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Enhancing Innovation in Manufacturing Firms through Customer Co-Creation

A Case Study

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ABSTRACT:

Manufacturing organizations operate in a market where they are increasingly expected to leverage external knowledge to stay competitive. This pressure has led to the emergence of the open innovation paradigm, of which customer co-creation is one popular way of managing external collaboration. While open innovation and co-creation have been widely studied, the existing research has primarily focused on service and high-technology industries. This study examines how customer co-creation can be integrated into innovation programs in manufacturing companies and the organizational barriers and enablers that affect this integration.

This study builds on a theoretical framework developed through a literature review on open innovation, innovation programs, and customer co-creation. The study was conducted as a qualitative single-case study. The empirical data consist of nine semi-structured interviews with employees of the case company who have knowledge of the company's innovation activities. The data were analyzed using a thematic analysis, following the Gioia methodology, to identify current innovation practices, challenges, and development opportunities.

The findings show that customer involvement in the case company's innovation activities is informal and driven by internal initiatives rather than a structured strategy. Barriers limiting customer collaboration include a lack of formal processes, limited resources for managing customer knowledge, cross-functional collaboration, and difficulties in demonstrating short-term value for new projects. Simultaneously, several enablers were identified, including existing customer relationships, internal motivation, and innovation strategies. The study highlights that a pilot-based approach, aligning co-creation with long-term innovation goals, and strengthening organizational capabilities, such as knowledge sharing, are key to enabling more systematic customer co-creation practices.

The study highlights that the transition from internally driven innovation towards customer co-creation requires both organizational capability development and managerial commitment. The findings contribute to existing knowledge by providing a better understanding of co-creation in a manufacturing context and offering managerial guidance for organizations looking to enhance innovation through customer involvement.

KEYWORDS: Customer Co-Creation, Manufacturing Innovation, Innovation Programs, Open Innovation, Case Study

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TIIVISTELMÄ:

Valmistava teollisuus toimii markkinoilla, joilla sen odotetaan yhä enemmän hyödyntävän ulkoista osaamista pysyäkseen kilpailukykyisenä. Tämä paine on johtanut avoimen innovaation paradigman syntyyn, jossa asiakkaan kanssa tapahtuva yhteiskehittäminen on yksi suosituimmista tavoista hallita ulkoista yhteistyötä. Vaikka avointa innovaatiota ja yhteiskehittämistä on tutkittu laajasti, olemassa oleva tutkimus on keskittynyt pääasiassa palvelu- ja korkean teknologian aloihin. Tässä tutkimuksessa tarkastellaan, miten asiakasyhteistyö voidaan integroida valmistavan teollisuuden innovaatio-ohjelmiin, sekä mitä organisatorisia esteitä ja edistäjiä tähän integraatioon liittyy.

Tämän tutkimuksen teoreettinen viitekehys on kehitetty avoimeen innovaatioon, innovaatio-ohjelmiin ja asiakasyhteistyöhön keskittyvään kirjallisuuteen. Tutkimus toteutettiin kvalitatiivisena yksittäistapaustutkimuksena. Empiirinen aineisto koostuu yhdeksästä puolistrukturoidusta haastattelusta, joissa haastateltavina oli tapausyrityksen työntekijöitä, joilla on tietoa yrityksen innovaatiotoiminnasta. Aineisto analysoitiin temaattisen analyysin avulla Gioian metodologian mukaisesti. Analyysin tulokset jakautuivat nykyisiin innovaatiokäytäntöihin, haasteisiin ja kehitysmahdollisuuksiin.

Tulokset osoittavat, että asiakkaiden osallistuminen tutkittavan yrityksen innovaatiotoimintaan on epävirallista ja perustuu pikemminkin sisäisiin aloitteisiin kuin jäsenneltyyn strategiaan. Asiakasyhteistyötä rajoittavia tekijöitä ovat muun muassa virallisten prosessien puute, rajalliset resurssit asiakastiedon hallintaan, monialainen yhteistyö sekä vaikeudet osoittaa uusien hankkeiden lyhyellä aikavälillä tuottama arvo. Samalla tunnistettiin useita edistäviä tekijöitä, kuten olemassa olevat asiakassuhteet, sisäinen motivaatio ja innovaatiostrategiat. Tutkimus korostaa, että systemaattisempien asiakasyhteistyökäytäntöjen mahdollistamisessa avaintekijöitä ovat pilottipohjainen lähestymistapa, yhteiskehittämisen sovittaminen pitkän aikavälin innovaatiotavoitteisiin sekä tutkimuksessa esille tulevien organisaation valmiuksien kehittäminen.

Tutkimus korostaa, että siirtyminen sisäisesti ohjatuista innovaatioista kohti asiakasyhteistyötä vaatii sekä organisaation valmiuksien kehittämistä että johdon sitoutumista. Tulokset täydentävät olemassa olevaa tietoa tarjoamalla paremman ymmärryksen yhteistyöstä valmistavan teollisuuden kontekstissa ja antamalla johtamisohjeita organisaatioille, jotka haluavat parantaa innovaatiotoimintaansa asiakkaiden osallistumisen kautta.

AVAINSANAT: Customer Co-Creation, Manufacturing Innovation, Innovation Programs, Open Innovation, Case Study

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1 Introduction

This chapter will provide an introduction to the background, purpose, and research question of the study. It will further define the research gap, scope and the structure of the thesis.

1.1 Background of the Study

Innovation has become a defining factor in maintaining long-term competitiveness across industries. Innovation is not merely a strategic advantage, but large organizations are under constant pressure to generate new business value. In today's economic climate, it is no longer sufficient for companies to offer products with good quality and competitive pricing (Kim et al., 2020). In order to survive, organizations are required to create new forms of value and carry out disruptive innovation, sometimes against their own business models (Christensen et al., 2015).

Due to this constant pressure to transform, new processes and practices for driving innovation have been established. To approach innovation, companies have developed different means of innovation. Some common practices include feedback within the organization, brainstorming, self-managed innovation teams, and cross-functional collaboration. A more recent development companies have implemented is specified innovation programs to ensure innovation is happening and is constant. These programs are often created to promote employee involvement in innovation and to allow them the creativity to engage in projects outside of their routine work (Brem & Utikal, 2022). Previous studies have found that such initiatives within organizations foster employee creativity.

Beyond internal efforts, innovation culture has noticed a shift as companies have begun to realize that not all ideation will come from within the firm. Traditionally, innovation has occurred within the walls of the organization. However, in the rapid nature of today's business environment, companies must seek innovation outside the firm to remain

competitive (Lee et al., 2012). Moreover, due to dissatisfaction with the choices available to them, more and more customers are looking to collaborate with organizations to co-create value (Prahalad & Ramaswamy, 2004).

One way innovation has evolved is through open innovation. Open innovation, as described by Chesbrough et al. (2006), is "the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation" (p. 1). The open innovation strategy recognizes that idea generation can come both internally and externally to an organization. Specifically within high-tech industries, where the need to evolve is constant. The open innovation strategy acknowledges that not all the smart people work for a single organization, and that in order to remain competitive, knowledge must be found inside and outside the organization (Chesbrough, 2003). Hence, companies must seek to broaden their horizon from a firm-centric view and look towards co-creating value with their customers. Prahalad and Ramaswamy (2004) state that "high-quality interactions that enable an individual customer to co-create a unique experience with the company are the key to unlocking new sources of competitive advantage" (p. 7).

Although open innovation is often discussed as relevant to high-tech industries, more recent works have acknowledged that a broader range of companies are understanding the importance of creating value from beyond their own firm. Because all companies have customers with specific demands, one way to serve these needs has been to involve the customers in the value creation process. In other words, this is reflected in literature as customer co-creation. Co-creation is often acknowledged as a more niche sub-category of open innovation. Co-creation, as described by Kim et al. (2020), is "a type of collaboration where diverse interested parties develop a value creation ecosystem, to create and achieve shared value for the purpose of benefiting the customer demand and beyond for the greater good" (p. 575). This research will focus on customer co-creation and not examine the entirety of the open innovation paradigm.

1.2 Research Gap, Question, and Objectives

To identify the research gap of this study, a literature review process was conducted. The analysis of previous literature began by exploring databases such as Elsevier Scopus and Web of Science using keyword combinations such as *manufacturing innovation, innovation programs, open innovation*, *customer co-creation* and *customer collaboration* to identify the most relevant works on these subjects. The search was narrowed down to articles published in relevant fields such as manufacturing, industrial management, and innovation management. The selected papers were then analysed to determine how customer co-creation has previously been studied within the manufacturing industry. This literature review process is vizualized in Table 1. below.

Table 1. Research Gap Analysis

Keywords	Database	Time Frame	Subject Area	N. of hits	Synthesis
"manufacturing innovation" AND "open innovation"	Elsevier Scopus	2000-2026	Business, Management, and Accounting, and Engineering	72	Open innovation is increasingly relevant in manufacturing. Previous studies focus on general collaboration practices rather than mechanisms for implementation.
"customer co-creation" AND manufactur*	Elsevier Scopus	2000-2026	Business, Management, and Accounting, and Engineering	109	Customer co-creation in empirical research in manufacturing contexts is limited. Most studies focusing on service and high-tech industries.
"innovation program*" AND manufactur*	Elsevier Scopus	2000-2026	Business, Management, and Accounting, and Engineering	111	Innovation programs in manufacturing are researched from a structural and managerial perspective with limited

					research on externals involvement.
“innovation program*” AND manufactur*	Web of Science	2000-2026	Science, Technology, and Engineering	28	Studies emphasize organizational structures and processes of innovation programsa. Less focus on the manufacturing setting.
“open innovation” AND “customer collaboration” AND manufactur*	Elsevier Scopus	2000-2026	Business, Management, and Accounting, and Engineering	29	Research notes the importance of customer collaboration and open innovation, but provides little guidance on how to implement them within manufacturing firms.

The analysis showed that the concepts of open innovation and co-creation are widely explored topics in literature on innovation, yet despite this, most of the existing literature focuses on high-tech and service industries. Bosisio (2024) notes that most studies have been conducted in the retail sector, restaurant and bar sectors as well as social media, where the organizational culture is ideal for collaboration. In contrast, open innovation, specifically customer co-creation, is less explored in manufacturing firms. In the context of manufacturing, stability and efficiency are often valued over innovation capabilities, which in turn helps explain why in existing literature, innovation in manufacturing has long been considered mostly product development and reducing costs (Abernathy & Utterback, 1978). In their literature review of the manufacturing sector, Becheikh et al. (2006) found that most studies (37%) focused solely on product innovation, and 43% focused on both product and process innovation. Only 1% of all studies focused on only process innovation. More recently, yet similarly, Lassen and Larsen (2024) note that existing literature on manufacturing innovation has focused primarily on product development or the development of manufacturing technologies.

To this day, there remains a lack of dedicated knowledge in manufacturing innovation specifically. Furthermore, this explains why the possibilities of implementing customer co-creation in manufacturing innovation programs remain underexplored. While some companies have begun realizing the need to extend their innovation beyond the traditional in-house approach, empirical research on these practices is limited.

Recent studies have primarily focused on examining open innovation in general and less on customer co-creation specifically. While recent studies have increasingly discussed open innovation in manufacturing and value creation through customer co-creation, there seems to be a lack of case-based empirical evidence on how customer co-creation can be implemented within established manufacturing firms.

As a response, this study aims to investigate the challenges and opportunities associated with implementing customer co-creation in innovation programs of established manufacturing firms. The research purpose is to utilize the learnings through interviews and benchmarking similar innovation initiatives to be able to suggest managerial strategies for the case company to utilize when aiming to implement customer co-creation in their processes. The research question is as follows:

How can customer co-creation practices be integrated into innovation programs in manufacturing firms?

Furthermore, the objectives of the study are as follows:

- To analyze what challenges and opportunities influence the integration possibilities of customer co-creation in manufacturing innovation programs.
- To examine the current state of the case company's innovation activities through interviews.
- To benchmark the case company's innovation approach against similar initiatives in other manufacturing firms operating in Finland.

- To propose managerial recommendations for implementing customer co-creation for innovation programs in manufacturing firms.

1.3 Definitions and Scope of the Study

To ensure clarity, this section outlines the central theme of the study, which is innovation management. In this study, innovation management refers to how organizations structure, organize, and facilitate activities that lead to the development or improvement of products, services, or processes. Innovation management can be defined as a systematic set of processes, structures, and capabilities through which organizations search for opportunities, develop ideas, implement new solutions, and capture value from innovation (O'Regan et al., 2006; Tidd & Bessant, 2018). Within the theme of innovation management, this study focuses on **manufacturing innovation, open innovation, customer co-creation, and innovation programs.**

In this study, ***manufacturing innovation*** is defined as an organization-wide effort through which manufacturing companies develop and improve their products, services, or processes to enhance their performance and competitiveness. Braun (1981) defines manufacturing innovation as "a new method of producing an essentially established product by an essentially established process" (p. 274), while Yamamoto and Bellgran (2013) highlight manufacturing innovation as an organization-wide process improvement. This study views manufacturing innovation as a broader organizational effort, rather than focusing on specific technological improvements.

A second form of innovation relevant to the study is open innovation, which refers to the use of external knowledge to support internal innovation practices. ***Open innovation*** highlights how companies integrate external actors into their innovation processes (Chesbrough, 2006; West & Bogers, 2014). Although open innovation is not the primary focus of this study, it provides a contextual foundation for understanding the use of externals in innovation.

Building on open innovation, ***customer co-creation*** is defined as the involvement of an organization's customers in the process of value creation. Customers contribute ideas, knowledge, or feedback to influence the development or improvement of a company's products, services, or processes (Prahalad & Ramaswamy, 2004; Vargo & Lusch, 2008). In the context of this study, customer co-creation is examined as a mechanism for integrating customer knowledge and expertise into a manufacturing company's innovation program in order to enhance innovation.

Finally, the term ***innovation program*** is defined as a structured organizational framework used to generate, enhance, manage, and sustain innovation in companies. In this study, the term refers to internal efforts or teams within manufacturing companies that facilitate innovation through idea generation, campaigns, and initiatives.

The scope of this study is limited to examining customer co-creation within manufacturing companies operating in Finland. The study adopts a qualitative approach, using semi-structured interviews and a benchmarking analysis as data collection methods. The interviews will be limited to employees within the case company, while the benchmarking analysis will focus on manufacturing companies with established innovation programs. This scope allows us to understand how customer co-creation can be implemented in innovation practices within the Finnish manufacturing sector. The study does not aim to analyze all forms of open innovation or technological innovation within the case company, but rather to focus specifically on customer involvement within structured innovation activities.

1.3.1 Background with Case Company

This study will narrow its focus to co-creation specifically through the lens of manufacturing companies, an area that has been less explored in innovation research. Manufacturing has advanced substantially over the past decades as a result of advances in production technology, information systems, and strategic management approaches

aimed at reducing costs, improving product quality, and optimizing efficiency and profitability (Pereira & Romero, 2017; Lassen & Larsen, 2024). While these advancements have improved operational performance, they have also increased the industry's complexity. Resulting in a growing need to better understand how collaborative innovation can be implemented within the environment.

In response, many companies have begun to acknowledge the need to strengthen their innovation capabilities from traditional in-house innovation practices to external collaboration in order to remain competitive. Although prior research highlights the importance of external collaboration for innovation, empirical studies on how customer co-creation can be implemented into innovation programs in manufacturing companies remain limited.

To address this, the study adopts a case study approach focusing on a Finnish manufacturing company. The case company is a large manufacturing company that is underway in exploring the adoption of customer co-creation as part of its ongoing innovation program. While customer co-creation practices have not yet been implemented, the company has a growing interest in developing new approaches to implement collaboration into its innovation program. Examining customer co-creation through a case company aims to understand the challenges and opportunities that arise when introducing co-creation within an established manufacturing company.

The case company is a global manufacturing and technology organization based in Finland. The company provides lifecycle solutions in both the energy and maritime sectors. They specialize in designing and producing energy-efficient propulsion systems, digital technologies, and power-generation equipment, while simultaneously working towards helping its customers transition to more sustainable operations. The company has a long-established reputation for engineering excellence and research and development, and a background in collaborative development through partnerships with customers, suppliers, and academic institutions (case company, nd).

The study uses the case company as an empirical context to investigate the broader concept of implementing customer co-creation in manufacturing innovation activities. The aim of the study is to investigate organizational, structural, and managerial aspects influencing the implementation of co-creation practices in the case company and, therefore, to contribute to the limited research on the topic.

1.4 Structure of the Study

This thesis is divided into five sections. The structure is as follows: the first section is the introduction to the study, which includes the background, research gap, purpose, research question, objectives, and the scope of the study. Providing the reader with the necessary context for why the study was conducted.

After the introduction, the second section is the literature review. This section will provide the theoretical background for the study. The section covers open innovation and innovation programs, innovation programs in the context of manufacturing companies, customer co-creation in the context of innovation programs, integrating customer co-creation into innovation programs in manufacturing companies, and finally, barriers and challenges as well as organizational enablers and managerial considerations for integrating customer co-creation into innovation programs. The literature review forms the foundation for the findings section and is reflected through a thematic analysis.

The third section is the research methodology section. This section discusses the research design, describing in detail the choices made and the strategy employed. Furthermore, the section discusses sampling, data collection methods, data analysis, and the validity and reliability of the study to ensure the rigor and credibility of the findings.

The fourth section presents the findings of the study. It outlines the results of the case company interviews and the benchmarking analysis. Drawing on findings from case

company interviews, benchmarking analysis, and the theory presented in the literature review, this section provides managerial recommendations for implementing customer co-creation in manufacturing firms.

Lastly, the final section is the summary and conclusions. This section provides a summary of the overall study, discusses the theoretical contributions and limitations, and offers suggestions for future studies within the subject area.

2 Literature Review

This section of the study contains the literature review, which forms the theoretical background for the study. A literature review was conducted to gain a more in-depth understanding of the study's theoretical foundation and to serve as a basis for formulating the interview questions. The literature review will synthesize existing research to identify key topics and gaps that are relevant to the study. The research will first focus on broader topics, such as understanding open innovation and innovation in manufacturing companies, before narrowing down to innovation programs and customer co-creation in manufacturing contexts. Finally, the research will examine organizational enablers and managerial considerations for implementing customer co-creation into innovation programs.

The information for this literature review is primarily gathered using Boolean and ABD-Title-Key searches on the Scopus scientific database. Key terms used in the search included “Innovation”, “Open innovation”, “Manufacturing”, “Manufacturing innovation”, “Innovation program”, “Innovation initiative”, “Customer co-creation”, “Value co-creation”, “Customer involvement”, “Collaboration”, “Industry 4.0”, and “Case study”. The selection was narrowed down to peer-reviewed articles from relevant fields such as innovation management and industrial management.

Having established the literature review parameters, the following sections explain the core theoretical themes of this study. The review begins with innovation and open innovation in manufacturing companies. Discussing these concepts first will provide a foundation for exploring innovation programs and customer co-creation later on.

2.1 Innovation and Open Innovation

Innovation has long been considered a driver of organizational competitiveness and long-term success. Without innovating, organizations die (Chesbrough, 2003). Early work

by Schumpeter (1942) describes innovation as a process of “creative destruction”, where new combinations of resources replace old ones to generate economic progress. By this definition, any organization seeking to gain profit must innovate (Śledzik, 2013). This perspective of innovation remains foundational, however, more modern research has expanded the idea of innovation to include a wide range of activities. The concept of innovation has evolved beyond product innovation to include processes, services, and business models that together maintain a firm’s competitiveness.

Traditionally, innovation was largely seen as an organization’s internal process. Organizations competed with each other through improving their internal research and development activities (Chesbrough, 2003). Due to this, large organizations often succeeded with innovation better than small and medium-sized companies (SMEs) as they had the knowledge and capability for large-scale R&D (Chesbrough, 2003). However, technological advancements, faster production to market times, and digital collaboration of the 20th century have come to change the setting (Lee et al., 2012). Nowadays, organizations do not and have no need to invest in product development themselves. Organizations have increasingly recognized the sufficiency of collaborating with external partners to remain competitive (Bogers et al., 2017). This has simultaneously opened up the possibility of SMEs to rise rapidly (Chesbrough, 2003).

These developments made the rise of the open innovation paradigm possible. Chesbrough’s book (2003) is considered one of the revolutionary publications on the subject matter. The open innovation paradigm by Chesbrough (2006) is described as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation” (p. 1). Since Chesbrough’s seminal work, the scholarly studies on open innovation have increased exponentially. The paradigm presented a significant shift from the firm-centric innovation model towards more collaborative approaches, in which knowledge can flow both in and out of organizational boundaries (Chesbrough, 2006; Bogers et al., 2017) .

Previous studies identify the two main motivators and drivers towards open innovation as improved innovation through scale economies and access to innovation outside firm boundaries. The open innovation paradigm explains that the use of external knowledge in company ideation is more of a requirement than a suggestion in today's business environment (West & Bogers, 2014). This suggestion for the use of external knowledge enhances the need for mechanisms to manage the integration of external knowledge in innovation activities. However, existing research has scarcely studied how external contributions can be implemented into organizations' practices.

2.1.1 Innovation Programs

As innovation has evolved from a firm-centric process to a more collaborative approach, companies have been pressured to manage their innovation more strategically. As a result, some organizations have established formal innovation programs to provide structure and coordinate innovation activities. Innovation programs are organizational frameworks for enhancing, managing, and sustaining innovation within companies. Such programs function as an environment where idea formation, knowledge sharing, and development are possible. Research by van de Vrande et al. (2009) shows that companies increasingly require formal mechanisms to manage their innovation capabilities and to find new ways to innovate their innovation process.

Some motivations companies experience in implementing innovation programs are unlocking untapped employee innovation potential, responding to competition, meeting customer needs more effectively, and reducing innovation costs and risks. Furthermore, innovation programs can serve as a platform for external use of innovation as a complement to internal innovation capabilities. Studies on employee-driven innovation have shown that companies have dormant innovation capabilities and that organizations are underutilizing the innovative and creative potential of their employees (O'Connor & DeMartino, 2006; Kesting & Ulhøi, 2010). Similarly, several studies have endorsed that innovation from the individual employee level promotes organizational success (van de Vrande et al., 2009).

However, this potential is rarely utilized without a formal innovation structure that allows employees to contribute freely to innovation. Kesting & Ulhøi (2010) find management support to be one of the key factors for such employee initiatives. Innovation programs address the knowledge and ideation gap between employees and management and R&D teams by granting employees time, resources, and opportunities to be included in decision-making processes that are not typically part of their routine work. Therefore, by implementing formal innovation programs, companies can balance managing their current operations while exploring and developing new operations, without overloading individuals or R&D teams. Hence, increasing ambidexterity in their operations, which by Birkinshaw & Gibson (2004) description is an organization's ability to execute current operations and processes while having the capacity to innovate and reconfigure its activities as a response to market demands.

Lastly, innovation programs serve as a promising platform for implementing external inflows of knowledge to companies' innovation capabilities. The increasing utilization of open innovation in organizational activities has encouraged collaboration with customers, suppliers, institutions, and even competitors. Innovation programs serve as a possible platform for testing a more collaborative approach to innovation without hurting the company’s day-to-day operations. While innovation programs can provide structure and coordination, and are recognized as a possible tool for managing external innovation, their role in enabling customer co-creation is understudied. The literature on innovation management focuses more on idea generation and formal innovation processes, leaving a gap in the value of customer involvement and the mechanisms for implementing it. Studying this gap is important as customer co-creation is a way to leverage customer knowledge, aligning with open innovation principles and supporting organizations’ competitiveness and long-term success.

2.2 Innovation Programs in the Context of Manufacturing Companies

While innovation programs have been implemented in the operations of companies across all industries, they are particularly relevant in the manufacturing industry. Innovativeness has been seen as a crucial element in manufacturing companies' survival and growth (Marzi et al., 2017). Companies in this field must keep up with constant advancements in production technology, material science, information technology, and changing organizational frameworks (Lassen & Larsen, 2024). Manufacturing industry characteristics, such as technological complexity, long development cycles, and large investments, create a complex operational environment. As a result, introducing new ideas and product development, especially from external sources, may prove difficult for organizations. Therefore, the need for more structured approaches for integrating externals in manufacturing companies' innovation activities has become increasingly important. The industry-specific conditions make innovation programs a valuable tool for companies to structure their innovation practices and provide a systematic way to leverage external knowledge.

Given the challenges of the industry, manufacturing companies have had to reconsider how innovation is sourced and developed. Traditionally, manufacturing companies relied on internal R&D as the main source of knowledge for innovation. However, due to the shift towards an economic climate where external use of knowledge is no longer considered a competitive advantage but a means to survive, manufacturing companies have been required to expand their innovation capabilities and to combine internal expertise with insights from customers, suppliers, and research organizations. Drawing information from a wide range of sources has been shown to increase the novelty of innovation results (Amara & Landry, 2005). However, coordinating these diverse knowledge sources introduces coordination challenges and poses challenges for maintaining organizational ambidexterity. This change requires coordination internally, at both the management level and with line workers.

These coordination challenges closely relate to how organizations maintain ambidexterity in their operations. Although innovation in manufacturing is often considered costly and risky, Veugelers and Cassiman (1999) found that these factors do not deter manufacturing companies from innovating but rather help determine their innovation strategy. Their study found that large companies are more likely to adopt a hybrid approach, which integrates both internal and external knowledge sourcing into their innovation strategy. However, coordinating innovation efforts becomes more complicated when more knowledge sources, such as customers, are involved in the innovation process.

Given the complexity of knowledge sourcing and the need to maintain organizational ambidexterity, innovation programs offer a mechanism for manufacturing companies to manage these challenges by providing structure, clear processes, and resource allocation, without disrupting operational efficiency. Moreover, innovation programs can serve as a platform for companies to systematically implement customer co-creation into their innovation practices while managing both coordination and integration challenges.

2.2.1 Implementing Innovation Programs in Manufacturing Companies: Challenges and Opportunities

The implementation of innovation programs in manufacturing companies requires careful alignment of both operational efficiency and innovation activities. Manufacturing companies must be able to balance their operational efficiency and innovation capabilities (Birkinshaw & Gibson, 2004). The manufacturing field is often characterized as large-scale production, large investments, specialized labor, complex technology, tightly coupled processes, and strong demand for efficiency, which, as a result, makes it difficult to introduce flexibility into operations and makes innovation difficult to manage (Marzi et al., 2017; Lassen & Larsen, 2024). While innovation programs may help organizations in resource allocations, cross-functional operations, and provide more structured processes for innovation activities, creating such programs within the manufacturing environment remains challenging. These manufacturing characteristics

are particularly relevant for companies seeking to integrate customer co-creation, as they may limit an organization's abilities in incorporating external knowledge into their innovation activities.

To face the structural challenges of the manufacturing industry, organizations need to develop their capabilities that support learning, experimentation and collaboration. Innovation management research emphasized that companies must constantly evolve their technological knowledge and production capabilities to remain competitive (Henderson & Clark, 1990; Wheelwright & Clark, 1992). Companies depend on the organizational capabilities that enable experimentation and collaboration. Therefore, developing an organization's learning capability is important as it enables organizations to absorb and utilize new knowledge. Alegre and Chiva (2008) studied the effects of learning capability on an organization's product innovation performance. They identified key dimensions of learning capability, including experimentation, risk-taking, interaction with the external environment, dialogue, and participative decision-making, and suggested that these significantly influence innovation performance in manufacturing firms.

In addition to organizational capabilities, the implementation of innovation programs also depends on an organization's strategy, leadership, and culture. O'Regan et al. (2006) found that organizational behaviour is a significant driver of innovation performance. Their study showed a close association between strategy, organizational culture, leadership, and innovation. Companies with a stronger emphasis on strategy attributes and more defined leadership and culture styles had higher performance than their counterparts. Furthermore, this alignment between organizational culture and innovation is relevant in the context of co-creation, as an organization's internal willingness to collaborate with its customers is driven by the organization's culture and leadership priorities.

2.3 Innovation Programs in the Context of Customer Co-Creation

Customer co-creation has become an increasingly relevant topic in innovation management. Much of the existing literature focuses on value creation with customers and gives little attention to how co-creation can be implemented into innovation structures in manufacturing settings. Seminal work by Prahalad and Ramaswamy (2004) described the core principle of customer co-creation as engaging companies and customers to collaborate to create value together. Later expanded on by Galvagno and Dalli (2014), who define it as a joint, collaborative process that produces new value for companies and customers materially and symbolically. These, and several other studies in innovation management, realize that an organization's own competency in value creation is not sufficient to maintain sustainable competitive advantage (Lee et al., 2012). The works of these authors identify co-creation as a tool for value creation, especially in the current ever-changing market of technological advancements, shorter product lifecycles, and shorter lifespan of competitive advantage. In the context of this study, co-creation is a mechanism for integrating customer knowledge into formal innovation structures rather than a broader value creation tool.

Expanding on the innovation management perspective, co-creation literature builds upon the studies on user innovation and lead users. The seminal work by von Hippel (1986) demonstrated that lead users' needs are often ahead of the general market and, therefore, are a source that companies can leverage to create advanced solutions. Similarly, Prahalad and Ramaswamy (2004) proposed customers as active partners who can contribute essential knowledge. While these works showed that customer involvement can improve innovation quality and reduce uncertainty about new product market acceptance, they offer limited guidance on how such processes can be integrated into an organization's operations.

Moreover, numerous studies emphasize the need for a structured approach to collaboration practices. Ramaswamy and Gouillart (2010) identified four core elements that enable collaboration and value creation: experience mindset, context of

interactions for collective intelligence, engagement platform, and network relationships. Their study demonstrates that co-creation is not merely about collecting customer opinions and input, but requires an organizational framework and formal structures to effectively leverage scattered knowledge across industries. Aligning the role of innovation programs as a beneficial framework for managing innovation activities.

This perspective aligns with Teece et al. (1997) dynamic capabilities framework, which argues that companies must constantly integrate internal and external firm-specific capabilities in order to remain competitive. Yet a company's ability to effectively use external knowledge in its operations depends on its absorptive capability. Described by Cohen and Levinthal (1990) as a company's ability to recognize, assimilate, and apply external knowledge. In the context of this study, in manufacturing companies where operations are often efficiency-driven, a company's dynamic and absorptive capabilities are crucial for the effective use of customer input.

While some studies have shown that system-level design mechanisms, such as innovation programs, can improve innovation outcomes, little empirical insight has been provided on strategies for embedding such processes into formal structures. Innovation programs rely on external knowledge to enhance creativity and reduce risk (Bogers et al., 2017), and companies with cross-functional collaboration structures are better suited to transform customer contributions into innovation outcomes. This suggests that integrating customer co-creation into existing innovation programs has a strategic advantage. Customer co-creation can augment the process of transforming external knowledge into new opportunities and help create market-relevant innovation (Prahalad & Ramaswamy, 2004). As such, innovation programs have the potential to operationalize customer co-creation by providing the coordination and structure needed to manage external knowledge.

Examples of co-creation practices can be found in many corporate innovation program types, such as accelerator programs, design thinking initiatives, and innovation hubs.

Empirical studies often provide examples of open innovation initiatives in companies such as Xerox, Intel and IBM (Chesbrough, 2003). More recent examples of companies integrating customer co-creation in their innovation practices include several high-tech industries, such as Nike, Mattel, and Dell (Lee et al., 2012). These examples demonstrate how co-creation can enhance innovation outcomes when the company has the right organizational capabilities and a system-level design to facilitate such operations. These examples further demonstrate the need to understand how co-creation can be adapted in the manufacturing environment, where operational constraints and organizational structures differ from those in the service and high-tech industries.

2.3.1 Implementing Co-Creation into Innovation Programs: Challenges and Opportunities

While the benefits of customer co-creation are well-known, the practical implementation of co-creation into innovation programs faces both challenges and opportunities for companies. Implementing customer co-creation in innovation programs demands more than inviting customers to contribute their ideas. Empirical studies discuss organizational capabilities and operational requirements for implementing collaborative practices.

One challenge presented in co-creation literature revolves around organizational readiness to adopt new innovation practices. Co-creation relies on open exchanges between the company and its customers, while many firms operate with more linear innovation processes that are not designed for external input (Enkel et al., 2009). A misalignment between a company's innovation strategy and collaborative innovation desires can hinder the integration of customer contributions and limit the effectiveness of innovation programs.

In addition to organizational capabilities, integrating customer knowledge into innovation processes increases the volume and variability of information received (Bogers et al., 2017). Companies must, therefore, have the mechanisms to filter and

prioritize customer-given information to make the correct decisions for their own operations. This further reinforces the importance of a firm's absorptive capacity. Companies aiming to enhance their collaborative innovation must possess prior knowledge of cross-functional collaboration and have suitable internal structures to integrate external inputs (Cohen & Levinthal, 1990).

Furthermore, it is important to note the motivating factors driving engagement in co-creation. Füller (2010) found curiosity, dissatisfaction with existing products, intrinsic interest in innovation, to gain knowledge, to show ideas, or monetary rewards as key drivers encouraging customer participation. However, the use of incentives requires careful consideration, as Füller (2010) found that monetary rewards can lead customers to pursue compensation rather than genuinely contribute, resulting in non-serious inputs. Moreover, some studies have viewed the integration of customers into innovation processes critically, arguing that employing customers as co-creators may be seen as manipulation, as labor traditionally performed by the company is shifted to the customers themselves (Bonsu & Darmody, 2008; Zwick et al., 2008).

At the same time, co-creation presents several opportunities for companies' innovation programs. One widely acknowledged opportunity is the potential for market insights from the customers, leading to less market uncertainty. Specifically, lead users can note early signs of emerging needs within the market base and help validate innovation choices (von Hippel, 1986). Customer co-creation can also accelerate production-to-market times, as customers may participate in prototyping, testing, and iterating, allowing companies to shorten the development time of their products.

Studies show that co-creation can also strengthen customer engagement and loyalty. Ramaswamy and Gouillart (2010) demonstrate that customers who actively contribute to development processes tend to have stronger emotional bonds with the resulting products and brands. This is especially relevant for innovation programs as they rely on repeated interaction between the customer and company in hopes of long-term

collaboration, providing mutual benefit. Companies that have established clear platforms for collaborative innovation and create shared purpose with their customers are more likely to benefit from co-creation (Lee et al., 2012).

2.4 Integrating Customer Co-Creation into Innovation Programs in Manufacturing Companies

In comparison to service industries, manufacturing companies often operate with a more structured, long-development type process and with a higher complexity of technology. Due to these facts, the use of externals, such as customers, in the innovation process requires careful planning and management of internal processes and collaboration practices. Moreover, co-creation requires adjustments both internally and from the customer (Prahalad & Ramaswamy, 2004). The internal processes of the company must align with the value creation strategy of the organization (Lee et al., 2012), as well as align with the expectations of the external collaborator. To compete effectively in the market, companies must invest in new internal infrastructure to enable co-creation practices and enhance dialogue between both parties. Prahalad & Ramaswamy (2004) describe dialogue as “interactivity, deep engagement, and the ability and willingness to act on both sides” (p. 9). Innovation programs may help provide the necessary structure to manufacturing companies through which they can organize customer collaboration in ideation, development, and testing.

Manufacturing companies have increasingly been seeking means to implement customer input into the innovation activities of the company. As mentioned, this input is important for improving product relevance, reducing uncertainty in product development, and identifying emerging market needs. Literature on user innovation often emphasizes the use of lead users in identifying market needs ahead of the general market (von Hippel, 1986). Similarly, lead users provide valuable insights for new product development, making them a valuable source of information for the co-creation

practices of manufacturing companies. Such collaboration may occur through different collaboration mechanisms, such as customer partnerships for product development, pilot testing, customer advisory meetings, or digital platforms for customers to input their ideas and feedback. These mechanisms enable manufacturing companies to gain early insights into customer needs and run necessary testing before committing to large-scale production or heavy investments (Alam, 2006; Melander, 2019).

Integrating customer co-creation into the innovation programs of manufacturing firms, however, does not come without challenges. As mentioned previously, the organizational structures and capabilities, as well as the willingness of management, heavily influence the adoption of co-creation practices. While some organizations have structures and capabilities for leveraging customer knowledge in their innovation activities, others struggle with difficulties in coordination, the lack of resources, or negative perceptions towards change. Therefore, understanding the barriers and conditions for implementing customer input is crucial.

2.4.1 Barriers and Challenges of Intergration

Despite the many benefits of customer co-creation, integrating such practices into the innovation programs of manufacturing companies may provide several challenges. One of the more frequent challenges is related to internal perceptions of the manufacturing company towards external collaboration. Large established manufacturing companies oftentimes tend to stick to a certain way of operating. Moreover, employees and technical teams involved in innovation may view external collaboration critically, as undermining the expertise within the company. Bogers et al. (2017) describe this phenomenon as the “not-invented-here” syndrome, where organizations feel their work is replaced by external sources. While this syndrome is dependent on the synergy between the internal and external collaborators, this mindset may reduce the willingness of internal teams to utilize ideas from the company and therefore, hinder the possibilities of integrating valuable customer knowledge into the innovation activities of the company.

Another barrier relates to the nature of the innovation process, more specifically, of product development. Large manufacturing companies often rely on formal development models such as the stage-gate process to manage technical innovation. While these models provide the company discipline and control of the process, they may limit the necessary flexibility that implementing external input requires (West & Bogers, 2014). Similarly, the top-down hierarchy of large manufacturing companies may also influence the implementation of customer co-creation. New innovations as well as the use of externals, typically require the support of management to move forward (O'Connor & DeMartino, 2006).

In a similar fashion, another challenge facing the innovation activities is the justification of the financial investment of the project. Any new idea moving forward from the idea stage requires a financial justification before allocating resources to the development of the idea. However, due to the uncertainty of early-stage innovation and the nature of co-creation, these activities may be hard to value and financially justify in the early stages of development (Chesbrough, 2003; Cooper, 2008). The uncertainty of such projects may cause management to prefer more financially predictable development projects over customer co-creation. Resource allocation for such projects also presents a barrier for integration. Managing collaborative innovation requires dedicated employees, time, systems, and funds for collecting and evaluating customer knowledge and feedback. Without a dedicated person for such endeavors, the allocated time for innovation is time taken from employees' routine work (Kesting & Ulhøi, 2010). As mentioned earlier, Cohen and Levinthal (1990) state that organizations must possess a sufficient absorptive capacity to successfully manage and implement external knowledge.

Lastly, a challenge facing specifically the innovation activities of manufacturing companies is the technological complexity of their products. Their products and production systems often require highly specialized engineering knowledge that may not

be available or accessible to external collaborators. The complexity of the technology may therefore limit the capability of effective contributions made by the customers. Moreover, selecting the appropriate customers for any innovation idea presents yet another challenge. While customers may provide insights, not all possess the necessary knowledge or experience for technological innovation. Engaging with unsound customers may cause the manufacturing company to receive feedback that is not relevant for future market developments (von Hippel, 1986).

All in all, these barriers and challenges demonstrate that implementing customer co-creation into the innovation programs of manufacturing companies requires detailed planning and management from the organization's side as well as careful alignment between the organization and the external collaborators.

2.4.2 Organizational Enablers and Managerial Considerations

Literature on customer co-creation also highlights organizational conditions that help enable companies in implementing customer knowledge into innovation activities. One such factor is the organization's culture towards open innovation and external collaboration. Studies show that companies that encourage openness benefit most from co-creation initiatives (Bogers et al., 2017). Moreover, leadership plays a key role in driving external innovation forward. Not only are managers able to motivate their employees in terms of mindset towards an open innovation culture, but they also play a crucial role in encouraging cross-functional collaboration within the organization (West & Bogers, 2014).

The integration of customer knowledge into innovation activities often requires coordination across an organization. Lee et al. (2012) state that in order to facilitate external collaboration, organizations must have a functioning collaborative internal culture. Furthermore, cross-functional teams can help when customer knowledge needs to be adapted into the development activities of the organization, as technical teams, marketing, and business units are aligned with one another. Additionally, an

organization's learning capability also plays a role when integrating customer knowledge effectively. In their research, Alegre and Chiva (2008) discuss this as the company's capability to generate, acquire, and transfer knowledge. Companies with a strong learning-oriented culture are better suited to receive external knowledge and transform it into innovation outcomes.

For successful external collaboration, organizations need to have a platform for receiving and handling customer knowledge (West & Bogers, 2014). Ramaswamy and Gouillart (2010) emphasize that organizations need a structured platform where customers and other externals may engage with the organization and where their insights can be transformed into development activities. According to Lee et al. (2012), such co-innovation systems enable companies to create value based on collaboration, co-creation with customers, and convergence. The findings of these authors relate, once again, to the absorptive capability framework of Cohen and Levinthal (1990). Companies with strong absorptive capability are better equipped to identify insights from customers and integrate them into their innovation activities.

Lastly, an organization's co-creation ambitions must be aligned with the company's strategy, innovation goals, and business model (West & Bogers, 2014). When customer input is considered in the company's innovation strategy, resource and time allocation for such projects are better justified. Teece (2014) emphasized that organizations need to align their innovation activities with their strategic capabilities in order to respond to constantly changing market environments. Thus, co-creation activities should be integrated not only into the innovation programs but also into the broader goals and strategy of the company.

2.5 Summary of the Theoretical Framework

This literature review focused on the previous empirical research on open innovation, innovation programs, and customer co-creation through the lens of manufacturing

companies. These concepts were examined due to their relevance to the case company, and the research question of how can customer co-creation practices be integrated into innovation programs in manufacturing companies.

The theoretical framework begins by examining innovation as a key driver of organizational competitiveness and long-term survival. While traditionally innovation happened internally within an organization's research and development department, the rapid technological developments, fast market cycles, and growing competition have encouraged firms to approach innovation in a more collaborative manner (Chesbrough, 2003; Chesbrough, 2006; Lee et al., 2012). These developments resulted in the emergence of the open innovation paradigm, which underlines the importance of using both internal and external knowledge in innovation activities (Chesbrough, 2006). The paradigm highlights that valuable knowledge exists beyond the boundaries of one organization and that companies should collaborate with external stakeholders such as customers, suppliers, research institutes, and even competitors, to enhance their innovation performance (West & Bogers, 2014; Bogers et al., 2017).

In order to manage external knowledge, many companies have established innovation programs. These programs are used to provide structure to help the organization manage idea generation, knowledge sharing, and the development of ideas both internally and externally. Such programs are relevant in large manufacturing companies where specialized technological knowledge, operational efficiency, and large investments are needed in their innovation activities. Innovation programs help large manufacturing companies balance their daily activities while exploring new innovation opportunities. Other prior research suggests that organizational capabilities such as learning capabilities, collaborative culture within the company, and leadership support are other driving factors of successful innovation activities in manufacturing companies (O'Regan et al., 2006; Alegre & Chiva, 2008).

Within the open innovation paradigm, the concept of customer co-creation has emerged. Literature on co-creation highlights the importance of customers in generating value and participating in innovation activities (Prahalad & Ramaswamy, 2004; Galvagno & Dalli, 2014). Furthermore, literature on user innovation emphasizes that lead users often recognize emerging needs ahead of the general market and can therefore provide insights into innovation activities (von Hippel, 1986). When integrated into innovation programs, customer co-creation can help companies identify emerging market needs, improve product relevance, and reduce uncertainty in new product innovation.

Additionally, the literature also highlights both barriers and enablers of the integration of customer co-creation into the innovation activities of large established organizations. Such barriers discussed include formal product development structures, hierarchical organizations, lack of resources, complex technology, and negative perceptions towards external contributions. Enabling factors, however, include cooperative organizational culture, support of management, structured platforms for innovating, and strong learning capability (Alegre & Chiva, 2008; Ramaswamy & Gouillart, 2010). Additionally, aligning co-creation with an organization's strategy, innovation goals, and business model was identified as being crucial in the successful integration of external knowledge in innovation activities (Teece, 2014; West & Bogers, 2014).

All in all, previous literature provides assurance that co-creation has potential in enhancing innovation in manufacturing companies, but to be successful, organizational readiness, managerial support, and a carefully managed process or structure are needed. While co-creation has been studied at length in previous research, there is limited understanding of how it can effectively be integrated into established manufacturing companies. Therefore, this study aims to understand and discover best practices on how customer co-creation can be implemented into innovation programs in manufacturing companies and provide managerial recommendations for the case company based on these findings.

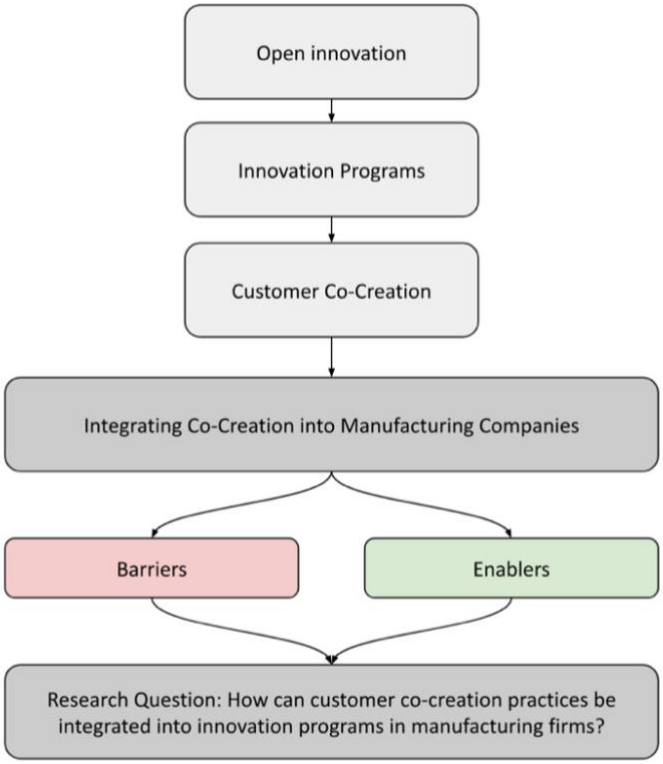

Figure 1. Visualization of the theoretical framework

3 Research Methodology

The methodology section offers an insight into the choice of research design, data collection, sampling, data analysis, as well as the validity and reliability of the study. The methodology section is a crucial part of any empirical study, as it shows how the research was conducted and enables future researchers the possibility of recreating the study. The research methodology section was conducted according to research practices described by Sallis et al. (2021) and case study practices by Yin (2009).

3.1 Research Design

This study adopts a qualitative research design, as qualitative methods enable a deep exploration of a phenomenon to understand whether something exists and how it works (Sallis et al., 2021). The nature of the data collected is what determines whether a study is characterized as qualitative or quantitative. While quantitative data is expressed in numbers, qualitative data consists of non-numerical information, such as communications and observations (Sallis et al., 2021). Because this study aims to gain an understanding of how customer co-creation can be implemented into innovation programs, a qualitative approach is the most suitable.

The research method choices can be justified through the lens of Saunders et al. (2023) research 'onion'. The research onion is a framework that researchers can utilize when designing their research. The outermost layer describes the philosophical orientation of the research. The second layer focuses on the research approach, while the third layer focuses on the research strategy. Furthermore, the fourth layer justified the data types gathered; this is called the choices of the study. The second-to-last layer describes the time horizon of the study, and finally, at the core of the onion, the researcher selects their techniques and procedures for data collection and analysis. The research onion for this study is presented in Figure 2. below.

This study adopts an interpretivism philosophical approach, which is the most appropriate when studying people's views and ideas within a contemporary phenomenon. The interpretivism philosophy is suitable for understanding and interpreting social and cultural factors, worlds, and contexts (Saunders et al., 2023). Continuing from the philosophical stance, the study follows an inductive research approach. The theoretical insights will be based on people's perceptions rather than testing pre-existing hypotheses. An inductive study is appropriate when researching topics that are not yet well theorized and where the goal is to build understanding from the ground up. This logic is relevant for this study, as customer co-creation has not yet been implemented in the case company.

To investigate the subject matter, the study is conducted as a case study, which aligns with the strategy layer of the research onion. While case studies can be considered among qualitative research choices, it is not only a form of qualitative research, as it is considered a flexible research design that is suitable for examining contemporary phenomena in a real-life context (Yin, 2009). A case study is particularly useful when a researcher is aiming to understand a real-life issue and when the boundaries between the phenomenon and its context are not clear. Therefore, a case study is well-suited when the researcher has little to no control over the events being studied and is aiming to study why or how something is happening (Yin, 2009). In the Saunders et al. (2023) research onion the choice of using qualitative data is described as the choice layer, emphasizing that only one type of data is collected (mono method).

Case studies are typically categorized as explanatory, descriptive, or exploratory. This study employs a single-case study using the exploratory approach. An exploratory case study is suitable when the phenomenon is not well understood and when the goal is to examine practices or experiences rather than testing for hypotheses. Therefore, the exploratory approach is suitable for this study. A single-case design is used as the study focuses on one manufacturing company as the empirical setting. A single case can be used to form the basis of research on typical and critical cases whereas multiple cases

may be used to achieve replication or to compare different cases (Schell, 1992). Hence, the results of single-case studies serve as a direction-giving insight rather than statistically generalizable conclusions (Yin, 2009).

Regarding the time horizon layer of the research onion, this study follows a cross-sectional design, as the data is collected within a limited time period, emphasizing the case company's current readiness and need for customer co-creation. Finally, at the innermost layer of the research onion, the study relies on semi-structured interviews and a benchmarking analysis as its data collection methods. The data collection methods are discussed in more detail in section 3.3.

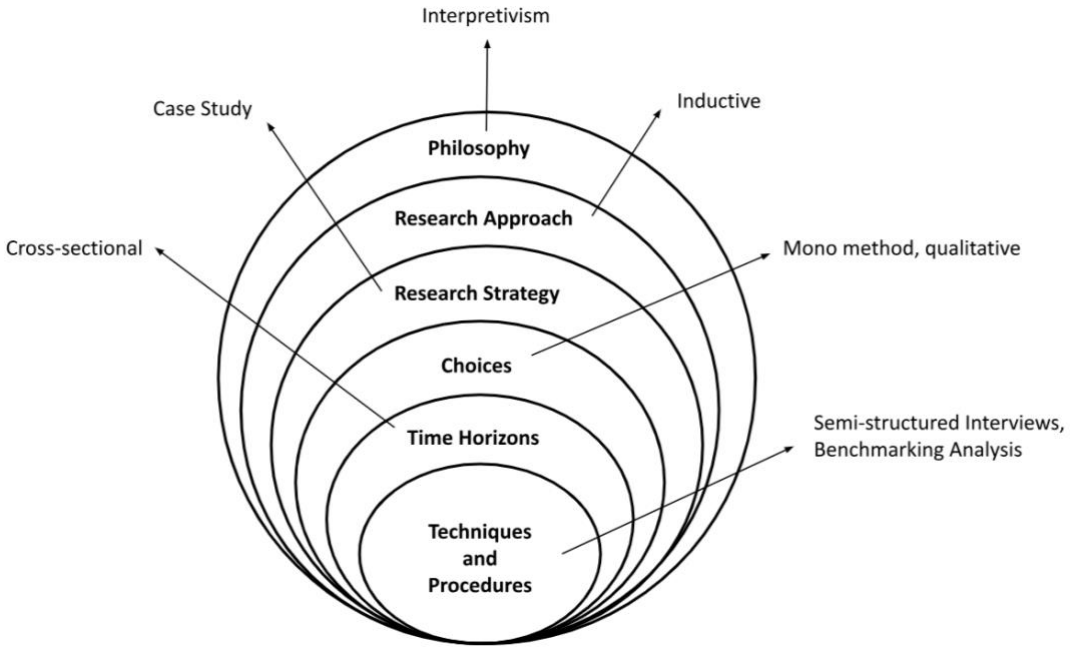

Figure 2. Research Onion (adapted from Saunders et al., 2023)

3.2 Sampling

The choice of sampling for this study is purposive sampling, which is a non-probability sampling method. Sallis et al. (2021) describe purposive sampling as the “selection of units of analysis based on characteristics of the population that the researcher wants represented in the sample (p. 100).” In other words, purposive sampling is common when participants are chosen based on specific knowledge or experience of a specific topic. It is a common sampling method in qualitative studies and is particularly suitable for exploratory case studies. Choosing participants based on their expertise on the research topic enhances the depth of the insights they may have and simultaneously increases the credibility of the study.

The participants for this study were selected from the case company based on their knowledge and involvement in the innovation activities of the company. Employees working in departments such as innovation and product management, offering developmet, and sales development were most likely to provide valid viewpoints of the company’s current innovation processes and its readiness for customer co-creation. More details of the selected participants are presented in section 3.3 on data collection.

Using purposive sampling ensures that the data collected reflects the views of those directly involved with the innovation practices of the case company. Likewise, purposive sampling was used when selecting companies for the benchmarking analysis, as only those manufacturing companies operating in Finland that have a running innovation program were analyzed.

3.3 Data collection

Data collection for this study was done through semi-structured interviews as the primary data and a benchmarking analysis as secondary data. According to (Yin, 2009), the use of multiple data sources is important for the validity of a study. Primary data refers to first-hand information collected directly for the study, whereas secondary data

is other, pre-existing, research-relevant data (Sallis et al., 2021). Due to the exploratory nature of the study, qualitative data is the most suitable for interpreting participants' experiences and knowledge.

The primary data was collected through nine individual in-depth interviews with case company employees involved in the company's innovation activities. Individual in-depth interviews are conducted when an individual's personal opinions and experience are of value for the study (Sallis et al., 2021). The purpose of using interviews as primary data in this study is to gain an understanding from the case company's point of view as to what the readiness of the company is in regards to customer co-creation and how customer co-creation practices could be integrated into their innovation program.

3.3.1 Case Company Interviews

The interviews with the case company were conducted in a semi-structured manner, following a pre-designed interview guide (see Appendix 1). The semi-structured format supports flexibility and depth of the study, allowing the conversation to follow the key questions while permitting follow-up questions and for the participants to elaborate freely. This interview format was chosen to capture the participants' experiences and perceptions regarding the case organization's capability and readiness to integrate customer co-creation into its innovation practices.

The interviews were divided into seven parts, consisting primarily of open-ended questions. Following the introductory questions, the interviews proceeded to examine the current state of the innovation program, organizational culture, and learning capability, the current use of external knowledge and customer collaboration, perceptions of customer collaboration, as well as challenges and requirements related to customer co-creation. The interviews concluded with closing questions.

The length of each interview was approximately one hour, and was conducted via Microsoft Teams. Interviews conducted through Microsoft Teams utilized the platform's

automatic transcription tool, and all interviews were recorded with the participants' permission to ensure accuracy and reliability during transcription and analysis. Both the interviewees and the case organization were anonymized to protect the identities of the participants and any possible confidential information. The interviews were conducted in either Finnish or English, depending on the native language of the interviewee, to ensure clarity, comfort, and natural expression. Quotations from interviews conducted in Finnish were translated into English for the findings section, to ensure consistency in reporting.

In total, nine semi-structured interviews were conducted. The participants for the interviews were selected together with the case organizations based on their involvement in and knowledge of the company's innovation activities. The interviewees presented a range of roles, from team leads to directors, and came from various departments, including innovation and product management, agreement product management, parts and field services, offering development, sales development, service design, and the energy division. People from different areas and with differing responsibilities were chosen to gain a comprehensive understanding of the company's innovation capabilities and the potential for implementing customer co-creation from multiple perspectives.

Table 2. below presents the interviewed person, length, and date of the interview. Altogether, the transcript was 240 pages long.

Table 2. Case Company Interviews

Person	Position/Department	Length	Medium	Date
Interviewee 1	Senior Manager	49 min	Microsoft Teams	5.1.2026
Interviewee 2	Senior Product Manager	58 min	Microsoft Teams	20.1.2026

Interviewee 3	Service Offering Lead	55 min	Microsoft Teams	28.1.2026
Interviewee 4	General Manager	53 min	Microsoft Teams	2.2.2026
Interviewee 5	Sales Development Manager	51 min	Microsoft Teams	2.2.2026
Interviewee 6	Customer Offering Engagement Manager	43 min	Microsoft Teams	5.2.2026
Interviewee 7	Development Manager	32 min	Microsoft Teams	9.2.2026
Interviewee 8	Director	59 min	Microsoft Teams	16.2.2026
Interviewee 9	Senior Product Manager	58 min	Microsoft Teams	16.2.2026

3.3.2 Benchmarking Analysis

In addition to the primary interview data, this study uses a benchmarking analysis as a secondary data source to support the findings from the case company. A benchmarking analysis is a standard tool for the evaluation and comparison of an organization's practices with those of other similar organizations in order to identify best practices and opportunities for improvement (von Kistowski et al., 2015). A benchmarking analysis is well-suited for an exploratory case study, as both approaches focus on gaining an understanding of a phenomenon that is not fully developed. Moreover, this approach enables the investigation in a broader industry context and provides further justification of the managerial recommendation in section 4.5.

In this study, benchmarking is used as a comparison of how co-creation is integrated into the innovation activities of other manufacturing companies operating in Finland. It is used as a secondary data source alongside the qualitative interview data, offering practical insights and external support for interpreting the interview findings. Moreover, the benchmarking analysis helps identify potential gaps or development opportunities from the case company interviews. The analysis findings are further used when creating informed recommendations for the integration of customer co-creation for the case company's innovation program.

This study applies functional benchmarking with a focus on comparing specific functions or processes of a company, rather than overall performance. Functional benchmarking allows for the identification of effective practices from other companies in a specific function or process. Specifically for this study, the functional benchmarking will focus on customer involvement or co-creation in innovation activities. This approach is suitable, as customer co-creation practices may be implemented similarly across the manufacturing field, even if products or markets differ.

The benchmarking companies, presented in Table 3. below, were selected based on two criteria. First, the organization operates in the manufacturing industry and has operations in Finland, and second, the organization has demonstrated the use of customer involvement or co-creation in its innovation activities. Data for the benchmarking were collected from publicly available sources, including corporate websites, annual reports, industry articles, and publications. As the analysis relies on secondary data and the findings are based on reported practices rather than direct observation, this should be considered in the findings of this study in Chapter 4.

Table 3. Benchmarked Companies

Company	Industry	Innovation Program / Initiative	Type of Customer Co-Creation	Source
KONE	Elevators and escalators	Veturi programs and Renaissance ecosystems	Customer-driven pilots and ecosystem collaboration with end-users and partners	*KONE. (n.d.). 2020-2024: KONE Veturi the Flow of Urban Life.*
ABB	Electrification and automation technology	H2 Springboard and Dynafin™ projects	Customer collaboration in pilot projects and joint technology development initiatives	ABB. (n.d). Dynafin™. ; H2Springboard. (n.d.). Frontpage
Metso Outotec	Aggregates, minerals processing, and metals refining	Innovation center Espoo	Co-development with customers through testing, pilot environments, and innovation centers	Metso. (2026). Metso Innovation Center.
Stora Enso	Packaging, biomaterials, and wooden construction	Innovating with startups	Collaboration with customers and startups in joint innovation and solution development	Stora Enso. (n.d.). Creating value through innovation.
Nokia	Telecommuni-cations infrastructure	Veturi programs, innovation hubs, and garages	Co-innovation with customers via innovation hubs, labs, and ecosystem partnerships	Nokia. (2026). Nokia Veturi programs
Patria	Defence and security technology	eALLIANCE	Collaborative development with customers and partners within secure innovation ecosystems	Patria. (2024). eALLIANCE - securing societies
MAKE	Multiple industries	Multi-member co-innovation networks	Multi-stakeholder co-creation networks involving companies, customers, and research actors	MAKE. (2024). About us.

3.4 Data Analysis

Following data collection, the interviews were carefully transcribed and reviewed to ensure accuracy. The involved re-reading the automatic transcription provided by Microsoft Teams and checking it with the original video recordings to check for errors. Interviews were transcribed in their original language (Finnish or English) and quotations from the interviews conducten in Finnish that were presented in the findings section were translated into English to ensure consistency in reporting while preserving the original meaning of the responses.

After ensuring the accuracy of the data, a systematic qualitative data analysis process was conducted. This study employs the Gioia methodology, and the analysis followed a common structure for the qualitative research process of compiling, disassembling, reassembling, interpreting, and concluding (Castleberry & Nolen, 2018).

Before beginning active coding, the research question and objectives of the study were revisited to gain a proper understanding of the focus. The transcripts of each interview were read multiple times to familiarise myself with the material and ease the identification of the value-adding content relevant to the research question. The Gioia methodology has three distinct steps, which were followed. The 1st order of analysis, including the analysis of raw data and identifying key phases and concepts to find similarities in the answers, the 2nd order of analysis, where these concepts are created into broader, more theory-centered themes, which helps in reducing the number of categories, and finally, the aggregate dimensions, where the 2nd order themes are further distilled into dimensions to explain the phenomenon (Gioia et al., 2013). Figure 3. below demonstrates the data structure of this study. Illustrating how the themes and concepts are connected, as well as how the data was shaped from raw text to aggregate dimensions (Gioia et al., 2013).

As mentioned above, the Gioia method was used in this study. The Figure 3. below presents the methodology in use visually. During the analysis of the data, 146 first-order

codes were discovered. Out of these, 12 second-order codes were constructed, which were further compiled into four aggregate dimensions :

1. Case Company Innovation Strategy and Culture
2. Organizational Structures and Processes
3. Current Customer Knowledge Utilization
4. Industry Constraints

Although 146 first-order codes were found, not all were considered, as some were outside the scope of this study. All the codes considered are presented in Figure 3. below. After structuring and interpreting the data, the empirical findings are discussed in relation to the theoretical framework of the study in Section 4. The data analysis is concluded by answering the research question and summarizing the findings in Section 5.

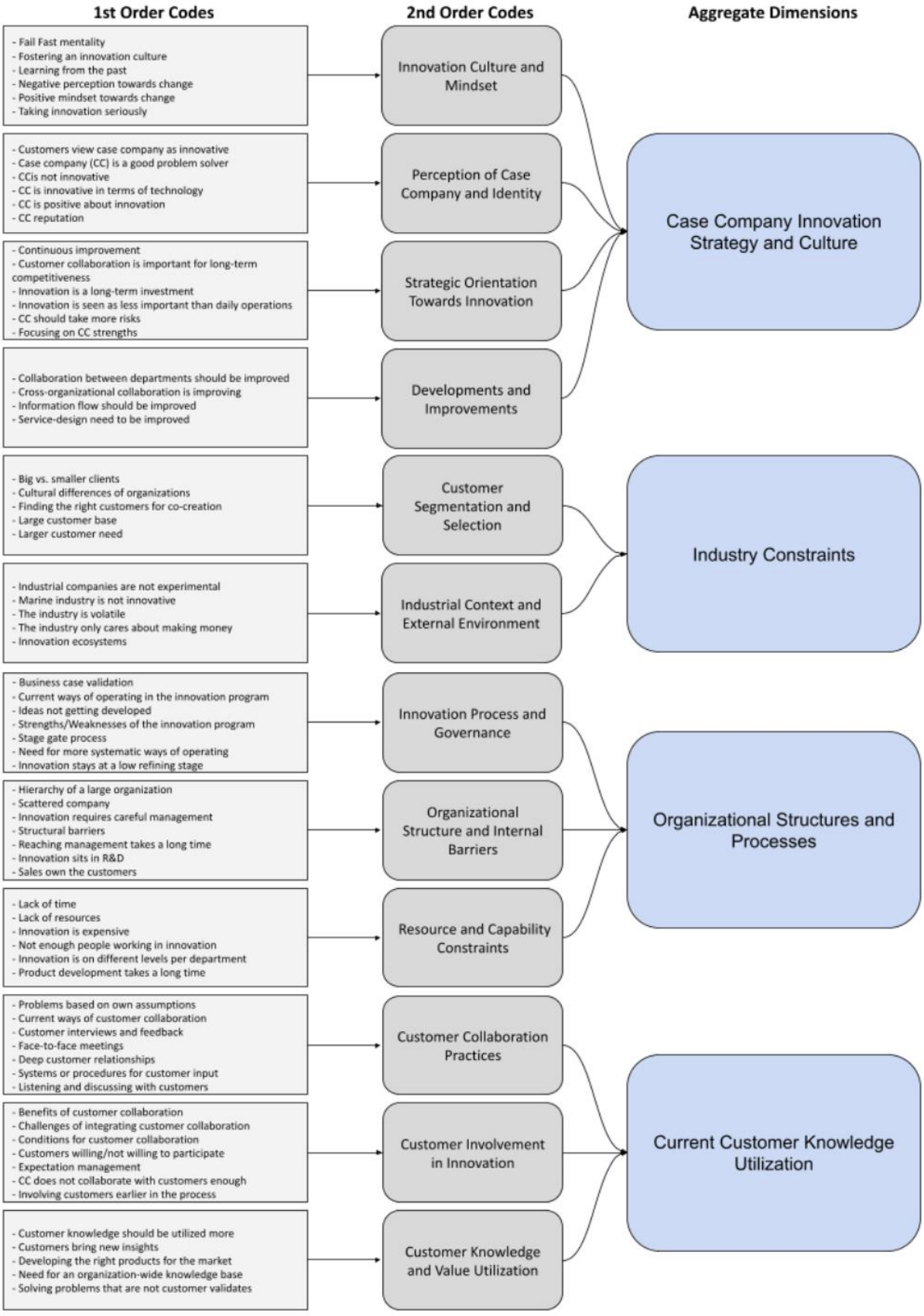

Figure 3. Data Structure of the Study

3.4.1 Benchmarking Data

In addition to the interview data, the benchmarking analysis was conducted to provide an external point of comparison and an industry perspective to the case company's innovation practices. The data were gathered from publicly available documents, company websites, reports, and publications from selected manufacturing firms operating in Finland (see Table 3). The selected companies were chosen for their established collaborative innovation practices, as they are relevant to the study.

The material was then reviewed and categorized to identify common themes and practices relating to collaborative innovation. By combining the case company interview findings with benchmarking results and existing literature, the study strengthened the analysis through triangulation. Furthermore, the findings from the benchmarking analysis were used to validate case findings and provide further reasoning for the managerial recommendations for the case company discussed in Section 4.5. Situating the case company within an industry context made the findings more reliable and helped to form well-grounded, practical recommendations.

The benchmarking analysis concentrated on:

- How customer co-creation is structured within innovation activities
- What mechanisms were used for customer involvement
- Different collaboration models and ecosystems
- Organizational enablers supporting co-creation

The identified practices were then compared with the case company's innovation approach. The findings enable the identification of similarities, gaps, and potential development opportunities. The analysis is reflected in the findings and forms a basis for the managerial recommendations presented in Section 4.5.

3.5 Validity and Reliability

The quality of a study is commonly measured by examining the validity and reliability of the study. This is an important part of the study as it helps enhance the credibility and transparency of the findings. Validity refers to the extent to which the study accurately measures what it was intended to investigate (Saunders et al., 2023). According to Yin (2009), the four main criteria for evaluating the validity of case studies are internal validity, construct validity, external validity, and reliability. Construct validity is used to identify the correct method for data collection. Internal validity mainly concerns exploratory studies, and the aim of it is to explain the causality between the findings and the interpretation made by the researcher. External validity measures the generalizability of the study, and finally, reliability explains the repeatability and transparency of the study.

The first measure, construct validity, essentially examines whether the correct methods were established to study what it claims to study. Yin (2009) states that construct validity can be improved through the use of multiple sources of evidence. In this research, nine case company interviews are used as primary data. To provide a diversified view, interviewees were employed in different tasks and departments within the case organization. An interview guide was used to ensure the interviews were aligned with the research objectives. Moreover, the use of multiple data sources, including semi-structured interviews and benchmarking, was used to ensure the findings were supported by different types of data evidence.

Internal validity, in essence, refers to whether the conclusions drawn from the data are supported by the collected data. First, each interview was recorded and transcribed in order to avoid biased interpretation. Second, internal validity was strengthened by the systematic manner in which the interview data were analyzed. The Gioia methodology was used to ensure that the themes were based on the interviewees' statements. During this stage, the computer software NVivo was used to avoid manual mistakes. Translations were applied only to selected quotations presented in the findings section, to

maintaining the integrity of the original data during analysis. Lastly, the use of secondary data helped support the interview findings.

For the third measure, external validity, it is commonly acknowledged that a single-case study is not intended to produce generizable results. Instead, the study aims to provide insight and recommendations within the specific case context. Through clear descriptions of the data collection and analysis methods, the study aims to improve transparency, which allows future researchers to understand how the findings were produced.

Finally, reliability, which refers to the consistency of the research and whether or not the results could be replicated using the same research methods, was supported by the careful documentation of the research process. As mentioned previously, all interviews were recorded and transcribed for accuracy, and the coding software NVivo was used to reduce manual errors. All research procedures were described in detail to increase transparency and allow for other researchers to follow the same process.

3.5.1 Ethics

Ethical considerations were taken into account throughout the research process. First, all participants were made aware of the purpose of the study, and all participation was voluntary. All the names of the case company, as well as all interviewees, remain anonymous to protect the identities of the participants and the confidentiality of the case organization. Anonymity encouraged open and honest discussion, specifically when addressing organizational challenges, customer-related information, or internal practices. Second, each participant was asked for consent to record the interviews. The recordings were used only for the sole purpose of this study and were stored securely. Recording the interviews ensured the accuracy of the transcription and reduced the risk of misinterpretation.

Artificial intelligence (AI) tools were used in supportive tasks during the research process. The Microsoft Teams' automatic transcription feature was used to assist in the transcription of interviews. In addition, Grammarly was used for grammar correction during the writing process, and ChatGPT was used for brainstorming purposes and refining the research question. However, AI tools were not used for producing text, coding, interpreting the findings, or drawing conclusions. As the use of AI was limited to supportive tasks, it did not replace the researcher's own critical thinking and academic knowledge.

4 Findings and Discussions

In this section, the findings from the case company interviews and benchmarking analysis will be presented and discussed. The findings will be analysed with a within-case analysis approach.

The section begins by examining the case company's innovation strategy and culture, followed by an analysis of organizational processes and structures. These sections help assess the organization's readiness for implementing customer co-creation into its innovation program. Next, the current customer knowledge utilization in innovation activities is discussed, followed by an overview of industry constraints.

Finally, the section will provide the case company with managerial recommendations for implementing customer co-creation. The discussion connects the interview findings with the benchmarked insights from other industrial companies with similar innovation initiatives. The section will conclude with the summary of findings.

4.1 Case Company Innovation Strategy and Culture

This part examines how innovation is strategically positioned within the case company, connecting the empirical findings with theoretical perspectives, such as ambidexterity and organizations' dynamic capabilities. Discussing innovation in relation to company strategy and culture. The analysis explores how the interviewees view the company's attitude towards experimentation, risk-taking, collaboration, learning capability, and how the company is creating value for its customers through innovation. Additionally, the section evaluates the extent to which these characteristics indicate the case company's readiness to integrate customer co-creation into its innovation activities.

4.1.1 Strategic Orientation Towards Innovation

An organization's strategy guides how employees manage their daily operations and prioritize activities. An innovation strategy helps companies align their innovation activities with organizational goals and long-term competitiveness. Innovation strategy in literature is often linked to dynamic capabilities, which emphasize an organization's ability to adapt, integrate, and reconfigure internal and external competencies (Teece et al., 1997). Positioning innovation at the core of business operations can help organizations with resource allocations and responding to market needs.

A theme discovered from the interviews is that innovation is positioned as an important aspect of the case company's strategy. In particular, the findings suggest that the innovation activities of the organization often focus on improving existing products, services, or operations, rather than new product development. The finding indicates that the case company has a strong orientation towards gradual improvements rather than exploration, which shows a limited level of organizational ambidexterity (Birkinshaw & Gibson, 2004). Interviewee 4 describes the company's innovation to involve incremental improvements aimed at solving technical challenges. This statement is supported by several interviewees mentioning the ongoing strategy of continuous improvement. The continuous improvement model in use reflects the organization's objective for operational efficiency and gradual development. Rather than focusing on disruptive change, the case company prioritizes refining existing solutions and improving performance over time.

> *"[...] we have a kind of emphasis on, in a way, on the development of operations, we have this [Company Name] continuous improvement model. There is a lot of focus on making operations more efficient." (Interviewee 7)*

In addition to operational improvement, the interviews highlight that the organization aims to create value through customer excellence and strong customer relationships. Several interviewees pointed out that collaboration with customers is an important element of the company's innovation activities. As Interviewee 4 stated, collaboration

with customers is emphasized in the direction of the company, and "innovating with customers" is seen as a guiding principle in the organization's strategy. The findings reflect that the case company has a strategic orientation towards customer-centric innovation.

> *"[…] within our strategy we have this innovating with customers as one of like our guiding principles and I would say that we as [Company Name], we want to deliver customers excellent service excellence support." (Interviewee 4)*

At the same time, while the organization is strategically oriented towards innovation, the findings suggest that innovation activities are mainly technology-driven. The innovation of the case company is strongly connected to its engineering and technical expertise. Many interviewees stress that innovation activities beyond technological improvements are not as common. Moreover, interviewee 3 explained that the company often develops technological solutions based on internal knowledge rather than based on customer requests. This suggests that there remains a gap between the case company's intended customer-oriented strategy and the enacted innovation practices. Moreover, these findings reflect on the nature of the company being highly technology-driven, where solving technological problems are at the heart of the organization's innovation activities. Interviewee 1 described the case company as a "very strong problem-solving organization", where technical solutions are always found successfully.

> *"[...] innovation, yes, there is mainly engineering, mainly technology related, in an environment which is not innovative at all and not seeking for innovation strictly. But I would not say that it is too innovative beyond technology itself." (Interviewee 3)*

> *"[Company Name] very often has these engineers or [...] technology organizations are damn good problem-solving organizations. If we have a problem, a technical problem, we will definitely find a solution for it." (Interviewee 1)*

Overall, the strategic orientation towards innovation suggests that the case company recognizes the importance of customer involvement, however, its current innovation approach remains internally driven and favors gradual improvements over exploration.

Limiting its readiness to leverage customer co-creation, which typically requires early-stage involvement and more radical innovation practices.

4.1.2 Innovation Culture and Mindset

Innovation culture plays a key role in how organizations generate and implement ideas. Literature suggests that an organization's openness to experimentation, learning, and internal collaboration has an influence on its ability to innovate and implement external knowledge into its innovation activities. From a dynamic capabilities perspective, an organization's culture is crucial to its ability to absorb and apply external knowledge. A positive innovation culture is an important enabler of initiatives such as customer co-creation, as it helps encourage employees with ideation, experimentation, and collaboration within and beyond organizational boundaries.

The findings suggest that the innovation culture of the case company is generally perceived as supportive, although there remains variation between individuals and departments. Innovation culture within the case company is shaped not only through strategy and processes, but through individuals' actions and behaviour. Interviewee 8 explained that innovation culture is fostered through daily activities and by "actually doing things". This highlights that a culture towards innovation is formed through actions and opportunities rather than solely through formal innovation strategies.

Furthermore, Interviewee 8 also highlights the significance of leadership in fostering an innovation culture. Innovation is influenced by how the team lead or manager responds to new ideas within their team. This reveals that managerial support is an important source of encouragement and a defining factor in employees' feeling comfortable in proposing new ideas and experimenting. Suggesting that managerial support acts as an enabler of innovation capability by influencing how employees engage with innovation activities.

> *"I personally believe that you foster innovation culture by actually doing things. [...] you bring an innovation culture, and you foster the innovation culture on scale by how each team lead, line manager, whatever, treats the ideas in that specific team." (Interviewee 8)*

The findings further showed that employees are, for the most part, encouraged to share ideas and experiment. Interviewee 8 noted that the case company provides good opportunities for implementing their ideas or experimenting. Employees are often encouraged and provided a budget to test their ideas if a valid business case can be presented. The interviewee further noted that even small-scale initiatives can be implemented if they demonstrate potential for the case organization. Similarly, interviewee 2 highlighted that employees are not discouraged from presenting their ideas and that even unconventional ideas are taken into consideration and listened to.

> *"In general if you have like an idea that you would like to test [...] and you're able to articulate the business case. You believe it will create efficiency, or you will believe it will enable something. So many times you have the opportunity to implement it in our company." (Interviewee 8)*

> *"The good thing is that people are not afraid to shoot. So even a simple or crazy idea [...], you are listened to, and you're not blamed for anything." (Interviewee 2)*

The interviews also reveal that innovation culture differs across teams and individuals. Not only does team lead and management affect innovation culture, but motivation may vary on an individual level. Both interviewees 1 and 3 noted that there are product managers who express a desire to act more closely with customers, and those who wish to do so less. While some employees are eager to pursue innovation and new ideas, others prefer to focus on their daily operations. Similarly, interviewee 7 explained that the innovation capabilities of the company are at varying levels across organizational departments. These findings suggest that the innovation culture and the ability to develop new ideas are not even throughout the organization. This variation suggests that uneven development of innovation capabilities may, in turn, hinder the implementation of co-creation.

> *"[...] they are all very different, and some really want to try to do something different and improve things, and they are spending a lot of extra time that sometimes they don't have trying to improve how things are. And then some others, they just do their job." (Interviewee 3)*

Despite the supportive innovation environment, many interviewees identified challenges regarding experimentation and risk-taking. Interviewee 4 noted that due to the long-standing history of the organization and already well-established processes, implementing change may be difficult. Therefore, establishing new routines or new ways of working can prove challenging for the case company. Similarly, the company's focus on financial return may influence its willingness to implement change or take innovation risks, as noted by interviewee 2.

> *"[...] if you want to make money [...] you have to have a return for the work you do. Intrinsically, the risk appetite is a bit low." (Interviewee 2)*

In addition to risk-taking, some interviewees explained that the organization is not yet openly discussing failure. Interviewee 3 noted that the organization is still "not very keen on trying and failing", while interviewee 2 mentioned the lack of a fail-fast philosophy within the organization. These findings suggest that the culture towards experimentation is still developing. The perspectives indicate that while an innovation culture is fostered and welcomed in the organization, the acceptance of failure as a part of the innovation process is still limited.

> *"There is definitely not yet the philosophy of fail fast and openly speaking about failures, by failure I mean an outcome different from the one that you were targeting at the beginning. That is definitely not there in term of in term of mentality." (Interviewee 2)*

Finally, the findings highlight that organizations may rely heavily on internal knowledge and familiar approaches, hindering the reach for external knowledge. Interviewee 8 stated that the organization tends to "circle within our known space and be in our own bubble", limiting new perspectives and opportunities.

Overall, the findings suggest that the case company has a supportive environment and demonstrates several cultural enablers for innovation. Interviewees highlight that managers play a key role in motivating and encouraging their employees. Furthermore, employees are encouraged to share and test out their ideas, as long as a business case can be validated. However, significant barriers remain. Innovation culture varies across the case company, and the organization still faces challenges relating to risk-taking, experimentation, and innovating beyond technical improvements. These findings indicate that the organization is only partially ready to leverage customer knowledge and implement co-creation. The effective use of customer involvement requires openness to external input and a strong tolerance for uncertainty and experimentation.

4.2 Organizational Processes and Structures

This part examines the organizational processes and structures in place in the case organization that support or hinder innovation activities. The analysis will focus on the interviewees' views on how innovation is managed, how the organization's departments collaborate with one another, and whether these structures enable or limit the possibilities of integrating customer co-creation. Additionally, the section evaluates the effectiveness and scalability of these processes to assess their suitability for co-creation practices.

4.2.1 Innovation Processes

The processes used in an organization play a key role in how innovation is carried out in practice. In large industrial organizations, such as the case company, innovation activities are often managed through structured processes and models. These include internal idea submission platforms, innovation campaigns, and formal models to guide innovation from ideation to development. Such structures are used to provide control and coordination. Their effectiveness in supporting co-creation practices, however,

depends on how well they enable flexibility, speed, and integration of external knowledge.

The interviews identified several structures to support the innovation activities within the case company. One key insight found is that innovation and development ideas are gathered across the organization using a collaboration platform. Internal tools are used to encourage employees to share their ideas and to gain insight into development possibilities from different units. Moreover, the case company has implemented workshops and cross-functional meetings to bring employees together for ideation and to facilitate ideas submitted through the collaboration platform. As interviewee 1 explained, ideas are usually not formed in formal settings, but emerge through interaction and collaboration, often in spontaneous environments. This suggests that while formal structures for ideation exist, the act of ideation occurs in informal situations and is socially driven, which may limit the potential and scalability of idea generation through their formal systems alone.

> *[...] the majority of ideas that people get don't actually come during working hours or in these brainstorming sessions, but rather outside of them, when our brains aren't actively thinking about something. But those ideas are usually based on these moments of interaction and the thoughts and views of others in these workshops." (Interviewee 1)*

Once an idea is submitted through the platform, the case company evaluates it through a structured process. Many interviewees explained how ideas are analyzed and further developed within the internal innovation process to assess them for feasibility and business potential. The findings indicate that a common barrier for ideas developing further is presenting a justified business case. This means ideas are often required to demonstrate a clear business proposal, including the expected return on investment, before they can progress further in the innovation process. While this approach supports the case organization's operational efficiency and resource allocation, it may hinder ideas that show uncertain value in their early stages or are more exploratory in nature. Particularly for co-creation projects, which may not show value until later stages of

development. Moreover, from a theoretical perspective, such an approach can hinder the involvement of externals, as the open innovation paradigm emphasizes that effective collaboration with externals requires iterative and flexible processes (West & Bogers, 2014).

> *"In practice, when evaluating ideas, we always talk about it, or we ask, what is the business case, how much does it cost to implement this, and then how will we get that investment back?" (Interviewee 1)*

> *"And if after a first screening, if we see something that is really interesting and also as a business impact, obviously we are [...] very much focusing on making money. So, introducing something that is a valid business case. The solution should also be profitable somehow." (Interviewee 9)*

Additionally to business case evaluation, the case organization uses a structured process for the development and management of innovation projects. The process is used to guide innovation through several stages of evaluation and development, from ideation to commercialization. While interviewees generally found the process to be a helpful guide to manage innovation, several interviewees also noted that such structures can slow down the development of ideas. Similarly, another challenge identified by the interviewees was that, due to the nature of the business environment, product development takes a long time. These lengthy development cycles may cause products to be out of date by the time development is completed. The findings suggest that the case company faces a trade-off between enhanced coordination and development speed, which may affect its ability to engage in collaborative innovation with customers.

> *"[...] developing something for too long and actually when it is ready, it's almost not relevant anymore." (Interviewee 2)*

> *"And of course innovation in [Company Name] takes so long time." (Interviewee 8)*

Moreover, the findings indicate that the organization faces challenges in managing the volume of ideas submitted through the ideation platform. Some interviewees suggested that promising ideas may remain underdeveloped due to limited resources or

uncertainty regarding which department should take ownership of the idea. Interviewee 1 explained that several ideas submitted through the ideation platform require further development or thought before they can be moved forward to the decision-making stage. The organization shows no trouble generating ideas, however, the findings suggest a lack of sufficient mechanisms or resources to advance them effectively.

> *"These are more of conceptual or strategic level ideas that could have potential in the long run and [...] they would have required a little more work and effort, or resources, or someone's time, to either have had time to work on them, to have reached the point where they could have shown a business case or enough material on which to base a decision to move forward. Unfortunately, there are already such ideas with potential that have been left on hold, because they would have required further refinement." (Interviewee 1)*

Lastly, some interviewees noted that ideas submitted through the ideation platform are not provided with feedback in a timely manner. The findings highlight the importance of increased feedback and recognition in order to strengthen and maintain employee motivation in participating in innovation activities. Interviewee 2 emphasized the importance of providing recognition to those who submit valuable ideas for the case company. Providing feedback in a timely manner reduces the risk of participants losing interest. Prolonged response times may reduce engagement and affect the ideation platform's long-term effectiveness.

> *"Increase the recognition of the ideas in the sense that [...] people are not just using their time to submit ideas just for the sake of making [Company Name] happy. And give visibility to the ones who have been submitting great ideas and show appreciation." (Interviewee 2)*

Overall, the findings demonstrate that the case company has established mechanisms to support innovation management and the operation of the innovation program. The internal ideation platform, innovation workshops, and structured processes for product development guide the evaluation and development activities across the organization. However, the interviews note that there remain limitations to the effectiveness of such processes, such as a lack of resources and time, feedback speed, and the justification of

a business case. These limitations indicate that the current processes of the case company are sufficient only partially to support co-creation. The processes currently value control and efficiency over flexibility and external collaboration.

4.2.2 Cross-Functional Collaboration

Literature on customer co-creation highlights the importance of cross-functional collaboration as one of the main criteria for an organization's successful implementation of external knowledge into innovation activities. The findings from the case company interviews note that cross-cultural collaboration also plays a key role in their innovation activities. As innovation activities often require the attention of several business units, the collaboration between units such as research and development, product management, and sales is crucial throughout the innovation process. Successful co-creation requires not only collaboration between departments but also an alignment of goals and coordination across these functions.

Several interviewees explain that innovation work involves the collaboration of multiple departments across the organization. Interviewee 8 explained that no business unit has the end-to-end responsibility for any activity within the case company. Similarly, interviewee 9 highlighted that development activities require input from different stakeholders. These findings indicate that, as innovation activities involve multiple departments across the organization, coordination and collaboration are essential. However, a lack of clear ownership of innovation efforts reduces efficient decision-making across unit borders and accountability.

> *"We are not doing this alone by any means [...] the organization is quite wide, and we are working with different stakeholders all the time." (Interviewee 9)*

> *"In [Company Name], no function has the end-to-end responsibility for anything. So it's also very important to be a spider in the web and ensure that [...] when you work with innovation, that it goes through the process." (interviewee 8)*

On the downside, while collaboration between departments is unavoidable, several interviewees brought up challenges limiting effective cooperation. One concern mentioned frequently is related to the fragmented structure of the organization. Building on their previous statement, interviewee 8 also described that as innovation is spread out across the organization, this causes scattered responsibilities and communication difficulties. This makes managing innovation a difficult task to accomplish. Additionally, from a theoretical point of view, the fragmentation of the case organization reflects constraints in their absorptive capacity, as the ability to recognize and apply external knowledge depends on effective internal coordination (Cohen & Levinthal, 1990).

Moreover, communication difficulties may further lead to a lack of visibility into what other employees are doing within the organization. Interviewee 3 describes that similar projects may be taking place in multiple parts of the organization at the same time. The hierarchical structure of the organization was described as one of the explanatory factors in hindering communication and collaboration between departments and individual employees. These findings suggest difficulties in knowledge sharing across the organization, which is critical for customer co-creation.

> *"Where we have still room for improvement is working over the silos. I think it comes down to that we don't have innovation as end-to-end. [...] different steps happens in different functions and teams, but also in different divisions, so it makes it very [...] scattered among many people's responsibilities. And the risk is that the communication breaks at some point and you could always improve [...] communication and working over the different silos." (Interviewee 8)*

> *"It's really fragmented in [Company Name], there are so many layers. [...] It's quite often that you figure out that actually, some people somewhere else is doing something very similar to what you're doing." (Interviewee 3)*

In addition, the findings indicated that collaboration between departments often depends on individual relationships of employees rather than organizational practices in place. Interviewee 1 explained that cooperation is people-oriented and happens among individuals.

> *"Cooperation, [...] if it happens, then it is perhaps more people-oriented and happens between individuals." (Interviewee 1)*

Another challenge the findings identified is the differing priorities across the organization's departments. The interviewees explained that as different teams operate with differing objectives and budgets, it may cause difficulties in initiating innovation activities that are in the interest of all the departments needed for collaboration. Misaligned goals between units hinder cross-functional collaboration, which, according to open innovation literature, is essential for integrating external insights into innovation processes.

> *"The challenges of large organizations or even smaller ones are that this happens across silos, everyone has their own metrics and budgets for what they do, so they are kind of looking at them, and if the KPIs (Key Performance Indicator) are not consistent or pointing in the same direction, then it is difficult to make decisions for something." (Interviewee 1)*

Regardless of the challenges facing the cross-organizational collaboration of the case company, many interviews highlighted cooperation as one of the key strengths of the innovation program. Innovation initiatives organized through the program often involve teams with expertise from different sectors, facilitating the finding of comprehensive solutions. The overall findings from the interviews indicate that the innovation activities of the case company rely heavily on collaboration between different business units. While this cooperation still faces several challenges, the case company has taken measures towards improving organization-wide collaboration.

> *"There is this very nice cross-functional team who has been working in this domain. So I think that is one of the strengths." (Interviewee 4)*

4.2.3 Organizational Constraints and Resources

In addition to organizational structures and cross-functional collaboration, the findings highlighted several organizational constraints affecting the implementation of customer

co-creation. Most of the identified constraints relate to a lack of time and resources or organizational priorities. The findings showcase that these constraints directly affect the case company's ability to scale co-creation activities, which often require both investments and coordination.

Most commonly mentioned by the interviewees was the lack of time for dedicated innovation work. Many interviewees explained that innovation activities often happen outside an employee's routine work rather than as part of their daily activities. Interviewee 3 described that employees are already faced with heavy workloads, which makes finding time for developing new ideas difficult. Similarly, interviewee 6 noted that organizing customer interviews or co-creation activities requires a significant amount of allocated time from both the case company and the customer. Suggesting that innovation activities are not embedded into the core processes of the case company, but rather treated as an additional activity.

> *"[...] people are just so busy, you cannot take them into a working group and get them in the headspace and the time to think about a concept and try to develop it. It has to be something on top of the bar. So they already are at 100%, and then you ask for 110." (Interviewee 3)*

> *"It also comes down to resources, and it's quite time-consuming to do this kind of interview. Everybody has their own work going on, but then we should do this not on the side but as part of the job." (Interviewee 6)*

Similarly to time constraints, the lack of resources was mentioned as a constraint by several interviewees. Many explained that innovation activities are often required to demonstrate the financial benefits before any resources can be allocated to a project. Therefore, limiting the possibilities of developing ideas that require long-term investments or those where the benefits may not be visible upfront. As interviewee 5 noted, innovation in the manufacturing industry may involve long development cycles, and therefore, it may take several years to reach a return on investment. This reinforces the idea that a short-term orientation towards innovation hinders co-creation

implementation, as the outcomes of such activities are often uncertain and show value only in the long term.

> *"When it comes to real innovation or real product innovation, where a real, tangible product has to be developed, the return on investment can be 5-6 years at least." (Interviewee 5)*

Furthermore, another challenge the interviewees identified was related to the responsibilities and ownership of innovation management. A few interviewees explained that the innovation activities of the case company are scattered across the organization. Interviewee 5 noted that, despite the importance of the topic, the resources for innovation management are limited. The findings indicate that the innovation activities of the case company rely heavily on the few individuals who are capable of coordinating initiatives across different departments. The lack of ownership showcases another limitation in managing co-creation, as a prerequisite for successful implementation is the ability to systematically manage innovation activities across the organization.

> *"There is only one innovation manager. I don't think he's a Superman." (Interviewee 5)*

Additionally, the large size and the complex structure of the organization were identified as factors that affect the innovation capabilities of the case company. As mentioned in section 4.2.1, the collaborative innovation process across business units requires careful alignment in how innovation is managed. Decision-making and involving multiple stakeholders may take a long time. Interviewee 2 mentioned that the complexity of the organization can make innovation both feasible and more challenging.

> *"In a company that is so big, it is feasible and harder at the same time." (interviewee 2)*

All in all, the findings showcase that while the case company has made efforts to develop the structures that support innovation activities, there remain several barriers and constraints limiting them. The organization's processes and structures provide a

promising foundation for innovation but are not yet capable of supporting customer co-creation, specifically in terms of flexibility, financial justification, and cross-functional collaboration. The findings indicate that addressing these limitations is the key to enabling customer co-creation in the innovation activities.

4.3 Current Customer Knowledge Utilization

Utilizing customer knowledge plays a key role in creating value through innovation. For manufacturing companies, the use of customer knowledge can help guide organizations through innovation challenges, validating existing ideas, and serving market needs better. The analysis in this section will focus on how the interviewees view current customer knowledge utilization in the case organization. Including how customer insights are collected, shared among departments, and used in current innovation practices.

4.3.1 Sources of Customer Knowledge

Literature on co-creation has identified the use of customer knowledge as a basis for understanding the customer needs of any organization. The findings showcase that the case company has several channels to gather customer knowledge. Such channels include customer interviews, surveys, and one-to-one meetings with customers. This section examines these variable sources and provides a general view on how customer knowledge is collected in the case organization.

Several interviewees described multiple ways of collecting customer knowledge and feedback. Interviewee 8 explained how the case company uses tools such as CRM (Customer Relationship Management) and customer surveys to gather customer feedback during several stages of the development cycle. Similarly, interviewee 4 noted the use of the same processes and also mentioned customer experience management surveys as one of the primary collection methods for customer inputs. The findings

indicate that formal mechanisms for customer knowledge collection are already in place in the case company.

> *"We are using CRM, Salesforce, so that we're collecting input. We also have this survey that we send out to the customer in different parts of the value chain." (Interviewee 8)*

> *"We collect actively customer feedback and hope to also [...] do interviews or review feedback from the customer experience management surveys, SEM surveys, those are also important inputs for our offering development processes." (Interviewee 4)*

In addition to these mechanisms, customer knowledge is also gathered through direct contact with customers. Many of the interviewees highlighted how important customer-facing roles are in providing customer insights into customer needs. Customer understanding is often developed through listening to customers directly during workshops, discussions, and one-to-one meetings. The findings suggest that while broad formats such as workshops and surveys are beneficial for the case company's innovation activities, more in-depth knowledge is gained through closer relations with customers. Interviewee 8 explained that one-to-one discussions with customers are what matter when collecting detailed customer insights.

> *"It's also very important with the one-to-one talks because then you're able to really drill into details and get to the to the level you need to get." (Interviewee 8)*

Moreover, customer knowledge in the case company is also gathered through the sales department during certain sales cases. Interviewee 9 noted that customer needs often arise during ongoing sales opportunities. The interviewee highlighted that sales situations are great opportunities to discuss more with the customer and ask questions about pain points. This finding further emphasizes the value of direct customer contact.

> *"Sometimes we discuss with the customers. Typically, if there is a sales opportunity with one of our solutions, and maybe it's the new solution, maybe it's the first pilot, or maybe the sales manager needs some support, they call us. Supported*

> *discussion is a good opportunity for us to ask some questions, understand a bit more about the need of the customer with the questions, a pain point, these types of things." (Interviewee 9)*

Furthermore, interviewee 6 explained that customer input is increasingly integrated into the innovation activities of the case company. The interviewee noted that discussions and interviews with customers may provide insights that the employees of the case company had not thought about.

> *"[...] some interviews that we have done, we find out, for example, that there is a new benefit that we didn't think about at all. But then the customers say 'hey this product, when we use it, we save time'[...] and then we are, oh wow, we didn't think about it" (Interviewee 6)*

While customer knowledge is gathered through multiple sources, many interviewees explain that the case company is not utilizing the knowledge to its full potential. Interviewee 5 emphasized this point by explaining that the organization is "underestimating the power of data and customer knowledge", indicating that while customer knowledge exists, its value may not be recognized. Similarly, interviewee 2 noted that the challenge of the case company is not a lack of feedback but rather that it is not used to its full potential.

> *"We should be more engaging towards customers, and I think we are underestimating the power of data and customer knowledge." (Interviewee 5)*

> *"The feedback from the customer and the feedback from the field, by that I mean understanding what's happening in order to improve, it's crucial. It's slightly growing. Yet I think that much more could be done, not in terms of how much information we are gathering, because actually, we are gathering a lot." (Interviewee 2)*

4.3.2 Integrating Customer Knowledge into Innovation

The interviewees recognized customer knowledge as an important part of the case company's development activities. Customer knowledge is recognized as valuable in validating ideas and in ensuring projects in development respond to actual customer needs. This section further discusses the interviewees' views on how customer knowledge and input can be implemented into the innovation activities of the company.

All interviewees agree that understanding customer needs reduces uncertainty in product development and helps in creating the right market solutions. In the manufacturing industry, where innovation requires large investments and developments take a long time, customer validation is essential from the very beginning of the process. Interviewee 6 explains that early developments should involve more than one customer in order to confirm the product has market potential once launched. This highlights that customer input is not only a source of inspiration for innovation but also a tool for risk reduction and market understanding.

> *"So before we start to develop there in the beginning of the process, we should discuss with not one customer, I think maybe even three or five customers, and check that we are thinking about developing this product, and what do you like about it, and how do you see the benefits and the value, and the price would be this? Is it something that you would buy? So we don't start to develop something, and then we notice when it's launched that nobody buys it or one customer is interested." (Interviewee 6)*

While the value of customer knowledge integration is recognized, many interviewees acknowledge that it is utilized in the later stages of the innovation process. Several interviewees described processes of customer pilots or gathering feedback through interviews and surveys. While these methods showcase that customer knowledge is already in use in the innovation process, they reveal that the case company uses a reactive rather than a proactive approach to customer involvement. Meaning, customers are consulted once the initial concept has already been formed, while the innovation process remains an internal process. In many cases, a customer's role is to evaluate or

refine ideas, rather than being a part of the ideation phase. Essentially, what is at the core of customer co-creation.

Interviewees 4 and 6 described the process of involving customers in the development process:

> *"So we would have discussions with the customers quite early, and that's always very nice to validate the ideas and understand what are then the needs of the customers." (Interviewee 4)*

> *"Of course, we always do piloting with customers, but usually that's also with one customer, but that's all, of course, better than nothing." (Interviewee 6)*

These observations are supported by interviewees who explained how the use of customer knowledge is not consistent. Instead of involving customers in the ideation stages, innovation activities are often based on technical expertise, organizational and industry knowledge, and internal assumptions. Interviewee 3 explains how the case organization is "playing with a version of reality that we constructed" rather than customer validating problems. Interviewees 1 and 3 present similar viwes. These findings indicate that several interviewees highlight the importance of customer knowledge, but that it is not systematically used. The case company, therefore, risks creating solutions to problems that may be technically strong, but do not solve challenges that are relevant to their customers.

> *"Perhaps the challenge in that is that we rarely stop to think whether the problem to be solved is a real customer problem, or in a way, whether by solving it, we are somehow able to produce customer value. [...] in a way, maybe we base ourselves on our own assumptions, versus really trying to validate the problem with the customer." (Interviewee 1)*

> *"When you start with the problem, normally in a company, you start with an idea, and then ideas that can come from something you heard or something that you assume. Most frequently, they are in something you assume [...] So it's really assumption-based. We're just playing with a version of reality that we constructed, and then we designed a solution to a problem." (Interviewee 3)*

> *"One of the challenges is that the ideas come mainly from our internal organization, so we would like to have more ideas from customers, or kind of at least understand the needs better from the customers" (Interviewee 4)*

The integration of customer knowledge is strongly influenced by the need to demonstrate the business case of the idea. In addition to the financial justification of an idea, interviewee 9 described customer input as fundamental. This indicates that customer knowledge is in close relation to decision-making and guiding businesses in reducing financial risks.

> *"[...] business case will be the most important tool to say yes or no to a gate, then I would say customer is the impact in input is fundamental." (Interviewee 9)*

Additionally, the findings suggest that in order to facilitate the integration of customer knowledge, the innovation activities of the case company must be carefully managed. Several interviewees explained that implementing customer insights in innovation practices is not a straightforward process but requires coordination across many organizational departments and an alignment of current business activities. Interviewee 4 noted that for customer collaboration to produce tangible outcomes, it requires careful planning. These findings explain that customer knowledge is not directly translated into business value but requires structural processes and mechanisms to support its use.

> *"So I think we would need to plan it very well and ensure that we facilitate the whole thing very efficiently and we get practical, tangible outcomes." (Interviewee 4)*

In addition to careful planning of organizational processes and mechanisms, the implementation of customer knowledge involves several stakeholders from both the case company and the customer side. Interviewee 8 described that customer decisions are linked with multiple departments, and in order to successfully integrate customer knowledge, internal units and employees must be educated to recognize the benefits of long-term collaboration.

> *"So I guess it would need that we would educate those people better on the possibilities and also enable those that they would understand what this co-innovation means, that they would have trust in the process that if they engage with the customers, there will be something long-term." (8)*

Similarly, some interviewees voiced another aspect influencing the implementation of customer knowledge, which is expectation management. Interviewee 8 explained that organizing customer collaboration always comes with expectations.

> *"When you do things with the customer, with that also come expectations." (Interviewee 8)*

In particular, interviewees highlighted that involving customers in the early stages requires clear and transparent communication about the purpose and possible outcomes of the collaboration. Many highlighted that it is important to distinguish co-creation practices from sales opportunities. Interviewees 1 and 9 noted that when engaging with customers, it should be emphasized that the company is not selling and that there are no guarantees of the completion of a project. These findings showcase that one of the key challenges of implementing customer co-creation is the balance between open collaboration and the uncertainty of the innovation process.

> *"[...] you have to do expectation management at the level that we present ideas, preliminary concepts, that there is no guarantee that these will now be implemented, even if they say that this is the best idea in the world, [...] that we're not selling, we're just collecting customer feedback" (Interviewee 1)*

> *"I would say the only critical thing is to explain that we're not selling, that we are developing. So that's a different thing. [...] I always try to explain that I'm not selling, I'm asking questions. I'm here to listen because I'm developing stuff."*
> *(Interviewee 9)*

Overall, the findings suggest that the case company has mechanisms in place for integrating customer co-creation, but the capabilities of the organization are currently used mainly for sales validation and piloting stages. Implementing customer co-creation into early ideation and development stages could reduce the uncertainty of introducing

new products into the market and help validate the customer need for innovation projects. Open and transparent discussions with customers are key to continuous collaboration and building long-term trust with their customer base. All in all, the findings indicate that while customer involvement exists, it is not yet a core driver of innovation.

4.3.3 Challenges in Utilizing Customer Knowledge

Despite the multiple sources of customer knowledge and the mechanisms in place for gathering it, the interviews revealed several challenges impacting the use of customer knowledge in the case company's innovation activities.

An issue highlighted by many interviewees was not the lack of collected data but rather the case company's ability to share and apply the knowledge in their activities. Interviewees 3 and 7 explained that while customer knowledge is collected in several ways, the case company lacks a mechanism for sharing or accessing customer knowledge between departments. Similarly, interviewee 4 notes that customer knowledge may not reach other business units if it is gathered by another. These findings suggest that while information exists, it is fragmented and limited to certain departments.

> *"I think the information is when there is some. [...] But I don't think we have a forum to really share it much. They (sales) are open to saying how things are, but it takes us to engage with the team to get the information. There is nowhere we can really access it. We don't have really account plans or stuff like that." (Interviewee 3)*

> *"But we don't have [...] what other companies that are really high in the maturity of customer focus (asiakaskeskeisyys maturiteetti) have, we don't have such mechanisms. That everyone would have access to the customer [...] feedback, there are no such mechanisms in use here. (Interviewee 7)*

> *"A lot of feedback is collected, but do we get the relevant feedback for us if it's gathered by many different units? Not necessarily always, so that kind of challenges may happen, of course" (Interviewee 4)*

More practical challenges in integrating customer knowledge relate to difficulties in customer engagement. Several interviewees highlighted that customers are often busy, and access to them can be limited. The challenge is heightened when several stakeholders are involved. The lack of time makes it difficult for the case company to consistently involve customers in the innovation activities. Interviewee 6 explained that while customers are generally positive towards innovating with companies, time management is one of the core barriers.

> *"They (customers) are, I would say, in most cases quite willing, and quite positive, but then I think maybe the time issue is something that they don't maybe have so much time." (Interviewee 6)*

> *"They are quite busy, of course, our customers, and then probably they discuss with many different stakeholders, [Company Name] is just one. So then if many people or many organizations contact them, they are maybe not so eager to participate in this innovation type of thing or interviews." (Interviewee 6)*

Moreover, building long-term customer relationships may be difficult, especially when projects involving customers are discontinued or priorities are shifted. Interviewee 3 explains that involving customers brings its own risks in not "losing face" of the company or the trust of the customer. These findings suggest that involving customers inconsistently or failing to follow through on collaboration initiatives may have a negative impact on customers' willingness to engage in innovation activities.

> *"So that's the risk and the challenge that someone needs to tackle is that how do you not lose face and the trust of the customer that you're really trying to change something [...], because it's a risk that you know you involve the customer on board on that project and then [...] whatever things happen and then boom, not in the priorities anymore. And then you drop that one" (Interviewee 3)*

The findings further reveal that differences in customer willingness to share information cause another barrier for customer involvement. As interviewee 2 describes, some customers are open to collaborating and will gladly share data, while others are more

reluctant and seek compensation for their involvement. Highlighting the necessity to find the right customers to collaborate with.

> *"[...] for example, in terms of performance data gathering from the engines and from the equipment that we have been supplying, some customers are saying yes, let's work together. I want to share it because I know that it can be useful for me, and it is actually part of the scope of supply that you help me in solving my issues with my data that I'm giving you. Some other customers, they're just saying, if you want my data, you need to pay me straight away. It really depends on customer mentality." (Interviewee 2)*

While customer knowledge exists, another challenge the case company is facing is transforming the data into insights. Several interviewees explained that while customer knowledge exists, it may be stored in inconvenient ways, such as in employee emails or through word of mouth, therefore limiting employee access to it. Interviewee 9 pointed out that large volumes of gathered data do not transform automatically into meaningful knowledge. The data must be documented and organized in a structured manner. This emphasizes a gap between the case company's data collection and knowledge utilization. Moreover, limiting the case company's ability to build on previous learning and apply customer knowledge across the organization's various departments.

> *"For instance, we have thousands of people around the world that work close to customers within the field service. But again they're not in the system, so [...] difficult to retrieve the state of all this information, and create [...] manageable information and not that big data lake, but transform this information into something that is manageable and meaningful." (Interviewee 9)*

> *"What we should do, but we are not doing very well until now, is to document, for instance, lessons learned. So you take what you learn from the process, all the problems or issues or the good things that happen, and you write it down in a structured way." (Interviewee 9)*

Lastly, as mentioned in the previous section 4.3.2, the case company relies heavily on internal assumptions, and ideas are generally created in-house rather than based on customer needs. Despite customer knowledge being available, it is not used to define the problems that innovation activities are solving. This tendency has been reflected in

the case company's past experiences. As interviewee 8 explains, this internal approach has limited earlier innovation activities, especially regarding digitalization efforts. This finding highlights that the lack of integrating customer knowledge in innovation is not only a current challenge but has also affected the case company in the past.

> *"That is like if you think about the history, why [Company Name] has failed with the digitalization in the past is that we believe we could do it standalone." (Interviewee 8)*

All things considered, the findings reinforce that the company does not have a lack of customer knowledge, but the challenges they face relate to how customer knowledge is accessed, shared, and utilized. The findings suggest that improving data collection methods, managing data in a structured and meaningful way, and improving employee access to customer knowledge are some of the key development areas for the case company.

4.4 Industry Constraints

The innovation activities of manufacturing companies are often affected by the constraints of the industry in which they operate. The interviewees described the manufacturing industry, specifically the marine industry, as being driven by high levels of technological complexity, long development cycles, and large investments. This section will focus on the interviewee's views on how the industry constraints affect the case company's innovation activities and the possibilities of implementing customer co-creation.

4.4.1 Characteristics of Innovation in the Manufacturing Industry

The interviewees describe the industry in which the case company operates as complex, conservative, and volatile. The industry is further described as an environment that is

less interested in exploring new opportunities for innovation and is instead driven by external pressure, immediate needs, and regulations.

Interviewee 2 described the marine industry as reactive. Innovation activities in the marine industry are often driven by regulatory changes rather than by a long-term strategic plan. Interviewee 2 explains that, because innovation activities are typically initiated in response to external constraints, the constraints may have changed before development is complete due to long development cycles. This creates a challenge for manufacturing companies, as they must deal with the uncertainty of reacting quickly to external constraints while avoiding heavy investments in solutions that may become irrelevant.

> *"The marine industry is by definition not innovative at all, simply because it is quite a reactive market in the end, it is completely driven by regulatory constraints." (Interviewee 2)*

> *"The rumor or the threat that tomorrow a certain regulation on emissions, for example, will or actually would impose taxation. [...] The customer is upset and says, [...] we need to have an option against that. We start developing after a while. OK, here it is. It is ready. I know, sorry, we don't need it anymore because it didn't materialize." (Interviewee 2)*

In addition to regulations, innovation within the industry is also affected by financial considerations. Innovation activities are evaluated through their financial profitability rather than their long-term potential.

> *"In terms of industry, it's purely about minimizing the costs, maximizing the revenues." (Interviewee 2)*

Similarly, interviewee 5 explained that companies are willing to invest in innovation but expect a fast return on investment in return.

> *"If I have clear guidelines that nothing will change in 10 years, I would invest. But then, what they do is that they invest, but then they see their return on investment in the next two years. They don't see the return on investment in the next 10 years."*

Another defining characteristic of the manufacturing industry that the interviewees mentioned is the complexity of business-to-business interaction. With both the case company and many of their customers being large organizations, the challenge of aligning multiple stakeholders and innovation collaboration arises. Interviewee 9 notes that when large organizations interact, the complexity "explodes" in scale. This complexity grows larger when many roles or functions from different organizations must meet. Interviewee 8 highlighted the importance of ensuring the right individuals are involved in discussing innovation collaboration activities.

> *"You can imagine how complex that is because we are a big organization, the customer is typically a big organization. [...] It's a B2B interaction. It's a complex one, but we are complex as well. Sometimes you discuss with the product manager, sometimes you discuss with the technical expert, sometimes you discuss with the fleet service superintendent, sometimes you discuss with the sales manager. So we are both complex, and this complexity explodes when they meet each other." (Interviewee 9)*

> *"When you talk about the customer, what layer in their organization are you talking about? So you also match the right people with the right people. I would maybe like this kind of that we are more of an advisory function, that you come and tell what you're proposing, but then you need to have the experts talking to each other." (Interviewee 8)*

Moreover, many customer differences further complicate customer collaboration. Many of the case company's customers differ in size, capabilities, and expectations, affecting each customer differently in its potential to collaborate on innovation activities. Where larger customers have specialized roles, more hierarchical structures, and several stakeholders to consider, smaller customers may face resource constraints but have a higher degree of flexibility. Interviewees 3 and 9 describe the differences between smaller and larger customers:

> *"[...] the small ones, they have their own skin in the game, and one person has so many hats that he can answer a lot of things, whereas when you go to the big customer, you might be very tight with the purchaser, but thenyou have no idea who's doing the other parts of the business and your problem might end up with invoicing or something like this. (Interviewee 3)*

> *"[...] big organizations, so you have different roles and let's say, specialized people, whereas in small, [...] everyone does everything. So you cannot really find a real expert as such." (Interviewee 9)*

Similarly, interviewee 4 emphasizes that customers' needs vary across business segments and regions. Therefore, it is difficult to generalize innovation with different customers.

> *"I think it's important not to just choose these big customers but also create insights on a wider customer space, and I think also we have the market segments, they are very different as well. So, because the customer needs differ quite a lot, if we only always work with the European customers because they are close by, then we might not have a full understanding on what are the needs for the customers in the Americas or in Asia." (Interviewee 4)*

Finally, the findings suggest that the manufacturing industry is not looking for radical innovation but is rather focused on incremental improvement of established technologies. As interviewee 2 describes, the market and industry are conservative and not actively looking for emerging innovation. Furthermore, this is supported by interviewee 3, who described the whole industry to be "struggling" and not innovation-driven.

> *"Because there are no outbreaking innovation in this company, and I would say because the industry itself is not looking for that or used to that or wishing that because it's a very conservative market and industry." (Interviewee 2)*

> *"I think the whole industry is struggling" (Interviewee 3)*

4.4.2 Economical and Structural Constraints

In addition to the complexity of the environment the case company operates in, the findings indicate that innovation activities are affected by economic and structural constraints. These constraints include practical limitations when engaging wth customers and coordinating co-creation activities.

One challenge identified by interviewee 5 is that customers have high expectations for the case company regarding innovation activities. With resources limited on both the case company's and the customers' sides, customers are selective about how they allocate time and finances. Interviewee 5 noted that only high-value and meaningful innovation ideas are likely to interest their customers.

> *"But if you are taking mediocre problems or mediocre innovations to them, they will not entertain you. You should be giving top-notch ideas to them."*
> *(Interviewee 5)*

This indicates that organizations in the manufacturing industry must plan their innovation activities carefully before involving customers. However, this may limit the case company's opportunities to involve customers in the ideation stages of innovation.

Additionally, reaching customers provides another significant constraint. Similarly to the case company, customers often face heavy workloads, and collaborative innovation activities are seen as an additional task on top of their daily operations. This is a particular challenge for smaller organizations, where resources and staff may be limited. This perceived additional workload may make customers less willing to contribute to innovation activities.

> *"I think small company people are more busy in general the workload. So maybe they see it as a sort of, I don't want to say the waste of time, but additional work on top of the workload they already have, so a bit less easy." (Interviewee 9)*

Another identified constraint relates to cultural differences between organizations. The findings show that successful partnerships between organizations depend on many aspects beyond technological capabilities. Differences in workplace culture or ways of working may hinder the possibilities of collaborating in innovation practices. Successful co-creation requires the organization's working culture to be compatible. Interviewee 8

explained that collaboration between companies often relies on cultural alignment and trust-building.

> *"So it can be that we propose a company which we believe has the superior technology. But then we just realized our cultures will not match. It will not work. We don't have the trust. It doesn't work. So then the partnership will fail. So then you need to go maybe for the second-best technology, but where we vibe, and we will get things done." (Interviewee 8)*

Moreover, even the industry's operational environment may impose limitations on how co-creation in innovation can be implemented. As interviewee 4 describes, in some cases, even basic infrastructure can restrict cooperation between the case company and its customers. The findings show that co-creation should be implemented with the industry's physical and operational realities in mind.

> *"It's relatively traditional or very traditional, and you know the environment, even that you don't always have a good internet connection when you are on board, and it for sure is, I think, also how you make the contracts and how you do the budgeting. So that's also let's say inbuilt in the the industry practices." (Interviewee 4)*

Finally, the findings indicate that identifying the right customers is a persistent challenge for the case company. With the number of customers and stakeholders involved, it is not always clear which customers should be included in the innovation activities or how to reach them. The finding reinforces that many internal and external factors must be aligned and innovation activities require careful planning to successfully implement co-creation.

> *"Kind of how to find the right customers and the right people in those customers. That's probably it (the challenge)." (Interviewee 1)*

All in all, the findings suggest that several practical, economic, and structural constraints limit the implementation of co-creation in the case company's innovation practices. As a result of these limitations, customer co-creation requires careful planning and

consideration. Managerial considerations for implementing customer co-creation are provided in the following section.

4.5 Managerial Recommendations for Implementing Customer Co-Creation

Following the findings from the case company interviews, this section will present managerial recommendations for integrating customer co-creation into the case company's innovation program. The case company has strong technical expertise, longstanding customer relationships, and collaborating with customers acts as one of the guiding principles of their actions. However, the findings suggest that customer involvement in innovation is seen as unsystematic and more dependent on individual initiatives than on a structured process.

According to the findings, the company should transform its customer involvement in innovation from sporadic and internally driven to a more structured and scalable approach. This section will present recommendations for this transition. The following recommendations are based on findings from case company interviews, grounded in existing literature, and further supported by insights from the benchmarking analysis.

4.5.1 Establishing Structured Customer Co-Creation Processes

The findings reveal that the case company lacks formal structures for conducting customer collaboration in innovation activities. Moreover, as many interviewees mentioned, innovation activities are more dependent on individual initiatives and internally generated ideas. These limit the case company's ability to gather and utilize customer knowledge. Therefore, for the first recommendation, the case company should establish a structured process of integrating customer knowledge into its innovation program.

A structured process should define the clear stages of customer involvement, including ideation, validation, and piloting. Furthermore, the process should include standardized collaboration methods, such as workshops and customer advisory sessions, and finally, the process should ensure that customer input is evaluated and integrated into decision-making systematically.

This recommendation is supported by the interview findings and the benchmarking analysis. Findings suggest that, currently, internally generated ideas are validated later in the innovation process, and customer knowledge is underutilized. The case company's practices contrast with the open innovation paradigm, which highlights the importance of externalities in innovation and emphasizes their early integration. Moreover, literature on service-dominant logic explains that value is created through continuous interactions with customers. Hence, the need for established and structured processes for implementing customer co-cretion are supported by both the case company interview and previous empirical studies on customer co-creation.

Furthermore, the benchmarking findings indicate that manufacturing companies in Finland with similar customer innovation activities have embedded customer interaction throughout their innovation processes. Integration of the customer validation is particularly important in the early stages of ideation. Moreover, this is supported by the interview findings, stating that customer validation should be integrated earlier into the innovation process. The findings highlight that without a structured process and customer validation, the innovation ideas risk being based on assumptions rather than actual customer needs.

4.5.2 Defining the Roles and Responsibilities of Managing Co-Creation

Another significant barrier identified in the case company interviews is the lack of ownership or personnel responsible for co-creation activities. The findings highlighted that innovation is spread across departments, and the collaboration between business units should be improved. This creates silos and prevents effective knowledge gathering

from customers. Moreover, the findings highlight a lack of a shared customer knowledge base.

This is supported by previous literature on absorptive capability (Cohen & Levinthal, 1990), which refers to an organization's ability to recognize, assimilate, and apply external knowledge. The theory explains that without clear structures and responsibilities, an organization's absorptive capability is weaker, and thus, customer insights can not be effectively utilized. Moreover, the benchmarking analysis indicates that dedicated roles are crucial for managing cross-functional collaboration and co-creation activities

Therefore, the recommendation for the case company is to define clear ownership of co-creation activities by naming responsible personnel. Facilitating cross-organizational collaboration and creating customer innovation teams from different business units, such as sales, R&D, and service functions, to facilitate knowledge sharing across departments. In doing so, the case company may improve internal coordination, reduce internal barriers, and enhance its absorptive capability for integrating customer knowledge.

4.5.3 Improving Mechanisms of Sharing Customer Knowledge

Building on defining ownership and facilitating cross-organizational collaboration, the interviewees emphasized that while customer information is collected, it is not stored or shared effectively. Information often stays within an individual or a business unit, limiting its accessibility and potential.

Therefore, the suggestion for the case company is to create and improve mechanisms for sharing customer knowledge across business units and individuals. To do so, the case company should create standardized systems for collecting customer insights, create a structured manner for documenting customer insights, and ensure collected information is accessible and transparent across departments.

This suggestion is supported by an organization's learning capability, which is an important part of innovation capabilities. Leaning capability describes an organization's ability to create, apply, and learn from knowledge and adapt its practices based on new insights and experiences. It highlights the importance of the use of customer insights in organizational processes. Therefore, companies require functioning mechanisms for collecting and sharing knowledge to fully leverage existing customer insights. Furthermore, the recommendation is supported by the benchmarking analysis. Manufacturing companies with customer innovation utilize platforms and standardized processes to collect and share customer feedback across the organization.

4.5.4 Piloting with Selected Customers

The findings indicated that not all customers are equally capable of participating in collaborative innovation. Lack of time and resources limits the possibilities for contribution. Moreover, the complexity of the case company’s products plays a role in these limitations.

Therefore, it is suggested that the company adopt a pilot-based approach, selecting customers with relevant expertise and a willingness to contribute. These pilots may help the company to test co-creation methods in a controlled environment and on a smaller scale in the early stages. This approach gives the company an opportunity to validate the business case of innovation ideas before making larger financial investments. Additionally, piloting enables the company to refine the products or ideas based on customer feedback and lessons learned.

A pilot-based approach may help in building customer trust and managing expectations. According to the interview findings, an identified risk is involving customers in innovation activities without follow-ups or bringing a project to completion, which may then damage customer relationships. These findings highlight a need for a well-structured

piloting program where select customers can contribute during various stages of the innovation process.

Furthermore, this recommendation is supported by the literature on lead users (von Hippel, 1986), which emphasizes the importance of engaging lead users with relevant expertise and market knowledge in the innovation process. Lead users can note emerging market needs ahead of the general market, which helps organizations validate their innovation activities.

Similarly, the benchmarking analysis supports this suggestion, as organizations with ongoing customer collaboration programs often begin with small-scale pilot projects before scaling the process to more customers.

4.5.5 Aligning Co-Creation with Long-Term Innovation Goals

An identified barrier for innovation activities is the organization's strong emphasis on return on investment. The findings indicate that many innovation activities are driven by short-term business considerations, when co-creation typically requires a long-term perspective. Moreover, in the broader manufacturing industry context, volatility and risk aversion make it difficult to validate experimentation.

Innovation management and ambidexterity literature emphasize the importance of balancing current operational efficiency while allowing long-term exploration. As co-creation requires continuous development, experimentation, and building trust with customers, its benefits may not be realized in the short-term, making investments difficult to justify. Therefore, it is suggested that the company aligns co-creation with long-term innovation goals. To do so, the case company should embed customer co-creation into its innovation strategy, define objectives and the metrics for success, and allocate resources to support long-term collaborative innovation with customers.

This alignment ensures that customer collaboration is not viewed as an optional activity but as an important part of innovation activities. Making resource and personnel allocation easier and more justified.

4.5.6 Fostering Company Culture Towards Collaborative Innovation

Finally, the last recommendation is to foster a collaborative innovation culture within the case company. The findings indicate that while there is openness to customer collaboration, idea generation remains strongly internally driven. The case company relies on internal expertise and good problem-solving skills, which in turn, limits the possibilities of integrating customer perspectives. The case company's mindset and culture should shift towards a co-creation model where innovation is driven by customer needs.

To support a cultural shift, management at the case company should encourage employees to actively engage customers in innovation and promote the importance of customer insights alongside internal knowledge. Moreover, training sessions and workshops could be organized to shift a company-wide mindset towards collaborative innovation.

As explained in the interview findings, customer collaboration is dependent on individual employees' initiatives. A company-wide culture shift could help systemize these practices and make co-creation a regular part of the case company’s innovation activities. Furthermore, this suggestion is supported by the benchmarking analysis, showing that organizations with successful collaborative models actively promote an internal culture that values external input and experimentation.

4.6 Summary of the Findings

This section summarizes the empirical findings and managerial recommendations discussed above. The aim of the study was to examine how customer co-creation practices could be implemented in the case company’s innovation program and to

provide managerial recommendations based on findings from nine semi-structured interviews. As is typical in qualitative research, the findings of this study are based on a small sample size and therefore cannot be generalized across the entire industry. Moreover, the goal of the study was not to establish cause-and-effect relationships, but rather to provide an in-depth understanding of the case company's current state of innovation practices and to explore barriers and enablers to implementing customer co-creation. Illustrating the results is Figure 4 below, which shows a revised framework first introduced in the literature review (see section 2.5).

Overall, the findings demonstrated that while innovation is strategically important to the case company, it is affected by both internal conditions and external industry constraints. The findings highlighted that innovation is an important driver of the organization's direction, with delivering customer value and maintaining competitiveness at its core. However, the findings also emphasized that the company is heavily technology-focused on incremental improvement, and radical or new product innovation is less common. The organization has strong problem-solving skills, engineering expertise, and is highly internally idea-driven, which supports its continuous improvement model but also acts as a barrier to exploring more customer-driven innovation opportunities. Customer collaboration is seen as important, but has yet to be utilized in the early stages of innovation and ideation.

Moreover, the findings indicate that the case company has established mechanisms to support customer co-creation, including ideation platforms, innovation programs, and structured development processes. These mechanisms can act as enablers for co-creation when used systematically and in a structured manner, however, the findings similarly noted difficulties due to the lack of integration and common company-wide practices. As innovation activities are spread across departments and innovation ideas must pass through multiple functions before moving forward, this results in challenges to cross-functional collaboration, limits knowledge sharing, and causes unclear ownership of co-creation activities. Subsequently, causing ideas to remain

underdeveloped or for innovation activities to not be coordinated across the organization.

The findings show that the case company has access to large amounts of customer data through various channels such as customer feedback interviews and surveys, sales interactions, and workshops. Acting as a strong foundation for implementing customer co-creation and knowledge utilization. However, the findings emphasized that this collected knowledge is not systematically used across the innovation process. Customer involvement is often focused on the later stages of innovation, where customers are asked to validate or refine existing products rather than participate in early concept ideation. These findings showcase the case company's internally driven approach to ideation and innovation.

Finally, the findings demonstrated that the broader industry context also plays a role in innovation activities. The industry, according to the interviewees, is volatile, highly complex, requires large investments, and is averse to risk-taking. These conditions act as a barrier to limiting the willingness of both the case company and its customers to pursue long-term or uncertain innovation initiatives. Furthermore, the findings show that the industry faces other challenges, including limited customer availability, limited time, difficulties in finding the right stakeholders, and the need to establish trust before implementing customer co-creation. Simultaneously, these industry constraints highlight the importance of customer collaboration, as understanding customer needs is crucial in the manufacturing industry to reduce uncertainty and ensure the case company is developing relevant products for the market.

All in all, the study highlights that the case company has a need for a more structured approach to integrating customer knowledge into its innovation activities. Based on the findings from the case company interviews, six managerial recommendations were suggested. These are summarized in Figure 4 below.

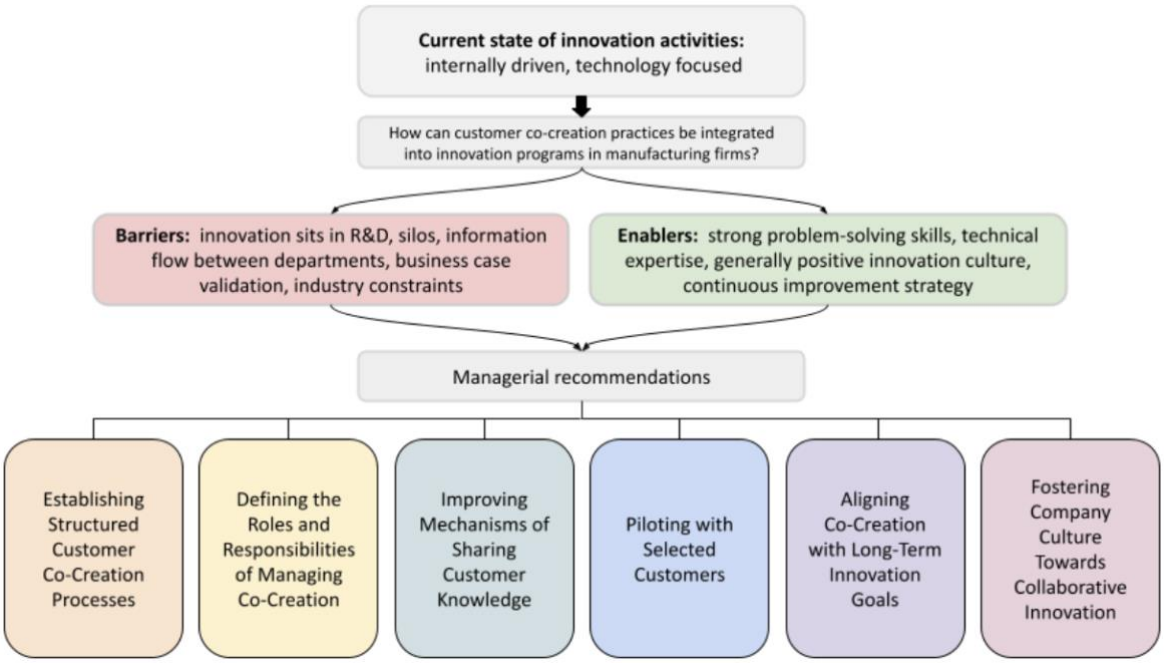

Figure 4. Summary of the Findings

5 Summary and Conclusions

Organizations operate in a volatile market, where they are under pressure to innovate to stay ahead of the fast-paced and evolving market. Today, in-house innovations are not sustainable enough to stay ahead of the market, but companies must integrate external knowledge and collaborate with customers to remain competitive. In this context, open innovation and co-creation have been recognized as important approaches for enhancing the innovation activities of organizations. However, their implementation into structured innovation processes in large manufacturing companies remains insufficiently studied. Moreover, transforming the innovation activities of large manufacturing companies from internal efforts towards a more collaborative approach remains challenging. Therefore, the purpose of this study was to examine how customer co-creation practices can be integrated into innovation programs in manufacturing firms. The study was conducted as a single case study, examining the innovation activities of a large manufacturing company in Finland.

The research was approached using four research objectives: (RO1) to analyze what challenges and opportunities influence the integration possibilities of customer co-creation in manufacturing innovation programs, (RO2) to examine the current state of the case company's innovation activities through interviews, (RO3) to benchmark the case company's innovation approach against similar initiatives in other manufacturing firms operating in Finland, and finally, (RO4) to propose managerial recommendations for implementing customer co-creation for innovation programs in manufacturing firms.

The study's findings show that while the case company has strong internal innovation, implementing customer co-creation remains challenging due to structural, cultural, and process-related constraints. The innovation activities of the case organization are internally driven and focused on gradual improvements, reflecting their orientation towards exploitation rather than exploration. Limiting the company's ability to leverage

external knowledge, which is known to be a key requirement for open innovation activities.

Furthermore, from a theoretical point of view, the findings indicate the case company faces limitations in organizational ambidexterity, as it prioritizes operational efficiency over exploratory innovation. Similarly, the scattered organizational structure and challenges in knowledge sharing between business units indicate weaknesses in absorptive capacity, further reducing the organization's ability to integrate customer input.

On the other hand, the study found several enablers that support co-creation implementation. These include strong technical expertise, established customer relationships, and existing innovation structures and processes. While these elements support the integration of external knowledge, they are not yet systematically aligned across the organization to enable co-creation practices.

Based on the findings from the case company interviews and benchmarking analysis, the study proposes that customer co-creation can be implemented into manufacturing company innovation programs through six managerial recommendations. These include structured innovation processes, clear ownership of innovation activities, improved knowledge-sharing mechanisms, piloting with customers, aligning the organization’s long-term innovation goals, and fostering a culture towards external collaboration. These elements are summarized into a conceptual framework presented in Figure 5. below, which illustrates how co-creation can be implemented into innovation programs in manufacturing companies, based on the findings from the case company interviews and the benchmarking analysis.

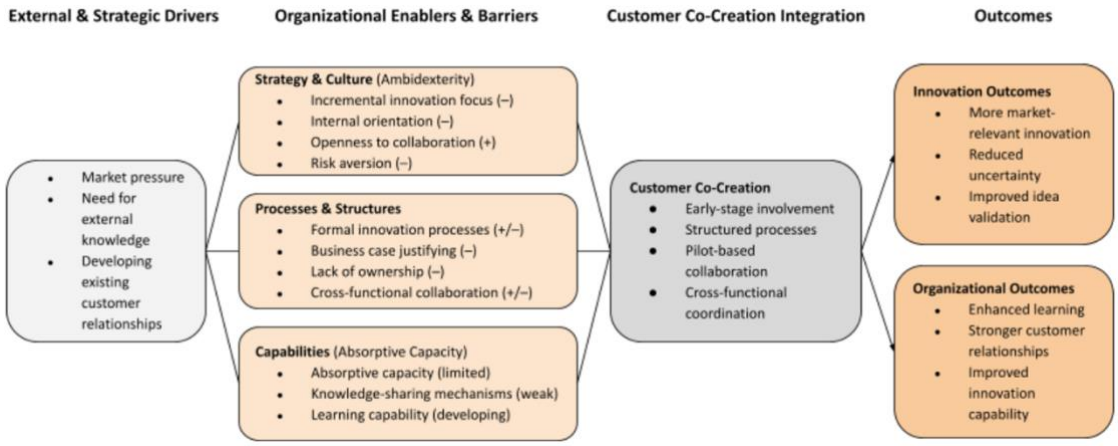

Figure 5. Conceptual Framework

Overall, this study answers the research question '*how can customer co-creation practices be integrated into innovation programs in manufacturing firms?'* by demonstrating that successful integration of customer co-creation in manufacturing innovation programs requires both the inclusion of externalities and the development of internal organizational capabilities that support coordination, learning, and flexibility.

The findings of this study are based on a single case study and cannot be generalized to a broad industrial context. However, they provide insights applicable to similar manufacturing environments characterized by technological complexity, a strong engineering background, and efficiency-driven processes.

In the following section, the study's theoretical contributions, limitations, and suggestions for future research will be presented.

5.1 Theoretical Contribution

The theoretical contributions of the study are discussed in this section. This study contributes to existing empirical research by clarifying how customer co-creation can be integrated into established innovation programs in a manufacturing context. The three

key contributions to existing literature are (1) identifying a gap between open innovation theory and its implementation in the manufacturing industry, (2) conceptualizing innovation programs as a formal structure for managing external knowledge, and (3) clarifying the organizational capabilities required for co-creation integration in a manufacturing context.

First, this study contributes to existing knowledge on open innovation, innovation programs, and customer co-creation by providing insight from a large manufacturing company operating in Finland. Previous knowledge on such practices in a manufacturing context is less explored compared to service and high-tech industries. Prior research emphasizes the importance of innovation as a tool for organizational competitiveness, and emphasizes the need to transform innovation activities from closed to open models (Chesbrough, 2003; Chesbrough, 2006; Bogers et al., 2017). However, this study reveals that this transition is still incomplete in large manufacturing companies, where innovation remains internally driven and focused on gradual improvements. Moreover, the study expands on previous research by demonstrating practical challenges that hinder the integration of open innovation in the manufacturing industry.

Moreover, this study contributes to the existing literature on innovation programs by examining them as tools for managing internal and external knowledge. Innovation programs are used to provide structure to innovation activities and promote ambidexterity of organizations (Birkinshaw & Gibson, 2004; van de Vrande et al., 2009). The results extend this previous literature by discussing how innovation programs act as a platform for integrating customer co-creation rather than solely as an internal innovation tool. The results highlight that organizations require clearly defined processes and mechanisms for managing external knowledge in innovation activities. Without such mechanisms, innovation programs risk remaining internally driven. Therefore, the study contributes by presenting innovation programs as a system-level design for managing external collaboration in manufacturing companies. This repositions innovation

programs not only as an internal coordination mechanism but also as an enabler for the use of external knowledge in manufacturing environments.

The manufacturing innovation literature characterizes the environment as requiring high technical competency and operational efficiency. Previous studies highlight the importance of implementing multiple knowledge sources and increasing novelty in innovation activities by integrating external knowledge (Amara & Landry, 2005; Lassen & Larsen, 2024). The results of this study highlight challenges in the field of manufacturing innovation, including organizational silos, hierarchical structures, long development processes, and financial justifications for innovation activities. These findings contribute to existing literature by providing evidence of how the characteristics of manufacturing companies constrain the integration of customer co-creation. Furthermore, the study explains why open innovation practices are more difficult to implement in the manufacturing industry than in other industries.

Additionally, this study contributes to existing literature on customer co-creation. Previous studies emphasize that co-creation creates joint value between the business and the customer and improves innovation outcomes (Prahalad & Ramaswamy, 2004). Similarly, studies on lead users emphasize that customers provide organizations with valuable insight into emerging market needs, ahead of the general market (von Hippel, 1986). This study acknowledges these benefits within the case company while also demonstrating limitations in organizational readiness, a lack of structure, and difficulties in aligning customer input with innovation activities. Through these findings, the study contributes to existing literature by shifting the focus from the benefits of co-creation to the conditions required for its integration. Supporting Enkel et al. (2009) study, which highlights the importance of organizational readiness and aligning their innovation strategy. This study contributes by demonstrating how challenges in readiness appear in a large manufacturing context.

Furthermore, this study contributes to understanding which organizational capabilities are required for successful co-creation integration. Previous literature on absorptive capability, learning capability, and the dynamic capabilities perspective describes a company's ability to apply external knowledge to its innovation activities(Cohen & Levinthal, 1990; Teece et al., 1997; Alegre & Chiva, 2008; Teece, 2014). This study supports previous literature in recognizing these organizational capabilities as enablers of customer co-creation. However, it further demonstrates that absorptive capability alone is not sufficient, and the integration of co-creation requires alignment across many organizational capabilities. These include cross-functional collaboration, internal communication, knowledge-sharing mechanisms, and a culture that values external input. Similarly, the study reveals that successful co-creation requires an organization's ability to adapt its internal processes, allocate resources, and align co-creation with long-term innovation goals. Contributing to existing knowledge by proposing a systematic and capability-guided view of co-creation integration in manufacturing firms.

By combining these elements, this study contributes to the existing literature by providing a comprehensive understanding of innovation activities in large manufacturing companies and of how customer co-creation can be integrated into innovation programs in this field. This study moves beyond descriptive co-creation literature by offering concrete and theoretically grounded explanations of under what conditions co-creation can be implemented in manufacturing innovation programs.

Table 4. Theoretical Contributions

Existing Empirical Findings	Theoretical Concept	Contribution
Organizations must balance operational efficiency and exploration to remain competitive.	Ambidexterity (Birkinshaw & Gibson, 2004)	A strong focus on incremental improvements limits the integration of co-creation and exploratory innovation
Innovation improves through external knowledge integration.	Open Innovation (Chesbrough, 2003; West & Bogers, 2014)	Organizations continue to rely on internal expertise, revealing a gap between open innovation theory and practice.

Value is created through company and customer collaboration.	Customer Co-Creation (Prahalad & Ramaswamy, 2004)	Co-creation is often informal and not supported by structured organizational processes.
The ability to recognize, assimilate, and apply external knowledge enhances innovation outcomes.	Absorptive Capability (Cohen & Levinthal, 1990)	Fragmented organizational structures limit the effective use of customer knowledge.
Organizational learning processes enable effective knowledge utilization.	Learning Capability (Alegre & Chiva, 2008)	Weak knowledge-sharing reduces the use of customer insights.
Companies must reconfigure internal and external capabilities to respond to changing environments.	Dynamic Capability (Teece et al., 1997)	Strong internal capabilities do not ensure effective integration of external knowledge.

5.2 Limitations

The study has some limitations that should be acknowledged. First, as a single-case study, the findings are specific to the context and based on one organization. This limits the generalizability of the results, as the identified barriers and enablers for co-creation are influenced by the case company's processes and culture. The results cannot, therefore, be assumed to represent the broader manufacturing field in Finland, and similarly, may not reflect the entire case company, as the empirical data is based on only nine interviews from selected departments. Given the size of the organization, a small sample size may not capture diverse perspectives within the organization, limiting the strength of the conclusions.

Second, the data consist of interviews collected at a single point in time, making it a cross-sectional study. As a result, the findings reflect the interviewees' perceptions at that specific moment and may be subject to bias, such as personal opinions and selective reporting. The findings, therefore, can not reflect on the interviewee’s views on co-creation practices over time. Additionally, the interviewees are limited to Finnish- and English-speaking individuals based in Europe, which reduces the cultural and ethnic diversity of the perspectives in this study. The selected participants can only represent their own culture and attitudes, and therefore, the findings cannot capture global customer collaboration practices.

Third, the study uses the Gioia methodology for interpretive coding and categorizing the data. The Gioia methodology provides structure to the data analysis, but involves the researcher's own interpretation. This may influence how themes and aggregate dimensions are constructed. The results of the study could vary if the coding were performed by another researcher. While transparency in reporting and coding was attempted, some degree of subjectivity may remain. Additionally, the benchmarking analysis was based on publicly available sources, therefore limiting the validity of the data. Internal challenges and processes may not be fully reported in public sources, and as a result, the findings should be interpreted as indicative rather than direct recommendations.

Finally, the managerial recommendations are based on the interview findings and should, therefore, be considered guidelines rather than comprehensive solutions for implementing co-creation into innovation activities. All in all, the findings of this study are context-specific and therefore cannot be generalized or applied to other organizations or broader settings. The applicability of the recommendations varies based on an organization's resources, strategy, and industry position.

5.3 Suggestions for Future Research

Based on the limitations of the study, several possibilities for future research can be identified. First, further studies should explore customer co-creation on a more global scale. Studies should examine how cultural differences affect customer participation, collaboration practices, and the effectiveness of co-creation. Expanding the scope of the study beyond a single case company and within national boundaries would allow for comparisons of how co-creation activities can be conducted in different regions and industries. Additionally, comparing SMEs and large manufacturing companies would provide insight into whether size and organizational hierarchy have an effect on the implementation of co-creation.

Regarding the case company, future research could examine the innovation program over time, especially after co-creation practices are implemented. A longitudinal study would demonstrate how co-creation practices have evolved and show their impact on innovation outcomes. Furthermore, the case company could benefit from studying the innovation program at a more mature stage, as it could provide deeper insights into the long-term challenges and benefits of co-creation. Future studies could compare different customer collaboration methods, such as pilot programs and workshops, to test their effectiveness, scalability, and impact on innovation outcomes, against customer co-creation.

Third, future research should more broadly explore innovation ecosystems and initiatives in Finland. Multi-actor studies involving companies, customers, suppliers, research institutes, and others should be conducted to better understand how co-creation practices are best conducted in innovation ecosystems. This could also provide more insight into external factors that support or hinder collaborative innovation. It is likewise important to examine customers' experiences, motivations, and mindsets regarding co-creation through surveys or mixed-method studies to identify the factors that influence their willingness to participate in collaborations and partnerships.

Lastly, further research should be conducted on how organizations measure the outcomes and the value of co-creation activities. Further studies should examine the effect of co-creation on performance indicators such as product success, time-to-market, and customer satisfaction. Specific focus should be placed on how investments can be justified and on the potential business impact. Similarly, future studies could examine what organizational capabilities and structures are required to successfully implement co-creation. Research should focus on how companies can overcome internal barriers, align business units, and leverage existing internal tools when integrating external knowledge. Such research could be valuable to both the case organization and to future researchers and practitioners.

Table 5. Future Research Avenues

Research Suggestion	Focus
Examining co-creation across national boundaries	Cultural differences affecting participation and collaboration practices.
Comparing SMEs and large manufacturing companies	The impact of company size and hierarchy in implementing co-creation.
Innovation programs over time	Evolution and long-term impact of co-creation practices.
Comparing customer collaboration methods	Effectiveness and scalability of different methods against co-creation.
Innovation Ecosystems	Interaction between companies, customers, and suppliers. External factors supporting or hindering collaborative innovation.
Customer motivations and experiences	Factors affecting the willingness to participate in co-creation.
Examine value and investment justification	Business impact and early-stage uncertainty.
Analyze organizational barriers and capabilities	Internal barriers, alignment, and internal mechanisms for integrating external knowledge.

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Appendices

Appendix 1. Interview Guide

Duration of employment at the case organization: 0-3, 4-7, 8-11, 12-15, 15+
Age range: 20-29, 30-39, 40-49, 50-59, 60-65+
Department/Function:
Role/Title:

Is it okay for you that I record this interview?

Introductory questions

1. Can you briefly describe your role and responsibilities in the company?
2. What is your role or involvement in the current innovation program or activities?
3. How does your work contribute to innovation activities?
    a. How long have you been involved in the company's innovation program / activities? (<1, 1-3, 4-6, 7+)

Current state of the Innovation Program

4. How would you describe the company's current innovation program? (e.g., structure, processes, tools, strategic alignment)
    a. What are the strengths of the current innovation program? Could you give concrete examples?
    b. What challenges or limitations have you noticed? (e.g., idea flow, resources, decision-making speed.)
5. What types of ideas or projects have been submitted or developed through the program?
    a. Which of these have succeeded / failed?
    b. How do you currently select ideas submitted to the program? Does customer input have any influence on the selection?
6. If you were designing the company's future innovation program, what would you change or include?

   a. Would you include customer participation? If yes, how?

Organizational Culture, Ambidexterity and Learning Capability

7. How would you describe the culture toward innovation within the company? (e.g., risk-taking, experimentation, openness)
   a. How well do different departments/functions collaborate during innovation activities?
   b. Does customer-related information flow between departments?
   c. How would you describe the company's attitude / openness toward new ideas, experimentation, and technologies? Could you give an example?
8. Does the company learn from past successes/failures?
   a. What mechanisms support this learning? (e.g., after-action reviews)

External Knowledge and Customer Collaboration

9. In what ways does the company collaborate with customers now? (e.g., product-level, process-level, strategic collaboration)
   a. How valuable is customer knowledge in the current innovation activities? What would you consider the most valuable?
   b. What challenges are there when trying to use customer insights in innovation activities? (e.g., collection, interpretation, integration, resource constraints)
10. Does the company have processes, systems, or routines to integrate customer input? Why or why not?
11. What kind of customer knowledge would be most useful for innovation? (e.g., technical, experiential, operational) Could you rank or give examples?

Perceptions of Customer Co-Creation

12. Would customers be willing/able to participate? Why or why not? (e.g., large accounts vs small clients)
13. What benefits could co-creation bring? Could you give an example?

14. Which customer types are most suitable? (e.g., technical expertise, product usage, strategic importance)

Expected Challenges and Requirements of Integrating Co-Creation

15. Is the company ready? What conditions are needed? (e.g., organizational capability or resource readiness)
    a. What challenges (operational / strategic) might appear if the company were to involve customers more directly in its innovation program internally (e.g., company culture/mindset, resources)
    b. externally? (e.g., customer willingness, intellectual property, communication)
16. Are there examples (inside or outside the company) of co-creation approaches you think could work here?

Closing Questions

17. What would ideal customer collaboration look like? (e.g., digital tools, phases of involvement, frequency)
18. Is there something important about innovation or customer co-creation that we haven’t discussed yet?