects that drive workload decreases and therefore increase the perceived ease of service use include for example good fit with existing operations, minimized customer responsibilities, and system integration. Problems in the listed aspects on the other hand result to increasing workload and negative value perceptions, but generally more positive than negative associations were identified related to this value item. Selected key examples from the data follow:

Fit with existing operations: *"It comes down to how easy they can make it for us. Now it [the takeback of clothes] was made really easy as the staff could just give the bags to the truck driver that comes to the restaurant frequently anyway. This surely helped us to achieve surprisingly high amounts of recovered workwear."* (I10 / T2)

Minimized customer responsibilities: *"Of course, regarding bookkeeping etc. it's an easy process for us as we don't really have to bother with those things. Industrial Tools' personnel takes care of collecting the old tools, giving out new ones and deals with the bookkeeping. Essentially we only need to give them facilities to carry out these operations."* (I12 / IT1)

System integration: *"Now we are only discussing about receiving data [of fuel consumption] in such a format that it would directly come to our IT systems, so that manual work could be reduced and only some occasional checks would need to be performed. That would also enable real-time utilization of the data."* (I20 / N3)

One more workload-related negative aspect of implementing a circular service is the required (un)learning. Both official trainings and more subtle change management of mindset is often required. For example, Industrial Tools has noticed that not everything can be trained by them, but the customer must do some internal personnel training too, as it may for instance be hard to get rid of the practice of simply discarding cheaper tools when they break.

Next value item, communication fluency, is affected by aspects like clarity of communication channels, continuity of interaction, and appropriability of agreed meeting practices. The quality of communication with the provider was deemed a rather important value item by various customers across the cases, probably due to the typically high

amount of needed dialogue related to circular business relationships. Examples of both positive and negative value perceptions follow:

*"The communication with Konecranes is generally very good. I think it has improved through the years so that we now have fluent communication also on difficult topics, which we can process together in a constructive way."* (I13)

*"I would say that it is a good and sufficient rhythm to meet up once a month to discuss through all hot topics and issues."* (I15 / K2)

*"In fact, regarding our collaboration, these weekly and monthly meetings… the topics in these meetings are very broad and the scope is unclear. So, I could give feedback that it would be better to focus on one strictly defined topic, as for example modernizations at a time."* (I16 / K3)

Third and final value item, customer service experience, includes aspects of service attitude and provider flexibility to offer extra support when needed. It is tightly related to communication fluency but addresses practical outcomes and service on the field. Identified perceptions on this value item were mainly positive ones, but bad service naturally would result to negative value generation.

*"Touchpoint has been very supportive and offered us extra materials when needed, in the format of presentations and videos. Always if there was something to ask, we have received help from them."* (I11 / T2)

*"We received support when I asked for a presentation [about the raw materials and supply chain of the fuel]. In addition to the presentation, they [Neste] offered to come talk with our management, so they provide comprehensive customer support."* (I20 / N3)

*"In this case also [false fire alarm in a crane] we were immediately in touch with them [Konecranes], and the mechanics who came to solve the problem offered excellent service. Of course, their supervisors did a good job as well, I can't complain. This time I felt like everyone was really working together."* (I16 / K3)

Other occasions that demonstrated positive customer service experiences were flexible project scheduling of Konecranes (I16) and field introduction sessions of new tool fleets (I2) as well as quick reactions to negative feedback (I12) of Industrial Tools.

Third subcomponent is **expertise and co-development**. It refers to any extraordinary capabilities that the provider has in order to boost the customer's business, as well as to the provider's intentions to work with the customers in R&D related efforts. Generally, value items of this subcomponent were seen by the customers as ones that positively affected the selection of the case companies as providers.

Firstly, this subcomponent withholds the value item of innovation and technological capabilities. Forward-looking companies often look for technologically advanced providers to facilitate the sustainability and technology transition also in the long term.

*"As we don't yet consider ourselves as experts of the circular economy, we hope that we can get good suggestions from our business partners and that we can unite with the right knowledgeable companies."* (I10 / T2)

*"Collaboration with Konecranes is smooth, as they are a market leader in many ways. Konecranes is in the front line when it comes to technological development and innovation."* (I13 / K1)

*"Our innovation capabilities clearly affect [customers' decision-making]. - - - Industrial Tools has enormous resources for R&D, we have annually over 50 product innovations implemented, which is something that not a lot of companies can match."* (I2 / Industrial Tools)

If the provider has capabilities to provide extraordinary long-time technological support, this also generates customer value:

*"We manufacture crane machineries by ourselves, in order to be able to serve the customer throughout the machine lifetime. There was a case in which a customer asked me how it is even possible that they have bought us a crane in 1979 and we can still make them an identical gear as spare part upon asking."* (I9 / Konecranes)

In the case of Konecranes they have productized their expertise into almost 40 different consulting services (I6), which may increase the visibility of this expertise towards customers. Examples of how they can help customers with their knowledge are reverse engineering and maintenance of other manufacturers' spare parts (I8), special inspections, and auditing (I6). Expertise included in this value item can also take other forms such as being able to communicate the qualities of the product in an exact and convincing manner, which was highlighted in case Neste (I17).

The second value item is business co-development. This refers to customer-centric, interactive R&D practices of the providers, as well as active feedback collection and long-term collaborations. When it comes to new circular business models, co-development aspects were deemed important from both the sides of the provider and the customer.

*"We want to engage the customer to co-develop the process with us, and that is one way to produce customer value. They have good ideas and questions for us. It is very interactive development work, which is very important for our customers."* (I3 / Touchpoint)

*"In the strategy work we aim for a supplier scorecard thinking, which means transitioning to long-term supplier relationships and creating mutually beneficial innovations. In this respect, there has been good progress with Konecranes in the recent years."* (I13 / K1)

Thirdly, there is the value item of multi-level collaboration. This one is closely connected to the value item of communication fluency but is categorized as its own as certain new touchpoints between provider and customer companies were found to enhance co-innovating and implementation of circular practices.

*"We have recently had closer cooperation including regular meetings with the R&D department of Neste. We have considered how we want to carry out external promotion, as well as been developing a new customer data platform together."* (I20 / N3)

In addition to GRK, also Posti (N2) and Outokumpu (K1) highlighted multi-level collaboration as a positive value item. On the other hand, communication problems in one level of collaboration might result into reduced or even eliminated co-development of business:

*"What I have recently noticed is that we should deepen the cooperation in one way or another. There are contradictions, unclear things, and some finger-pointing in our business relationship. But things have also improved, and the mechanics are top guys who provide great service. But maybe in the upper levels there is some confrontation which shows to me as difficulties in communication and as different conflict situations."* (I16 / K3)

Last subcomponent of the service value is **reliability and transparency**. This subcomponent largely deals with the trust and awareness that the customer experiences in the business relationship. First value item addresses the reliability and safety of the circular service itself. Reliable service delivery happens on time and with agreed specifications. In the interviews no complaints on this issue were observed, but some customers complimented the timeliness and pedantry of service deliveries (I16).

As with products, safety is usually nowadays seen as an integral part of an industrial service solution (I6). It is expected by the customers and any lack of safety might have dramatic negative implications to the perceived value (I14).

Secondly, customers observe reliability generally in regard to the provider. This value can stem from the provider brand, size, and previous experiences:

*"Generally, Konecranes is seen as a safe choice and that is one of the biggest factors of our brand value. We are a big firm with a long history that manufacturers its own cranes. Whatever happens, Konecranes will take care of it and so it also goes."* (I9 / Konecranes)

This value item is emphasized when discussed in connection with provider's CSR efforts. The interview data hints that to be perceived as responsible, a provider first needs to be deemed reliable by a customer, although confirming this would require additional research. Openness of communication concerning also difficult issues was also seen to enhance provider reliability. All the case providers generally received good feedback on reliability in the customer interviews.

As the last value item, there is the issue of reporting and data availability. Through regular and well-executed reporting based on high quality data, a provider can give the customer an added feeling of security, peace of mind, as well as all necessary information to back up their decision-making. In the circularity context, this value item presents another strong connection point to the provider responsibility (ethical value component), because especially demonstrating environmental sustainability of business presents multiple big challenges for transparent and reliable reporting.

Data and reporting were discussed intensely in the interviews, leading to a good amount of evidence and perspectives on how they affect the perceived customer value. Positive effects stem for example from supply chain transparency, digital reporting tools, proactive communication, and data customization. A couple of examples below:

*"The visibility that we have to our supply chain all the way from raw material production to logistics is a big strength for us. The sustainability transparency and knowledge around this topic is valued highly."* (I1 / Neste)

*"One important criterion for supplier selection was that interaction with them is active, that we receive real-time information and that the reporting is of high quality. And I don't remember that there would've been any problems regarding these things."* (I10 / T2)

There is also an interesting internal aspect to data transparency for the customers. That's to say that circular business models have the potential to improve downstream data management and reporting:

*"From now on we see exactly what and how many clothes restaurants have in use, which gives us the data on total amount of workwear in circulation. This information we have been completely missing before."* (I10 / T2)

On the contrary, any missing information produces a negative effect on the perceived value. Reporting could be insufficient regarding many issues such as cost perspective (I16, see page 60), but it seems that the expectations are typically quite high especially when it comes to sustainability:

*"We have received carbon and water footprint of the Pure Waste T-shirt, but my impression is that we don't have such information of the other garments. It is not explicitly written down anywhere. I remember that in the sustainability report of Touchpoint they have very broad data on the sustainability of their own business and products in general, but they could produce more accurate reporting for customer use. Currently, the information is a little bit scattered."* (I10 / T2)

To conclude, the customer experience of the quality of reporting sometimes also depends on the customer proactiveness on the topic. This is demonstrated by these two different value perceptions of Neste customers:

*"We have had open discussions with them [Neste] for example about the different parts of their supply chain, raw materials, their availability and raw material planning processes to ensure the sustainability. We have received all the information we need."* (I18 / N2)

*"It would be really important [to have transparency to the fuel supply chain], but frankly, I have no clue about the supply chain, but I'm only strongly trusting their word on the sustainability of the fuel and that the raw materials are from waste streams. But on the other hand, I have not asked for more information or proofs on the topic. In any case, transparency is very important."* (I17 / N1)

### 5.2.5 Symbolic value component

***Table 13*** *Customer-perceived value in CE: symbolic value component*

| **Subcomponent** | *Value item* | Case example(s) | Types of perceived value | Additional explanations |
|---|---|---|---|---|
| **Brand positioning** | *Building innovative pioneer status* | Promoting sustainable workwear to demonstrate comprehensive sustainability of business (case Touchpoint) | Perceived positively | Not something that every customer seeks for, but perceived with high importance by the ones who do |
| | *Using existing provider brand awareness* | Neste's famous brand eases getting partners on board (case Neste) | Can be perceived either positively or negatively | Negative value perceived if provider image is compromised |
| | *Verifying execution of* | Using CBM collaboration in | Perceived positively | |

| | | | | |
|---|---|---|---|---|
| | *sustainability strategy* | marketing as evidence of taking CSR action (cases Neste & Touchpoint) | | |
| **CSR visibility and concreteness** | *Concrete and customized communication* | Presenting emission scenarios to customers in familiar units (cases Touchpoint & Konecranes) | Can be perceived either positively or negatively | Non-existent, inaccurate, or complicated data might lead to negative perceptions |
| | *Tangible outcomes of reverse logistics* | Creating physical products to be used in restaurants from recovered and recycled workwear waste (case Touchpoints) | Can be perceived either positively or negatively | Negative perceptions can occur if the end products are not of desired type or quality or their production is delayed too much |
| **Internal promotion** | *Fostering employer image* | Tool Service as a way to attract workforce (case Industrial Tools) | Perceived positively | Negative perceptions unlikely, but could be possible if provider image is compromised |
| | *Influencing attitudes* | Boosting internal sustainability innovation by presenting CBM collaboration as a reference for inspiration (case Neste) | Perceived positively | |

The symbolic value component encompasses the effects that the business relationship with the provider has on the customers' brand image and how they believe this relationship, and in this case the related circular practices, will affect their external and internal stakeholders' perceptions on them. Firstly, there is the subcomponent of **brand positioning**. This subcomponent refers to the ways in which the customer uses the offering or provider's brand to strengthen their desired branding especially towards their own customers.

First value item addresses the desire to be seen as an innovative industry pioneer, especially when it comes to sustainability. Many of the customers of the study were seeking

to establish or strengthen a sustainability pioneer image helped by the collaborations with the case providers. Aiming for added brand value and customer recognition through sustainability pioneer status stands out as a frequently mentioned and important value item from the data.

*"We have emphasized in our strategy work that we want to be a pioneer in infrastructure construction, and climate change is the biggest megatrend in construction guiding our actions. - - - We have made a joint publication [with Neste] for a large audience, with the aim of making clear that we have chosen to be pioneers [by using renewable diesel] even though no one is requiring that from us."* (I20 / N3)

*"If you wait until the last minute [to make a sustainability transformation], you won't get the brand value and business boost out of it."* (I10 / T2)

Here it is good to remember that in addition to added brand value, pioneer position is often searched to avoid costly late forced adaptation of business, as was reviewed earlier with the economic value component. Regarding this value item, it is also good to point out that achieving, and especially retaining an image of sustainability front-runner is not an easy task. To maintain the customers' attention, new stories have to be created frequently, for which circular business initiatives can provide good content:

*"Corporate social responsibility can not only cover one area. There is only so much that you can speak about responsible ingredients of food, and you need all the time something new to keep up the consumers' attention. You need to always find new areas to improve and talk more about."* (I10 / T2)

The evolving and advancing demands on sustainability branding force companies to find new and more complete ways of promoting their actions. This naturally also applies to circular business collaborations. Neste customer Posti is a good example of comprehensive marketing, having promoted the collaboration with Neste with for example a front-page newspaper ad, blog texts, webpage promotion, customer meeting discussions, and vehicle tapes.

Some of the customers also highlighted the effect of provider brand awareness in their own target market, and among other stakeholders. From here stems the second value item of the first subcomponent. Popularity of the provider brand might help in boosting sales and getting stakeholders on board, but on the other hand this quality might generate negative business outcomes in case the provider runs into widely recognized problems, or their sustainability image is compromised.

*"The well-known brand [of Neste] helps us to sell the collaboration to our [logistics] providers. This aspect is not as important as being a front-runner for us, but it does make taking the steps into the right direction easier."* (I17 / N1)

The second subcomponent of symbolic value is **CSR visibility and concreteness**. The theme of quantifying, clarifying, and translating environmental impacts of actions in understandable and useful terms is one that came up in connection to multiple value components, especially symbolic and ethical value. Regarding symbolic value, it is first and foremost the key to verifying the execution of the commitments of the sustainability strategy, which is the first value item in this subcomponent. By being able to promote the actions taken, as well as to quantify their impact by placing numbers on them, a company can convince stakeholders that they are living up to their commitments in the sustainability front. For some companies, sustainability is in the strategic core and for some it is something to consider as one affecting factor. Nevertheless, getting input for promotion is important, as the following data extracts show:

*"Kotipizza's brand, growth, and success nowadays are based on our sustainability ambitions. We have set the bar high for ourselves and committed to it publicly. It is extremely important to have this kind of initiatives to have that proof of the responsible actions for the consumer interface as well. Competition in this sense is also fierce, and this kind of collaborations are fuel to the marketing efforts."* (I10 / T2)

*"We have promoted for example energy efficiency projects in our sustainability report, which is definitely branding related to this topic [sustainability efforts]. There we highlight these bigger projects that we have know-how for."* (I14 / K2)

To demonstrate meeting specific goals and have more convincing arguments, numbers are needed as well. And this is where the providers' support becomes critical, as customers do not typically have the competences to calculate such data if it is not provided for them (e.g. I5, I20). Requirements to report emissions, for example, are getting stricter for each actor of the supply chain in many industries, and customers need support from their providers to complete their own downstream reporting, let alone demonstrating superiority in sustainability issues. For the latter, it is critical to present facts in an understandable and easily digestible way for one's own target audience, which brings us to the second value component, concrete and customized communication. Especially when it comes to consumer interface, many interviewed customers highlighted the importance of packaging and presenting the sustainability data in a concrete and impactful way.

*"Nowadays all CSR communication is moving towards the need to have concrete numbers on the table. It's very impactful and convincing to say for example that we saved*

*water equal to the volume of lake Saimaa. It is comparable to how we speak about reducing food waste, where we say for example that we saved 21 000 pizzas and if we would make a pile out of them, that would be the height of Ylläs mountain. That's how to demonstrate the concreteness towards the consumers."* (I10 / T2)

In industrial settings, companies with enough know-how to calculate the environmental impacts into accurate and usable data are still few and far apart (I6), which opens up a potential source of competitive advantage. Additionally, if a provider is able to customize data presentation so that the customers are able to directly use it effectively in the promotion to their customers, this could generate even more customer value. The challenge in data-based 'green branding' is however that it is often very hard especially for consumers to see which products or companies are the most sustainable due to the lack of regulation and standards in CSR reporting. Similar numbers might contain very different actions and truths on the practical level (I18).

The last value item in CSR visibility and concreteness concerns especially CBMs that utilize takeback systems of products or materials, such as in case Touchpoint. Here it was noticed that for customers, promotion-wise it would be very important to reach the end of the recovery process and to be able to show the stakeholders the concrete physical outcomes of participating in takeback-recycling in the form of new products or materials. This is not only a key marketing tool towards the consumer interface, but also raises the internal motivation to contribute to the reverse logistics.

*"Business-wise, we evaluate what kind of brand value this gives us. And that is essentially connected to what products we at the end get in our hands from the recovery process."* (I5 / T1)

To conclude the analysis of this subcomponent, all the discussed value items can be connected to the economic value component. Customers are often ready to pay more for sustainable solutions, and by making the sustainability visible by means of promotion, this additional potential income can be unlocked.

*"We are actively considering how could we even more effectively commercialize this use of Neste MY Diesel and make it visible. The logistics field is very cost-competitive and with our immense amounts of kilometres driven, even a small price difference does have its effect on the business. If that effect can't be cashed out as brand value, it is something we must consider in strategic decision-making."* (I18 / N2)

Finally, there is the subcomponent of **internal promotion**. This refers to such brand value which can be utilized internally to affect perceptions of the employer or perhaps to solidify internal collaboration. First value item, fostering employer image, refers to the

former of these. Promoting circularity-related business initiatives to own employees is a popular action among customers, being highlighted by various customer interviewees (I5, I10, I18). The added employer attractivity is naturally sought from demonstrating CSR actions, but also through the use of providers with good reputation or state-of-the-art solutions, which CBMs often represent. Industrial Tool's Tool Service was a case in point of a service for which a frequent buying motive is to increase employer attractivity, even if that is not due to sustainability considerations (I2).

Secondly, internal promotion might resolve dissenting opinions in the company, as well as create positive domino effects. These perspectives are addressed by the second value item, influencing attitudes. In convincing colleagues of the right course of action, concrete data, also monetary, is again a key factor (I5). On the other hand, promoting sustainability initiatives internally might generate more related ideas and innovation:

*"Of course, we also communicate these actions internally, and make it clear for the logistics organization that we do support such initiatives and ideas also if they arise internally. At the same time, we're trying to make sustainability considerations part of the daily work of our transport managers and their teams."* (I17 / N1)

### 5.2.6 Ethical value component

***Table 14*** *Customer-perceived value in CE: ethical value component*

| **Subcomponent** | *Value item* | Case example(s) | Types of perceived value | Additional explanations |
|---|---|---|---|---|
| **Environmental value** | *Size of positive impact* | Willingness to recycle workwear even if it leads to some monetary losses (case Touchpoint) | Usually perceived positively, sometimes negatively | Constantly growing importance. Negative value perceived if a customer identifies something that the provider could do better and smarter sustainability-wise |
| | *Comprehensiveness of positive impact* | In addition to much lower released CO2, improved air quality in closed-area deliveries seen valuable (case Neste) | Perceived positively | Negative value perceptions are rare because usually customers don't/can't aim to tackle all areas of CSR |

| | | | | |
|---|---|---|---|---|
| | | | | through a single provider |
| | *Transparency and measurability* | Broad and accurate data availability in CSR reporting (case Touchpoint) | Usually perceived positively, sometimes negatively | Sufficient transparency is often confirmed before the decision to buy if the customer places importance on environmental value |
| **Social value** | *Social value** | In clothing, the social aspects of the production have been discussed long before environmental issues (case Touchpoint) | Usually perceived positively, could also be perceived negatively | Negative perceptions not identified in cases, but they could occur if a customer identifies something that the provider could do better |
| **Ecosystem influence** | *Affecting stakeholders* | Directly promoting the CBM collaboration to other suppliers to spark sustainability initiatives (case Neste) | Perceived positively | |
| | *Changing industry standards* | Constructing and showcasing sustainability-based sourcing criteria so that it would sooner or later be taken into use (case Neste) | Perceived positively | |

This last component of customer-perceived value addresses the intrinsic value of acting responsibly and contributing to the society, besides the entailed business benefits reviewed in previous value components. Generally speaking, businesses are more and more concerned of the environmental and social impacts of their actions, not only because it is demanded in the marketplace but also out of sheer sense of responsibility. CSR targets and commitments are placed centrally in corporate strategies, and working with them contributes to the meaningfulness and enjoyability of work (e.g. I5, I18; Kravets 2021).

Different approaches could be taken with what kind of topics to include in this value component. While structuring how providers can contribute to this value, it is best to stick with a rather simplified categorization, which in this case means firstly a division to subcomponents of environmental and social value. In this data structure, the environmental value is further divided into certain value items, *that also apply to the social value subcomponent but that weren't included there due to insufficient data*. Thus, the social value subcomponent is simplified into one value item of the same name. In the CBM-focused discussion environmental impacts were covered more extensively, but social value is in any case important to present as its own category.

The aforementioned subjective motivation aspects like increased meaningfulness of work do affect the creation of ethical value (as shown by Figure 11 and the following discussion) but are difficult to attribute to a certain provider or business relationship, instead reflecting rather the complete state of CSR in the customer company. Thus, they are not singled out as their own subcomponent. On the contrary, the aspect of influencing one's business ecosystem was singled out as its own subcomponent because although it is tightly connected to environmental and social value, it was frequently mentioned by the interviewees as a concrete goal towards which CBM providers and initiatives can contribute. What could also be placed in this value component is legal compliance, especially when it comes to obeying laws. However, the value of addressing the legal environment was already mostly covered in economic (regarding environmental regulation) and product performance (safety regulation) value components. Moreover, helping a customer to obey the law cannot really be seen as an added customer value that provider can generate, because the customer would have to address this in any case. Therefore, it is better to stick with only the three subcomponents that are listed in Table 10.

First subcomponent, **environmental value**, is presented in a more detailed way as mentioned, dividing it into three value items. First of these, size of positive impact covers the fundamental question of how big intrinsic value does a customer see in being able to diminish the environmental burden of business or convert it into a positive impact by using the circular offering. It also deals with the importance that a customer places on the scope of the impact. The following data excerpts demonstrate how closely environmental responsibility as such is integrated to many of the customer companies' strategies and key objectives:

*"At Paulig we have very ambitious sustainability targets. That is, decreasing emissions of the value chain by 50% by 2030 and of own activities by 80%. Also logistics has now gotten its first own targets which is decreasing emissions by 25% by 2025. This is very*

*challenging as increase in sales increases deliveries in logistics. - - - This is a very strategic issue, sustainability is no more a separate issue but we have concrete goals and we are taking it into account in everything we do."* (I17 / N1)

*"Economic reasons do not always support the decisions and here for example [in the takeback of workwear] the burning of the clothes could be cheaper than this kind of recycling. In these occasions we need to have another type of reasons, and they can naturally be found from the sustainability programme and its goals. Sometimes when you want to make an impact you have to make some sacrifices in economic terms."* (I5 / T1)

*"It's great to be taking these [sustainability] actions forward in a company where there is a will to really act instead of only investigating. If you can show the opportunities, the company understands that not all benefits are measured in money. - - - In our field, the emissions are very tricky to push to zero or negative, but we wanted to find a maximally good solution and put it into practice immediately."* (I20 / N3)

*"Without there being a sustainability agenda behind these clothes, we couldn't buy them or speak anything about them. This is due to our sustainability commitments and the general image of textile industry nowadays."* (I11 / T2)

Evidence of the significance of maximizing the good impact is that some customers also presented wishes for a supplier to expand the circularity of their products and services, by for example asking for even more extensive use of recycled materials in workwear (I10). Growing role of sustainability as a value is demonstrated in its appearance in explicit decision-making criteria. This was identified in various customer companies of different types and sizes, especially regarding project portfolio management. Emissions or other dimensions of sustainability have become part of evaluation criteria in internal project selection processes of for example Outokumpu and Paulig (I13, I17).

However, there is naturally also variance and not all customers perceive or rate highly the environmental value that a provider can deliver. This variance and even negligence were especially observed in case Konecranes. They have some customers who pay a lot of attention to the environmental impacts of cranes but for a majority it is not a significant buying criterion (I7, I9). Interestingly, big differences in environmental valuation were also seen to occur between the values and visions of company management and the practical level. It was concluded that the potential environmental customer value is not operationalized into the sourcing processes because taking that value into account is not incentivized for the buyers (I9).

*"It is a challenging situation how some companies' visions and values on their webpages assure that they are doing their part for sustainability, but when we gather around the*

*table to sell a crane or a service, the only thing that matters is the price. The sourcing is not yet aligned with the promoted values, there's no connection. That is a real pity."* (I6 / Konecranes)

Hearing from a customer, the following quote describes an order of values that is probably still quite common among industrial customers:

*"Obviously, we don't want to risk our environmental permissions. But if there are things that do not directly affect that, we first consider costs, lead times, supply security, functional reliability, usability, … - - - Of course, environmental factors are important but honestly said, they only affect decision-making if there are no significant differences in these other factors between two options."* (I14 / K2)

This value item can also surface as a negative one if a customer is disappointed or doubtful about the environmental performance of the product or service. Interestingly, in the studied data a negative perception was only observed in relation to the reuse-based CBM in which ownership is retained by the provider. That seems to occur if the product in question is not used extensively enough during its lease:

*"One question that comes into mind sometimes is if this Tool Service is for all of the equipment the most ecological way to act. I would dare to suspect that part of the tools ends up in their grave before it would be necessary. So, I have questioned every once in a while whether it would be better to own some of those tools, and focus more on the critical ones in the Tool Service."* (I12 / IT1)

Another dimension of environmental value is its comprehensiveness, which is covered by the second value item. Even though main attention is usually directed towards CO2 emissions, there may be multiple environmental issues, problem areas and indicators which can be seen as valuable to tackle. These can include reductions in other types of emissions and protecting air and water quality, saving natural resources, minimizing waste production, especially that of hazardous waste, and the protection of biodiversity. If a provider is able to contribute to multiple facets of environmental conservation, that would often mean greater value perceived by the customer.

This issue was not extensively discussed in the interviews because typically these collaborations focus on improving one aspect of sustainability. One good case example of comprehensive benefits was presented by Paulig, who complimented the improved air quality in closed-area deliveries due to lessened nitrogen oxide emissions of the Neste MY Renewable Diesel (I17 / N1). Generally, the sustainability strategies of the customer companies include various distinct dimensions and targets (I5; Outokumpu 2021b;

Paulig 2021b; S-Ryhmä 2021d) which demonstrates the potential customer value of delivering versatile environmental benefits for CBM customers. Outokumpu manager explains well the importance of diverse actions for the environment (although not in the context of the sourcing of cranes):

*"Carbon footprint is a decision-making criterion, but we are not only looking at that. We are talking about nitrogen oxide emissions and dusting for example. All these different emissions are addressed, and flue gas management is a big focus area for us. Big investments have been made to achieve a leading position in the industry. Another example would be recycling of chemicals at the rolling mill."* (I13 / K1)

Lastly, the degree of transparency and amount of quantitative data that the provider can deliver on the environmental impacts is valued highly by the sustainability-focused customers as well. This topic was already partly addressed in connection to service value and symbolic value, so it will only be addressed here briefly. The availability of clear and reliable CSR data did play an important role in multiple customers' decision to buy the circular product or service (I10, I11, I18), and added data on these issues would also generally be deemed useful (I12, I16). Open discussions on the supply chain and its impacts are also highly appreciated (I10, I18). The value item of comprehensiveness is also interconnected with this value item:

*"I do feel that it would clearly have a value if we would get more data regarding this [saving natural resources]. It would also support the general discussion on biodiversity and sustainable use of natural resources, which are in our and global interests. To obtain an understanding about where we are, we need data. It is currently kind of a high-level flurry, and every input of data can contribute."* (I5 / T1)

As was earlier concluded, sometimes the customer's experience on the reporting issue is also partly dependent on their own ways of communicating with the provider. This was observed regarding Neste's transparency as a provider, as discussed in service value section on page 80.

Even though environmental responsibility is often defined inside corporate social responsibility, when looking at the impact, social and environmental aspects are distinct and thus can be seen to form separate value components (as in the triple bottom line, for example). Second subcomponent is thus **social value** which, as said, was not broken down to value items due to more limited data in the scope of this study. The value items of size, comprehensiveness and transparency of impact would nevertheless be equally applicable here. Social actions, such as equality promotion in workplace, community

support, and human rights protection in the value chain receive a lot of attention alongside sustainability topics in responsible companies. Companies often present the actions related to social responsibility in the same places as those of environmental responsibility, referring to CSR strategies and reporting (Konecranes 2020; Touchpoint 2020; Paulig 2021b). In some industries, customers have even used to pay more attention to the social issues:

*"Sustainability is emphasized more and more… earlier we were mostly asked where the clothes are manufactured, that there is no child labour used etc. And now these circularity topics have stood out much more."* (I3 / Touchpoint)

Last subcomponent, **ecosystem influence**, refers to the systemic perspective and customer companies wanting to multiply their positive impact by setting examples or perhaps putting pressures for their stakeholders to take action as well. Customers seem to consider this ecosystem dimension frequently when sourcing circular products or services. First value item, affecting stakeholders, covers the cases in which a circular collaboration is used to push certain business partners, typically other suppliers or own customers to transition into a more responsible path of business as well. Some examples from the data follow:

*"And another strong motive from the logistics perspective that I see is that I would like this to be an example for our other suppliers. When we write promotion posts about this collaboration, I wish that at least someone from our partners would call me and approach with a sustainability-related idea. So that this would encourage the whole logistics field and show that a change is possible."* (I17 / N1)

*"In addition to the traditional promotion, I'm using it [the collaboration with Neste] in everything. When having discussions with our suppliers or different stakeholders I bring it up as a practical example of what is needed and how to develop sustainability together."* (I18 / N2)

The second value item, changing industry standards refers to slightly different ways of influencing the ecosystem. These actions do not include such stakeholder-specific promotion efforts, but are about setting new perspectives, measuring impact and quantifying environmental value in business interactions, to be seen and followed by other players on the market.

*"And even if [emission data and sustainability criteria] can't right now be included in the strict public sector sourcing criteria, we want to get that stick into the minds and thereby be included in the future criteria. Our aim is to be able to affect the practices and tools of sourcing."* (I20 / N3)

*"In my opinion, it would be good [to get more data on environmental impacts], because Konecranes as a trend setter and market leader can give a benchmark for other suppliers as well."* (I13 / K1)

As a conclusion, some sustainability-oriented customer companies might well be very interested on the systemic perspective. They acknowledge that with their choices they are actively shaping their business ecosystem and they are curious about the implications.

*"Considering circular economy, Neste's role, and us as a big logistics provider who employs these tools, the implications on the systemic level are interesting. How is us using the renewable diesel taking the energy- or oil refining industry to the right direction, and on the other hand, how is it taking the logistics sector and its value chains to the right direction? On the big picture, it would be interesting to understand what positive and negative implications this has."* (I18 / N2)

To complement the understanding of the ethical value component, some brief points outside of the value subcomponents will be lastly discussed. Firstly, it's important to acknowledge how much the ethical value perceptions vary not only on company level, but also between organizational levels and individuals, and how drastically this could affect the decision-making criteria of a customer. It was already reviewed how big differences are sometimes observed between company values and practical actions, but sometimes ethical valuation might also depend on individual decision-makers, which is good for providers to identify to optimize selling strategies and manage risks.

*"One of our directors was driving this [Touchpoint-collaboration] very strongly when we started to work on it, and generally he is a person who lives and breathes sustainability."* (I10 / T2)

Also, the data clearly reveals the widely acknowledged rapid growth of sustainability values. Circular economy in general is about sustainable development, but there are still CBM configurations that do not yet pay much attention to their absolute environmental benefits. When providers consider their R&D focus areas, they should take into account the powerful surge of sustainability valuation in all key customer segments, of which the following extracts provide some proof.

*"Sustainability of raw materials is a theme that has grown quickly in recent years, earlier not much attention was paid and now it starts to be valuable."* (I5 / T1)

*"So far we have had sustainability included in subcontracting tendering processes only to quite a limited extent. But I believe that already this year the questions for subcontractors will be clearly stricter. But there is still way to go for sustainability to be maybe even the primary driver of procurement."* (I17 / N1)

*"I agree that especially through the Zero Carbon 2030 project sustainability has risen to a very central role with continuous practical action around it. It is also pouring to the business unit's own decision-making, which is also affected by our own customers. We firmly believe that sustainable consumption is a growing trend, which is shown in our customers demanding green supply chains. Thereby, our role as a green actor is highlighted and if we are not in that game, we are left without a future."* (I19 / N2)

This is the abductively built classification of customer-perceived value in the CE explained in a detailed level. It is far from the only way to structure the value components and includes a lot of interconnectedness between subcomponents and value items resulting to some potential ambiguity regarding certain data points. That is however inevitable as customer value is a multidimensional and dynamic concept, for which breakdowns are not easy to construct. The next subchapter reviews which CE-specific aspects this classification withholds that are distinct from those of the earlier modelling attempts of customer-perceived value in linear economy.

### 5.2.7 Customer value in linear and circular economy: similarities and differences

The aim of this subchapter is to search for the key differences, as well as important similarities, of customer-perceived value in linear and circular business settings. Through this, it strives to make the answers to the two sub-questions of RQ1 more explicit:

*RQ1a: How are already recognized sources of customer-perceived value realized in industrial scale circular business settings?*

*RQ1b: What is original to the customer-perceived value in industrial scale circular business settings?*

Naturally, a comparison between these two systems is not unambiguous to make, as value chains are rarely purely linear or circular, as offerings often involve both linear and circular elements, and as the earlier studies on customer value have not consciously focused on linear economy. However, comparing the value perceptions of today's customers for highly circular products or services to earlier identified value perceptions of customers for mainly linear offerings, it is possible to obtain extremely useful information

of how both the transition to circular economy and the larger sustainability transformation in society are affecting what business customers want from their providers.

All seven identified sources of customer value from earlier literature exist to various extents also in CE environment and are included in the value component classification as shown in Figure 11, but the CBM characteristics and the environmentally conscious corporate atmosphere of the 2020s do create lots of new focus areas for customer value perceptions, as well as change some old ones. In the following, the key changes are summarized for each value component.

**Economic value**

An important general observation is that **economic value becomes less important when customers engage in circular procurement for the sake of sustainability, and especially when striving for pioneer status** (I1, I5, I20). Therefore, if a company's product or service represents a unique circular innovation or carries significant environmental value and the target customers are from the said segment, not a lot of attention needs to be put on *indirect cost effects* or *financial stability* value subcomponents in marketing efforts. On the contrary, however, **some customers for whom the circular product or service is vital to run the business and/or a significant investment are hard to get to prioritize any environmental value over economic value** (I6, I9, I13, I14). In the cases of highly prioritized economic value, the provider may try to take advantage of the various ways in which circular solutions can lower the customer's indirect costs (through reduced material use, optimized performance, and other value items of *indirect cost effects*) to increase the attractiveness of the offering.

Ultimately, the role of economic value is less cemented in CBMs than in conventional linear business models. However, to evaluate the state or development of the economic value perceptions considering any circular offering, it is important to address the whole value chain. This refers to the subcomponent of *changing operating environment* and to the fact that if willingness to pay for sustainability increases in the downstream value chain, this quickly creates a monetary incentive for the companies to employ more circular sourcing strategies.

**Product performance value**

**Value related to a product's quality and performance does not seem to be perceived radically differently by customers in circular than other type of business relationships.** For example, the notions of technical value by Anderson & Narus (1998) or of functional/instrumental value of Smith & Colgate (2007) continue to be equally true and relevant in the circular context too. Quality, reliability, and usability are still crucially

important for customers. High and empirically demonstrated product performance may even become a key to tackle possible doubtful attitudes that an innovative circular solution might face in the customer companies or from the side of some stakeholders (I17).

Perhaps the most notable change brought on by circularity concerns the *ease or difficulty of use* subcomponent through the **added importance of infrastructural fit** value item. Sometimes a problem of circular innovations from the customer perspective is that they are costly or complicated to adapt to the existing systems, as their full extent use might require changes to the technical infrastructure, partner network, or regulation (!10, I11, I20). Therefore, the possibility of quick and efficient implementation is highlighted in customer value considerations (I18, I19, I20). Other minor change to value considerations brought upon by sustainable innovations regarding this value component could be for example the material-derived challenges in product customization (I3), but no more major changes can be found.

**Service value**

Service value is one of the components that were altered more strongly when constructing the classification of customer-perceived value for CE from the earlier identified sources of customer value. This is partly due to the more and more highlighted role of provider-customer interaction and service experience in circular value chains. **Maintaining a circular customer relationship does generally require more active support from the provider,** which then converts itself into a central piece of customer-perceived value (I3, I7, I12, I18). The interviewed manager of Industrial Tools described this aptly regarding the difference between traditional selling and selling product as a service:

*"It [customer interaction in selling tools as a service] is something that we have learned a lot about. When we launched the service I think that we didn't immediately realize that this can't be sold transactionally, contacting the customer only every couple of years. When we tried it like this it wasn't easy. The customers might have had problems, they hadn't understood the service, hadn't used the services, or seen the benefits. Now we have taken big steps in this respect and are constantly in touch with our customers. We make regular customer visits and give thorough user training. We have also automatized communication via digital marketing tools for various causes. All in all, it [the use of the service] transforms the customer relationship into a partnership really. We have to put in more effort, being close to customers, listening to them, and figuring out the changing customer needs."* (I2 / Industrial Tools)

Another aspect emphasized by circularity is the *expertise and co-development* subcomponent, and especially the business co-development value item. **Sustainability- or future-oriented customers who carry out circular sourcing to bring something new to their business require innovative, proactive, and customer-oriented providers** (I5, I10, I13, I20). Lastly, the sustainability aspect of circular business increases the importance of providers acting in a transparent way, laying emphasis on the *reliability and transparency* subcomponent. The general trend seems to be that in order **to verify the sustainability benefits to customers, providers should employ rigorous reporting methods and keep up a reliable image through proactive information-sharing** (I1, I10, I17, I18).

**Symbolic value**

The added characteristics that circularity brings to the symbolic value component are highly related to concretizing the sustainability effects of the business models. **Circular providers can help their customers to demonstrate and verify their CSR efforts by providing clear, numeric, and preferably customized data on the environmental impacts** (I5, I10, I20). As the director of Neste customer Posti highlighted, it can be critically important to be able to create cashable brand value out of sustainability efforts in the consumer interface (I18).

Moreover, **customers of circular companies often aim to leverage the sustainability brand of the provider to build their own** (I10, I20). Besides marketing towards their own customers, the studied customers perceived some benefits from such collaborations in building their partner networks (I17). These aspects of brand value are typical in the circular business environment, but altogether the symbolic value component has similar main contents in linear and circular value chains.

**Ethical value**

As reviewed in the subchapters 2.3 and 3.1, ethical value has not really been addressed so far in customer value literature, especially when it comes to B2B environment. **In the CE, however, ethical value and especially the *environmental value* subcomponent often become central to the customer-perceived value.** It is becoming a critical piece to consider both in research and in practice, as the values and aspirations of many big companies are changing fast:

*"In my opinion, the ecological aspects related to sustainability and circularity have started to be clearly seen as value-producing only in recent years, for example considering decision-making in sourcing."* (I5 / T1)

*"Environmental considerations such as carbon footprint are now in development here. I believe they will be more and more strongly integrated to the decision-making, and they are already visible in internal processes such as project management."* (I13 / K1)

In the circularity transformation actor networks and ecosystems play a key role, which seems to be also recognized by the customer companies as **influencing stakeholders and building new connections to maximize the environmental and social impacts was given significant importance by various interviewees**. Through this, the *ecosystem influence* subcomponent is a distinctive newly identified piece of customer-perceived value in CE. It also links closely with symbolic value as brand building is critical in network construction.

## 5.3 Comparisons of CBM categories and customer/provider perspectives

In this chapter, research questions 2 and 3 will be tackled by conducting two comparison analyses with the empirical data. As the study includes in-depth company cases from three distinct CBM categories (refer to subchapter 4.2), their mutual comparison enables distinguishing differences and similarities in customer-perceived value within the three categories, each of which have their own set of implications to customers' businesses (RQ2). Secondly, as both the customers and the providers were interviewed in detail and with a similar set of questions, by comparing these two datasets, potential areas of customer-perceived value not well recognized by the providers can be explored (RQ3), thus providing insights on how to improve the configuration and marketing of circular offerings.

### 5.3.1 Comparison of customer-perceived value between recycle- and reuse-based CBM categories

The cross-category analysis is presented in this subchapter first by discussing typical characteristics of customer-perceived value for each CBM category, including considerations on the case-specificity of findings. Recycle-based CBM category is reviewed first, after which the two reuse-based CBM categories are analyzed simultaneously while pointing out all notable differences in customer-perceived value formation between them. After this, a summarizing section gathers the main differences, as well as similarities of the three categories as identified from the data. This analysis gives circular providers specific tips on considering customer value according to their own CBMs.

**Customer-perceived value in recycling-based CBMs**

When it comes to economic value component, two things seem to be highlighted for the customer value of recycle-based CBMs. Firstly, the demand for recycled products from

the customers' value chains was perceived to be high, which was reflected in their high willingness to pay for such solutions (I10, I17, I18). This seems to be especially emphasized among customer companies that work in the consumer interface. The second frequently mentioned point acts as a balancing force to the first one: the customers of recycle CBMs noted that the acquisition and operation of recycled products is often more costly (I5, I17, I20). Balancing the economic interests of different players of the value chain was described for example as follows:

*"From our perspective, we have to convince [the logistics partners] that our intention is not to decrease the drivers' profits but that we understand that we have to pay our share. The on the other hand, we already have studies that show that consumers are ready to pay some premium for knowing that the product is responsibly and sustainably produced. That allows us to incorporate some of the added costs to the consumer price as well."* (I17 / N1)

Regarding product performance value component, both positive and negative changes to value perceptions can clearly be observed. Sometimes the recycled or renewable products might have even better performance attributes as their conventional counterparts (I1, I3, I17), but sometimes their performance in some respects also lags behind or is just doubted by the customer (I10). However, a repeatedly heard message was that a recycled or renewable product should not have a worse general quality to have chances of success in the market (I1, I5). Additionally, ease of use and especially infrastructural fit was seen as quite a critical value item by customers, affecting the decisions to start or extend the use of the product (I17, I18).

One could expect that the service value component is not as essential for recycle CBMs as reuse CBMs, which are inherently often more service- than product-intensive solutions, but the truth is not so straightforward. Aspects that make service value critical for recycle CBMs as well include the need for fluent communication and collaboration when taking a circular product into use (I5, I17, I20), the importance of provider integrity especially regarding environmental effects and their reporting (I1, I5, I11, I17, I18, I20), and the service dimension that takeback-systems bring into recycle CBMs. Regarding the last point, implementation of takeback logistics in value chain is one of the most challenging changes that adopting a CBM might imply for a customer firm. Takeback may also occur in some reuse settings, but in this study it was observed in case Touchpoint in the recycle category. Takeback-related challenges were identified as tricky ones by customer interviewees, but on the other hand these challenges were met by excitement and positive attitudes (I10, I11). Takeback can significantly augment the possibilities to

create service value, through for example collaborative development, redistribution of responsibilities, and improved data collection possibilities.

Symbolic value component was strongly perceived by the customers in the recycle category, which is connected to them generally seeking competitive advantage from sustainability, as discussed in the next paragraphs on ethical value. Establishing a pioneering image on the sustainability front was among key motives to engage in circular sourcing (I5, I10, I17, I20). Symbolic value links closely with the service value, as the data, materials, and knowledge obtained from the provider can be translated into marketing contents and added brand value. What was highlighted in these recycling collaborations, especially in the one employing a takeback-scene, was that tangibility (such as the resulting physical products) is deemed critical for capturing the symbolic value (I5, I17).

Generally, customers seemed to put a lot of emphasis on the ethical value in recycle category. As mentioned, for many of the customers being an environmental pioneer in their field was a strategic objective. This observation might be partly due to the limited sample of customer companies but would be of great interest to investigate in further studies. Anyway, this emphasis on ethical value is reflected also in other value components, for example as lowered cost-sensitivity (economic value) or heightened appreciation for transparent and comprehensive communication on environmental impacts (service and symbolic value). The interconnectedness of lowered emissions, added costs, and branding were contemplated for example by Neste customer Posti (see complete quote on page 84).

Regarding the other subcomponents of ethical value, that of social value was not highlighted in discussions due to the general interview focus on sustainability, but the customer companies were also paying attention to social justice in their sourcing. With workwear, social aspects had been in considerations already before environmental ones (I3). On the contrary, changing the ecosystem subcomponent was seen as a very valuable one by the customers in the recycling cases (I5, I17, I19, I20). The strategic value placed on sustainability makes the customer companies want to set examples to their partners and become leaders of systemic change.

**Customer-perceived value in reuse-based CBMs**

In the reuse CBM cases, economic value component was generally playing a central role. Noticeable is that it was also used as the key argument in marketing, mainly by highlighting various forms of cost savings enabled by the CBM (I2, I6, I7). On a subcomponent level, main attention was thus directed on indirect cost effects, but interestingly,

even though the economic value was underlined as critical by many reuse customers, not all customers fully perceived the cost savings (I14, I16, see page 60).

In addition, case Industrial Tools revealed that the cost savings may be questioned if the product to be sold as a service is rarely used and/or non-critical, as discussed on page 60. This is an issue specific to the ownership retained CBMs.

Subcomponent of financial stability was perceived by customers of case Konecranes to be realized through lowered production risk (I13, I14, I16), but in case Industrial Tools also through lower investment costs and stable cash flows (I2). This illustrates the potential of added economic value that the 'ownership retained' CBMs carry. Rather surprising is that the subcomponent of changing operating environment was almost non-existent in the data. That implies that there was little willingness to pay for sustainability in the case customers' value chains, and neither was there any considerable regulative pressure on the customers to apply circular or sustainable practices. Lastly, it must be pointed out that the observations on economic value might include some case-specificity, especially in case Konecranes that involved large and valuable machinery with high investment costs.

Considering the product performance value component, reliability and safety subcomponent was perceived as the most critical one by most of the reuse customers (I13, I14, I16). However, this finding probably also partly stems from case-specific characteristics, as functional reliability and operational safety are essential to big industrial machinery like cranes. General product quality was also recognized important by all of the customers. Ease or difficulty of use was hardly discussed in case Konecranes, but the data of case Industrial Tools suggests that the product as a service (ownership retained) CBM is seen to add ease to the use of the products instead of complicating things (I12).

Other significant differences in perceptions on product performance value between ownership transferred/retained CBMs were hard to find. For both, keeping the performance high and defect rates low is a key objective, but it can be achieved with both CBM categories, with the characteristics of the product and the customer relationship defining which is the optimal CBM configuration.

Service value was generally highlighted in the reuse cases. Service quality was, as can be imagined, important for all the customer companies. In both cases, positive comments were much more prevalent, but this could naturally change if cases with lower quality offering were selected for analysis. Both ownership transferred and retained CBMs showed a lot of potential in creating positive value perceptions related to ease of use and

communication subcomponent (stemming for example from human resourcing, time allocation expertise, workforce skills, digital tools), but on the other hand communication issues which destroyed perceived value were reported too in this subcomponent (I16). Generally, if the product to be serviced is (production) critical and constantly used, the communication and service quality gain more importance in customer value perceptions.

Value items related to expertise and co-development subcomponent were highly valued by some reuse customer companies (I13), whereas for others they did not appear much in the discussions (I12, I14, I15). Negative value perceptions were not observed to occur in this subcomponent, unlike in the other ones. Reliability and transparency subcomponent was seen as rather important, but any specific issues did not arise from the data. Although similarly to recycle cases, the expectations for reporting quality were high and the availability of technical/financial/environmental data was easily criticized when asked about (I12, I16).

Similarly to the product performance value component, significant differences were not observed between ownership transferred/retained CBMs here either. The nature of the service relationship usually differs to some extent between these two, ownership retained CBM forcing the formation of a tight service relationship with continuous communication (I2), but on the other hand a well-executed ownership transferred CBM entails a similar dynamic too. Selling product as a service enables the provider to assume many tasks from the customer and thus reduce their workload and complexity of use (I2), but such services can also be integrated in the more conventional ownership transferred CBMs (I7). Further, more focused research would be needed to explore the differences in perceived service value of these two in detail.

Symbolic value was, interestingly, only weakly perceived by the reuse CBM customers. This stems from the fact that the customers of the reuse cases were missing the ambition for sustainability pioneer status which was common among recycle customers. It is difficult to say if that is due to the case selection or if it is a recurring pattern. Single cases emerged in which a customer wanted explicitly to generate symbolic value, but they were few and far apart in comparison to the recycle customers. This applied more or less similarly to all the three subcomponents in the symbolic value component.

Regarding the ‘ownership retained’ CBM category, the data gives rather limited answers on the perceptions on symbolic value. Partly due to that any prominent differences between the two reuse CBM categories were not identified for this value component. However, it can be speculated that advanced product-as-a-service sourcing could open possibilities to harness added brand value, and not only in respect to sustainability. What

was observed is that the ownership retained CBMs might have more potential of creating value in the internal promotion subcomponent (which did not come up in the ownership transferred cases), as their use typically has more immediate (positive) effects on the employees and their daily work.

The ethical value was also less explicitly perceived in this category compared to the recycle CBM cases. For the industrial customers of the reuse categories, the valuation of especially the environmental value item was found to be visible on high-level strategic visions and speeches, but rarely perceived to a considerable extent in the operative sourcing level of the customer companies (I6, I9, I13, I14). Quote from one of Konecranes customers from page 89 is reused below, as it illustrates one typical order of priorities in decision-making:

*"Obviously, we don't want to risk our environmental permissions. But if there are things that do not directly affect that, we first consider costs, lead times, supply security, functional reliability, usability, … - - - Of course, environmental factors are important but honestly said, they only affect decision-making if there are no significant differences in these other factors between two options."* (I14 / K2)

The interesting difference between ownership transferred/retained CBM categories here is that the latter seems to have the potential to create also negative perceptions on environmental value as discussed earlier on page 89. This happens in case the product being sold as a service is not used often enough and the afterlife treatment is not deemed sustainable enough. This risk of negative perceptions was not observed related to the ownership transferred category.

For the social value subcomponent, the data does not give that much material to form conclusions, but what can be confirmed is that the customers generally check that they don't participate in socially questionable value chains and that they comply with all regulation (I13, various secondary sources). Therefore, possible problems related to social responsibility in CBMs will likely generate destruction of customer value, whereas merit in this respect has the potential to provide added value. Ecosystem influence subcomponent of ethical value did not come up as a perceived value in the reuse CBM categories, as the customer companies were more focused on other kinds of market leadership, such as technological. As a final note, it must be pointed out that the way customers perceive ethical value seems to be changing rather quickly in some of the researched industries (as companies turn to sustainability for competitive advantage), and therefore the environmental value especially is likely to be regarded higher among reuse customers as well already in a matter of some years.

**Brief summary**

The key points in answering both RQ2a and RQ2b in turn are listed here, displaying the key differences of the formation of customer-perceived value between the three CBM categories. To be noted is that these are only the most prominent, big-picture findings, with some finer remarks of the characteristics of each CBM category being already pointed out in the preceding discussion.

Regarding RQ2a; the possible differences between recycle- and reuse-based CBMs, the data suggests the following for each of the value components:

- *Economic value:* Generally, more central in decision-making for the reuse category, although important also in recycle category. Reuse customers perceive much added value from increased financial stability, whereas for recycle customers the economic value is often realized through stakeholder impact such as their customers' willingness to pay for sustainability or regulatory development.
- *Product performance value:* Approximately equally important for both recycle and reuse customers. For example, value of added sustainability was seen incapable of substituting value provided by product quality or reliability throughout the cases.
- *Service value:* Generally, slightly more central in decision-making for the reuse category. However, that does not mean that recycle customers would not put significant value on it, only that the successes or failures of the provider in delivering service value are observed with higher importance among reuse customers. As an exception, the recycle customers deemed more essential certain value items such as business co-development and reporting and data availability under the service value.
- *Symbolic value:* Generally, more central in decision-making for the recycle category. Symbolic value was somewhat ignored among the reuse customers, whereas the recycle customers leveraged it especially in sustainability promotion on many occasions.
- *Ethical value:* Generally, more central in decision-making for the recycle category. Seemingly, it is more common for customers to source circularly to foster a sustainability pioneer position in recycle CBMs than reuse CBMs, which has knock-on effects on value perceptions of various other value elements as discussed earlier. For the studied reuse customers, sustainability was more of a nice plus than an actual decision-making criterion. The data gives however no reason

to assume that recycle and reuse customers would have differences in perceiving social value.

For RQ2b, which addresses the possible differences between the 'ownership transferred/retained' reuse CBM categories, the following key findings emerge from the data:

- *Economic value:* Ownership retained CBMs have a higher perceived value in financial stability subcomponent, through the freed capital and cash flow predictability. Secondly, ownership retained CBMs may face negative value perceptions on indirect cost effects if the lifecycle costs are not effectively communicated.
- *Product performance value:* Significant differences not identified. Ownership retained CBMs may entail some more potential to produce positive value perceptions regarding ease of use.
- *Service value:* Significant differences not identified.
- *Symbolic value:* Significant differences not identified. Ownership retained CBMs could in some cases have more potential to create positive value in the internal promotion subcomponent.
- *Ethical value:* Ownership transferred CBMs can create also negative perceptions on environmental value in case the product is not suitable to be sold as a service and the post-use treatment is not optimal.

### 5.3.2 Providers' ability to recognize customer-perceived value

In this subchapter, RQ3 is answered by conducting a comparison analysis between the datasets obtained from the customer and the provider organizations. In the following, the providers' views and potential pitfalls in interpreting customer-perceived value are analyzed value component by value component, pointing out in each case if the findings were general or observed in relation to a specific CBM category.

**Economic value**

To begin with, the providers do generally recognize the importance of indirect cost effects to the customers. What is however problematic is that in some cases they seem to overestimate their ability to communicate the finer aspects of the cost effects of the circular solutions, especially regarding the lifecycle costs perspective. Basic issues, such as the fact that modernizing a crane is cheaper than buying a new one, are naturally understood (e.g. I13), but more sophisticated effects such as effects provoked by optimized service scheduling or changing spare parts are often not perceived as the customers are not well enough informed on the effects (I14, I16).

*"It would help and ease the decision-making and financing if we would have better monetary data on the effects [of modernization projects] on short- and long-term. Often the argumentation is focused on technical functionality, and the benefits should be highlighted more from a total cost of ownership -perspective."* (I14 / K2)

Also, sometimes providers might misestimate what is valuable for a customer. As an example, talking about medium-long payback times might not be relevant for a customer with a very tight investment budget (I14). These findings considering the indirect cost effects and partly the financial stability subcomponents stem especially from the data of the reuse-based CBM categories. In particular, for the 'ownership retained' CBM category there is a risk of negative cost effect value perceptions that is perhaps not always well recognized by the providers. This risk is realized if the provider is not fully informed of the customer's use of the leased products and the customer deems that they are taken out of use too early (I12). The negative perception might be even bigger if the product in question is non-critical to the customer, because in that case there is less risk management -related motivation for paying more.

Another topic that the providers should be paying careful attention to is related to the changing operating environment value component. The customer data calls for a value chain vision from the providers. They should actively contemplate which players can be found from the customer's ecosystem and especially downstream value chain to understand who could potentially pay the possible extra costs of added sustainability of the offering. They should also consider that the proximity of consumer interface might well affect (increase) the customer company's willingness to pay for sustainability. These perspectives were frequently discussed by the customers (I10, I17, I20) but less discussed by the providers (I3). They were especially discussed with those customers for whom the sustainability was among the principal reasons to buy, thus this problem was observed mainly in the recycle CBM category.

Finally, the providers generally mentioned aspects of economic value more frequently than the customers. Therefore, it is possible, although difficult to confirm, that the economic value might be overemphasized by the providers in comparison to the rest of the value components.

**Product performance value**

For this second value component, as well as for the following service value, only minor remarks regarding providers' troubles to understand customer value perceptions were noted. Both the providers and customers identified this value component as an essential one, especially when it comes to key performance characteristics and reliability. As was

discussed on page 67 with an illustrative quote from Touchpoint customer SOK, the value provided by product quality is hard to replace with other types of added value, especially after a certain level of quality has been established.

Related to the quality subcomponent, the only observation made for RQ3 was that the 'product performance enabled by services' value item received more focus from the provider than from the customers in case Konecranes. In other words, the performance upgrades of the cranes that resulted from modernizations and maintenance operations were not seen as very important by the customers even though they were a focus area in the marketing side (Konecranes 2021e). Instead, the Konecranes customers valued the functional reliability more than any other individual value item (I14, I16), which may not totally be seen by the provider. Work safety improvements were also more sought after than performance upgrades (I15). These findings may however be to some extent case specific or apply only to similar expensive, production-critical products.

Another value item whose importance for the customers may in some cases be undermined by the provider is that of infrastructural fit. Especially in case Neste the suitability of the fuel for conventional diesel engines was a critical factor for decision-making among customers. That criticality can stem both from cost perspective (I17) as well as from the quickness of implementing that it allows (I18). Uncertainties about the fit (technical/regulative/etc.) can quickly hamper the acceptance of the product in the customer company or even turn around the buying decision.

**Service value**

Regarding the subcomponent of quality, any cross-case patterns on value perception misfits did not really emerge. Individual services' importance is naturally very case- and customer-specific. One remark was that when executing optimization services in reuse CBMs (e.g. optimizing maintenance based on remotely collected machine data), the data has to be of top quality for the customer to see value in the service (I14, I15).

Moving on to the 'ease or difficulty of use and communication' subcomponent, a general observation was that in an industrial circular service business where the customers come from different industries, there might be quite significant differences in what communication and customer service style the customers need, for example depending on the business structure (cooperative customer T1 vs franchising customer T2) or nature of business (process industry customers K1 & K2 vs project industry customer K3). Providers should design their service implementation and customer support taking into account

such characteristics. It was identified from the data that there is sometimes lack of understanding the need to customize service and communication strategy. A circular service has to be made easy and collaboration fluent for all parties involved.

For the last two subcomponents, 'expertise and co-development' and 'reliability and transparency', no significant differences in the understanding of customer-perceived value between the business parties were found. Reasons to value for example co-development or transparency vary between CBMs and customer relationships, but the providers and customers were generally well aligned in their opinions regarding these issues. An aspect not mentioned by the providers but referred to a couple of times by the sustainability-oriented customers is that building circular network and understanding the systemic perspective through the help of the provider is seen as a valuable thing (I10, I18).

**Symbolic value**

Regarding this value component, the customer's interest in environmental value seems to increase the perceived importance of symbolic value significantly. Therefore, it would be important for providers to identify the customers who genuinely aim for sustainability pioneer status and for whom sustainability is a major reason to engage in the CBM. For them, the sustainability-related symbolic value can play a key role. As stated by Neste customer Posti (quote on page 84), being able to 'cash out' the added costs as brand value is essential (I18). There are typically multiple players in the value chains that the provider should be aware of to best support the customer in capturing full brand value. For example, Touchpoint customer Kotipizza needs to be able to communicate their sustainable choices all the way down from the franchising-entrepreneurs to their employees to the consumers, which can be to some extent facilitated by the provider.

To unleash the symbolic value, the providers should once again keep in mind the importance of offering versatile and customized sustainability-related data and marketing materials. The scope of this issue might escape the providers' understanding in some cases, but high-quality data addresses value from all of the three subcomponents of symbolic value, including the internal promotion one. Various customer interviewees told that being able to concretize the impact to their own workforce is an important goal and adds to the meaningfulness of work (I11, I18, I20):

*"Now that our franchising-entrepreneurs have stored all these clothes in whatever places, it would be great to get to tell that 'Hey now we have collected this amount and this and this much we could save in different resources'. This kind of small things are very important for us too, also for internal communication and not only external." (I11 / T2)*

Symbolic value perceptions might include things that are difficult for providers to identify, such as inspiring new development ideas in the customer companies through internal promotion (I17) or getting rid of old, brand-hampering products through takeback logistics (I10). One essential remark for providers to note is that symbolic value related to sustainability is impermanent by nature. There always needs to be something new to tell and advertise and even if something is done CSR-wise in an excellent fashion, significant symbolic value can only be generated out of it for a limited time (I10). In general, the customers (mostly in recycle CBMs) mentioned symbolic value more frequently than the providers, which hints that the recycle CBM providers would maybe need to consider this area of value more carefully to become fully aligned with the customer value perceptions.

**Ethical value**

When it comes to environmental value, it is important for a provider to recognize the state of development of sustainability valuation in each customer company. The data suggests that sustainability values are often first introduced into the high-level vision of the company, from where they proceed into internal core operations, and only after that to the value chain thinking and sourcing department. Although this observation might be partly case-specific, this implies that the provider might not easily be able to determine whether the customer places value on the sustainability of the CBM solution in their sourcing process, especially with big industrial customers. This pattern was identified especially in case Konecranes (reuse with transferred ownership).

The ability to be able to produce and deliver useful data related to ethical value must be emphasized again here. The recycle category customers brought the need for versatile and detailed data up a lot (I5, I10, I18, I20, see page 90) but it also matters for the case customers in reuse-category, as they are big industrial players whose decision-making is highly numeric. Therefore, quantitative data, which can preferably be monetized like that of energy savings (I14), could increase the importance of ethical value in decision-making. Multiple reuse customers too expressed their interest to receive more data on the environmental impacts of the solutions (I12, I13).

On a more specific note, for the reuse – ownership retained CBMs similar pitfall exists here than for the economic value: A product that is discarded in a fully functioning condition due to the end of a contract period *and* does not receive sustainable enough end-of-life treatment can cause negative environmental value perceptions (I12). This calls for extra attention and case-specific evaluation from providers offering products as services.

These were the primary remarks regarding ethical value, but lastly it is good to note that the ecosystem influence subcomponent is also relevant for this third research question

in the sense that it can introduce some collaboration opportunities that are easily hidden for the provider. If the customer actively seeks to work with different partners, institutions, or regulators on sustainability front, noticing and contributing to that can create mutually beneficial ways to deepen the business relationship and increase perceived customer value (this type of ecosystem efforts was identified in case Neste and case Touchpoint).

## 5.4 Synthesis of the results

This section summarizes and unites the key results of the three research questions of the study. This is done with a visual matrix that combines insights of all three research questions into a single layout shown below (Figure 12).

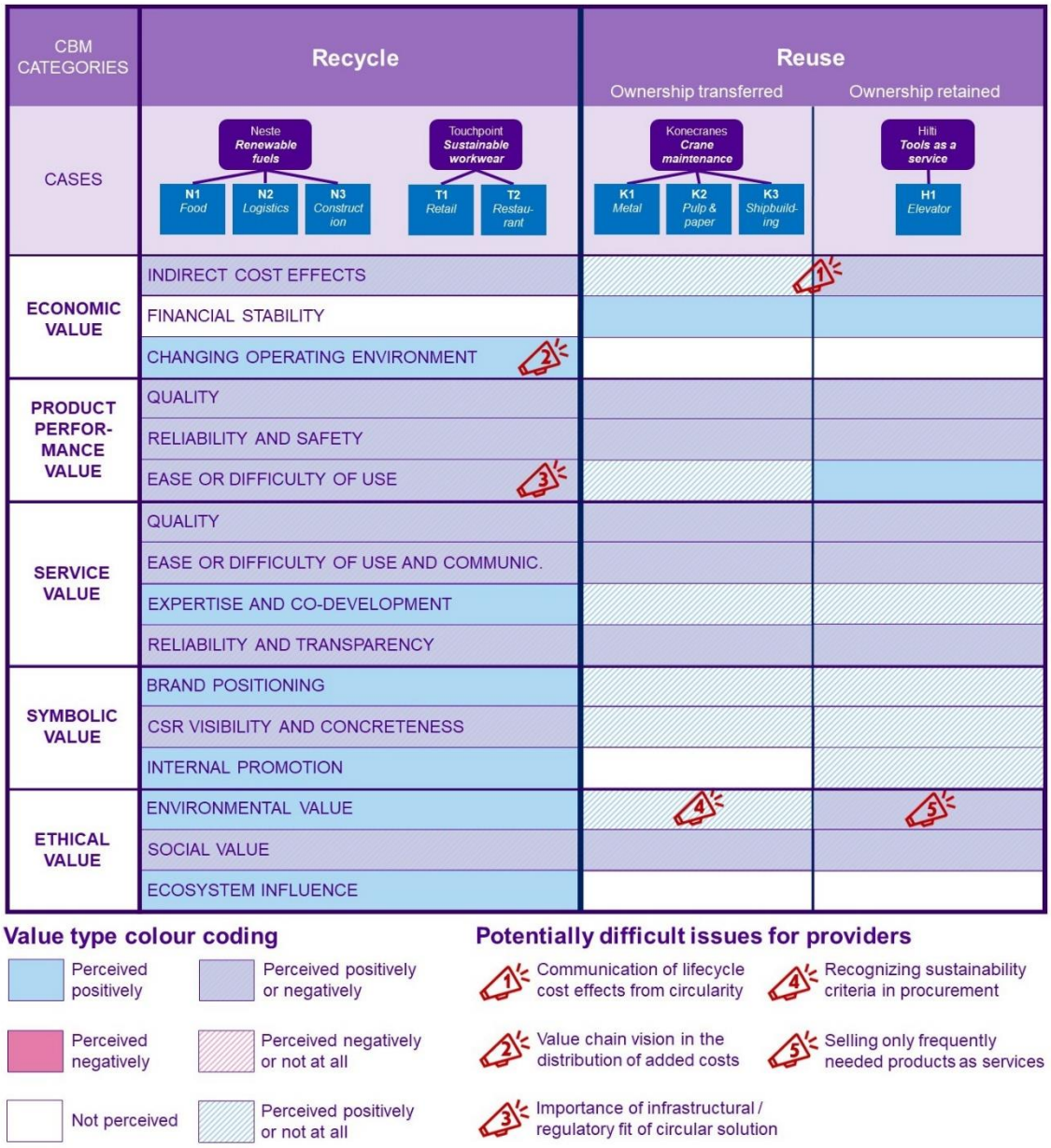


***Figure 12*** *Visual summary of results*

Below, it is briefly explained how the results for each of the research questions are presented in this summarizing graphic.

*RQ1: What constitutes customer-perceived value in circular business?*

The five main components of the customer-perceived value in the CE, economic, product performance, service, symbolic, and ethical value component, are listed on the left and broken down to the subcomponent level in the next column to the right. By colour coding, the figure shows that each subcomponent may withhold both positive and negative value perceptions, according to the discussion in subchapter 5.2. More detailed table of the customer-perceived value components, going to the level of value items, is presented as Appendix D. This subcomponent level is however easier to apply for any other CBM case, as some of the value items identified in this study might be rather case-specific.

*RQ2: What differences in customer-perceived value can be found between different circular business models?*

The three CBM categories studied are displayed as the columns, with recycle CBM category on the left and the two reuse CBM categories separately on the right. The empirical case setting is shown on the second row for each CBM category. By looking at the changes in colour coding on the rows of each value subcomponent, the general differences in customer value perceptions between the different CBM categories can be observed. In addition to most of economic value being highlighted for reuse CBMs, symbolic and ethical value for recycle CBMs, and product performance as well as service value being rather balanced between the two, the visualization reveals finer differences in the subcomponent level between the three CBM categories related to especially the types of value perceived (positive/negative). For detailed discussion, consult subchapter 5.3.1.

*RQ3: How well do providers recognize how their customers perceive value from the CE offering in each CBM category?*

The most prominent issues of provider understanding of customers' value perceptions are highlighted in the figure. To be noted firstly is that in many areas the provider understanding was deemed to be at a good level. This applies especially to product performance and service value components; providers seem to notice well the critical points of offering features and aspects of customer support. However, multiple improvement points were also found as explained in subchapter 5.3.2 and compactly below.

Five red symbols mark the main issues identified from comparing the provider and customer datasets. First of them points out that the communication of all cost effects of a

circular reuse offering from a total cost of ownership -perspective is challenging and providers may either fall for incomplete informing or be overly optimistic about the customer's ability to understand the cost effects. Second remark reminds providers how important it can be to gain visibility into the customer's downstream value chain in order to be able to see who is ready to pay for what, and which kind of drivers and barriers emerge for the customer to buy the circular solution. Thirdly, the importance of the circular solution's fit into the existing business infrastructure and regulatory environment should not be undermined. Solutions whose implementation requires the customer to invest big into related equipment or lobby its stakeholders can be a lot harder to sell. Fourth point calls for attention into identifying to what extent sustainability valuation affects the customer's procurement and what is the speed of change, especially for big industrial companies. Finally, the last remark is for product-as-a-service providers, to remind that each customer's product usage profile should be individually investigated, as well as the post-treatment designed to preserve resources so that the customers can be convinced about the environmental benefits.

# 6. CONCLUSIONS

This final chapter summarizes the study's theoretical and practical contributions, as well as lays out its limitations and explores needs for future research. Subchapter 6.1 focuses on stating the key findings and observing them in relation to the existing theoretical knowledge. The aim is to clarify how the existing academic knowledge is complemented by this study and see how the results align with or challenge those of earlier research. Subchapter 6.2 focuses on the relevance of the findings to practitioners, 6.3 lists the main limitations of the study and assesses its quality, and 6.4 presents opportunities for related future research.

## 6.1 Discussion of key findings and theoretical contributions

This study tackles a significant research gap in the interface of circular economy and customer value research fields, adopting a strong customer perspective. It abductively develops the first, comprehensive classification of customer-perceived value components for a circular industrial context. In comparison to the first exploration of Aarikka-Stenroos et al. (2021) on the topic, this study takes the leap to construct a new classification of customer-perceived value in the CE that is built on earlier understanding of customer value but incorporates the various new characteristics of circular business. Moreover, the study focuses strictly on industrial B2B markets and the structured multiple-case study design allows for not only obtaining a systematic view on B2B customer-perceived value in CE but also for understanding the differences in customer-perceived value between major CBM categories.

The study answers Aarikka-Stenroos' et al. (2021) call for more comprehensive CE research from the customer perspective as well as Rintamäki's et al. (2008) wish for comparisons between providers' and customers' value perceptions. Besides the new customer value classification, the dyadic approach to data collection and analysis as well as the focus on industrial B2B circular business environment are original contributions of the study for the CE research.

### 6.1.1 RQ1: Customer-perceived value in the circular economy

The most fundamental research question of the study, RQ1, called for mapping of the customer-perceived value in industrial scale circular business. As a result, five value components, which can be further divided into 16 value subcomponents and various value items emerged. This classification is abductively constructed meaning that it is

derived combining insights from earlier research with those from empirical data (Figure 11). Certain components resemble closely those of some earlier classifications of CE (for example: economic value – Anderson & Narus (1998), Holbrook (2006), Rintamäki et al. (2007); service value – Anderson & Narus (1998), Plewa et al. (2015); symbolic value – Smith & Colgate (2007), Rintamäki et al. (2007); ethical value – Holbrook 2006), but as a whole this classification is distinct to any of the previous ones, as it is tailored for the circular business models. What adds to the originality of this classification in comparison to the earlier ones is its depth, as it can be broken down to subcomponent and even into value item levels.

Compact considerations of the relationship of individual components to the earlier literature follow. The economic value component has been repeatedly referred to in previous customer value studies (e.g. Anderson & Narus 1998; Rintamäki et al. 2007), also in the few conducted for circular economy (Aarikka-Stenroos et al. 2021; van Boerdonk et al. 2021). Whereas the 'indirect cost effects' and 'financial stability' subcomponents contain typically analyzed aspects of the CE, the 'changing operational environment' subcomponent brings a new viewpoint to the analysis of economic value by being future-oriented and employing a wider value-chain perspective. The customers' focus on future economic effects of engaging in circular business (often due to changes in stakeholders' attitudes or actions) is an original highly interesting finding of the study, not discussed by previous literature.

The product performance value component marks a relatively new type of value characterization. It is logical to discuss it together with the service value component. In the CE context, separating the two was deemed necessary as the data revealed differences in how product- and service-related performance perceptions are created, and how the latter is tightly connected to the interaction between the provider and the customer, which is in many ways highlighted in circular value chains. The formulation of these two components differs from those of earlier research, although for example Rintamäki's et al. (2007) functional value is close to product performance value, Anderson & Narus (1998) single out service value as one of their four value elements and Plewa et al. (2015) list value dimensions similar to the subcomponents of the service value component of this study.

On the subcomponent level, product performance value includes mainly traditional issues of quality and reliability, already widely recognized by previous customer value literature. The most original aspect identified is that of infrastructural fit. In the rapidly and dramatically changing technological and regulative environment of the CE transformation, customers lay a big emphasis on the easiness to adapt the circular offering into

the existing business infrastructure. Regarding the service value, the subcomponents obtained from the cases highlight the importance of dynamic interaction between the provider and the customer. Earlier research also suggests that these considerations could gain more weight in the CE, as providers are employing new roles and developing more relationships with their customers and other stakeholders in the CE (Ranta et al. 2018; González-Sánchez et al. 2020). In addition, the reliability and transparency aspects take a slightly bigger role than in earlier research due to their central role in applying environmental sustainability to business.

Symbolic value has been widely recognized in the earlier customer value literature (e.g. Holbrook 1999, 2006; Smith & Colgate 2007; Rintamäki et al. 2007) and applied to CE by Aarikka-Stenroos et al. (2021). Its impact on green consumption choices in the B2C interface has also been investigated several times (Beall et al. 2021; de Morais et al. 2021). The classification of this study formulates the symbolic value subcomponents and value items so that they highlight the sustainability-related focus shift. Especially the subcomponent 'CSR visibility and concreteness' links explicitly to these actions.

The ethical value component has not been widely used in customer value modelling in the linear context (only singled out by Holbrook 1999, 2006). However, as companies engage in the circularity transformation motivated by their sustainability goals and commitments, especially the environmental, as well as social responsibility become key drivers of sourcing in the industrial B2B markets. As companies' ambitions grow, they start to engage in circular business also to be part of and direct an ecosystem change, having a positive impact that reaches outside their immediate business. This phenomenon is included in the classification as the 'ecosystem influence' subcomponent and can be considered a modern aspect of customer-perceived value, something that the earlier literature does not seem to have properly recognized.

Companies are also expecting the importance of the ethical value component to grow and broaden rapidly in the coming years, which is why it should be a key piece of all future customer value classifications, even more so in the CE context. The ethical value seems essential to retain also for possible refined classifications for B2C settings, as consumer awareness and concern about environmental problems is growing. According to de Morais et al. (2021) pure altruism is the main driver of green consumption.

Regarding the whole classification of customer-perceived value in the CE (Figure 11), it is applicable as such or as a template to research various industrial scale circular business settings thanks to the highly cross-industrial and cross-CBM approach used to construct it. Maximized usability is also the reason why the value item level (displayed in

subchapters 5.2.2 - 5.2.6 and in Appendix D) has been left out of the illustration, as the value items include more case-specificity and are best applied to cases with similar characteristics regarding the offering, the industry, and the value chain. They can however be used for guidance with a critical view in all types of CBM cases.

### 6.1.2 RQ2: Comparison of customer-perceived value across CBM categories

The research questions RQ2 and RQ3 are more specific and target even more pristine research gaps. Starting with RQ2, the most significant big-picture finding on this RQ of the study is that economic value component is highlighted for the customers of reuse-based CBMs, whereas symbolic and ethical components are highlighted in the recycle-based CBMs. This finding stems from the observation that very sustainability-driven customers are more typical for recycle- than reuse-based CBMs. This claim has not been investigated by extant research, but the results are supportive to Gusmerotti's et al. (2019) conclusion that 'linear companies' are more motivated by economic factors, even though customers were not strictly profiled as linear or circular ones in this study. Further studies with bigger samples taking into account more customer variables would be needed to strengthen the argument.

In addition, multiple more specific but highly interesting findings stood out. Inside the economic value component, reuse customers perceived added value especially from financial stability, whereas the recycle customers employed a strategic, future-oriented value chain perspective when considering the monetary implications. Regarding the symbolic and ethical value that were of less importance for the reuse customers, symbolic value seems to be often close to ignored among them whereas ethical value does affect decision-making, just not (yet) with the same weight as economic, product performance and service value. Regarding similarities between the recycle and reuse CBMs, most significant finding is that product performance value retains its important in all cases and cannot generally be compensated for with for example added ethical value. All of the aforementioned issues are original contributions, as the differences of customer-perceived value between different types of CBMs have not been addressed at all in prior research.

Customer-perceived values of reuse-based CBMs with transferred and retained ownership model were also compared for the first time, resulting in a few interesting findings. First one is that the potential to produce financial stability value is higher when ownership is retained. Secondly, in ownership retained CBMs there is a risk of negative cost savings value perceptions if the communication fails or the products are retracted too soon.

Thirdly, if this is complemented with non-ideal end-of-life treatment, negative perceptions on environmental value might result too (although positive perceptions should result if these problems do not exist). Some of the economic benefits have been recognized in earlier research (Moro et al. 2020), but the potential problems of cost-related and environmental value perceptions have not been addressed or identified before. Lastly, the data hinted of added potential to the ease-of-use value in ownership retained CBMs, aligned with the findings of Akbar & Hoffmann (2018) and Moro et al. (2020).

### 6.1.3 RQ3: Providers' ability to recognize customer-perceived value

The results to RQ3 provided some interesting insights into potential misinterpretations of customer-perceived value from the providers' side, although it is to be remembered that these are rather exceptions of a body of generally well aligned provider understanding of customer-perceived value than indicators of general problems in customer value recognition. There is also some uncertainty on how generalizable some of the spotted issues are.

The main identified improvement points in the understanding of customer-perceived value are communication of lifecycle cost effects from circularity, value chain vision in the distribution of added costs, importance of infrastructural and regulatory fit of circular solution, recognizing sustainability criteria in procurement, and selling only frequently needed products as services (as explained in detail in subchapter 5.3.2). Some of these issues have been scratched on by the existing CE literature, such as the importance of downstream value chains to value formation by Mishra et al. (2018), but in a dyadic analysis of CE customer value they have not been explored before.

In the earlier customer value literature, the dyadic approach to analyze provider understanding of customer-perceived value has been utilized earlier by Pandza & Vignali (2010) and Mustak (2019), but this study provides the first such analysis in a CE context. It is only the first attempt to investigate the issue and could be complemented by for example researching how the provider-customer interaction moderates the level of understanding, something which has been actively researched in linear settings.

To wrap up the discussion on key findings and theoretical contributions, it is good to point out that in many companies, including many case companies of the study, environmental sustainability has become an intrinsic value very recently. A lot of uncertainty on the magnitude and speed of changes for the comprehensive customer-perceived value remain. The classification provided by this study is better able to capture the new aspects brought upon by sustainability and circular economy on customer value perceptions in

industrial settings but should be regularly critically reviewed, as well as adapted to meet CE cases with distinctive characteristics when needed.

## 6.2 Managerial implications

This study helps industrial companies to optimize value creation in circular business relationships by enhancing the recognition and alignment with customer-perceived value. This can lead to improved customer satisfaction and retention, as well as accelerated, better incentivized transition into greater degrees of circularity in business. The approach to this study was dyadic, and similarly the results can be utilized by both provider and customer companies, although from slightly different perspectives. Familiarizing with and utilizing this research can offer a competitive advantage both in the competition for customers and the selection of circular providers. Below, the key benefits for both are presented one by one:

***Providers:*** *The classification of customer-perceived value in the CE can help to understand what distinguishable value components the customers of circular solutions perceive and to explain the value of a circular solution for the customers.*

The study provides the first explicit classification of customer-perceived value that is tailored for a circular environment. Therefore, it can act as a key tool in (re)design processes of various CBMs. By going through the value components with customers or potential customers systematically, possibly all the way to the value item level, industrial companies can gain a whole new level of insight into what the market wants. Applying the classification can also help the providers to communicate the value of their solutions, enabling them to enhance their value propositions in detail and rearrange their marketing focus according to the customer needs. The managers can also obtain insights into what are some of the typically critical value items of their specific CBM.

Importantly, interacting with the customers from the basis of this classification enables a provider to understand how deeply the sustainability values (environmental value and related symbolic and economic subcomponents) have already rooted in their customer base. Having this knowledge helps the provider not only in product or service configuration, but also in marketing and general customer service efforts.

***Customers:*** *The classification of customer-perceived value in the CE can be used as a tool to evaluate providers or as a base for building more specific assessment tools.*

For any company willing to engage in circular sourcing or re-evaluate their providers from the point of view of sustainability, the constructed classification can act as a valuable tool to figure out priorities and weights for different characteristics of circular providers. The

customer should adapt the classification to their individual business situation and consider the CBM-specific remarks from the results to the RQ2. It is possible to use the classification to build a customized numeric assessment tool to support provider selection processes.

***Providers:*** *The research provides insights into what is important to know about the customer to offer optimal value propositions, such as their strategic objectives, structural aspects, or way of using the circular offering*.

By familiarizing with this research, managers of industrial CE companies can obtain some insights into what customer characteristics can drive their value perceptions. They can therefore figure out where they are lacking necessary information to understand and predict their customers' wishes. Even when direct data is not available, providers can analyse their (potential) customer base through indirect public data. For example, if the customer company has a strategic objective of being a sustainability front-runner, they are very likely to appreciate highly not only the ethical value, but also for example 'brand positioning' and 'CSR visibility and concreteness' subcomponents regarding symbolic value. The study also points out that the customer's internal structure and the role of the product or service in their business might significantly affect perceptions considering individual value subcomponents. For example, production-critical use of a product most likely means an emphasis onto 'financial stability' as well as 'reliability and safety' subcomponents in the customer's eyes.

***Providers:*** *The results highlight issues such as data-centricity, ecosystem perspective, and product quality that are important to address in building circular business models to ensure strongly positive customer value perceptions.*

Various practical discussion points that providers should be aware of came up frequently in the data. Additionally, results to the RQ3 revealed possible pitfalls for providers in interpreting customer-perceived value, for which they should keep their eyes open to avoid falling into them. A selection of some key issues for managers to pay attention to follows:

- **Data is a key:** The circularity transformation means that customers become even more interested about the data, *especially CSR-related data*. Providers should strive to produce accurate, comprehensive, understandable, and customized data on the environmental and social effects of their offerings. The ability to monetize environmental effects is a big advantage.
- **Be aware of customer's ecosystem:** Environmentally conscious customers are increasingly probing their value chains to support their sourcing decisions (for

example consumers' willingness to pay for sustainability often affects). Also, in many industries regulatory changes create different kind of pressures in an accelerating pace, and the provider should follow the developments to understand their customers' decision-making.

- **Do not compromise on quality:** The value component that stayed important among all customer companies across cases was product performance, especially product quality. Even with sustainability-oriented customers big trade-offs from product quality to environmental value cannot seemingly be made. This applies also to services in the cases where the offering is service-intensive.

***Providers:*** *The economic value of a circular solution should be argued through forward-looking ecosystem perspective for sustainability-focused customers and through indirect cost savings and financial stability (including risk management) for conventional customers. The former is more common in recycle-, and the latter in reuse-environment.*

This last implication is more specific focusing on the economic value that is nowadays very frequently discussed by CE companies. The study suggests that customers who have sustainability in the core of their strategy often adapt a forward-looking valuation when it comes to economic impacts. Thus, the provider should tailor the value proposition to consider stakeholders preferences', as well as medium-term regulatory and infrastructural changes' economic implications. This seems typical with recycle-based CBMs. On the contrary, when selling to customers with more traditional strategic priorities (as typically happens in reuse-based CBMs), the focus should be kept on the various cost benefits resulting from circular optimization, added financial predictability, and, when applicable, on the financial implications of improving production security.

## 6.3 Limitations and quality assessment of the study

The study succeeded well in constructing a first classification of customer-perceived value in the CE and comparing different CBM categories as well as provider and customer perspectives on the topic. This was thanks to the rich, highly cross-industrial data with profound access to cases, data and researcher triangulation, participant validation, effective use of data analysis software and the abductive approach to diminish researcher bias. Broader analysis on the validity and reliability of the study is presented in subchapter 4.5. This subchapter focuses on presenting the unavoidable limitations brought upon by the study setting and methodological choices.

On the theoretical front, the research questions put together are relatively big and ambitious. Although the data allowed for a profound analysis of each RQ, it is possible that

some relevant literature from related research streams has escaped the literature review due to the broad scope of investigated issues.

The case sampling was purposeful and relatively broad considering that all the cases were studied in a focused manner. However, the sample sets limitations to the reliability and especially generalizability of some of the results as was mentioned on many occasions. Especially on CBM category level the case amount is small and thus the conclusions on cross-CBM differences of customer value might be biased by varying amounts of case-specific characteristics. Perhaps the best example of such case-specific features is the size, price, and production-criticality of industrial cranes in case Konecranes. Additionally, the cases could include more variety in customer profiles to improve the generalizability of the results. Customer variables to investigate could include for example size, industry, and proximity of consumer interface. In this study, for example the reuse cases were missing small customers, and in the recycle cases there was only one customer whose business takes place further away from the consumer interface.

Regarding data collection, although the interviewees were knowledgeable on the circular offerings and business relationships in the cases, their roles and personal viewpoints can bias the data. This effect was reduced by investigating secondary data sources and obtaining interviewees with different positions and perspectives when possible. The dyadic data collection approach also allowed for obtaining data from multiple points of view.

The constructed classification of customer-perceived value in the CE also has its limitations. Firstly, the components are highly interconnected (as for example product performance value vs service value) because customer value as a concept is complicated and hard to chop into pieces. The division is biased by the researcher's preferences, although this effect is reduced with the abductive theory building approach. Moreover, some of the subcomponents related to for example symbolic and to some extent ethical value are highly subjective to every customer, which could present a threat to the generalizability. In general, customer value is always a customer's subjective evaluation (Rintamäki et al. 2007). Finally, there is surely some cultural bias in the data and thus in the classification, as the discussion on sustainability is very active in Finland and the societal awareness rather high in global comparison. This could mean that the stage of circularity and sustainability transformation should be considered, and the classification possibly adapted when applied in a different cultural context.

According to the literature (e.g. Dubois & Gadde 2002; Saunders et al. 2019) the chosen thematic analysis with an abductive theory building approach fits well for this type of focused case study in an industrial business environment. Therefore, there is no reason

to assume that the study's validity or reliability would have suffered from the profound methodological choices. The biggest question marks consider the external validity (generalizability) as described earlier. The limitations are however taken into account in the following section on future research suggestions.

## 6.4 Implications for future research

Suggestions for future research stem from the findings of the study, its limitations, as well as from earlier remarks of literature. There is still minimal research written from the customer perspective in the CE context and conducting more is strongly encouraged. This study builds a good base for expanding and verifying the understanding of the formation of customer-perceived value in the CE.

Some of the findings still have question marks in the air regarding their external validity, as discussed in the previous section. To investigate the generalizability especially regarding the results for RQ2 and RQ3 (differences between CBM categories as well as between provider and customer perspectives), more studies with bigger or differently composed samples would be needed. Especially the provider understanding of customer-perceived value in the CE could be researched more systematically and taken to the main focus of a future study. Quantitative survey-based research could fortify the results regarding these topics. Future studies should include new industries and new types of offerings or alternatively be strictly focused on a single industry to offer more accurate recommendations.

As this stream of research adopts a strong customer perspective, it would also be important to explore possible customer characteristics that can influence the customer-perceived value other than the CBM category in question. Such characteristics could include customer industry, size, role of circular offering in customer business, B2B vs B2C customers, etc. This would enable companies to make more informed decisions based on the data of their customer base. In addition, different and more sophisticated CBM categorizations could be tried out and compared regarding customer-perceived value, as earlier suggested by Ranta et al. (2020) considering a very related concept of customer value propositions. These future research opportunities would preferably involve testing the classification of this study in different contexts and searching for ways to improve it.

On the side of the value components identified in the study, their linkages and dynamic interconnectivity would be a fruitful research avenue, as already pointed out by Aarikka-

Stenroos et al. (2021), although with a different set of value dimensions. This would enable companies to better estimate the consequences of taking action in any given value dimension. Furthermore, future research could analyse in more detail which value subcomponents of the new classification appear especially due to circularity and which ones overlap in linear and circular business models to produce added practical advice for companies transitioning into CBMs.

Another highly interesting issue to study especially in the CE context would be the speed, dynamics, and mechanics of the change of customer-perceived value, as the awareness and pressure for environmental sustainability continues to surge. This would enable companies to proactively develop their business models and value propositions to match future market needs. In the same context, the relationship of social and environmental value from customer perspective is also an issue in need of further exploration.

The results of this study include findings such as the importance of environmental data and ecosystem perspectives, whose impacts on the customer-perceived value in different future scenarios are still difficult to predict. Future research could tackle these issues and their exact effects on the formation of customer-perceived value. Finally, this study suggested that environmental front-runners would be more commonly found as customers of the recycle-based CBMs than reuse-based ones. Testing this suggestion and revealing the potential underlying reasons would be an important objective for future research, since reuse actually maintains the products at a higher value and thus generally saves more resources (EMF 2013).

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*In addition, 8 web pages were used that are not listed due to anonymization reasons.*

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# APPENDIX B: LIST OF IDENTIFIED CASES

| Company | Industry | CBM Category | Circular Offering |
|---|---|---|---|
| **Neste** | Renewable fuels | Recycle | World's biggest producer of renewable diesel (road transport and aviation), producer of renewable plastics. |
| **Kiilto** | Chemical | Recycle | Innovative chemical products using renewable raw materials and industrial waste streams in production. |
| **Kemira** | Chemical | Recycle | Makes chemical products from recycled raw materials that contribute to longer lasting products. |
| **Forchem** | Chemical | Recycle | Buys tall oil generated e.g. in pulp production and refines it to high-value materials with potential to replace fossil-based raw materials in production processes. |
| **Stora Enso** | Wood | Recycle | Sustainable new solutions from biocomposites. Circular Packaging Programme initiative. |
| **UPM** | Wood | Recycle | Wood-based packaging solutions to replace plastic. Wood-based chemicals. Recycling initiatives such as Raflatac Rafcycle. |
| **Kotkamills** | Wood | Recycle | Plastic-free packaging boards, plastic-free cups, cascading of used cups into laminating paper. |
| **Metsä Group** | Wood | Recycle | Plastic-free packaging materials such as Prime FBB EB, production of renewable energy, e.g. Äänekoski bioeconomy ecosystem. |
| **Touchpoint** | Textiles | Recycle | Using recycled and renewable textile raw materials, taking textiles back from customers for a state-of-art recycling scheme. |
| **ZenRobotics** | Waste management | Recycle | Manufactures waste recycling robots that allow for cost savings in waste handling and environmental benefits. |
| **Huhtamäki** | Packaging | Recycle | Blueloop initiative to enhance recycling of the products. |
| **Tarpaper Recycling** | Construction | Recycle | Turns old/leftover roofing felts into raw material for asphalt production, enabling |

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| | | | reductions in the usage of bitumen. |
| **DestaClean** | Construction | Recycle | Separates construction waste, refines new raw materials from it and manufactures own recycled construction material Puukivi. |
| **Spinnova** | Textiles | Recycle | Makes innovative wood-based fibers that have big potential to replace cotton and oil-based fibers in the future. |
| **Arctic Biomaterials** | Plastics | Recycle | Manufactures bio-based plastics and composites, also for high-temperature processing. |
| **Betolar** | Construction | Recycle | Produces replacement materials for cement from the side streams of forest, mining, steel, and energy industries, achieving big environmental benefits. |
| **Konecranes** | Cranes & lifting | Reuse – transferred ownership<br>Reuse – retained ownership | Has a variety of advanced lifecycle prolonging services for their cranes as well as Rentall-concept for cranes as a service. |
| **Ponsse** | Forest machinery | Reuse – transferred ownership | Used machines marketplace, refurbished remanparts and other reused spare parts, modernization services. |
| **Valtra** | Agriculture machinery | Reuse – transferred ownership | Remanufactured gearings and engines, with up to 85% energy savings in production |
| **Pa-Ri Materia** | Furniture | Reuse – transferred ownership | Acquires, refurbishes, and redistributes used office furniture. |
| **Netlet** | Construction | Reuse – transferred ownership | Collects surplus construction materials from construction sites and sells them in online marketplace. |
| **Industrial Tools** | Professional tools | Reuse – retained ownership | Tool Service lets customer lease the tools, which saves resources and often also reduces their total amount. |
| **Tamturbo** | Compressed air | Reuse – retained ownership | Customers are charged on the basis of the amount of compressed air used. At the end of the contract, machines are recovered and redirected to the next customer. |
| **Lem-Kem** | Lighting and energy | Reuse – retained ownership | Offers lighting service in which customer's monthly fee is financed with the cost savings from reduced energy consumption. |

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| **3StepIT** | IT equipment | Reuse – retained ownership | Manages its customers' IT equipment in three steps: 1. acquisition 2. management 3. repurposing. In the third step customer gets new equipment, while 3StepIT services and sells the used equipment onward for a second life. |
| **Innorent** | Facilities | Reuse – retained ownership | Offers temporary facilities such as factory halls, sports halls or marketplaces as a service. After use the building elements can be recovered and used again. |

# APPENDIX C: INTERVIEW GUIDES

This appendix presents the interview structure and questions separately for provider and customer interviews. To be noted is that the questions were often slightly modified to match each case and company's individual setting. The interview guides are translated to English from the original interview language Finnish.

**Provider interviews**

*Introduction*

a. Would you please tell a little bit of your background, especially in the current company?
b. What are your current responsibilities in the company? Are you actively working in the customer interface?

*Circular economy in the company*

a. What is your personal understanding of circular economy?
b. How does circular economy show in your company?
c. If to consider the three most important principles of circular economy; resource efficiency, prolonging a product's lifecycle, and closing material loops to minimize waste, is one of these highlighted in your company's activities? How?

*Business model specific questions*

a. What reasons has your company had to increase the use of renewable or recycled raw materials or recyclability of products / to implement lifecycle-prolonging services / to transition to offer a product as a service?
b. How and when has this transition been carried out?

*Customer value perspective*

a. What kind of customers and customer segments do your renewable or recycled products / aforementioned services have?
b. What key differences are there between the new more sustainable products and the replaced ones / the old and new business model from customer perspective?
c. How do you think that the sustainable products / circular services produce added value for the customer?
d. Have you received direct customer feedback related to the more sustainable products / circular services?
e. How do the renewable or recycled products / these services affect your prices or other costs encountered by the customer?
f. Is there a difference between the performance of the renewable or recycled products / circular services and the old products / services?
g. How would you describe the dynamics of the customer relationships to have changed due to the introduction of the circular products / services? Has the amount of interaction or its forms changed somehow?
h. Do you believe that the renewable or recycled products / circular services affect customers' processes, use of time, or general workload?
i. Do you think that the potential brand value resulting from selecting responsible providers plays a role in the customers' buying decisions?
j. Have the employees of the customer company expressed their personal thoughts or feelings related to the sourcing or use of the renewable or recycled products / circular services?

*Closing*

a. Would you like to add something that was not discussed yet?

**Customer interviews**

*Introduction*

a. Would you please tell a little bit of your background, especially in the current company?
b. What are your current responsibilities in the company? Are you actively in touch with the case provider company?

*Circular economy in the company*

a. What is your personal understanding of circular economy?
b. How does circular economy show in your company?

*Relationship with the provider company*

a. What do you know of the provider, and their products and services?
b. What made your company to become a customer of the provider or buy the circular product / service?
c. How and when did the customership or sourcing of the circular product / service start?
d. Describe the collaboration with the provider shortly. What kind of processes do you have?

*Customer value*

a. Please describe what kind of role does the circular product / service play in your business.
b. What benefits or disadvantages resulting from the use of the product / service come first to your mind?
c. How does the use of the product / service affect your total costs? How about the effect on your revenue?
d. How does the use of the product / service affect your processes? Including sourcing, use, own marketing and selling, and end-of-life.
e. Are there differences between the performance of the circular product / service and the alternatives?
f. What is the effect on workload and work time allocation? Is the use of the circular product / service easier or harder compared with 'traditional' products / services?
g. Does the general reputation of the circular product / service in your industry or among customers influence your buying decisions?
h. Does the use of the product / service affect the value of your brand? Is the impact small or big?
i. Do you perceive that the use of the product / service makes your business more sustainable? Is there intrinsic value in this impact?
j. Would you see value in it, if the provider would generate you (more) data regarding the environmental benefits?
k. What kind of indirect benefits does the (possible) added sustainability cause?
l. How does the sourcing of the product / service affect you or your colleagues on the emotional level?
m. Do some of the mentioned value aspects of the product / service give you for example a particular sense of satisfaction?
n. Considering everything discussed, do you think that the perception of the value of the product / service has changed in time, for example from when you where making the decision to buy to when there was already more use experience?

*Closing*

a. Reflecting this discussion, how would you hope the collaboration with the provider will develop in the future?
b. Would you like to add something that was not discussed yet?

# APPENDIX D: DATA ANALYSES & STRUCTURE

| Case evidence | Value item | Value subcomponent | Value component |
|---|---|---|---|
| *Konecranes*: Modernizing cranes leads to big material savings | Cost savings of reduced material use | Indirect cost effects | Economic value |
| *Industrial Tools*: Purchase price is only 20% of total cost of ownership, the 80% is work that can be saved by servitization | Cost effect of reduced workload | | |
| *Konecranes:* Intelligent service planning reduces customer's responsibilities | | | |
| *Konecranes:* Data-based predictive maintenance of crane parts gets them changed right when needed, not too early or late | Optimized service schedule | | |
| *Industrial Tools:* Unnecessary tools are removed from fleet in the servitization process | Optimized fleet size | | |
| *Touchpoint:* Take-back logistics of workwear may either add costs or reduce them (savings in waste management) | Cost effect of logistics | | |
| *Konecranes:* Modernizing cranes improves their energy efficiency which saves money | Performance-related cost effects | | |
| *Neste:* Renewable fuel might lower total consumption in some conditions | | | |
| *Konecranes:* Modernizations and predictive maintenance improve the reliability of production-critical cranes | Production risk management | Financial stability | |
| *Industrial Tools:* Including critical tools in Tool Service en- | | | |

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| sures their quick repairs and/or renewals | | | |
| *Industrial Tools:* Tool Service with fixed monthly price eliminates surprise expenses | Cash flow predictability | | |
| *Konecranes:* Occasional difficulties to invest in expensive cranes | Ease or difficulty of investing | | |
| *Industrial Tools:* Investment costs are significantly lower when using Tool Service | | | |
| *Neste & Touchpoint:* Customers want to avoid need for costly ad-hoc adaptation when regulation develops in the future | Foreseeing regulatory development | Changing operating environment | |
| *Neste:* Customers have noted that consumers are ready to spend more for responsibly produced products | Increasing willingness to pay for sustainability | | |
| *Neste:* Renewable fuel burns cleanlier than regular fossil-based fuel | Performance enabled by product characteristics | Quality | Product performance value |
| *Konecranes:* Modernizations bring performance upgrades | Product performance enabled by services | | |
| *Industrial Tools:* Continuously used products are changed in Tool Service before their performance starts to suffer | | | |
| *Touchpoint:* Recycled materials might have more restricted availability than virgin ones | Customizability | | |
| *Industrial Tools:* Small modifications to Tool Service products are easy to request | | | |
| *Touchpoint:* The looks of sustainably produced workwear matter | Appearance | | |
| *Touchpoint:* Workwear should always last long in use | Durability | Reliability and safety | |

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| *Neste:* Reliability of a fuel is critical especially in professional use | Functional reliability | | |
| *Konecranes:* Securing production by taking care of cranes | | | |
| *Konecranes:* Cranes have to meet safety regulations, for which circular services are frequently used by the customers | Operational safety | | |
| *Neste:* Neste MY Renewable Diesel works in normal diesel engines | Infrastructural fit | Ease or difficulty of use | |
| *Neste:* Some machines prohibit use of all bio-based fuels | | | |
| *Industrial Tools:* Less maintenance work of products needed | Operational ease or difficulty | | |
| *Konecranes:* Life Cycle services are sold in a modular format | Customizability | Quality | Service value |
| *Touchpoint:* Take-back logistics can complicate things for the customer because of added work and multiple involved stakeholders | Change in total complexity | | |
| *Industrial Tools:* Tool Service enables reducing the total number of tools to be managed | | | |
| *Neste:* Digital platforms: Precise fuel consumption portal for B2B customers | Other performance characteristics | | |
| *Konecranes:* Accurate specifications: well-holding estimations of project durations | | | |
| *Industrial Tools:* Versatility: Tool Service includes free laser calibrations | | | |
| *Konecranes:* Customer can follow the progress of crane modernization from a mobile app without having to do anything | Change in total workload | Ease or difficulty of use and communication | |
| *Industrial Tools:* Upon changing to | | | |

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| Tool Service the provider is able to assume a variety of tasks from the customer | | | |
| *Konecranes:* Systematic (+) but insufficiently customized (-) meeting practices | Communication fluency | | |
| *Neste & Touchpoint:* Delivering extra materials and support upon requests | Customer service experience | | |
| *Neste:* Unique product qualities due to pioneer technology | Innovation and technological capabilities | Expertise and co-development | |
| *Konecranes:* Technology leadership is appreciated among customers | | | |
| *Industrial Tools:* Frequent product innovations stemming from big R&D resources | | | |
| *Touchpoint:* Actively co-developing the takeback processes with customers | Business co-development | | |
| *Neste:* Bringing regular meetings with the R&D team a part of the customer relationship | Multi-level collaboration | | |
| *Konecranes:* Timely service deliveries | Service reliability and safety | Reliability and transparency | |
| *Neste, Touchpoint, Konecranes & Industrial Tools:* Perceptions of provider as one who always fulfils their responsibilities | Provider reliability | | |
| *Neste:* Transparent supply chain and regularly calculated emission factors available for customers | Reporting and data availability | | |
| *Touchpoint:* Specific data on resource savings highly appreciated when available | | | |
| *Touchpoint:* Customers promoting sustainable workwear to demonstrate comprehensive sustainability of business | Building innovative pioneer status | Brand positioning | Symbolic value |

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| *Neste:* Decision to use renewable fuel is highlighted as a voluntary front-runner action by the customers | | | |
| *Neste:* Neste's famous brand eases customers' work of getting partners on board | Using existing provider brand awareness | | |
| *Neste & Touchpoint:* Customers using CBM collaboration in marketing as evidence of taking sustainability action | Verifying execution of sustainability strategy | CSR visibility and concreteness | |
| *Touchpoint & Konecranes:* Presenting emission scenarios to customers in familiar units | Concrete and customized communication | | |
| *Touchpoint:* Creating physical products to be used by customers from recovered and recycled workwear | Tangible outcomes of reverse logistics | | |
| *Neste & Touchpoint:* The CBM collaboration makes customer firms' work environment more meaningful and motivating | Fostering employer image | Internal promotion | |
| *Industrial Tools:* Tools Service as a way to attract workforce due to its modernity and high-quality tools | | | |
| *Neste:* Customers boosting internal sustainability innovation by using CBM collaboration as an inspiring reference | Influencing attitudes | | |
| *Touchpoint:* Customers willing to recycle workwear even if it means losing some profits | Size of positive impact | Environmental value | Ethical value |
| *Neste:* Customers willing to buy renewable fuel even if it means losing some profits | | | |
| *Neste:* In addition to much lower released CO2, improved air quality in closed-area | Comprehensiveness of positive impact | | |

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| deliveries seen valuable | | | |
| *Neste & Touchpoint:* Broad and accurate data availability in CSR reporting | Transparency and measurability | | |
| *Touchpoint:* In clothing, the social aspects of the production have been discussed long before environmental issues | Social value | Social value | |
| *Konecranes:* Social responsibility issues are sometimes more explicit in customers' sourcing criteria than environmental ones | | | |
| *Neste:* Customer directly promoting the CBM collaboration to other suppliers to spark sustainability initiatives | Affecting stakeholders | Ecosystem influence | |
| *Neste:* Customer constructing and showcasing sustainability-based sourcing criteria so that it would sooner or later be taken into use in the industry | Changing industry standards | | |
| *Konecranes:* Customer pointing out the role and responsibility of the provider as an industry standard setter | | | |