

MARKUS JÄHI

Customer Involvement in Industrial Service Portfolio Development

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ACADEMIC DISSERTATION

To be presented, with the permission of
the Faculty of Engineering and Natural Sciences
of Tampere University,
for public discussion in the auditorium Pieni sali 1
of the Festia building, Korkeakoulunkatu 8, Tampere,
on 27 March 2020, at 12 o'clock.

ACADEMIC DISSERTATION

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Finland

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ISBN 978-952-03-1502-3 (print)
ISBN 978-952-03-1503-0 (pdf)
ISSN 2489-9860 (print)
ISSN 2490-0028 (pdf)
<http://urn.fi/URN:ISBN:978-952-03-1503-0>

PunaMusta Oy – Yliopistopaino
Tampere 2020

"Words are real. Everything human is real, and sometimes we know things before they happen, even if we aren't aware of it. We live in the present, but the future is inside us at every moment. Maybe that's what writing is all about (...) not recording events from the past, but making things happen in future."

- Paul Auster in Oracle Night

ACKNOWLEDGEMENTS

Research seldom takes place in isolation. Even a monography like this doctoral dissertation is dependent on supervision, encouragement, participation, advice, and trust of others. I have been lucky to enjoy that all, and without this support, my undertaking would not have been completed.

Firstly, I would like express my gratitude to my supervisor Professor Miia Martinsuo. Her advice and support has been invaluable throughout the whole doctoral process in the past five years. Earnest thanks for all the efforts, encouragement, high-quality guidance, and the opportunity to visit the CROPS research group at Tampere University of Technology (TUT).

Sincere thanks go to my pre-examiners Professor Daniel Kindström and Professor Vicky Story for their insightful comments that helped me to improve the manuscript and make the contribution more accessible. I feel honored to have Professor Maria Holmlund-Rytkönen as my opponent. I am also grateful to Dr. Marinka Lanne and Professor Hannu Kärkkäinen for reading my manuscript and for their encouraging feedback.

I am deeply grateful to Dr. Taru Hakanen, who offered me the possibility to join the S4Fleet research program and to take up the challenge in the first place. My compliments from all the support as a co-worker, project manager, and team leader especially in the first half of the dissertation project. I also wish to thank our whole S4Fleet project group Marja, Mervi, and Markku at VTT, and also Kati from TUT, for their involvement.

Acknowledgements of their financial support to the Finnish Technology and Innovation Agency (Tekes), Finnish Metals and Engineering Competence Cluster (FIMECC), and all the companies that participated in the S4Fleet research program. I also thank Employment Fund for the educational allowance, which enabled me to fully focus on the thesis when it was really needed.

During the dissertation process, I had the privilege to spend a year as a visiting researcher by CROPS research group at TUT. Thanks especially to Eija, Lauri, Beheshte, Toni, Matias, Prasanna, and Tuomas for a pleasant year. I look forward to our future cooperation.

I owe many thanks to my present and former colleagues at VTT. In particular, I would like to thank my closest colleagues, Katariina and Marinka, for all the encouragement and great discussions over the years! Earnest thanks to our own ‘Jaffa’ doctoral study group Jyri, Johanna, and Maria for the peer support. I am also indebted to many other great minds I have had a pleasure to work with – Mervi, Minna, Pertti, Tapani, VaNu, and all other great colleagues – thank you! Finally, many thanks to Tiina and Katri for the organizational support towards the end of the project.

To my parents, family, and friends, it is a privilege to have you around – thank you! In particular, I wish to thank my mother, who has successfully passed on an interest in qualitative research and in the social construction of reality.

I am ever so grateful to my wife Kaisa. Thank you for your love and support, unwavering faith in me, and in this endeavor. To my sons Otso and Eino, thank you for all the love and happiness!

Tampere, 29 February 2020

Markus Jähi

ABSTRACT

The main objective of this research is to provide new understanding of how industrial service providers can benefit from customer involvement in developing their service portfolio. The study focuses on the entire service portfolio instead of the individual services of industrial firms. Although customer involvement in developing individual services is a rather well-known phenomenon, it is not clear how customer involvement can benefit the development of the entire firm service portfolio, which is a more strategic and complex issue. In particular, it is not well-understood how customer involvement can promote the different ways through which contemporary industrial firms develop their services. In the industrial setting, the portfolio perspective is especially important because firms not only develop individual services but also pursue service-based growth strategies and business models with their customers. Theoretically, the study is positioned at the intersection of the partly overlapping research fields of service growth (i.e., servitization), new service development, and customer involvement.

At the center of this study are four generic offering development modes through which industrial service providers can develop their service portfolio: 1) refining basic services portfolio, 2) promoting customer service elements, 3) developing more complete offerings, and 4) extending portfolios with advanced services. The study focuses on how different customer involvement forms can be applied within these offering development modes. The study looks at customer involvement in a business-to-business (B2B) service setting. B2B services are those that help other organizations to achieve their goals. In the industrial context, service portfolios typically cover a wide selection of B2B services ranging from basic maintenance and logistics services to advanced data-enabled services and consulting. Industrial firms also bundle services together to form more complete service packages and solutions.

This research was conducted as a qualitative multiple case study. The findings of the study are based on the exploration of three cases—*SCALE*, *DEVICE*, and *FLOW*—that cover a focal firm (i.e., service provider) and a selection of 6–7 business customers in each case. All focal firms were industrial service providers that supplied a diverse selection of industrial business services. The participating customers represented different industrial branches, such as manufacturing, energy,

and heavy industries. The primary data was gathered through semi-structured, in-depth interviews.

This study illustrates that industrial service providers can benefit from customer involvement in different ways in all four offering development modes studied. Customer involvement can provide valuable contributions to issues, such as customer service elements and interfaces, service packaging and standardization, interorganizational collaboration and development partnerships, and improving existing services. Of these, especially the first three have received only minor attention in earlier research. To the service growth literature, the study contributes by showing that customers can contribute to the definition of service transitions, trajectories, and offering dimensions. Moreover, a service strategy explains how different firms apply customer involvement. For the new service development and customer involvement literatures, this research provides new knowledge by illustrating the strategic nature of knowledge that originates from customer involvement. Customer involvement can contribute to important innovation dimensions, such as customer interfaces and service delivery system, and this knowledge may remain underutilized if customer involvement is strongly focused on only individual services. In addition, to fully benefit from customer involvement, industrial service firms need to utilize versatile customer involvement forms in both an explorative and exploitative manner in portfolio development. For the managers of industrial firms, the study provides new knowledge and recommendations for involving customers in service portfolio development when outlining service-driven growth strategies.

TIIVISTELMÄ

Tämän tutkimuksen päätavoitteena on tuottaa uutta ymmärrystä siitä, miten teolliset palveluntarjoajat voivat hyötyä asiakkaiden osallistamisesta kehittäessään palveluportfoliotaan. Tutkimus keskittyy teollisten yritysten koko palvelutarjoamaan (portfolio) yksittäisten palvelujen sijaan. Vaikka asiakkaiden osallistaminen yksittäisten palvelujen kehittämisessä onkin melko hyvin tunnettu ilmiö, ei ole selvää, miten asiakkaiden osallistaminen voi hyödyttää yrityksen koko tarjooman kehittämistä, joka on strategisempi ja monitahoisempi asia. Etenkään sitä, miten asiakkaiden osallistaminen voi edistää nykyaikaisten teollisten yritysten tapoja kehittää palvelutarjoamistaan, ei ymmärretä vielä hyvin. Teollisessa kontekstissa tarjoomatason tarkastelu on erityisen tärkeä, sillä yritykset eivät ainoastaan kehitä yksittäisiä palveluja vaan myöskin palvelupohjaisia kasvustrategioita ja liiketoimintamalleja asiakkaidensa kanssa. Teoreettisesti tutkimus asemoituu osittain päällekkäisten tutkimusalueiden, palvelupohjaisen kasvun (servitisaatio), uusien palvelujen kehittämisen ja asiakkaiden osallistamisen leikkauskohtaan.

Tämän tutkimuksen keskiössä on neljä yleistä tarjoomakehittämisen tapaa, joilla teolliset palveluntarjoajat voivat kehittää palveluportfoliotaan: 1) peruspalvelutarjooman parantaminen, 2) asiakaspalveluelementtien edistäminen, 3) kokonaisvaltaisempien tarjoomien kehittäminen ja 4) tarjoomien laajentaminen kehittyneillä palveluilla. Tutkimus keskittyy siihen, miten erilaisia asiakasosallistamisen muotoja voidaan soveltaa näihin tarjoomakehittämisen tapoihin. Tutkimus tarkastelee asiakkaiden osallistamista yritystenvälisen palvelujen (business-to-business -palvelut) puitteissa. Yritystenväliset palvelut ovat palveluja, jotka auttavat toisia organisaatioita saavuttamaan omia tavoitteitaan. Teollisessa kontekstissa yritysten tarjoomat käsittävät tyypillisesti laajan valikoiman erilaisia teollisia palveluja peruskunnossapidosta sekä -logistiikasta aina kehittyneisiin tietopohjaisiin palveluihin sekä konsultointiin. Teolliset yritykset myös kokoavat palveluja yhteen muodostaakseen laajempia palvelupaketteja ja ratkaisuja.

Tutkimus toteutettiin laadullisena monitapaustutkimuksena. Tutkimuksen tulokset pohjautuvat kolmen tapauksen – *SCALE*, *DEVICE* ja *FLOW* – tarkasteluun, joista kuhunkin sisältyi palveluja tarjoava keskusyritys ja sen 6–7 yritysasiakasta. kaikki keskusyritykset olivat teollisia palveluntarjoajia, jotka tarjoavat

laajan valikoiman erilaisia teollisia palveluja. Osallistuneet asiakasyritykset edustivat eri teollisuudenaloja kuten valmistavaa teollisuutta, energia-alaa sekä raskasta teollisuutta. Tutkimuksen pääaineisto kerättiin puolistrukturoiduilla syvähaastatteluilla.

Tutkimus osoittaa, että teolliset palveluntarjoajat voivat hyödyntää asiakkaiden osallistamista erilaisin tavoin kaikissa neljässä tarkastellussa tarjoomakehittämisen tavassa. Asiakkaiden osallistaminen voi tuottaa arvokasta tietoa eri asioihin kuten asiakaspalveluelementteihin ja -rajapintoihin, palvelujen paketointiin ja standardointiin, yritystenväliseen yhteistyöhön ja kehittämiskumppanuuksiin sekä olemassa oleviin palveluihin liittyen. Näistä erityisesti kolme ensiksi mainittua ovat saaneet vain vähäistä huomioita aikaisemmassa tutkimuksessa. Palvelupohjaiseen kasvuun liittyen tutkimus tarjoaa uutta tietoa osoittamalla, että asiakkaat voivat myötävaikuttaa yritysten palvelutransitioiden, kehityskaarien ja tarjoomallottuvuuksien määrittelyyn. Lisäksi palvelustrategia vaikuttaa siihen, miten erilaiset yritykset soveltavat asiakkaiden osallistamista. Uusien palvelujen kehittämiseen ja asiakkaiden osallistamiseen liittyvään kirjallisuuteen tutkimus tuo uutta tietoa havainnollistamalla asiakkaista lähtöisin olevan tiedon strategista luonnetta. Asiakkaiden osallistamisella voidaan vaikuttaa tärkeisiin innovaatioulottuvuuksiin kuten asiakasrajapintoihin ja palvelujärjestelmään ja että tällainen tieto voi jäädä hyödyntämättä, mikäli asiakkaiden osallistamisessa keskitytään vahvasti vain yksittäisiin palveluihin. Hyödyntääkseen täysimääräisesti asiakkaiden osallistamista, teollisten palveluyritysten tulee lisäksi tarjoomakehittämisessä hyödyntää monipuolisia asiakasosallistamisen muotoja sekä eksploratiivisesti että eksploraatiivisesti. Teollisia palveluja tarjoaville yrityksille tutkimus tarjoaa uutta tietoa ja suosituksia siitä, miten ne voivat osallistaa asiakkaita palveluportfolion kehittämiseen osana palvelupohjaisten kasvustrategioiden toteutusta.

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1 INTRODUCTION

This research explores service development in industrial settings. It focuses on the development of service portfolios instead of singular services. In particular, this study addresses customer involvement, which is one of the central phenomena in service development but has been sparsely studied in the industrial service context. This chapter introduces the rationale and objectives of the study, the selected research approach, and the structure of the thesis.

1.1 Background and rationale

In a business-to-business (B2B) setting, firms (i.e., service providers) offer services to help other organizations (i.e., customers) to achieve their own business objectives and run their operations (see, Kowalkowski and Ulaga, 2017, p. 21). This study deals with industrial services, which are a particular form of B2B services (Holmlund, et al., 2016). Industrial services cover a wide range of B2B services, such as maintenance services, logistics services, consulting, or data-analytics, that are developed and delivered in an industrial context (Rabetino, et al., 2015; Raddats and Easingwood, 2010; Raddats and Kowalkowski, 2014; Story, et al., 2017). In this study, the focus is on the service portfolios instead of individual services. Accordingly, the term “service portfolio” is used to refer to the total mix of services offered by a firm.

Changes are typical for firms’ service portfolios. The change can be incremental or radical (Gallouj and Weinstein, 1997; Snyder, et al., 2016). It can be about the actual service concept (Edvardsson and Olsson, 1996; Jong and Vermeulen, 2003) or about how services are bundled together with other services or products (Evanschitzky, et al., 2011; Nordin and Kowalkowski, 2010; Tuli, et al., 2007). The change can also be about increasing the share of services in the company portfolio (Oliva and Kallenberg, 2003; Vandermerwe and Rada, 1988), about customer service (John and Storey, 1998; Storey and Easingwood, 1998), about technology (den Hertog, 2000; Jong and Vermeulen, 2003), or about cooperating and creating value with other organizations (Edvardsson, et al., 2006; Moeller, et al., 2013; Prahalad and

Ramaswamy, 2000; Vargo and Lusch, 2004). Moreover, the change can be originated in the company itself or initiated by external pressures (Hrebiniak and Joyce, 1985; Pfeffer and Salancik, 1978). Nevertheless, all organizations face the need to renew their portfolios at some point. Therefore, a key question for any organization is how service portfolios are or should be renewed.

Although it is not the only direction, both business practitioners and academics have increasingly turned to customers in leveraging service development in recent years (Biemans, et al., 2016; Carlborg, et al., 2014; Mendes, et al., 2017). This may be attributable to several reasons. First, customers are expected to hold a lot of valuable information. For example, customer needs can be communicated to suppliers, customers can give feedback for the services they are familiar with, and customers may have ideas for novel services (e.g., Alam, 2002; Edvardsson, et al., 2006; Kristensson, et al., 2008). Customers can also possess more original ideas and think differently than the company employees (Kristensson, et al., 2002; Magnusson, et al., 2003). Second, customers may take a more active role by participating in the ideation and development of new services. For example, customer involvement can take the form of co-creation or the innovator's role can even be entrusted to the customer (Cui and Wu, 2016; von Hippel and Katz, 2002; Prahalad and Ramaswamy, 2000; Vargo and Lusch, 2004). Thus, the rationale behind listening to the customer voice is apparent. Customer involvement is expected to help organizations in developing superior products and services, consequently leading to financial rewards (e.g., Bogers, et al., 2010; Mahr, et al., 2014; Witell, et al., 2011).

Despite the considerable interest of both business practitioners and academics in customer involvement, the scholarly understanding is still incomplete (Bogers, et al., 2010; Hoyer, et al., 2010; Storey and Larbig, 2018). The impacts of customer involvement on management practice have also remained somewhat modest (see, Homburg and Kuehnl, 2014; Mahr, et al., 2014). For example, the prior customer involvement literature has predominantly addressed the development of services at the level of individual projects (e.g., Mahr, et al., 2014; Storey and Larbig, 2018; Westh Nicolajsen and Scupola, 2011), or more rarely at the level of programs (e.g., Alam, 2002), but not the firm portfolios as a whole. As a phenomenon, however, portfolio development is more strategic and complex than the development of individual services. For example, it may require consideration of a firm's overall business strategy, balance between various services and products, and maximizing the value of the portfolio (Cooper, et al., 2001).

Moreover, majority of prior customer involvement studies have taken a broad approach to customer involvement by addressing both products and services (e.g.,

Chang and Taylor, 2016; Cui and Wu, 2017; Homburg and Kuehnl, 2014; Witell, et al., 2014). Studies focused on services have covered both B2B and business-to-consumer (B2C) services (e.g., Carbonell and Rodriguez Escudero, 2015; Hsieh and Hsieh, 2015; Storey and Larbig, 2018). With only a few exceptions (e.g., Alam, 2002; Martin, et al., 1999; Westh Nicolajsen and Scupola, 2011), B2B services have not been the sole focus in prior studies on customer involvement. Moreover, very few studies, if at all, have particularly focused on customer involvement in the realm of industrial services.

Industrial services and other B2B services have some similarities. For example, they share the idea of organizations (instead of individuals) as customers, and the portfolio perspective to service development is of high importance to them both, as service providers typically offer and develop a range of services that can be of different types. However, the industrial services context also has unique characteristics that arguably have an influence on service development and related customer involvement. In particular, the industrial services context is characterized by a service transition process through which industrial firms change from product manufacturers to service providers by expanding their services offered and finally may proceed to taking over customers' operations (Oliva and Kallenberg, 2003; Vandermerwe and Rada, 1988).

In consequence, industrial firms develop services toward more relational, bundled, customized, or output-based offerings (Raddats and Kowalkowski, 2014). At the same time, the firms continue delivering and improving traditional after-sales services, such as maintenance, spare parts, supply management, and warehousing services (Baines and Lightfoot, 2013; Kowalkowski, et al., 2015; Rabetino, et al., 2015). Furthermore, many industrial organizations increasingly develop sophisticated "advanced" services that are critical to customers' core processes to grow their revenues and profits and to add value to customers (Baines and Lightfoot, 2013; Story, et al., 2017).

Accordingly, the recent research has demonstrated that industrial organizations simultaneously offer a wide range of diverse services (Raddats and Kowalkowski, 2014), can concurrently follow different transition trajectories in the process of adding more services to their portfolio (Matthyssens and Vandenbempt, 2010), and need to adopt parallel business logics (Windahl and Lakemond, 2010). Therefore, industrial service development is characterized as a multidirectional and multifaceted phenomenon (Kowalkowski, et al., 2015).

How to simultaneously renew and manage a set of diverse services is an issue that has only recently been addressed in industrial service research (Kowalkowski, et al.,

2015, 2017). In particular, a lack of customer involvement has been highlighted as one of the main hurdles in advancing service-based growth strategies in the industrial setting (see, Kowalkowski and Ulaga, 2017, pp. 24–26). For example, customer knowledge that companies extract in practice is said to be variously underutilized, ill-suited, or insufficient to help companies in matching their offerings with market opportunities (Wiersema, 2013). Current research on exploring how customer involvement differs between distinct offering development forms (e.g., Cui and Wu, 2016; Edvardsson, et al., 2012; Witell, et al., 2011) and how organizations can benefit from customer involvement in developing industrial offerings in multiple directions (e.g., Kowalkowski, et al., 2015; Matthyssens and Vandenbempt, 2010; Raddats and Kowalkowski, 2014; Windahl and Lakemond, 2010) is particularly scarce.

1.2 Objectives and focus of the study

The issue of customer involvement in service development is not new. This research, however, takes a novel perspective to customer involvement as it specifically focuses on portfolio-level development and explores customer involvement in the context of industrial services. The main goal of the study is to provide novel, scientific understanding of how customer involvement can benefit industrial service providers in developing their service portfolio. Consequently, this study aims to complement the existing understanding in the partly overlapping research fields of industrial service growth (i.e., servitization), new service development (NSD), and customer involvement.

For the service growth literature, this study aims to create new understanding of how customer involvement supports the different ways in which service portfolios can be developed. Within industrial service growth research, the co-existence of different development directions is an emerging research stream (Kowalkowski, et al., 2015, 2017; Matthyssens and Vandenbempt, 2010; Raddats and Kowalkowski, 2014; Windahl and Lakemond, 2010). By adopting a customer involvement perspective, this study specifically aims to complement the current understanding of the different competencies and activities necessitated by the parallel offering development trajectories (Kowalkowski, et al., 2015). Moreover, the customer perspective of industrial service growth has been under-represented in the prior research because a majority of it has focused on manufacturers (Brax and Jonsson, 2009; Story, et al., 2017; Vaitinen, 2019). Therefore, this study aims to contribute to

this generic research gap by providing insights into customers' role in service growth and in B2B services (see, Holmlund, et al., 2016).

With regard to the NSD literature, this study aims to create new understanding of NSD at the portfolio-level. The literature on customer involvement in NSD has predominantly concentrated on the development of individual services or service development projects (e.g., Mahr, et al., 2014; Storey and Larbig, 2018; Westh Nicolajsen and Scupola, 2011). Therefore, the need for portfolio-level service research has been specifically called for. This is particularly because findings on individual service development projects do not always enable drawing conclusions at the portfolio-level (Menor, et al., 2002). In the context of industrial services, this is especially important because the service providers simultaneously need to manage a wide range of distinct services, different service transition trajectories, and business logics, as discussed above (Kowalkowski, et al., 2015; Matthyssens and Vandembemt, 2010; Raddats and Kowalkowski, 2014; Windahl and Lakemond, 2010). Thus, this study pursues new portfolio-level understanding within NSD.

In terms of customer involvement research, this study aims to provide novel insights into customer involvement in the context of industrial services. Prior research on customer involvement has mainly neglected B2B services (cf. Alam, 2002; Martin, et al., 1999; Westh Nicolajsen and Scupola, 2011). B2B services have been a part of broader studies that cover a wide range of products and services (e.g., Chang and Taylor, 2016; Cui and Wu, 2017; Homburg and Kuehnl, 2014; Witell, et al., 2014), or studies have included both B2C and B2B services (e.g., Carbonell and Rodriguez Escudero, 2015; Hsieh and Hsieh, 2015; Storey and Larbig, 2018). Industrial services, however, are a distinct form of B2B services, characterized by the service transition process (Oliva and Kallenberg, 2003) and collaborative, long-term relationships that are a source of innovation and differentiation (Fitzsimmons and Fitzsimmons, 2008, pp. 11–12). Therefore, empirical evidence from product development or B2C services does not necessarily apply in the context of industrial services.

Based on the objectives discussed above, the main research question (RQ) was formulated as follows: *How can industrial service providers benefit from customer involvement in service portfolio development?* The research question follows the overall goal of the study to provide novel, scientific understanding of how customer involvement can benefit industrial service providers in developing their service portfolios. To further inform the empirical part of the study, the research question is elaborated and broken down into more detailed sub-questions after the literature review (see, 2.5.2).

Following the above-mentioned objectives, this study draws its theoretical background mainly from service research and industrial marketing research and is focused, in particular, on the following research fields:

- 1) *Industrial service growth (or servitization)* (Baines, et al., 2017, 2009; Gebauer, 2008; Kindström and Kowalkowski, 2009; Kowalkowski, et al., 2015, 2017; Oliva and Kallenberg, 2003; Rabetino, et al., 2018; Raddats and Kowalkowski, 2014; Vandermerwe and Rada, 1988),
- 2) *New service development (NSD)* (Biemans, et al., 2016; den Hertog, 2000; Jaakkola, et al., 2017; Johne and Storey, 1998; Johnson, et al., 2000; Mendes, et al., 2017; Menor, et al., 2002; Snyder, et al., 2016; Storey, et al., 2016; Storey and Easingwood, 1998), and
- 3) *Customer involvement (CI)* (Alam, 2002; Bogers, et al., 2010; Cui and Wu, 2016; Edvardsson, et al., 2006, 2012; Gruner and Homburg, 2000; von Hippel, 1986, 1976; Mahr, et al., 2014; Storey and Larbig, 2018; Witell, et al., 2011).

As these streams of research partly overlap with closely related fields, such as new product development (NPD) (e.g., Chang and Taylor, 2016; Cui and Wu, 2016; Homburg and Kuehnl, 2014) and service and product innovation management (see, Carlborg, et al., 2014; Menor, et al., 2002; Snyder, et al., 2016; Witell, et al., 2016), they are not altogether excluded from the study. Figure 1 illustrates the positioning of the study.

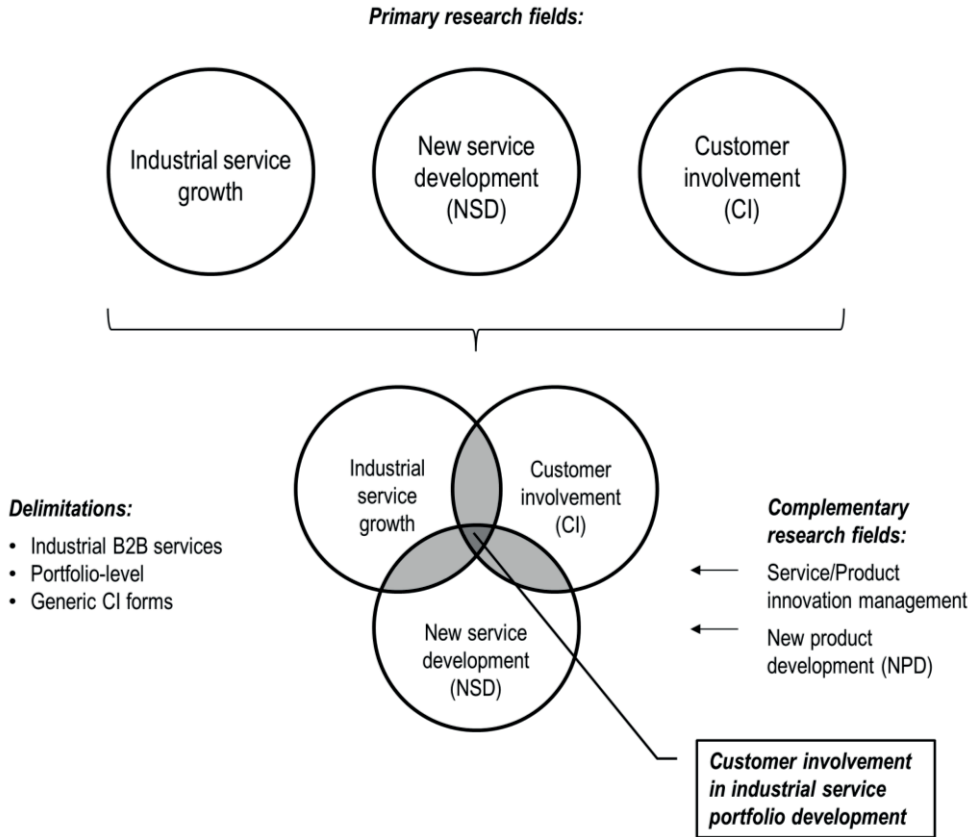


Figure 1. Positioning of the research

The primary focus of the study is at the intersection of the three above-mentioned research fields, which covers the key elements of customer involvement in industrial service portfolio development. That is, industrial services and service business (i.e., service growth), portfolio-level service development (i.e., NSD), and customers' role as a knowledge source and participant in service development (i.e., customer involvement).

The study is delimited to the context industrial B2B services; thus, B2C and other B2B services are excluded from the study. The study also focuses on portfolio-level service development; therefore, developing individual services or service projects is excluded from the study (see, Menor, et al., 2002). However, customer contributions on different levels (i.e., individual service and portfolio levels) are covered as long as they provide support to the different ways through which service portfolios are developed. Finally, this study focuses on generic customer involvement forms: customers as information sources, co-developers, and innovators (Antikainen, 2011;

Cui and Wu, 2016; Kaulio, 1998). Thus, the study does not address specific methods or tools, such as service quality function deployment (SQFD), empathic design, or customer-driven development (CuDIT) that are sometimes applied to involve customers, especially in the B2C context (Edvardsson, et al., 2012). These methods are excluded from the study, because they are not commonly used by industrial B2B service providers including the focal firms of the study.

1.3 Research approach and structure of the thesis

To meet the objectives of this research (see, 1.2), a qualitative multiple case study was designed (Baxter and Jack, 2008; Dubois and Gadde, 2002; Harrison, et al., 2017; Ketokivi and Choi, 2014; Miles, et al., 2014; Yin, 2003). This study is based on three cases, labeled as SCALE, DEVICE, and FLOW. In all the cases discussed in the study, the focal firms delivered and developed a range of different industrial services. All focal firms also sought different ways of renewing their service portfolio, although each of them had a different focus in emphasizing the basic and advanced services, building more complete offerings, and stressing the role of customer service elements. The focal firms also held different approaches to customer involvement. Thus, the cases were selected to complement each other and to enable a case research strategy where within-case findings can be replicated on the cross-case level (Eisenhardt, 1989; Yin, 2003, p. 47). This study also covers focal firms and customer perspectives. Accordingly, the qualitative data was gathered from both focal firms and their customers. The focal firms that participated in the study were located in Finland, and the customer data was gathered from companies located in Finland, Belgium, Poland, and the Netherlands.

This study originates from the research work that was conducted in a research program called Service solutions for fleet management (S4Fleet). S4Fleet was a large research program that was organized within the Digital, Internet, Materials & Engineering Co-Creation (DIMECC) network and its participants included several research organizations and companies in 2015–2017 (DIMECC, 2017). The goal of the program was to explore the opportunities provided by the digitalization of the industrial operations, and the program covered issues, such as industrial internet, data-enabled services, and service-led growth strategies (e.g., DIMECC, 2017; Hakanen, et al., 2017; Martinsuo and Kärri, 2017). The author of this thesis took part in the program as a researcher of the VTT Technology Research Centre of Finland, which is one of the organizations that participated in the program.

This thesis comprises six chapters. Chapter 1 has so far introduced the research topic, the rationale for this study, and the research objectives. Chapter 2 presents the key concepts and provides an overview of the current understanding of the research topic. The chapter concludes with a synthesis of the literature and the introduction of the conceptual framework of the study. Chapter 3 describes how the research was conducted in practice and presents the methodological choices underlying the selected research strategy. The chapter also introduces the cases and focal firms that participated in the study. Chapter 4 forms the empirical part of the study and describes the findings of the research. First, all three cases are described. Then, the findings on four distinct offering development modes are discussed in detail. Chapter 5 discusses the findings by elaborating the answers to the sub-questions. Chapter 6 concludes the thesis. First, the scientific contributions of the research are summarized. Then, the managerial implications of the study are presented. The study ends with an evaluation of the research and an elaboration of the future research opportunities.

2 THEORETICAL BACKGROUND

This study draws from the partly overlapping research fields of service growth, NSD, and customer involvement, which together provide the theoretical foundation of the study. Accordingly, the study is centered on industrial services, portfolio-level development, and customer involvement and how they interrelate. This chapter first introduces the key concepts and then discusses the current knowledge about industrial service development within the key research fields of this study. The chapter ends with a synthesis of the theoretical background, elaboration of the detailed sub-questions, and introduction of the conceptual framework.

2.1 Key concepts

2.1.1 Industrial services and service growth

As noted previously, B2B services exist to help other organizations to achieve their own business objectives and run their operations. B2B services cover both manufacturing and service industries, and include a variety of different services that organizations in the private and public sector purchase (Holmlund, et al., 2016). B2B services are usually separated from B2C services in academic research because many of their issues, insights, and findings have altogether different implications and likely applications (Wiersema, 2013). In the B2B context, the collaborative relationship that enables a co-production of value between the service provider and customer is of the fundamental nature. According to Fitzsimmons and Fitzsimmons (2008, pp. 11–12), the three dimensions that characterize B2B services are co-creation of value, relationship, and service capability. Accordingly, a customer is a co-producer of value and an input to the service processes; relationships are a source of innovation and differentiation, and long-term collaboration enables the customization of offerings to meet customer needs; and service capacity is sized to meet the fluctuations in demand (Fitzsimmons and Fitzsimmons, 2008, pp. 11–12).

Industrial services form a specific category within B2B services, covering a wide range of services that are developed and delivered in an industrial context (Rabetino, et al., 2015; Raddats and Easingwood, 2010; Raddats and Kowalkowski, 2014; Story, et al., 2017). For example, Rabetino et al. (2015) synthesized industrial services to 11 main categories: administrative services, installed base services, consulting services, customer services, financial services, maintenance services, operational/outsourcing services, optimization services, research and development services, recycling services, and supply management and warehousing services. Accordingly, Rabetino et al. (2015) defined the service offerings of manufacturing companies to include all types of services that could be needed by industrial customers throughout product life-cycle from purchase planning to product disposal. Following this definition, industrial services are approached from the perspective of customers in the present study. However, this study is not limited to the product-related services offered by manufacturing companies and covers the services offered by service companies within an industrial setting.

This study also builds on a widely adopted classification of industrial services into base, intermediate, and advanced services (see, Baines and Lightfoot, 2013). The more advanced the services, the more sophisticated and critical they are to customers' core processes (Baines and Lightfoot, 2013). Regarding the above-mentioned service categories (see, Rabetino, et al., 2015), consulting, operational, and optimization services can typically be classified into advanced services. Also, Industrial Internet of Things (IIoT) enabled services, such as remote monitoring, that are based on the integration of physical machinery and devices, software, sensors, and analytics as a network, typically belong to advanced services (see, Boyes, et al., 2018; Ehret and Wirtz, 2017; Kiel, et al., 2017). In contrast, installed base services, customer services, or supply management and warehousing services are typically base or intermediate services. Moreover, advanced services are often based on more long-term contracts and charged by usage or performance (Baines and Lightfoot, 2013).

As with any other service sector, industrial services constantly undergo changes. In the industrial context, a service transition or service-led growth is a prevalent, if not a predominant, approach to service development (see, Kohtamäki, et al., 2018). A seminal study in the field, Oliva & Kallenberg (2003), depicted a service transition process through which firms gradually change from product manufacturers to service providers by expanding their relationship-based and/or process-centered services and finally proceed to taking over customers' operations. That is, companies may eventually become solution providers (Davies, 2004). This process requires not

only an introduction of new services but also the renewal of organizations' capabilities and processes to better create value by shifting from selling products to selling services (Baines, et al., 2009).

In the literature, this phenomenon is often labeled as servitization (Baines, et al., 2009; Vandermerwe and Rada, 1988) or service infusion (Brax, 2005; Kowalkowski, et al., 2012). The current study follows a recent conceptualization of the phenomenon by Kowalkowski, Gebauer, and Oliva (2017) and simply refers to "service growth" to cover the variety of existing concepts (e.g., servitization, service infusion, hybrid offerings, solutions, transition from products to services, and product-service systems) that emphasize how companies across industries are pursuing service growth strategies.

2.1.2 Service portfolio development

In service research, a few close, although distinct, approaches specifically focus on services at the level of multiple services. These include portfolio-level NSD (Johne and Storey, 1998; Johnson, et al., 2000; Menor, et al., 2002), service portfolio management (Cooper and Edgett, 1999; Johnson, et al., 2000; Kohlborn, et al., 2009), service mix (Mathe and Shapiro 1990), augmented service offering (Grönroos, 1990; Ozment and Morash, 1994; Storey and Easingwood, 1998), and industrial service offering development (e.g. Kindström and Kowalkowski, 2009; Kohtamäki, et al., 2013; Kowalkowski, et al., 2009; Rabetino, et al., 2015). The key characteristics of the different approaches to the service management of multiple services are summarized in Table 1.

Table 1. Existing approaches to portfolio-level service development

Approach	Main focus	Context	Example studies	Contribution to this study
Portfolio-level NSD	Development of a service program or portfolio instead of individual services or a project	All services, financial services	Alam, 2002; Alam and Perry, 2002; Djellal and Gallouj, 2005; Johne and Storey, 1998; Storey, et al., 2016	Portfolio-level as a unit of analysis; importance of customer involvement
Service portfolio management	Management of a service portfolio; balancing internal and external considerations	All services	Cooper, et al., 2001; Cooper and Edgett, 1999; Johnson, et al., 2000; Kohlborn, et al., 2009	Setting the right set of services; matching portfolio with customer needs
Service mix	Optimum mix of services offered throughout the product/service life-cycle	After-sales services, health care and dental services	Eldenburg and Kallapur, 1997; Manski, et al., 2014; Mathe and Shapiro, 1990	Life-cycle perspective to service development
Augmented service offering	Augmented service offering through customer service elements	All services	Grönroos, 1990; Johne and Storey, 1998; Ozment and Morash, 1994; Storey and Easingwood, 1998	Essential role of customer service and interaction in service delivery
Industrial service offering development	Augmented market offering through services	Industrial B2B services	Johansson and Olhager, 2004; Kindström and Kowalkowski, 2009; Kowalkowski, et al., 2015, 2017; Matthyssens and Vandembemt, 2008; Rabetino, et al., 2015	Concept of industrial service offering; centrality of service-based growth in industrial businesses; solutions

These approaches stem from different contexts and thus emphasize different aspects in terms of service development. Service portfolio management is a dynamic decision process that aims at selecting the right set of services to be funded, developed, and offered to the customers (Cooper and Edgett, 1999, pp. 179–220; Johnson, et al., 2000; Kohlborn, et al., 2009). Service mix is an integrated approach that has been suggested by Mathe & Shapiro (1990) to manage after-sales services in a strategic way, but the concept has not become particularly common in the context of industrial services (cf. Eldenburg and Kallapur, 1997; Kawamura, et al., 1998; Manski, et al., 2014). Augmented service offering emphasizes that services cannot usually be delivered without customer service and close interaction with customers (Johne and Storey, 1998; Storey, et al., 2016). In NSD, multiple services (e.g., portfolio or program level) is one possible unit of analysis in studying service development (Johne and Storey, 1998; Johnson, et al., 2000; Menor, et al., 2002). Moreover, industrial service offering development is essentially a portfolio-level issue because service growth usually refers to the development of the entire service portfolio of a firm (see, Baines, et al., 2009; Rabetino, et al., 2015). Also, industrial

service offering development typically covers portfolio-level issues including the level of service standardization (or industrialization) and bundling of services (e.g., solutions) (e.g., Kowalkowski, et al., 2015; Matthyssens and Vandembemt, 2008).

This study especially draws from the portfolio-level NSD, augmented service offering, and industrial service offering development approaches. First, setting the correct unit of analysis in NSD is important because the findings on individual service development projects do not always enable drawing conclusions at the portfolio-level (Menor, et al., 2002). Second, augmented service offerings have implications on the portfolio-level service development because customer service elements and interactions with customers are typically not restricted to particular services but are common across several or all services offered by a firm. Third, the offerings of industrial firms comprise a wide selection of different services, such as basic, advanced, availability, and performance services (Baines and Lightfoot, 2013; Kowalkowski, et al., 2015; Rabetino, et al., 2015; Raddats and Kowalkowski, 2014). Thus, the prioritization of the services to be developed by, added to, or withdrawn from the company's service portfolio is of importance in developing service-based businesses (Kowalkowski, et al., 2017). Therefore, service portfolio development is defined as the renewing of the mix of services offered by a firm through adding, withdrawing, or modifying services including changes in customer service elements, bundling of services and service standardization.

2.1.3 Customer involvement

Several complementing perspectives to customer involvement exist that stem from different, although closely related, academic disciplines, such as NPD and NSD, service and product innovation management, and open innovation. Customer involvement has also links to the broader value co-creation phenomenon (see, Galvagno and Dalli, 2014; Mustak, et al., 2009; Saarijärvi, et al., 2013). Especially in two fields, service marketing and innovation, research on customer involvement has been generous (Cui and Wu, 2016; Mahr, et al., 2014). The present study primarily builds on the research within the traditions of NSD and service innovation management, wherein customer involvement has become a central and increasingly studied research topic (see, Biemans, et al., 2016; Carlborg, et al., 2014; Mendes, et al., 2017). Nevertheless, as the aforementioned research streams are closely related and partly overlapping, the present study has not adopted an exclusive approach toward the other traditions. For example, part of the empirical research explicitly

conducted with NPD covers the development of both products and services; thus, these contributions have not been excluded from the study (e.g., Chang and Taylor, 2016; Homburg and Kuehnl, 2014; Witell, et al., 2014).

In the context of NSD, customer involvement is defined as an aspiration of coming close to customers to learn from and with them in versatile ways that go beyond traditional market research techniques, such as focus groups, questionnaires, and interviews (Edvardsson, et al., 2006). The definition particularly highlights that customers can participate in service development in many ways. For example, industrial customers can provide ideas and make demands at the ideation stage, act as co-developers at the development stage, and take part in service delivery as well as give feedback after the services have been launched (see, Kowalkowski and Ulaga, 2017, p. 155).

In particular, this research draws from three generic customer involvement forms: 1) customers as information sources, 2) customers as co-developers, and 3) customers as innovators. Customers as information sources emphasizes learning from customers' stated and latent needs, preferences, wishes, and values through traditional market research techniques (Cui and Wu, 2016; Edvardsson, et al., 2006). Customers as co-developers extends the role of customers from knowledge contribution to customer collaboration through customer participation, integration, or co-creation (Moeller, et al., 2013). Customers as innovators goes one step further by shifting the primary responsibility of innovation to customers (Cui and Wu, 2016; von Hippel and Katz, 2002). The classification is adapted from Cui & Wu (2016), although the same classification is applied in literature in the form of design for, design with, and design by the customers (e.g., Antikainen, 2011; Kaulio, 1998).

The rationale behind customer involvement is that it is expected to facilitate the development of superior products and services. Customers are regarded as possessing the essential knowledge about needs and usage situations that is of importance in developing novel products and services (Bogers, et al., 2010). Customer can also provide original ideas and think differently than the company employees (Kristensson, et al., 2002; Magnusson, et al., 2003). In addition, customer involvement is expected to facilitate other benefits, such as reduced development cycle time, improved customer education and market acceptance, or enhanced long-term relationships with key customers (Alam, 2002; Alam and Perry, 2002).

For the service providers, the consequences of customer involvement are anticipated to materialize through gaining novel and relevant knowledge that they would not obtain otherwise, eventually leading to financial rewards, such as improved profit margins (Mahr, et al., 2014; Witell, et al., 2011). Furthermore,

integrating customers to NSD has been generally regarded as a key success factor in service development (de Brentani, 1995; Martin and Horne, 1995; Storey, et al., 2016). However, many B2B firms still struggle with inadequate customer insights, underinvest in service market research, and only learn to co-create services with customers (see, Kowalkowski and Ulaga, 2017, pp. 24–26; Wiersema, 2013).

2.2 Industrial service business

2.2.1 Service growth phenomenon

Service-driven growth has become a major trend within manufacturing and other industries (see, 2.1.1). According to Oliva & Kallenberg (2003), industrial companies gradually transition from product manufacturers to service providers by expanding their relationship-based and/or process-centered services and finally proceed to taking over customers' operations. In consequence, companies eventually become solution providers (Davies, 2004). The main reasons behind the transition is to seek higher profits, gain competitive advantage, and support product selling (see, Baines, et al., 2009). This process requires not only an introduction of new services in the company portfolio but also the renewal of organizations' capabilities and processes to create value by shifting from selling products to selling services (Baines, et al., 2009).

In industrial service research, service-led growth has become a prevalent, if not a predominant, phenomenon (see, Baines, et al., 2017; Kohtamäki, et al., 2018; Rabetino, et al., 2018). Since Vandermerwe & Rada (1988) introduced the term “servitization,” often referred to as the starting point of the research field, the number of studies in the field has dramatically grown (Baines, et al., 2017; Kowalkowski, et al., 2017; Lightfoot, et al., 2013; Rabetino, et al., 2018). For example, the bibliometric study of Rabetino et al. (2018) identified over 1000 relating articles, accompanied by 51 review articles in the field. In addition to Oliva & Kallenberg (2003) and Vandermerwe & Rada (1988), numerous other foundational studies have significantly contributed to the current understanding of service growth or servitization (e.g., Brady, et al., 2005; Davies, 2004; Gebauer, et al., 2005; Mathieu, 2001; Mont, 2002; Tukker, 2004; Tuli, et al., 2007; Ulaga and Reinartz, 2011).

Currently, distinct research communities are present within the service growth field, although they are closely related and the communities have a varying degree of

interdependence between them (Lightfoot, et al., 2013). Accordingly, three broad servitization-related communities have been identified: product-service systems, solution business, and service science (Rabetino, et al., 2018; see also, Lightfoot, et al., 2013). Issues that have received attention in the field include, but are not limited to, service business growth, solutions, marketing of after-sales services, profitability of services, and novel business models (Lightfoot, et al., 2013). A wide range of terms, transitions concepts, and classification schemes for industrial services also exist (Rabetino, et al., 2018). Moreover, the research domain is still growing and theory building is increasing (Baines, et al., 2017).

2.2.2 Transitions, trajectories, and strategies

Prior research on service transitions suggests that a transition from a product manufacturer to a service provider necessitates changes in different dimensions (Mathieu, 2001; Matthyssens and Vandenbempt, 2010; Oliva and Kallenberg, 2003; Penttinen and Palmer, 2007; Ulaga and Reinartz, 2011; Windahl and Lakemond, 2010). For example, Kowalkowski et al. (2015) have classified transition dimensions into three prevailing categories: (1) from product to process-oriented services, (2) from standard to customized services, and (3) from transactional to relational services.

Transitions also take place through different steps, paths, or trajectories (Matthyssens and Vandenbempt, 2010, 2008; Penttinen and Palmer, 2007; Raddats and Easingwood, 2010). For example, Penttinen & Palmer (2007) identified two alternative paths through which companies proceed toward more complete offerings: product-service path and relational path. Within the product-service path, companies first concentrate on the development of the novel services, whereas companies that follow the relational path initially focus on establishing closer linkages, information exchange, and cooperation with customers (Penttinen and Palmer, 2007). Moreover, companies do not shift from product manufacturers to solution providers directly with one major transition; the shift occurs through alternative paths in different transition dimensions. Empirical findings also indicate that changes are typically incremental rather than radical (Matthyssens and Vandenbempt, 2008).

In this research, the focus is on the service portfolios of industrial firms and on how customers can contribute to their development. Therefore, the literature review emphasizes on the different offering types and service strategies that the extensive

service growth literature has provided (for a comprehensive overview of the field, see Baines, et al., 2017, 2009; Kowalkowski, et al., 2017; Rabetino, et al., 2018; Zhang and Banerji, 2017). Accordingly, the following discussion takes a closer look at industrial service strategies and offerings. For industrial firms, service growth typically materializes in the service strategies that the companies follow and offerings that they choose and develop.

2.2.3 Service strategies and offering dimensions

Within a given market, a service strategy defines how a company intends to compete with services (Raddats and Kowalkowski, 2014). Three generic service strategies available for industrial companies include equipment supplier, availability provider, and performance provider strategies (Kowalkowski, et al., 2015). This classification of service strategies corresponds, for example, with Helander and Möller (2007), Tukker (2004), and Windahl and Lakemond (2010), although the authors have labeled the distinct strategies differently. Tukker (2004) applied terms, such as product oriented, use oriented, and result oriented services, and Helander and Möller (2007) equipment/material supplier, solution provider, and performance provider to refer to different service strategies.

When a company is an equipment supplier, it mainly offers services that are directly linked to its products, and the company business model is still focused on product selling (Tukker, 2004). Availability provider refers to a strategy wherein services are regarded as a key differentiator in competition, and the service provider offers “availability” to customers throughout the product life-cycle (Helander and Möller, 2007). As a performance provider, the service provider takes over some of the customer processes, for example, through outsourcing, and agrees to offer results (i.e., “performance”) instead of products and services (Helander and Möller, 2007; Tukker, 2004).

Other ways to classify service strategies also exist. For example, Gebauer (2008) has classified the different service strategies to after-sales service, customer support, outsourcing partner, and development partner strategies. Although the first three strategies somewhat correspond with the equipment supplier, availability provider, and performance provider strategies discussed above, development partnership is presented as a separate strategy. Within the development partnership strategy, customers can benefit from service provider’s research and development competencies, which are offered as a service (Gebauer, 2008).

More recently, Raddats & Kowalkowski (2014) suggested a generic typology for service strategies that is based on service doubters, service pragmatists, and service enthusiasts. Their classification is descriptive, and it is not based on particular services or service types but on how companies address different services as combinations. Accordingly, service enthusiasts are characterized by a strong focus on different services in general, service pragmatists are mainly focused on the product-related services of their own products, and service doubters have a low focus on all types of services (Raddats and Kowalkowski, 2014).

Based on their service strategy, companies determine the service categories that they offer to a given market (Raddats and Kowalkowski, 2014). Literature is abundant in showing the different types of services that companies can offer to their customers (e.g., Mathieu, 2001; Matthyssens and Vandenbempt, 2010; Rabetino, et al., 2015; Raddats and Easingwood, 2010; Raddats and Kowalkowski, 2014; Ulaga and Reinartz, 2011; Windahl and Lakemond, 2010). Based on a literature review of service offerings, Raddats & Kowalkowski (2014) provide an overview of the dimensions through which different offerings can be explored. They identified seven dimensions that are frequently applied in both literature and business practice:

1. Services to a supplier's products vs. services to a customer's processes
2. Transactional services vs. relational services
3. Individual services vs. bundled services
4. Standardized services vs. customized services
5. Input-based services vs. output-based services
6. Product-related services vs. product-independent services
7. Services on own products vs. services on own and others suppliers' products

In each dimension, the latter types of services represent a more extensive and complex offering. Raddats & Kowalkowski (2014) note that in particular, the first five dimensions are often interrelated. That is, when a company makes a transition in one dimension, it presumably results in a transition in another dimension as well.

Another way to classify services is to divide them into base, intermediate, and advanced services (see, Baines and Lightfoot, 2013). The more advanced the services, the more sophisticated and critical they are to customers' core processes (Baines and Lightfoot, 2013). Further, advanced services are often based on more long-term contracts and charged by usage or performance (Baines and Lightfoot, 2013). Moreover, different service offerings can be classified based on the service

content. Rabetino et al. (2015), for example, classified different life-cycle offerings into 11 main categories: administrative services, installed base services, consulting services, customer services, financial services, maintenance services, operational/outsourcing services, optimization services, research and development services, recycling services, and supply management and warehousing services. Of these, consulting, outsourcing, or optimization services can typically be classified into advanced services. In contrast, installed base services or customer services are typically base or intermediate services.

IIoT-based services form a specific offering category within the industrial services context. IIoT, or Industrial Internet as it is occasionally labeled, refers to the integration of physical machinery and devices, software, sensors, and analytics as a network that enables, for example, remote monitoring of the connected machinery and devices (e.g., Boyes, et al., 2018; Ehret and Wirtz, 2017; Kiel, et al., 2017). By using IIoT as a platform, industrial service providers can develop a wide range of services that are typically of advanced nature. As a term, IIoT is separated from IoT (Internet of things) to emphasize the use and deployment of IoT technologies in industrial settings (Boyes, et al., 2018).

Finally, solutions are a specific form of offering in the service growth literature. Solutions are usually depicted as broad and complex entities, which comprise a bundle of products, services, software, and knowledge elements that are integrated together to solve customer-specific problems (Nordin and Kowalkowski, 2010). Solutions are often differentiated from other services and products in terms of their complex integrated nature, customization, and relational character (Evanschitzky, et al., 2011). Instead of being merely combinations of different goods, services, and varying knowledge elements, they are often defined as relational processes between a customer and supplier (Tuli, et al., 2007). Moreover, it is expected that a solution provides more value than the sum of its components when offered stand-alone (Brax and Jonsson, 2009). Within service growth, solutions are sometimes regarded as the final stage in the servitization process because industrial firms are expected to eventually take over customers' operations and thus become solution providers (Davies, 2004; Oliva and Kallenberg, 2003).

2.2.4 Overlapping and interrelated classification schemes

As the previous discussion demonstrates, many terms and classifications for different transitions, service strategies, and offerings exist (see, Rabetino, et al.,

2018). Another issue that complicates the phenomenon of service growth is that companies usually have concurrent roles (Kowalkowski, et al., 2015). Companies simultaneously follow different transition trajectories (Matthyssens and Vandenbempt, 2010), offer a wide range of diverse services (Raddats and Kowalkowski, 2014), and need to adopt parallel business logics (Windahl and Lakemond, 2010). For example, although many companies proceed toward offering more complete solutions to customers, they still continue supplying equipment and offering basic, often product-related, services to their customers (Kowalkowski, et al., 2015; Windahl and Lakemond, 2010). Moreover, companies not only expand their businesses by introducing new services and integrating the existing ones to more complete solutions but also standardize and scale down the services that were formerly customized (Kowalkowski, et al., 2015). In other words, companies seldom follow linear, unidirectional transitions in reality.

This has led some scholars to claim that the service growth phenomenon is more complex, multifaceted, and multidirectional than what much of the former research has suggested (Kowalkowski, et al., 2015; Windahl and Lakemond, 2010). Consequently, more research has been called for that takes into account the different transition trajectories, offerings, and business logics that often simultaneously prevail within companies seeking growth through services (Kowalkowski, et al., 2015, 2017; Matthyssens and Vandenbempt, 2010; Windahl and Lakemond, 2010).

Table 2 summarizes the key aspects of the transitions, service strategies, and offerings as discussed above.

Table 2. Summary of the relevant service growth literature.

Issue	Main focus	Example studies	Contribution to this study
Transition dimensions and trajectories	Dimensions and paths through which companies transition to service providers	Kowalkowski, et al., 2015; Matthyssens and Vandenbempt, 2008; Oliva and Kallenberg, 2003; Penttinen and Palmer, 2007; Ulaga and Reinartz, 2011	Dimensions of the service transition process; optional transition tracks
Service strategies	Generic service strategies available for industrial service providers; other classifications	Gebauer, 2008; Helander and Möller, 2007; Kowalkowski, et al., 2015; Raddats and Kowalkowski, 2014; Tukker, 2004; Windahl and Lakemond, 2010	Diversity of strategies, such as (1) equipment supplier, (2) availability provider, and (3) performance provider
Service offerings	Service categories present in the industrial context; dimensions through which different offerings vary	Baines and Lightfoot, 2013; Davies, 2004; Mathieu, 2001; Rabetino, et al., 2015; Raddats and Easingwood, 2010; Raddats and Kowalkowski, 2014; Tuli, et al., 2007; Ulaga and Reinartz, 2011	Abundance of different industrial services and classification schemes; generic categories, such as (1) base, (2) intermediate, and (3) advanced services; solutions
Concurrent offerings and logics	Simultaneously existing, diverse offerings, trajectories, and business logics	Kowalkowski, et al., 2015; Matthyssens and Vandenbempt, 2010; Raddats and Kowalkowski, 2014; Windahl and Lakemond, 2010	Companies usually follow and maintain parallel strategies and offerings
Reviews of service growth/servitization literature	Origins and the current state of the research field, schools of thought, key issues, and research topics	Baines, et al., 2017, 2009; Kowalkowski, et al., 2017; Rabetino, et al., 2017; Zhang and Banerji, 2017	Overall understanding of the service growth phenomenon; key issues for studying customer involvement in the context of industrial services

The preceding review demonstrates that the applied terminology and concepts in the service growth literature are not fully consistent, and the different transitions, service strategies, and offerings are partly overlapping and highly interrelated (cf. Rabetino, et al., 2018). For example, distinguishing between service strategies and offerings is not always easy. Accordingly, Raddats & Kowalkowski (2014) have emphasized that the terms strategies and offerings are quite often used interchangeably and that this confusion should be addressed more carefully in the future research.

2.3 New service development

2.3.1 Overall scope

As industrial firms pursue growth through services, they place service development at the core of industrial competitiveness (Mendes, et al., 2017). To be successful, industrial firms need to both capitalize on existing services and introduce completely new services to their portfolios (see, Kowalkowski and Ulaga, 2017, p. 148). NSD is a growing discipline within the field of innovation (Biemans, et al., 2016). The specific focus of NSD lies in the overall development process of services that are novel to the supplier (Johne and Storey, 1998; Johnson, et al., 2000; Menor, et al., 2002). As a research field, NSD covers the entire life-cycle of service development from idea generation to market launch and includes both creating new and improving existing services (Biemans, et al., 2016). NSD has its roots in the product development domain, but it has developed into an independent area of research during the last few decades (Carlborg, et al., 2014; Mendes, et al., 2017). NSD covers both B2B and B2C services, although most of the studies in the field have not focused on identifying patterns between the market sectors (Papastathopoulou and Hultink, 2012).

Prior research on NSD has covered a wide range of topics. The early writings in the field were especially focused on a narrow set of subjects, such as critical success factors and the NSD process (Johne and Storey, 1998; Papastathopoulou and Hultink, 2012). In the more recent works, NSD has been expanded to cover new topics, such as organizational issues and, importantly to this study, customer involvement (Carlborg, et al., 2014; Jong and Vermeulen, 2003; Mendes, et al., 2017; Papastathopoulou and Hultink, 2012).

This chapter particularly focuses on three central issues in NSD: degree of change (incremental vs. radical), NSD dimensions (service concept, customer interface, service delivery system, and technology), and NSD stages (see, Carlborg, et al., 2014; Droege, et al., 2009; Jong and Vermeulen, 2003; Myhren, et al., 2018; Snyder, et al., 2016). In general, within NSD research, much of the prior research on these issues is based on project-level inquiries (see, Johnne and Storey, 1998; Johnson, et al., 2000; Storey, et al., 2016). However, it is expected that these issues are of importance to the portfolio-level service development.

2.3.2 Degree of change

The most commonly used method to classify service development is to separate the radical and incremental changes in the portfolio (Snyder, et al., 2016). According to a definition by Gallouj & Weinstein (1997), incremental changes refer to the improving of the existing characteristics of a service, whereas radical change denotes the creation of a completely new service in terms of characteristics that are not connected to the old ones. Alternative ways to delineate incremental and radical new services also exist. For example, the difference between incremental and radical changes can be characterized by investigating the discontinuity of the change (e.g., Brown and Osborne, 2013); whether the changes are revisions to existing services, service line extensions, or serve new markets (e.g., Oke, 2007); or whether the new services are new to the world or new to particular markets only (e.g., Sundbo, 1997).

The degree of the change has implications on how service development is conducted. Prior research has identified the success factors that are relevant to incremental and radical service development or both (e.g., Avlonitis, et al., 2001; de Brentani, 2001; Myhren, et al., 2018; Oke, 2007; Westh Nicolajsen and Scupola, 2011). For example, an innovation-supporting corporate culture that encourages creativity and entrepreneurship has been found as more important to radical service development (de Brentani, 2001). However, in incremental changes, introducing services that have a strong corporate fit, a formal stage-gate process, and avoiding unnecessary complex and costly services have a more significant role (de Brentani, 2001). Based on a literature review, however, Droege et al. (2009) have concluded that the differences between the success factors for incremental and radical service development may be of degree instead of kind and that the success factors on one type of service development are not counter-productive to the other.

Importantly to this study, the degree of the change may have implications for customer involvement, although findings have been somewhat inconclusive (Storey and Larbig, 2018). For example, customer involvement has been found to improve innovation performance in an incremental setting but harm it within radical innovations (Menguc, et al., 2014). In contrast, customer involvement has been discovered to be positively linked to customer information quality in the context of highly innovative products, but not when development addresses modifications or extensions to the existing products (Bonner, 2010). Customer involvement is discussed in more detail in its own sub-chapter (see, 2.4).

2.3.3 Innovation dimensions and development stages

In product development, separating product and process innovations is a commonly applied dichotomy, which is sometimes also applied to service development (see, Droege, et al., 2009; Snyder, et al., 2016). In the service context, however, the delineation of process and product components is not straightforward, and alternative frameworks have been proposed that take the characteristics of services better into account (see, Droege, et al., 2009; Gallouj and Savona, 2009; Snyder, et al., 2016). For example, prior research has demonstrated that the development or invention of something new can be related to changes in different service innovation dimensions (Droege, et al., 2009; Jong and Vermeulen, 2003).

Change in the service concept (i.e., in the characteristics of the service itself) is the most widely recognized dimension (Jong and Vermeulen, 2003). Service concept is the description of what is to be delivered to the customer and how it is to be achieved (Edvardsson and Olsson, 1996). It is essentially a communication construct that describes the key characteristics of a service, including the value for the customers, the overall shape of the service, customer experience, and the outcomes for the customer and organization (Clark, et al., 2000). However, development of a service concept usually refers to individual services and not to the firm portfolio as a whole.

Development of novel services can take place through other dimensions as well, and these may be more relevant to the portfolio-level. For example, den Hertog (2000) has suggested a four-dimensional model that includes service concept, client interface, service delivery system, and technology dimensions. Here, the client interface refers to the part of service delivery that takes place in the interface between the service providers and its customers, and it emphasizes both customer specific aspects as well as the co-production of the service (den Hertog, 2000). Changes in the service delivery system relate to internal work processes and arrangements and include the skills and capabilities of the service employees (Jong and Vermeulen, 2003). Technology is also addressed as a distinct dimension. Although technology is not a prerequisite for a service innovation, in practice, there are a number of relationships between the two, and technology often plays a facilitating or enabling role in service development (den Hertog, 2000; Jong and Vermeulen, 2003).

Service development can also deal with customer service elements (Johne and Storey, 1998). Unlike products, services cannot usually be delivered without customer service and close interaction with customers (Johne and Storey, 1998; Storey, et al., 2016). Consequently, the concept of augmented service offering is

sometimes applied in service marketing to refer to the combination of the core service attributes (i.e., core service product) and related customer service elements that are necessary in delivering the service (Grönroos, 1990; Ozment and Morash, 1994; Storey and Easingwood, 1998). Augmented service offering emphasizes that in developing services, concentrating on the core service attributes alone is not meaningful and the customer service elements must also be considered (Johns and Storey, 1998). Customer service elements and interactions with customers are typically not restricted to particular services but cover a collection of services or the entire firm service portfolio. Therefore, it is meaningful to consider it in portfolio development. Changes in the customer service elements are parallel, particularly to the client interface dimension discussed above (see, den Hertog, 2000).

Services can also be developed through service architecture and modularity (Brax, et al., 2017; Dörbecker and Böhm, 2013; Iman, 2016; Voss and Hsuan, 2009). On the one hand, modular services can be developed to improve the efficiency of the service production (Brax, et al., 2017). For example, service companies can standardize processes, break them down into standardized sub-processes, and reuse standardized elements to compose modular services (Carlborg and Kindström, 2014). In this way, service modularity comes close to productization of services (Iman, 2016). On the other hand, modularization can be applied to guarantee a certain level of customization through a variety of standard components and processes, for example, through mass-customization approaches (Bask, et al., 2011; Dausch and Hsu, 2006; Da Silveira, et al., 2001). Still, unmodularized services may be able to accommodate customer requests more flexibly (Brax, et al., 2017). Therefore, developing service modularity and standardization requires a consideration of a possible trade-off between efficiency in service production and fulfilling heterogeneous customer needs. As for customer involvement, there are differing views of whether service modularity and standardization should be visible to customers. In other words, the views differ on whether modularity is an integral part of the offering in the customers' eyes or should it stay as a hidden property of a service system (see, Iman, 2016; Pekkarinen and Ulkuniemi, 2008).

In addition, other typologies to describe different service development dimensions exist. For instance, companies can develop new or improved services, service processes, or service business models (Ostrom, et al., 2010). Another way is to break down the service development into three activities: service concept development, service system development, and service process development (Edvardsson and Olsson, 1996). It is also possible to combine services to form "service packages" and thus introduce new combinatory services (Djellal and

Gallouj, 2005). In fact, such combinations may come close to solutions, particularly if they comprise complex combinations of services, products, and knowledge elements and are combined to solve specific customer problems (see, 2.2.3). To conclude, service development can take place in any of the above-mentioned dimensions, and an introduction of new services usually requires a combination of changes in several dimensions (den Hertog, 2000).

Stages of service development and the overall NSD process have been some of the most studied issues in the prior NSD research (Menor, et al., 2002; Papastathopoulou and Hultink, 2012). However, there is no consistent view of either the nature of the NSD process or the involved stages. The discussion is also centered on individual services instead on service portfolio development stages (cf. Kindström and Kowalkowski, 2009). Some authors have followed the sequential development processes often applied in product development (see, Booz, et al., 1982). For example, stages such as strategy, idea generation, screening and evaluation, business analysis, development, testing, and commercialization have been proposed for NSD (Voss, 1992).

More service-specific models have also been proposed. For example, Scheuing & Johnson (1989) and Alam & Perry (2002) have formulated comprehensive process models that cover 10–15 different NSD stages. The sequential nature of NSD processes has also been questioned in the literature (see, Johnson, et al., 2000; Menor, et al., 2002), and some authors have suggested cyclical process models (e.g., Johnson, et al., 2000; Kindström and Kowalkowski, 2009). Moreover, there is a disagreement whether service development should follow formal or informal processes and to what extent (see, de Brentani, 1995; Martin and Horne, 1993; Menor, et al., 2002).

Although there is no consensus of the NSD process and the respective stages, it is generally acknowledged that development of services is often a non-linear and highly iterative process (Menor, et al., 2002). Most of the process models in the field of NSD cover three generic activities or stages, including idea generation (i.e., early stages), planning/development (i.e., mid stages), and execution (i.e., late stages), which are then sometimes broken down into more detailed stages (cf. Alam, 2006; Johnson, et al., 2000; Kindström and Kowalkowski, 2009; Menor, et al., 2002). These kinds of generic stages have also been proposed for industrial service providers in extending their product offerings with services (Kindström and Kowalkowski, 2009). This type of broad classification of development stages is followed in many customer involvement studies (e.g., Alam and Perry, 2002; Chang and Taylor, 2016; Gruner and Homburg, 2000; Witell, et al., 2014), where empirical evidence generally suggests that development stages have an effect on customer involvement (see, 2.4.5).

Moreover, in the industrial services context, the importance of the late stages, sales and delivery of novel services, has been especially highlighted (Kindström and Kowalkowski, 2009).

2.3.4 New service development at portfolio-level

Development of services can be investigated at different organizational levels, such as business unit, development portfolio, product line, development project, or steps, stages, and tools used in an individual project (Menor, et al., 2002). Much of the earlier NSD research has been conducted at the level of individual services, which has led scholars to call for more research that would explicitly take a portfolio perspective to NSD (Johne and Storey, 1998; Johnson, et al., 2000; Storey, et al., 2016). The portfolio-level analysis has been called for because observations at an individual project-level are not always suited to be generalized at the portfolio-level (Menor, et al., 2002). In addition, service firms often have an overarching culture that influences the company's service development as a whole, not just individual services or projects (Alam, 2002; Alam and Perry, 2002).

Nevertheless, some empirical evidence on portfolio-level NSD exists. Prior research on portfolio-level NSD has shown certain factors linked to companies that are successful in developing a service portfolio rather than individual services (Johne and Storey, 1998). These include, for example, a culture and systems that support innovation, efficient and formalized development processes, a clear service development strategy, and program-level customer involvement practices (see, Alam, 2002; John and Storey, 1998; Storey, et al., 2016). Importantly to the present study, it has been indicated that analyzing customer involvement at the project-level (i.e., individual services) may be less than optimal because it could provide little insights on how customers are involved in service development in the long term (Alam, 2002), thus warranting exploration of customer involvement within the portfolio setting.

Three issues were highlighted in the above discussion on NSD: degree of change, NSD dimensions, and development stages (cf. Carlborg, et al., 2014; Droege, et al., 2009; Jong and Vermeulen, 2003; Myhren, et al., 2018; Snyder, et al., 2016). As the current study takes the portfolio perspective to service development, considering the implications of the degree, dimensions, and stages on portfolio-level development is necessary. First, incremental and radical changes form two different strategies. In practice, companies can either focus on one or the other strategy or emphasize both

strategies to some extent, which is common for many industrial companies providing services (see, Rabetino, et al., 2015; Raddats and Kowalkowski, 2014).

Second, there are differences in how the innovation dimensions are related to the portfolio-level development. On the one hand, the development of a service concept typically refers to a project-level, whereas the development of a customer interface, service delivery system, and technology are issues that typically transcend the level of individual services (see, den Hertog, 2000). That is, changes in the customer interface, service delivery system, and technology are closely linked to a range of services or to the entire service portfolio. For example, an industrial maintenance provider can have several distinct service concepts although it utilizes the same resources and capabilities to deliver the services (see, Kowalkowski and Ulaga, 2017, pp. 84–104). The same applies to customer service elements, as previously discussed.

Third, a NSD process usually proceeds through generic stages (i.e., early, mid, and late stages). As customer involvement is typically influenced by the stages in question, it is expected that stages play a role also when service development is studied at the portfolio-level.

Table 3 summarizes the key issues of NSD literature that were found relevant to the study and provides examples of the related key studies.

Table 3. Summary of the key NSD literature relevant to the study.

Issue	Main focus	Example studies	Contribution to this study
Degree of change	Incremental vs. radical service development or innovation	de Brentani, 2001; Gallouj and Weinstein, 1997; Myhren, et al., 2018; Oke, 2007; Snyder, et al., 2016; Westh Nicolajsen and Scupola, 2011	Relevance of incremental vs. radical development to NSD and customer involvement
NSD dimensions	Locus of innovation: service concept, customer interface, service delivery system, and technology	Brax, et al., 2017; Droege, et al., 2009; Edvardsson and Olsson, 1996; den Hertog, 2000; Iman, 2016; Jong and Vermeulen, 2003; Snyder, et al., 2016	Portfolio-level dimensions, e.g., customer interface, service delivery system, customer service elements, standardization, and modularity
Stages and process of NSD	Nature of service delivery: iterative and cyclical process; main stages (early, mid, and late)	Alam, 2006; Alam and Perry, 2002; Chang and Taylor, 2016; Johnson, et al., 2000; Kindström and Kowalkowski, 2009; Menor, et al., 2002; Witell, et al., 2014	Influence of development stages on service portfolio development and customer involvement
Portfolio-level NSD	Development of service program or portfolio instead of development projects (i.e., individual services)	Alam, 2002; Alam and Perry, 2002; Djellal and Gallouj, 2005; Johne and Storey, 1998; Storey, et al., 2016	Rationale for the study (lack of portfolio-level research); importance of the portfolio-level to customer involvement
NSD reviews	Origins and the current state of the research field; positioning within related fields of research	Biemans, et al., 2016; Carlborg, et al., 2014; Johne and Storey, 1998; Mendes, et al., 2017; Menor, et al., 2002; Papastathopoulou and Hultink, 2012	Overall understanding of the service development phenomenon; key issues for portfolio-level NSD

The next sub-chapter looks across service growth and NSD research fields and, based on the prior research discussed above, makes a synthesis of the different offering development modes through which industrial service portfolios can be renewed.

2.3.5 Offering development modes

The preceding literature review on industrial service development, covering both service growth and NSD literatures, demonstrates that service portfolios can be developed in different ways. In particular, the literature on service growth is abundant in suggesting a wide range of terms, transition concepts, and classification schemes for industrial services (Rabetino, et al., 2018). However, the prior research does not provide a generally accepted framework that compiles the different ways in which industrial service providers can develop their service portfolios.

The delineation of base, intermediate, and advanced services reflects the differences in the sophistication and criticality of the industrial services (Baines and Lightfoot, 2013), and thus provides different routes for portfolio development. The present study draws from this classification, but extends the categories by including the development of customer service elements (‘promoting customer service elements’) and by dividing advanced services into two different modes (‘developing more complete offerings’ and ‘extending portfolios with advanced services’). The development of base and intermediate services are also combined into a single category ‘refining basic services portfolio’ in this study. Table 4 summarizes the applied offering development modes, their scope, and theoretical underpinnings as discussed in the preceding literature review.

Table 4. Offering development modes

	Development content	Links to literature	Chapter reference	Example
Mode 1: Refining basic services portfolio	Adding, withdrawing, or modifying base and intermediate services	Base and intermediate services, incremental innovation	2.2.3; 2.3.2; 2.4.5	<i>Adding a new maintenance operation to the service portfolio</i>
Mode 2: Promoting customer service elements	Developing customer service elements that accompany the delivered services	Augmented service offering, customer interface dimension in NSD, relational transition path in service growth	2.2.2; 2.3.3	<i>Introducing a novel service reporting practice</i>
Mode 3: Developing more complete offerings	Renewing the way how services are packaged, bundled, or standardized without changing the core service product(s)	Service contracts, service packaging and bundling, solutions, service standardization (productized services)	2.2.2; 2.2.3, 2.3.3	<i>Combining previously separate services under one service contract</i>
Mode 4: Extending portfolios with advanced services	Adding, withdrawing, or modifying advanced, knowledge-intensive services	Advanced services, radical innovation	2.2.3; 2.3.2; 2.4.5	<i>Introducing data-based analytics tools for maintenance optimization</i>

The classification of portfolio development into four offering development modes is used to align the study with the identified ways of how industrial companies develop service portfolios in light of the literature. The selected classification is also adapted to the recognized service portfolio development goals of the focal firms that participated in the study. First, developing customer service elements appeared as an important direction through which service providers can enhance their service portfolios in the industrial context. The literature review showed that customer service elements have an indispensable role in the service delivery (see, 2.3.3).

Customer service elements also have a role in both NSD and service growth literatures, for example, in the customer interface dimension in NSD (see, 2.3.3) and in service transitions toward more relational services (see, 2.2.2).

Second, the development of advanced, knowledge-intensive services that are novel to the focal firms (e.g., IIoT-based services or consulting) was purposely separated from the development of more complete offerings. The literature review illustrated that industrial firms can renew their service portfolio through service contracts, bundling of services into packages and solutions, and thus shifting larger responsibilities to service providers in the form of performance provision or outsourcing (see, 2.2.2–2.2.3). Thus, it is expected that developing service portfolios through advanced, knowledge-intensive services is different from developing more complete offerings in terms of customer involvement.

Third, developing spareparts, warranty, maintenance, repair, and on-site condition monitoring services as well as packaging, dispatching, and warehousing services was regarded as incremental improvements to the existing offerings by the participating companies. No differences between base and intermediate services were stressed in terms of service development or customer involvement. Consequently, developing base and intermediate services were combined into a single category ‘refining basic services portfolio’, and then separated from the development of the advanced, knowledge-intensive services. Moreover, the separation of basic and advanced services also illustrates the differences between incremental and radical changes, which are often emphasized in NSD (see, 2.3.2). The degree of change also is highlighted in customer involvement literature (see, 2.4.5), thus warranting its application as a focal dimension in service portfolio development.

Finally, the number of modes was limited to four to provide a balance between analytical clarity and richness. However, it is acknowledged that this categorization is not the only possibility in terms of scope and depth in classifying service portfolio development.

2.4 Customer involvement

2.4.1 Previous research on customer involvement

In his seminal work on customer involvement, von Hippel (1976) examined the role of customers in innovation in the context of scientific instruments and showed that customers can be a significant source of innovation in contrast with the conventional notion of producers as the locus of innovation. Since then, considerable research has been conducted on the role of customers in innovation (Bogers, et al., 2010). In addition to customers and producers, the scope of potential innovators now encompasses ordinary end-users (Kristensson, et al., 2008; Magnusson, et al., 2003) as well as other stakeholders of the innovating companies, such as competitors and universities, although they fall outside the scope of the present study.

As previously noted, several complementing perspectives to customer involvement exist that stem from different, although closely related, academic disciplines: NSD and NPD, service and product innovation management, open innovation, and value co-creation. However, this study mainly builds on the research within the traditions of NSD and service innovation management, where customer involvement has become a central and increasingly researched topic over the last decades (see, Biemans, et al., 2016; Carlborg, et al., 2014; Mendes, et al., 2017).

Despite the growing popularity of involving customers among both academics and practitioners, the scholarly understanding in the field is still incomplete (Bogers, et al., 2010; Hoyer, et al., 2010; Storey and Larbig, 2018). Moreover, the impacts of customer involvement on management practice have remained somewhat modest (see, Homburg and Kuehnl, 2014; Mahr, et al., 2014). For example, many B2B firms have claimed to struggle with inadequate customer insights and underinvest in service market research (Wiersema, 2013). This provokes both a need for and opportunities to researchers to probe deeper into exploring the role of customers in innovation (Bogers, et al., 2010). For example, a better understanding of different customer involvement forms has been generally called for (Cui and Wu, 2017, 2016; Witell, et al., 2011).

Research on customer involvement can be divided into two broad stages, labeled here as “early studies” and “recent studies.” Early studies cover the time span of 30 years after the seminal works of von Hippel (1976, 1978), whereas recent studies refer to the research conducted on customer involvement roughly during the last decade. A vast majority of the early research on customer involvement was based on

case or small-sample studies or yielded conceptual contributions (Bogers, et al., 2010; Sandén, Matthing, et al., 2006). However, more recent studies on customer involvement have extended the existing understanding, especially through surveys and statistical methods (e.g., Chang and Taylor, 2016; Cui and Wu, 2017; Homburg and Kuehnl, 2014; Storey and Larbig, 2018), thus answering to the calls for more large-scale quantitative research that examines, for example, the relationship between customer involvement and the success of new products and services (Alam, 2002; Bogers, et al., 2010; Carbonell, et al., 2009; Hoyer, et al., 2010).

More recent studies also extend the role of customer from information provision toward increasing participation in the service and product development to complement earlier market research techniques (Edvardsson, et al., 2006; Witell, et al., 2011). Today, there are several complementary perspectives to customer collaboration, such as customer participation, customer integration, and co-creation (Moeller, et al., 2013) that propose collaborative approaches wherein customers increasingly participate in the new product and service development (Cui and Wu, 2016; Prahalad and Ramaswamy, 2000) and/or create value together with companies through interaction (see, Galvagno and Dalli, 2014; Saarijärvi, et al., 2013).

Moreover, the early studies on customer involvement were mainly centered on the development of products (Alam, 2002; Sandén, Matthing, et al., 2006). The recent scholarly work, however, has increasingly addressed the development of services either by exclusively focusing on services (e.g., Carbonell and Rodriguez Escudero, 2015; Storey and Larbig, 2018; Westh Nicolajsen and Scupola, 2011) or by including the development of both services and products as typical of studies founded on NPD (e.g., Cui and Wu, 2016; Homburg and Kuehnl, 2014; Mahr, et al., 2014). Both B2B and B2C markets have been addressed in the customer involvement literature (Bogers, et al., 2010; Sandén, Matthing, et al., 2006), although the role of B2B has been slightly more dominant (Hoyer, et al., 2010).

2.4.2 Performance implications

The empirical evidence of the overall usefulness of customer involvement is scattered and partly inconsistent. Nevertheless, a vast majority of the studies generally conclude that customer involvement improves the market success of new services and/or products (e.g., Carbonell and Rodriguez Escudero, 2015; Gruner and Homburg, 2000; Mahr, et al., 2014; Storey and Larbig, 2018). In addition, a number of contingency and mediating factors have been found to have an effect on

customer involvement. For example, a recent meta-analysis of 35 empirical studies on customer involvement by Chang & Taylor (2016) concluded that involving a customer in the ideation and launch stages of NPD is generally advantageous but the benefits are greater in the B2B context, in low-tech industries, and when there is technological turbulence.

There are also differences between the service and product contexts in terms of customer involvement. Homburg & Kuehnl (2014), for example, have demonstrated that a moderate level of customer involvement is most successful in service development whereas product development usually benefits from either low or high degree of customer involvement. This is in line with Storey & Larbig (2018), who showed that there are limits to the useful degree of customer involvement in service development. Moreover, technological turbulence and the development team's prior experience have been found to mediate the benefits of customer involvement in services (Carbonell and Rodriguez Escudero, 2015); the same applies to service providers' capabilities in knowledge assimilation and service concept transformation (Storey and Larbig, 2018).

In contrast, not all studies have found customer involvement as beneficial to innovation performance. For example, Carbonell et al. (2009) concluded that customer involvement did not predict the market performance of new services, although it was found out to have a positive indirect effect through improving technical quality and innovation speed. Table 5 summarizes the selected key aspects of customer involvement literature, including key readings, rationale behind customer involvement, and performance implications to NSD and NPD.

Table 5. Selected key aspects in customer involvement literature

Issue	Main focus	Example studies	Contribution to this study
Founding articles (published < 2000)	Challenge the conventional view of producers as the locus of innovation; lead user method; CI as a success factor in NSD	de Brentani, 1995; Griffin and Hauser, 1993; von Hippel, 1976, 1986, 1978; Kaulio, 1998; Martin and Horne, 1993; Martin, et al., 1999	Origins of customer involvement in product and service development; lead user method
Rationale for CI	CI can promote superior products and services, customer understanding, fresh ideas, development cycle time, long-term relationships, financial rewards, etc.	Alam, 2002; Alam and Perry, 2002; Bogers, et al., 2010; Magnusson, et al., 2003; Witell, et al., 2011	Understanding of the potential benefits of CI
Performance implications to NSD/NPD success	Implications of CI to new service/product success; mediating factors	Carbonell, et al., 2009; Carbonell and Rodriguez Escudero, 2015; Gruner and Homburg, 2000; Mahr, et al., 2014; Storey and Larbig, 2018	CI generally improves NSD/NPD success; empirical findings are partly contrasting, contingency factors have an influence
CI reviews and meta-studies	Origins and the current state of the research field, key issues and research topics, and research gaps	Alam, 2002; Bogers, et al., 2010; Chang and Taylor, 2016; Edvardsson, et al., 2012; Sandén, Matthing, et al., 2006	Overall understanding of the CI phenomenon; empirical findings are inconclusive

NOTE: CI = customer involvement

The empirical findings of the overall utility of customer involvement offer important insights into customer involvement, thus supporting the rationale of involving customers in service as well as product development to create competitive offerings. To assess the empirical understanding of customer involvement for the purposes of the present study, the next two sub-chapters take a closer look at customer involvement by first discussing the different forms of customer involvement and then addressing customer involvement in relation to NSD stages and degree of change (i.e., incremental vs. radical) that were identified as essential issues in studying portfolio-level service development (see, 2.3.4).

2.4.3 Generic customer involvement forms

Earlier research has demonstrated that customers can be involved in service and product development through various methods (Alam and Perry, 2002; Cui and Wu, 2016; Edvardsson, et al., 2012, 2010; Kaulio, 1998). In addition, one of the key implications of the customer involvement literature is that the outcome of customer involvement is strongly affected by the way in which the customers' input is gathered

(Cui and Wu, 2017; Magnusson, et al., 2003; Mahr, et al., 2014; Witell, et al., 2011). However, in light of the extant research, it is not clear how companies could benefit from different customer involvement forms in developing the entire firm portfolio, which is the focus of this research. Nonetheless, customer involvement literature has produced a variety of insights into the different forms of customer involvement that arguably are relevant to this study.

There are different ways to classify the approaches and/or methods that exist to involve customers in service development (for an overview of these methods, see Edvardsson et al. 2012); for example, on the grounds of customers' role as active or passive (Mannervik and Ramirez, 2006), the type of knowledge involved (Cui and Wu, 2016), novelty of services as new or existing (Mannervik and Ramirez, 2006), or use situation/context (Edvardsson, et al., 2012). Approaches to customer involvement can also be divided into traditional market research techniques and methods stressing co-creation (Witell, et al., 2011). Moreover, the techniques used in the B2B setting can be separated from the methods typically applied in the B2C context (Bogers, et al., 2010; Edvardsson, et al., 2012).

Instead of looking at individual involvement methods, this research draws on three generic customer involvement forms: 1) customers as information sources, 2) customers as co-developers, and 3) customers as innovators. The terminology is adapted from Cui & Wu (2016), although the same classification is applied in the earlier literature in the form of design for, design with, and design by the customers (e.g., Antikainen, 2011; Kaulio, 1998). Table 6 provides an overview of the applied customer involvement forms.

Table 6. Generic customer involvement forms, adapted from Cui & Wu (2016)

	Customers as an information source	Customers as co-developers	Customers as innovators
Customer role	Provides knowledge	Co-develops	Innovates on their own
Firm role	Develops solutions	Manages collaboration	Provides support and utilizes customer-developed solutions
Customer contribution	Needs	Needs and input to solutions	Solutions and no sharing of needs
Interaction	No close interaction	Close interaction and joint problem solving	No interaction
Development responsibility	Firm employees	Shared	Customers
Locus of development	Firm	Firm	Customers

As illustrated in the table, different forms of customer involvement employ knowledge from the customers differently and therefore have varying implications to knowledge management as well as service and product development (Cui and Wu, 2016). Moreover, numerous studies have used the same or somewhat similar categories focusing on investigating customer involvement (e.g., Blazevic and Lievens, 2008; Cui and Wu, 2017; von Hippel and Katz, 2002; Prahalad and Ramaswamy, 2000; Witell, et al., 2011), typically emphasizing the differences between customers' roles as information sources and between more proactive approaches where customers not only provide knowledge but also take part in the actual development to some extent.

When customers are employed as an information source, the development of new services resides with the focal company and its employees and the role of customers is especially to offer information about their current and future needs (Cui and Wu, 2016). The goal is to learn more about the customers, their stated and latent needs, preferences, wishes, and values and to understand how the focal company could create value for them through service development (Edvardsson, et al., 2006). Sometimes the concept of 'customer needing' is also used to describe what customers intend to achieve and to acquire to correspond the firm-centered concept 'offering' (Strandvik, et al., 2012). Understanding customer needs is regarded as imperative in successful innovation; thus, customers are used as an information source (Bogers, et al., 2010). In the current study, customer-originated knowledge is divided into three categories: 1) customer needs, 2) customer feedback, and 3) ideas for new services. The classification is derived from customer involvement literature (Alam, 2002; Edvardsson, et al., 2006; Kristensson, et al., 2008), although it is also of common sense nature.

Using customers as an information source covers the traditional market research techniques, such as customer surveys, interviews, and focus groups (Cui and Wu, 2016; Griffin and Hauser, 1993; Witell, et al., 2011). These techniques are typically regarded as passive in the sense that customers only react to predetermined questions and stimuli from the focal company (Witell, et al., 2011). However, customers' role as information sources not only is restricted to the traditional market research techniques but also covers a large range of approaches and techniques that aim at understanding customers (Edvardsson, et al., 2006). Thus, the present study draws from the kind of broader approaches that cover both formal methods and informal interactions with customers that enable transferring versatile knowledge from customers to the focal company.

The two other generic customer involvement forms, customers as co-developers and customers as innovators, extend the role of customers from providing information to participating in the actual service and product development (Edvardsson, et al., 2006). The rationale behind more collaborative approaches is that traditional market research techniques can be insufficient in understanding customer needs, which are often latent in nature (Edvardsson, et al., 2006; Witell, et al., 2011). When customers take the role of co-developers, the development of new products and services still takes place within the focal company, but it becomes a collaborative process wherein customers participate in the development of new products and services (Cui and Wu, 2016). For example, a company can adopt a more proactive approach and let customers participate in idea creation, designing solutions, or re-designing service processes (Edvardsson, et al., 2006). Thus, it is expected to lead to new insights and a wider range of information including both spoken and latent needs (Witell, et al., 2011).

In the literature, there are complementary perspectives to customer collaboration, such as customer participation, customer integration, and co-creation (Moeller, et al., 2013). The present study follows the terminology of Cui & Wu (2016; 2017) and uses the term co-development to refer to all forms of participation by customers in the various stages of service development that go beyond knowledge provision (cf. Moeller, et al., 2013). The co-development of services is linked to the broader discussion on value co-creation that highlights the interaction of customers and firms for the development of new business opportunities and value (e.g., Galvagno and Dalli, 2014; Grönroos and Ravald, 2011; Mustak, et al., 2009; Prahalad and Ramaswamy, 2000; Saarijärvi, et al., 2013; Vargo and Lusch, 2004, 2008, 2016). The present study adopts the service-dominant view that value is always co-produced, interactional, networked, and determined by the beneficiary (Vargo and Lusch, 2004, 2008). However, the study is delimited to a specific theme within the broader value co-creation theory, namely collaborative (service) innovation, and to exploring collaborative patterns that may benefit industrial service development (see, Galvagno and Dalli, 2014).

Moreover, the lead-user approach (Franke, et al., 2006; von Hippel, 1986; Lüthje and Herstatt, 2004) is a specific form of co-development. This approach is focused on identifying trends, producing ideas, or introducing new solutions through the active engagement of particular customers, i.e., lead users (Edvardsson, et al., 2012). Lead users are characterized as specific users whose present needs are expected to become general in future, thus showing the way for customer needs that will lie ahead for most others users (von Hippel, 1986). The lead-user approach tries to avoid some

deficiencies of traditional market research techniques by involving the customers who are both qualified and motivated to participate in service and product development (Lüthje and Herstatt, 2004). The approach is applicable to service development, in B2B settings, and throughout the various development stages (Edvardsson, et al., 2012).

The third form, customers as innovators, takes the role of customers one step further by shifting the primary responsibility of innovation to customers. The focal firm's role is limited to providing some technological knowledge, for example, through an innovation platform and technical support (Cui and Wu, 2016). However, instead of the focal firm, the customer combines the need-related knowledge with service or product design (ibid.). In other words, companies abandon the effort to understand the needs of the customers comprehensively and transfer “need-related aspects of product and service development to users” (von Hippel and Katz, 2002, p. 821). In practice, customers can take the role of innovators through different means, for example, by designing their own solutions using the toolkits offered by the focal company (von Hippel and Katz, 2002) or by participating in different online communities, such as the companies' online innovation communities or open source software communities (Antikainen, 2011; Nambisan, 2002; Prahalad and Ramaswamy, 2000).

2.4.4 Empirical evidence of customer involvement forms

Empirical studies suggest that different forms of customer involvement have their own advantages and are suitable for different conditions (Cui and Wu, 2017; Witell, et al., 2011). Traditional market research techniques are commonly regarded to function better when customer needs are not latent but are spoken and clear (Witell, et al., 2011). In practice, considerable knowledge related to existing offerings is accumulated through customer involvement (Blazevic and Lievens, 2008). Thus, utilizing customers as an information source tends to drive incremental changes in the offerings. Collaborative approaches, in contrast, have been found to produce more innovative ideas and knowledge than traditional market research techniques (Blazevic and Lievens, 2008; Mahr, et al., 2014; Witell, et al., 2011). Empirical findings also demonstrate that co-development can serve as an effective means to foster relationships between the parties and develop capabilities in customization (Hsieh and Hsieh, 2015). However, it has been claimed that a firm cannot achieve double pay-offs using customers extensively as information sources and active

participants in the development process (Cui and Wu, 2017). Thus, choosing either approach is recommended.

In general, customer involvement that emphasizes dialogical co-creation of knowledge is found to be an effective means of gathering valuable information (Hsieh and Hsieh, 2015). Co-created knowledge can be highly relevant, and it can be obtained at a low cost when the relationship between the focal company and customers is close (Mahr, et al., 2014). Moreover, in light of the empirical findings, co-development is preferable when customer needs are heterogeneous (Cui and Wu, 2016). That is, the traditional techniques of collecting information from customers are better when customer needs are homogenous (ibid.). Moreover, when a company follows an experimental strategy in service and product development (i.e., emphasize trial and error), using customers as an information source has been found to be more effective than co-development (Cui and Wu, 2017). Furthermore, some empirical evidence suggests that customer co-created solutions could provide higher profits than those based on more traditional techniques (Witell, et al., 2011).

Although co-development seem to have some clear benefits, it produces only moderately novel knowledge (Mahr, et al., 2014). Thus, although co-development can produce more novel information than the more passive approaches, it does not guarantee, for example, innovative ideas. A lead-user approach is one solution that could possibly result in innovative but still feasible ideas. According to empirical findings, the lead-user method can address more original customer needs (Lilien, et al., 2002), provide greater novelty of ideas (Lilien, et al., 2002; Mahr, et al., 2014), and produce knowledge that is highly relevant to the focal company (Mahr, et al., 2014). Moreover, the ideas generated by the lead-user approach have resulted in higher sales and higher forecasted market share than the ideas generated through traditional techniques (Lilien, et al., 2002), thus increasing the overall success of development efforts (Gruner and Homburg, 2000). In contrast, the lead-user approach has been criticized for being time-consuming and burdensome (Olson and Bakke, 2001). Furthermore, finding the lead users can be a challenge (Edvardsson, et al., 2012). Table 7 summarizes the key customer involvement literature that discusses the different customer involvement forms and their implications on service development.

Table 7. Examples of studies indicating the role of different customer involvement forms in service portfolio development

Authors	Primary focus	Type of study	Context	Key findings	Contribution to this study
Blazevic & Lievens (2008)	Co-production of knowledge with customers for different innovation tasks	Empirical: multiple case study (three interaction channels)	Services, B2B (not stated explicitly), and computer services	Three different roles of customers in knowledge co-production: passive user, active informer, and bidirectional creator; co-produced knowledge can be utilized throughout the innovation stages	Different customer roles in knowledge co-production and across development stages
Cui & Wu (2016)	Antecedents and impacts of three forms of CI: customers as an information source, as co-developers, and as innovators	Empirical: survey (n = 341)	Both services and products, B2B/B2C, and multiple industries	Three CI forms employ different ways of utilizing customer knowledge; when customers' needs are heterogeneous, their role as co-developers and innovators is preferable	Conditions under which different CI roles for customers are more beneficial
Cui & Wu (2017)	Two forms of CI: customers as an information source and as co-developers	Empirical: survey (n = 236)	Both services and products, B2B/B2C, and multiple industries	Both forms of CI have their own advantages; engaging in both forms will not generate double pay-offs	Differing roles of customers as an information source and as co-developers
Edvardsson et al. (2012)	Integration of customers within service development through existing methods	Review	Services and B2B/B2C	Classification of CI methods by introducing a framework based on user information	Overview of existing CI methods; lack of methods in a B2B setting
Gruner & Homburg (2000)	Performance impacts of the intensity of CI at different stages and under different characteristics of customers	Empirical: interviews (n = 12) and survey (n = 314)	Products, B2B, and machinery industry	CI at some stages (but not others) has a positive impact on new product success; characteristics of customers also have a significant effect; use of lead users is beneficial	CI at the early and late stages increases new product success; collaboration with lead users improves the success rate
Hsieh & Hsieh (2015)	Effects of customer co-creation on the performance of service innovation	Empirical: survey (n = 149)	Services, B2B/B2C (not stated explicitly), and high-tech	Dialogic co-creation not only provides valuable information and knowledge but also improves the relationship between companies and customers	Promoting relationships between the focal company and customers through CI

manufacturing industries

Lilien et al. (2002)	Lead user idea-generation vs. more traditional methods	Empirical: quasi-experimental design, qualitative, and quantitative	Both services and products and 3M as the case company	Lead-user method improves the innovation capabilities of a firm and promotes sales	Lead-user method improves idea-generation relative to traditional methods
Mahr et al. (2014)	Customer co-creation; the characteristics of involved customers and the communication channels	Empirical: survey and 126 co-creation projects	Both services and products, B2B/B2C, and multiple industries	Customer co-creation is most beneficial for highly relevant but moderately novel knowledge; co-creation with close customers provides highly relevant knowledge; novel and relevant knowledge can be obtained from lead users	Co-creation of knowledge; the benefit of customer closeness; lead-user method
Witell et al. (2011)	Proactive and reactive market research techniques in NSD and NPD	Empirical: survey (n = 195), quasi-experimental design (n = 50)	Both services and products and B2B/B2C	The relationship between using customer information and profits is stronger for co-creation-based techniques than for traditional market research methods	Active customers produce ideas that are significantly more innovative

To conclude, the current research on customer involvement offers important insights into the various customer involvement forms. Nevertheless, the current understanding is not complete, and authors have called for research that helps to understand, for example, the differences between the distinct customer involvement forms and the conditions under which they are beneficial (Cui and Wu, 2016; Witell, et al., 2011) as well as research that simultaneously explores different forms and their trade-offs (Cui and Wu, 2017). In particular, prior research does not provide a consistent picture of how customer involvement forms differ in relation to the different ways through which service portfolios can be renewed. For example, some empirical evidence deals with incremental and more radical changes in the offerings, but the topics of developing customer service elements or more complete offerings have been rarely touched upon.

2.4.5 Relation to development stages and degree of change

Development stages are of importance to NSD and NPD, and their role has been emphasized in customer involvement literature (e.g., Alam and Perry, 2002; Hoyer, et al., 2010; Lagrosen, 2005; Morgan, et al., 2018; Witell, et al., 2014). At the early stage of idea generation, screening and concept development, often labeled as the fuzzy front end in the literature, customer involvement can have a significant role in clarifying the otherwise obscure stage of the first decisions about where to steer the development process (Alam, 2006). Here, the role of customers is especially to communicate their needs (Chang and Taylor, 2016). At the development stage, customers can offer solution knowledge; at the later stages, they can participate in testing and provide support during the market launch (Chang and Taylor, 2016). The usefulness of customer involvement at the later stages comes from the fact that customers are better positioned to provide feedback to developers when the service concept has achieved certain level of maturity (Witell, et al., 2014).

Empirical studies have generally shown that customer involvement at different stages can take different forms and lead to varying impacts. However, empirical findings on customer involvement in relation to NSD stages are partly mixed. On the one hand, there is a notion that customer insights can be useful at all development stages (Alam and Perry, 2002; Blazevic and Lievens, 2008; Hoyer, et al., 2010). For example, Carbonell et al. (2009) show that the impacts of customer involvement are independent of the stages in service development and therefore recommend customer involvement throughout the development process. On the

other hand, Alam & Perry (2002) and Alam (2002, 2006) emphasize that customer involvement can be beneficial at all stages but is especially important in idea generation, service design, and testing. Moreover, several studies have reported clear differences between early, mid, and late stages; in particular, the early and late stages have been emphasized as points where customer engagement is desirable (Chang and Taylor, 2016; Gruner and Homburg, 2000; Witell, et al., 2014).

Another issue that is relevant to portfolio-level service development is the distinction between customer involvement in relation to incremental and radical changes (see, 2.3.2). Prior literature on customer involvement offers some insights into the issue (e.g., Blazevic and Lievens, 2008; Menguc, et al., 2014; Westh Nicolajsen and Scupola, 2011). First, much of the knowledge originating from customers relates to the existing services and products and is therefore prone to steer incremental changes (Blazevic and Lievens, 2008). There exists some empirical evidence that stems from the NPD context that supports this view. For instance, Menguc et al. (2014) have shown that although customer involvement can promote the success of incremental changes to the offering, it can actually be harmful in designing radically new products. Other studies have also shown that customers having close relationships with the focal company are typically a source of relevant knowledge but do not provide novel, radical knowledge (Mahr, et al., 2014).

Second, customers provide ideas that are more original than those coming from inside the company (Kristensson, et al., 2002; Magnusson, et al., 2003). Moreover, Westh Nicolajsen & Scupola (2011) concluded that in a B2B service setting, customers can be involved in developing radically new services but it necessitates cooperation that could be best described as partnership between the parties. Further, Blazevic & Lievens (2008) have argued that when customers actively co-produce knowledge with the focal company instead of being only informers or passive users, customer involvement can transcend the existing offerings and incremental changes. Third, prior research has demonstrated that the characteristics of the involved customers are significant (Gruner and Homburg, 2000). For example, customers that have lead-user characteristics may provide knowledge that is both novel and relevant (Mahr, et al., 2014) and thus produce higher profits (Witell, et al., 2011). Besides, a good relationship with customers is generally found to have a positive effect on service innovation in high-tech context (Hsieh and Hsieh, 2015).

Fourth, the application and usefulness of customer involvement has been argued to depend on the novelty of the technology at hand and the speed of the technological evolution (i.e., technological turbulence) (Carbonell, et al., 2009; Chang and Taylor, 2016). When technological novelty and turbulence are high, customers

are more likely to be involved in service development (Carbonell, et al., 2009). It has been argued that customer needs under these conditions are usually tacit in nature, thus stressing the importance of the more co-creative customer involvement methods (Witell, et al., 2011). Table 8 summarizes the key customer involvement literature that is related to NSD stages and the degree of change.

Table 8. Examples of studies indicating the role of NSD stages and degree of change in customer involvement within service portfolio development

Authors	Primary focus	Type of study	Context	Key findings	Contribution to this study
Alam (2002)	Review literature, identify key elements of CI, and develop the inventory of CI activities	Review and empirical: multiple case study (n = 12) and program-level	Services, B2B, and financial services	CI during the early and late stages has a positive impact on new service success; characteristics of customers have a significant effect; collaboration with financially attractive customers or lead users increases new service success	Effects of CI at different stages; lead-user method
Alam (2006)	CI at the front-end stages of service development	Empirical: interviews (n = 52)	Services, B2B, and large financial service firms (n = 26)	CI can help in reducing fuzziness at the front-end stages; customer input can be obtained through several means; CI can shorten the development cycle time	CI is more important in idea generation, idea screening, and concept development
Blazevic & Lievens (2008)	Co-production of knowledge with customers for different innovation tasks	Empirical: multiple case study (three interaction channels)	Services, B2B (not stated explicitly), and computer services	Three different roles of customers in knowledge co-production: passive user, active informer, and bidirectional creator; co-produced knowledge can be utilized throughout the innovation stages	Different customer roles in knowledge co-production and across development stages
Carbonell et al. (2009)	Effects of CI on new service performance, role of technological novelty, and service development stages	Empirical: survey (n = 102)	Services, B2B/B2C, and multiple industries	CI does not predict the market performance of new services but improves technical quality and innovation speed; service development stage had no moderating effects	CI does not guarantee market performance; CI should be applied throughout the service development stages
Chang & Taylor (2016)	Synthesizing a variety of contingency factors relevant to CI	Meta-analysis (quantitative) of 35 empirical studies	Both services and products, B2B/B2C, and multiple industries	CI at the ideation and launch stages improves the financial performance of new products whereas at the development stage, it lengthens time to market; the benefits of CI are greater, for example, in technologically turbulent and low-tech contexts	Benefits of CI at the ideation, development, and launch stages as well as in technologically turbulent environments and low-tech industries

Gruner & Homburg (2000)	Performance impacts of the intensity of CI at different stages and under different characteristics of customers	Empirical: interviews (n = 12) and survey (n = 314)	Products, B2B, and machinery industry	CI at some stages (but not others) has a positive impact on new product success; characteristics of customers also have a significant effect; use of lead users is beneficial	CI at the early and late stages increases new product success; collaboration with lead users improves the success rate
Homburg & Kuehl (2014)	Optimal degree of CI in new service and new product settings	Empirical: survey (n = 257)	Both services and products, B2B/B2C (not stated explicitly), and multiple industries	Differences between new service and product settings exist; a moderate level of CI in service development is most successful	Need for an optimal degree of CI in service development
Magnusson et al. (2003)	Customers vs. professional developers	Empirical: comparative experimental design; professional designers, users, and consulting users (n = 51)	Services, B2C, and telecom industry	Users provide more original ideas, but the ideas are less producible on average; how CI is performed in terms of CI intensity has an effect on the outcome	Users/customers can provide more original ideas than professional service designers
Mahr et al. (2014)	Customer co-creation; the characteristics of the involved customers and the communication channels	Empirical: survey and 126 co-creation projects	Both services and products, B2B/B2C, and multiple industries	Customer co-creation is most beneficial for highly relevant but moderately novel knowledge; co-creation with close customers provides highly relevant knowledge; novel and relevant knowledge can be obtained from lead users	Co-creation of knowledge; the benefit of customer closeness; lead-user method
Storey & Larbig (2018)	Mechanism and conditions of successful CI	Empirical: survey and 126 new service projects	Services, B2B/B2C, and multiple industries	Mediating role of customer knowledge assimilation and service concept development; limits to the benefits of CI	Role of CI in designing service concepts, systems, and encounters
Westh Nicolajsen & Scupola (2011)	Customer contribution to radical innovation in consultancy services	Empirical: single case study	Services, B2B, and engineering consultancy	Actively involving customers in radical service innovation necessitates a partnership between the parties	Importance of partnership in developing more advanced services with customers

Witell et al. (2014)	Influence of CI on profits at different stages of an NPD/NSD process	Empirical: survey (n = 366, financial data from 244 firms)	Both services and products, B2B/B2C (emphasis on B2B, 76%), and multiple industries	For services, the financial rewards of CI are high at the early and late stages of the development process; for goods, they are the highest at the early stages and decline at the later stages	Essential role of CI at the service concept design stage, i.e., at later stages
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To conclude, previous literature offers many insights into the NSD stages and incremental/radical changes in relation to customer involvement. Nevertheless, the findings on the relationship between customer involvement and the different development stages are somewhat mixed and do not provide a complete picture of how customer involvement benefits service portfolio development in particular. There are also inconsistencies in the current understanding of how customer involvement benefits incremental and radical changes (Storey and Larbig, 2018), and link to portfolio-level is rarely addressed. This has led scholars to call for customer involvement research that particularly focuses on the development stages (Homburg and Kuehnl, 2014; Storey and Larbig, 2018; Witell, et al., 2014). For example, Storey & Larbig (2018) particularly emphasize future research on the later stages, including the design of the service system and service encounters, as an area where the effects of customer involvement are not conclusive. In addition, more customer involvement research has been called for that elaborates radical and incremental changes (Bogers, et al., 2010).

2.4.6 Customer involvement in industrial service settings

A strong customer centricity is a key feature in service growth strategies and, to some extent, in the whole service growth phenomenon (Baines, et al., 2009). For example, motives for enhancing industrial service business include responding to the changing customer needs and improving customer loyalty (Baines, et al., 2017). The role of customers in prior research, nevertheless, has been somewhat limited because a majority of the research has been conducted from the manufacturers' perspective (Brax and Jonsson, 2009; Story, et al., 2017; Vaitinen, 2019).

In developing industrial services, customers can take different roles. For example, industrial customers can provide ideas and make demands in ideation, act as co-developers at the development stages, and participate in service delivery as well as give feedback after the services have been launched (see, Kowalkowski and Ulaga, 2017, p. 155). In this way, customer involvement in industrial service development may not differ from other settings. In customer involvement research, however, very little attention has been specifically paid to industrial services so far.

The importance of involving customers to support service development has been generally acknowledged in service growth literature (e.g., Kohtamäki, et al., 2018; Story, et al., 2017). However, as previously pointed out, many firms still struggle with inadequate customer insights and underinvest in service market research (Wiersema,

2013). In particular, the service transitions, offerings, and strategies that are at the center of industrial service growth have been largely neglected in the prior customer involvement research.

2.5 Synthesis

2.5.1 Summary of theoretical background

This study is primarily informed by industrial service growth, NSD, and customer involvement research. The preceding literature review demonstrated that despite the substantial research conducted in each of these research fields, customer involvement in industrial service development has remained largely under the scientific radar. Furthermore, research that integrates or elaborates the central components of this study (i.e., portfolio-level, industrial services, and customer involvement) has been generally called for (see, Bogers, et al., 2010; Cui and Wu, 2016; Holmlund, et al., 2016; Kowalkowski, et al., 2015, 2017; Storey, et al., 2016; Witell, et al., 2014). Consequently, it is concluded that there is a clear research gap in the intersection of the aforementioned research fields. This gap calls for more research and provides the main impetus to this study.

First, service growth has become a research priority (Ostrom, et al., 2015, 2010) and a prevailing phenomenon through which service development is discussed in the context of industrial service research (Baines, et al., 2017; Kowalkowski, et al., 2017; Rabetino, et al., 2018). Service growth necessitates changes in the firm service offerings and capabilities (Baines, et al., 2009) and places service development at the core of industrial competitiveness (Mendes, et al., 2017). The preceding literature review demonstrated that diverse service transitions (Matthyssens and Vandenbempt, 2008; Oliva and Kallenberg, 2003; Penttinen and Palmer, 2007) and strategies (Gebauer, 2008; Raddats and Kowalkowski, 2014; Tukker, 2004) exist and are available for industrial companies. Firms also maintain and develop a wide range of heterogeneous services (Baines and Lightfoot, 2013; Rabetino, et al., 2015; Raddats and Kowalkowski, 2014) and need to manage concurrent trajectories, offerings, and business logics (Kowalkowski, et al., 2015; Matthyssens and Vandenbempt, 2010; Raddats and Kowalkowski, 2014; Windahl and Lakemond, 2010). Moreover, firms supply and develop more complete offerings, such as solutions (Davies, 2004; Oliva and Kallenberg, 2003; Tuli, et al., 2007).

Second, service portfolio forms a particular level of analysis that complements other levels, such as development project, service, business, and industry levels in NSD (Alam, 2002; Johnson, et al., 2000; Menor, et al., 2002; Storey, et al., 2016). Importantly to this study, portfolio-level has been regarded as particularly suitable for studying customer involvement (Alam, 2002, 2006; Menor, et al., 2002). Furthermore, the literature review highlighted service delivery system and customer interface dimensions (den Hertog, 2000; Jong and Vermeulen, 2003) as well as customer service elements (Johnne and Storey, 1998; Storey, et al., 2016) and service standardization and modularity (Brax, et al., 2017; Iman, 2016; Voss and Hsuan, 2009) in portfolio-level NSD. As a phenomenon, portfolio development is arguably more strategic and complex than individual services and their development and may require consideration of issues, such as the firm's overall business strategy, balance between various services and products, and maximizing the value of the portfolio (Cooper, et al., 2001).

Third, prior literature on customer involvement has predominantly addressed individual service or service development project levels (e.g., Mahr, et al., 2014; Storey and Larbig, 2018; Westh Nicolajsen and Scupola, 2011). Development of the entire firm portfolio has not been focused upon in customer involvement literature so far, and the review only revealed a few exceptions (e.g., Alam, 2002, 2006). Moreover, literature on customer involvement has not focused on B2B service development (cf. Alam, 2006, 2002; Martin, et al., 1999; Westh Nicolajsen and Scupola, 2011), and very few studies, if at all, have been conducted in the realm of industrial services. For example, although customer centricity is one of the tenets of service growth, key concepts, such as service transitions, strategies, and offerings have not been combined with customer involvement in the prior research (Baines, et al., 2009). Nonetheless, the review emphasized some key issues that call for attention when customer involvement is examined at the portfolio-level. These included customer involvement forms, stages of the service development process, and degree of change (see, Alam, 2006, 2002; Chang and Taylor, 2016; Cui and Wu, 2016; Mahr, et al., 2014).

In conclusion, this study seeks to answer several calls for research by merging the service portfolio perspective and industrial service growth to customer involvement. Table 9 summarizes the identified research gaps.

Table 9. Identified research gaps within the primary research fields

Fields of research	Main focus in this study	Research gaps	Key study examples
Service growth	Transitions and trajectories, service strategies, industrial offerings, and concurrent roles and strategies	Management of multiple offerings (i.e., concurrent roles and strategies, offering development modes) Customer perspective to service growth/B2B services	Brax and Jonsson, 2009; Holmlund, et al., 2016; Kowalkowski, et al., 2015, 2017; Matthyssens and Vandenbempt, 2010; Raddats and Kowalkowski, 2014; Story, et al., 2017; Windahl and Lakemond, 2010
New service development (NSD)	Portfolio-level, innovation dimensions, incremental and radical changes, and customer service elements	Portfolio perspective to NSD Customer service elements within augmented service offering	Alam, 2002; Johnne and Storey, 1998; Johnson, et al., 2000; Menor, et al., 2002; Storey, et al., 2016; Storey and Easingwood, 1998
Customer involvement (CI)	Benefits, CI forms, service development stages, and degree of change at portfolio-level	Differences between CI forms Role of CI at service development stages CI in a B2B service portfolio context	Alam and Perry, 2002; Bogers, et al., 2010; Cui and Wu, 2016, 2017; Homburg and Kuehnl, 2014; Witell, et al., 2011, 2014

First, this study responds to a call for research that seeks to understand how to best develop an extensive portfolio that covers concurrent roles and strategies within service growth (Kowalkowski, et al., 2015, 2017). In particular, the study recognizes the multifaceted nature of industrial service growth strategies and seeks to supplement the emerging understanding on the issue by focusing on customer involvement in relation to the different ways of developing service portfolios (i.e., offering development modes). Second, this study pursues to contribute to the lack of customer perspective in the service growth literature, as remarked in several studies (e.g., Brax and Jonsson, 2009; Story, et al., 2017; Vaittinen, 2019). Third, regarding service development, this study first answers to the generic call for more research that explicitly takes the portfolio perspective to NSD, including customer service elements (Johnne and Storey, 1998; Johnson, et al., 2000; Storey, et al., 2016; Storey and Easingwood, 1998).

Regarding customer involvement, this study responds to three calls for research. First, the study intends to increase the understanding of the different customer involvement forms and techniques that has been highlighted in several recent studies (Cui and Wu, 2017, 2016; Witell, et al., 2011). Second, the study responds to a call for more research that takes into consideration the service development stages in relation to customer involvement (Homburg and Kuehnl, 2014; Storey, et al., 2016;

Witell, et al., 2014). Finally, the study aims to answer the generic call to probe deeper in customer involvement (Bogers, et al., 2010) and particularly to create an understanding of the different B2B service contexts (Alam, 2002; Wiersema, 2013).

Three of the identified research gaps (i.e., management of multiple offerings, portfolio perspective to NSD, and differences between customer involvement forms) emerged as particularly interesting during the research process. These main gaps (bolded in Table 9) were specifically taken into account in defining the conceptual framework and setting the overall focus of the study.

2.5.2 Conceptual framework and research questions

Based on the previous literature review and the identified research gaps, a conceptual framework of the study was constructed. The framework presents the basic conceptual structure of this study by showing the key concepts and focus of the research (see, Eriksson and Kovalainen, 2008, p. 306). The main purpose of the conceptual framework is to guide the research process and especially the interpretation of the data (Baxter and Jack, 2008; Dubois and Gadde, 2002; Gibbert and Ruigrok, 2010; Yin, 2003). The conceptual framework is presented in Figure 2.

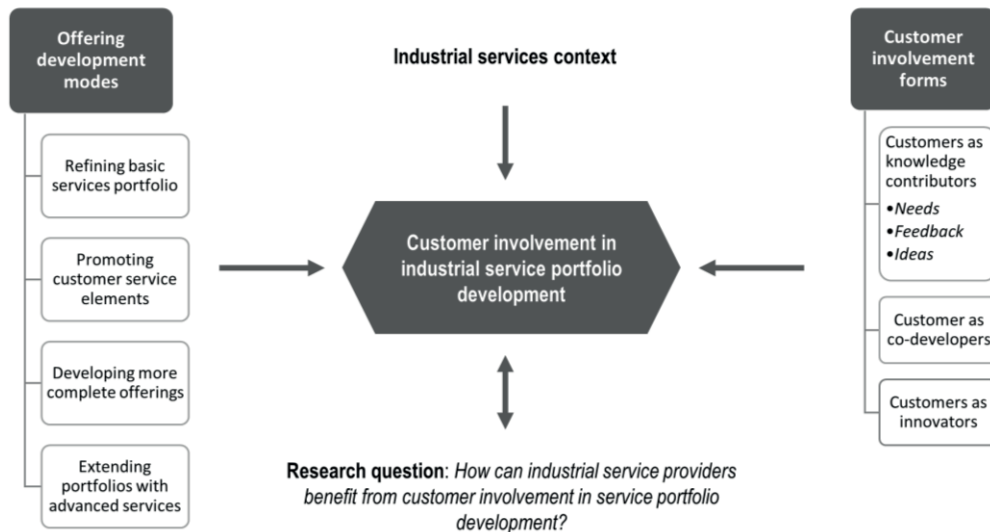


Figure 2. Conceptual framework of the research

Based on the previous literature review, the conceptual framework of the study mainly integrates two aspects: different offering development modes and varying customer involvement forms. The three customer involvement forms, customers as an information source, as co-developers, and as innovators, are drawn from the customer involvement literature (Antikainen, 2011; Cui and Wu, 2016; Edvardsson, et al., 2006; Kaulio, 1998). Customer as knowledge contributors is further divided into categories of needs, feedback, and ideas to enable more fine-grained analysis, and because companies typically utilize different channels for collecting different forms of knowledge. This classification of customer knowledge forms is also drawn from customer involvement literature (see, Alam, 2002; Edvardsson, et al., 2006; Kristensson, et al., 2008).

As discussed previously (see, 2.3.5), prior literature did not provide a classification of different offering development modes that could be directly applied in the study. Therefore, four offering development modes were drawn from service growth and NSD literature and combined into a categorization as follows: 1) refining basic services portfolio, 2) promoting customer service elements, 3) developing more complete offerings, and 4) extending portfolios with advanced services. As demonstrated in the literature review, both service growth and NSD literature offers different classification schemes for services, innovation dimensions, service transitions, and strategies, which provide the basis for the categorized offering development modes.

The main research question of the study was introduced in Introduction (see, 1.2):

RQ: How can industrial service providers benefit from customer involvement in service portfolio development?

Based on the literature review, identification of research gaps, and elaboration of the conceptual focus (i.e., conceptual framework), the main research question was broken down into three sub-questions as follows:

RQ1: How do customers contribute to service portfolio development in different service offering development modes?

RQ2: How and why do particular customer involvement forms differ in portfolio-level service development?

RQ3: How, and through what kinds of approaches, can industrial service providers best utilize customer contributions?

These sub-questions were formulated to guide the study in more detail, and by responding to the sub-questions, the study aims to answer the main question above.

The first sub-question (RQ1) acknowledges the distinct ways of how a firm service portfolio can be developed as suggested in the theoretical framework. It focuses on the different offering development modes and examines if and how customer contributions vary between the offering development modes. In particular, the sub-question explores how customers interact in relation to the different ways of how service portfolio development takes place.

The second sub-question (RQ2) emphasizes the customer involvement forms as formulated in the conceptual framework. It explores how and why the customer involvement forms vary between the applied offering development modes and examines if there are similarities or differences. That is, the sub-question focuses on customer interactions, and whether they concern knowledge provision, co-development, or innovation.

The third sub-question (RQ3) asks if different approaches to utilizing customers and their contributions emerge. The question emphasizes the potential differences between offering development modes and/or customer involvement forms in how customer involvement is performed by industrial service providers. The sub-question aims to clarify how focal firms could utilize customer contributions to make better decisions about service portfolio development. For example, if certain customer involvement strategies can be recognized within the industrial service settings. Finally, the main research question and the sub-questions do not explicitly concern a comparison of the focal firm and customer views. However, as the study covers both sides, all questions are examined through both perspectives.

3 METHODOLOGY AND RESEARCH APPROACH

This study follows a multiple case study strategy that is based on the nature and objectives of the research. In the following, the choices related to the methodology are elaborated, covering the philosophical assumption underlying the study as well as the practice of how the research was conducted. The chapter also describes the selection of the cases, introduces them, and discusses the researcher's role.

3.1 Nature of the research

This research takes a philosophical position that is between the ends of the subjective–objective continuum of social sciences (see, Morgan and Smircich, 1980). The selected position reflects the nature and objectives of the study as well as a stance toward the different ways in which new knowledge can be created through research (Eriksson and Kovalainen, 2008, p. 10). The current study accepts objectivistic ontology to some degree but, at the same time, follows epistemology that reflects interpretivism. In line with objectivistic ontology, the study assumes that separate and distinct reality exists and that it is independent of the knowledge of it (see, Eriksson and Kovalainen, 2008, pp. 13–14; Hatch and Cunliffe, 2013, pp. 11–15). In contrast, this study posits that knowledge is subjective, is prone to multiple interpretations, and can only be acquired through social actors in line with interpretivism (see, Eriksson and Kovalainen, 2008, pp. 14–15; Hatch and Cunliffe, 2013, pp. 11–15). That is, the study assumes that objective reality exists, but the knowledge of it is considered as socially constructed, relative to those who are involved, and can only be acquired through social actors who participate in constructing it.

The chosen approach to ontology and epistemology bear a resemblance to postpositivism (Guba and Lincoln, 2004) and critical realism (e.g., Bhaskar, 2008; Easton, 2010; Leca and Naccache, 2006). Postpositivism diverges from strict positivism by accepting that the knower and the known cannot be separated and that there is no single, objective reality (Eriksson and Kovalainen, 2008, p. 19). Postpositivist research generally argues that reality can be known only imperfectly

but can be explored by ensuring rigor in data collection and analysis to manage bias (Eriksson and Kovalainen, 2008; Harrison, et al., 2017). Critical realism is another school of thought that is positioned between positivism and interpretivism. It makes an ontological assumption that reality exists but it is difficult to capture in practice (Easton, 2010). Critical realism suggests that the world is stratified, comprising three layers: the real world, the actual events that are produced by the real world, and the empirical events that can be observed and recorded (Bhaskar, 2008; Easton, 2010). As a research approach, critical realism is a specific tradition leaned toward studying observable events and the potential causal mechanisms behind them (Reed, 2005).

The chosen research philosophical position has implications for this research. The realist ontology means that the objects of the research, service portfolios and customer involvement, as well as the structures and relationships surrounding these objects (e.g., focal firms, customers, interorganizational relationships, and physical environment) are regarded to exist independently of the knowledge of them. However, the adopted epistemology, interpretivism, implies that the knowledge of service portfolios and the role of customers in developing them can only be gathered from the social actors involved. Moreover, it is assumed that knowledge is produced through social construction and that the phenomena under investigation are open to multiple interpretations. The study seeks to answer the question of how industrial service providers can benefit from customer involvement in service portfolio development. Thus, to answer the question, the study adopts a qualitative research approach that emphasizes individual accounts and interpretive and descriptive orientation and aspires to rigor in data collection and analysis (cf. Gibbert and Ruigrok, 2010; Harrison, et al., 2017; Miles, et al., 2014; Yin, 2003). The applied research strategy is elaborated in the next sub-chapters.

3.2 Case study as research strategy

This study follows a qualitative multiple case study strategy as the primary research approach (Baxter and Jack, 2008; Dubois and Gadde, 2002; Harrison, et al., 2017; Ketokivi and Choi, 2014; Miles, et al., 2014; Yin, 2003). The strategy was selected because it was deemed particularly suitable for the research setting. First, case studies generally represent a pragmatic and flexible research approach that enables the researcher to produce a comprehensive in-depth understanding of the phenomenon under investigation (Harrison, et al., 2017). Second, case studies are especially suitable for investigating “a contemporary phenomenon within its real-life context,

especially when the boundaries of the phenomenon and context are not clearly evident” (Yin, 2003, p. 13). Third, the strength of the qualitative approach is that it focuses on naturally occurring ordinary events and through this, provides a strong image of what the real life is like (Miles, et al., 2014, p. 11). Finally, richness and holism is an advantage of the qualitative data that enables understanding and description of complexity (Miles, et al., 2014, p. 11).

The strengths of case studies are consistent with the objective of the study. This study aims to increase the understanding and provide insights on the supposedly complex, naturally occurring phenomenon (i.e., customer involvement in service portfolio development), which takes place out of researcher control. Moreover, case studies are generally suitable for the “how” and “why” type of questions that deal with contemporary events over which the researcher has little control (Yin, 2003, p. 9). This is in line with the present study, which seeks understanding of how industrial service providers can benefit from customer involvement in a real-life setting. Finally, the research topic can be characterized as an under-researched topic, for which case studies are often recommended. Accordingly, the ambition of this research is to extend and/or generate theory for which case studies lend themselves especially well (Eisenhardt and Graebner, 2007; Flyvbjerg, 2006; Ketokivi and Choi, 2014).

The essence of any case study is the *case* or the *cases*. In the words of Eisenhardt (1989, p. 534), the focus of case study research is “on understanding the dynamics present within single settings.” The studied phenomenon is explored in a versatile manner within its context, thus ensuring that multiple facets of the phenomenon are revealed and understood (Baxter and Jack, 2008). The focus of the inquiry is on the particularity and complexity of the case to understand its activity within a supposedly important setting. In addition, a typical characteristic of case studies is the use of multiple sources of data (Baxter and Jack, 2008; Yin, 2003). However, case study research is not a unitary or coherent research strategy, and different case study methods and approaches exist (Baxter and Jack, 2008; Harrison, et al., 2017; Ketokivi and Choi, 2014; Piekkari, et al., 2010). For example, a distinction between intensive and extensive case study designs can be made (Eriksson and Kovalainen, 2008, p. 118). Case studies can also be categorized into studies that focused on theory building (Eisenhardt, 1989; Eisenhardt and Graebner, 2007), theory testing (Hillebrand, et al., 2001; see also Flyvbjerg, 2006;), or elaborating prior theories (Ketokivi and Choi, 2014).

This study is based on the extensive case study design (Eriksson and Kovalainen, 2008, p. 118) and follows the abductive case study logic to elaborate the current

theoretical understanding (Dubois and Gadde, 2002; Ketokivi and Choi, 2014). Extensive case study design was selected because the study focuses on a particular phenomenon (i.e., customer involvement in industrial service development) instead of intrinsically interesting cases (Stake, 1995, p. 3). The literature review above demonstrated that the current understanding of customer involvement in service portfolio development is insufficient (see, 2.5.1). For example, much of the prior research has focused on the development of individual services but not on the entire service portfolio of a firm. Consequently, the study investigates customer involvement in service portfolio development to extend and elaborate its current understanding (cf. Ketokivi and Choi, 2014). In addition, an abductive case study approach was chosen because it is deemed fruitful for discovering new things, such as variables and relationships (Dubois and Gadde, 2002). The approach also illustrates the research process of the present study because it allows reasoning to go back and forth between empirical observations and theory to increase the researcher's understanding of both (see, Dubois and Gadde, 2002).

Finally, the multiple case design was selected for two main reasons. First, it allows a comparison of findings within and especially between cases (Baxter and Jack, 2008). The use of multiple cases enables the researcher to replicate findings across cases to find out similarities and/or differences (Eisenhardt, 1989; Yin, 2003, p. 47). According to Yin (2003, p. 53), this substantially benefits the analytics in comparison to single case designs, thus enabling a broader exploration of research questions and theoretical elaboration (Eisenhardt and Graebner, 2007). Second, multiple case studies are generally regarded as more robust and reliable (Baxter and Jack, 2008), and they expand the external generalizability of the findings (Eisenhardt and Graebner, 2007; Yin, 2003, p. 53). The selection of the cases and their characteristics are elaborated in more detail in the next sub-chapter.

3.3 Case selection and description of the cases

In this research, a case comprises a focal firm with its customer relationships, and it forms the primary unit of analysis. Three cases—SCALE, DEVICE, and FLOW—were selected to be part of the study. Each of them comprised a focal firm and a selection of the firm's customer companies. Figure 3 illustrates the selected cases.

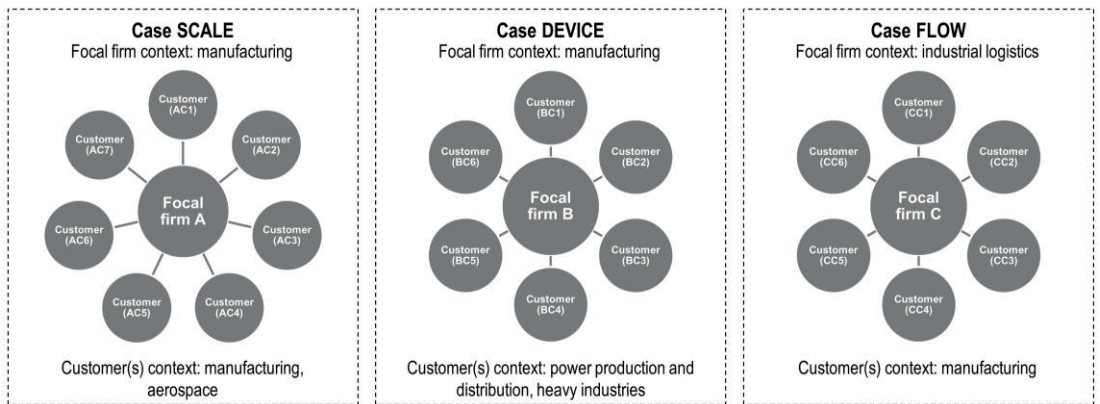


Figure 3. Illustration of the selected cases

More than one case was studied because multiple cases support the researcher in theory building (Eisenhardt, 1989; Yin, 2003, p. 53), generalizing the findings (Eriksson and Kovalainen, 2008, p. 124), and allowing a comparison of findings between cases (Baxter and Jack, 2008). However, owing to the in-depth nature of case study analysis and because exploring numerous cases can be very time consuming and expensive (Baxter and Jack, 2008), the number of cases was limited to three. In selecting the number of cases, the complexity of the external realm, validity of the selected cases in that regard, and type of the intended replications were considered, as advised by Yin (2003, pp. 51–52). In consequence, three cases were expected to enable meaningful comparison and replication of the findings (cf. Baxter and Jack, 2008; Yin, 2003, p. 47).

The selection of the cases followed theoretical sampling in contrast to statistical or random sampling typical of survey research. Theoretical sampling denotes that cases are chosen because they are regarded as particularly suitable for illuminating and extending the relationships and logic of the studied phenomena (Eisenhardt and Graebner, 2007). Three cases involved in the study were regarded as particularly appropriate, because all of them offered and developed a range of different services covering the various offering development modes (see, Table 4). The cases were also chosen to complement each other. Although all modes were covered by the participated focal firms to some extent, the firms highlighted different offering development modes. By selecting the three cases, the sample provided a comprehensive coverage to each offering development mode. Thus, sampling was purposive.

Moreover, pragmatic considerations, such as access and feasibility were considered (Eriksson and Kovalainen, 2008, p. 124). Accordingly, in-depth analysis of three cases was considered feasible in terms of the time and effort it necessitated (cf. Baxter and Jack, 2008). Three cases were deemed sufficient to allow replication but also take into account the pragmatic considerations in fulfilling the objectives of the study. In addition, the author of the study had access to in-depth insights into industrial companies through a research program (see, 1.3). The involved companies were selected from the research program participants, and by taking into account the criteria above.

The focal firms included in this study were all industrial service providers. All the focal firms were somewhat large companies, and all of them were located in Finland. They also had an established position in the field of industrial services and had been in the business for years. Developing industrial services and service-based business was a key condition for participating in the study, and it was a common strategic goal for the firms. However, all firms supplied diverse selection of services and placed varying emphasis on the different offering development modes. Two of the three focal firms were manufacturing companies that enhanced their product portfolios with services, and one was essentially a service company even though manufacturing was a minor role in its total portfolio. All the cases studied also represented typical cases because customer involvement was not a predominant management practice in any of them (see, Homburg and Kuehnl, 2014; Mahr, et al., 2014; Wiersema, 2013). Applicability of the focal firms for the study was ensured through workshops, where service portfolio development and customer involvement, among other things, were discussed with focal firm representatives. Table 10 presents the key characteristics of the focal firms.

Table 10. Key characteristics of the focal firms

<i>Case</i>	Case A: SCALE	Case B: DEVICE	Case C: FLOW
<i>Main industry</i>	Manufacturing	Manufacturing	Industrial logistics
<i>Company size</i>	Mid	Large	Large/mid
<i>Core offering</i>	Production automation solutions—to increase <i>SCALE</i> of automation	High and mid voltage power appliances— <i>DEVICES</i>	Internal logistics solutions—to improve <i>FLOW</i> of logistics
<i>Customer industries</i>	Manufacturing	Power production and distribution and heavy industries	Manufacturing
<i>Service portfolio</i>	Periodic maintenance, repair services, spare parts, installations, startup services, help desk service, consultation and expert services, and system design	Periodic maintenance, repair services, spare parts, installations, consultation and expert services, and system design	Packaging, dispatching, warehousing, quality control, in-site transportations, and consultation and expert services
<i>Role of services in company strategy</i>	High/increasing; focus on advanced services, e.g., IIoT services; increasing service business as a key competitive objective and growth area	Moderate/slowly increasing; focus on service standardization and promoting expert services; service business primarily supports product selling	Very high; focus on comprehensive service solutions and increasing knowledge intensiveness; a shift toward the development of partnerships as a central objective

NOTE: CI = customer involvement

In the case of SCALE, the focal firm was particularly focused on capitalizing on advanced services, such as IIoT-enabled services and expert services. However, traditional after-sales services like maintenance and spare parts were deemed necessary in future. In general, increasing the role of service business was a key element in the focal firm's strategy, and it was recognized as a potential avenue to improve competitiveness and increase revenues. In the case of DEVICE, the focal firm was interested in utilizing service development. However, instead of advanced services, the focal firm was particularly focused on refining the existing offerings through service standardization and packaging. The focal firm also emphasized long-term customer relationships, mutual acquaintance, and good availability of a local service organization in its strategy. In the case of FLOW, the focal firm was particularly focused on extensive service packages. They sought new opportunities by complementing the existing service contracts with new industrial logistics services, both basic and advanced. They also sought new service business through new customers, where it could take over parts of the customers' industrial logistics flows.

The participating firms were anonymized using the acronyms SCALE, DEVICE, and FLOW of the cases. Focal firms were also referred to as focal firms A (SCALE),

B (DEVICE), and C (FLOW). To secure anonymity, exact company details (e.g., size, industry, and products) were not provided in the table above. Similarly, code names (e.g., BC1, AF3) were given to all interviewees to guarantee confidentiality. The first letter refers to the cases (A, B, or C) and the second letter denotes customer interviewee (C) or focal firm interviewee (F). The next sub-chapter describes data collection and the obtained data in more detail.

3.4 Data collection

This study follows the mainstream of case studies in business research and uses in-depth interviews as the primary data collection method (see, Eisenhardt and Graebner, 2007; Eriksson and Kovalainen, 2008, p. 78). Interviews were selected as the primary method as they are generally acknowledged as a highly efficient way to gather rich empirical data (Eisenhardt and Graebner, 2007). As the use of multiple data sources is a distinctive feature in case studies, the present study takes advantage of other data sources as complementary data (see, Baxter and Jack, 2008; Eriksson and Kovalainen, 2008, p. 125). As secondary data, the present study utilized observations from workshops with case companies as well as documentary material to complement the primary interview data.

Table 11 presents an overview of the collected data. In total, 36 interviews were conducted with an average length of 81 min, producing in total 2907 min (circa 48 h) of recorded interview data.

Table 11. Overview of the collected data

Case SCALE					
Primary data	Code	Title	Length (min)	Customer industry	Country
Firm interviews n = 6	AF1	R&D manager	96		Finland
	AF2	Vice president	70		Finland
	AF3	Service manager	80		Finland
	AF4	Product manager	86		Finland
	AF5	CFO	65		Finland
Customer interviews n = 7	AC1	Engineering manager	66	Contract manufacturing	Belgium
	AC2	Process planning manager	51	Aerospace	Poland
	AC3	Development director	93	Contract manufacturing	Finland
	AC4	Production manager	60	Manufacturing	Belgium
	AC5	Production development manager	85	Manufacturing	Finland
	AC6	Development manager	98	Manufacturing	Finland
	AC7	Director of R&D	37	Manufacturing	The Netherlands
Total		n = 12	avg = 74		
Secondary data	Workshops with case company (n = 5); 2015–2017 Other: presentations, documents, and web pages				
Case DEVICE					
Primary data	Code	Title	Length (min)	Customer industry	Country
Firm interviews n = 6	BF1	Development manager	69		Finland
	BF2	Sales manager	53		Finland
	BF3	Manager	96		Finland
	BF4	Product group manager	108		Finland
	BF5	Service manager	77		Finland
	BF6	Development manager	108		Finland
Customer interviews n = 6	BC1	Group manager	108	Chemical industry	Finland
	BC2	Maintenance manager	110	Energy	Finland
	BC3	Maintenance manager	46	Maintenance	Finland
	BC4	Group manager	51	Energy	Finland
	BC5	Grid manager	97	Energy	Finland
	BC6	Maintenance manager	80	Metal industry	Finland
Total		n = 12	avg = 84		
Secondary data	Workshops with case company (n = 3); 2015 Other: documents and web pages				
Case FLOW					
Primary data	Code	Title	Length (min)	Customer industry	Country
Firm interviews n = 6	CF1	CEO	119		Finland
	CF2	Key account manager	70		Finland
	CF3	Development manager	97		Finland
	CF4	Unit manager	68		Finland
	CF5	Development director	114		Finland
	CF6	Business manager	71		Finland
Customer interviews n = 6	CC1	Production line manager	77	Manufacturing	Finland
	CC2	Vice president, product group	76	Manufacturing	Finland
	CC3	Vice president, procurement	92	Manufacturing	Finland
	CC4	Production line manager	48	Manufacturing	Finland
	CC5	Procurement director	88	Manufacturing	Finland
	CC6	Production technology manager	97	Textile industry	Finland
Total		n = 12	avg = 85		
Secondary data	Workshops with case company (n = 3); 2015 Other: presentations, documents, and web pages				
Interviews (in total)					
N = 36					
Total length = 2907 min = ca. 48 h					
Average length = 81 min					

In each focal firm, 5–6 representatives per firm (17 interviewees in total) who were particularly knowledgeable about service portfolio development within the firm were interviewed. Recommendations about the suitable interviewees were obtained from the focal firm contact persons to find the most knowledgeable informants regardless of their formal title or position in the organization. As a result, selected interviewees held varying titles, such as service manager, development manager, vice president, and key account manager. Thus, the study followed the recommendations by Eisenhardt & Graebner (2007) to select numerous highly knowledgeable interviewees that represented different organizational roles and/or functions within the focal firms as well as customer companies.

An access to customer organizations was provided by the focal firms. Each focal firm was asked to recommend a few customers that would represent their customer base in a meaningful way in terms of industries, company size, customer type, etc. As a result, 6–7 customers of each focal firm (19 customer organizations in total) were selected to participate in this study. As the study is focused on customer involvement in service portfolio development, all the selected customers were active service customers of the focal firms. In addition, the services offered by the focal firms were expected to have a somewhat important role for the selected customers to guarantee an interest in the development of the focal firm portfolio.

All focal firm interviews were conducted in Finland, where the participating companies were located. In the cases of DEVICE and FLOW, all participating customers were also located in Finland. In the case of SCALE, the participating customers were located in Belgium, Finland, the Netherlands, and Poland. All interviews with Finnish participants were held in Finnish, whereas interviews in Belgium, the Netherlands, and Poland were held in English. In line with a good interview practice (e.g., Gibbert and Ruigrok, 2010), all interviews were conducted face-to-face, recorded, and transcribed in verbatim. Field notes (memos) were also produced during and immediately after the interviews to support data analysis afterward (Stake, 1995, p. 66).

A semi-structured interview approach was applied throughout the data collection process. In conducting the semi-structured interviews, a certain outline of topics, issues, and themes was selected to be discussed with the interviewees, but the exact wording and order of questions was varied between interviews (Eriksson and Kovalainen, 2008, p. 82). Moreover, open-ended questions were preferred over closed questions. The aim was to allow the interviewees to use their own ways of defining the topics under discussion and to enable the interviewees to raise new issues to the discussion if needed. The main advantage of the selected approach was

that the relevant topics could be covered systematically and comprehensively, while the tone of the interview could be kept rather informal and conversational (Eriksson and Kovalainen, 2008, p. 82). In general, the conducted interviews followed the same structure. However, as the case companies represented different industries and had diverse development objectives, the interview outline was partially adapted to the particular requirements of each case. For example, the wording of questions was altered between the cases. Moreover, the focal firm and customer interviews were conducted using slightly different interview outlines.

The generic interview outline was as follows. First, the aim of the interview and the confidentiality of the responses were clarified to the interviewee. Then, the interviewees were asked to introduce themselves as well as their position and duties in the organization. Next, the discussion shifted to the primary topics. In the focal firm interviews, these included the current state of the service portfolio, development of the portfolio, and the role of customers in service development. In the customer interviews, the primary topics covered the service portfolio of the focal firm, procurement of the services, services and cooperation in practice, and future service needs. More detailed interview outlines are presented in the annexes (see, Annex 1: Interview outlines).

Workshops with the case companies ($n = 9$) and documentary materials (e.g., presentations, web pages, and other documents) were used as complementary data in this study. The role of this secondary data was to extend the understanding of the focal firm contexts and enable researchers to become familiar with the companies (i.e., organization, products/services, and markets). In addition, the preliminary interview findings were discussed with the company participants to enable “member checking” of the researcher interpretations (see, Stake, 1995, p. 115).

3.5 Analysis

3.5.1 Analysis process

This study was conducted in two analytical main stages, within-case and cross-case analyses, which is a generally recommended approach in multiple case studies (Eisenhardt, 1989; cf. Yin, 2003, pp. 133–135). The particular cases were first focused upon for two main reasons. First, the realities of case study research (i.e., huge volume of data) often require division of the work into smaller parts

(Eisenhardt, 1989). In the present study, it would not have been possible to cope with the empirical data of three cases at once. Second, the overall idea in multiple case studies is to become familiar with the cases as stand-alone entities and to reveal the unique patterns of the cases (Eisenhardt, 1989). Therefore, the focus was first on the particular cases before analyzing the differences and similarities across the cases. The overall analysis process of the study is presented in Figure 4.

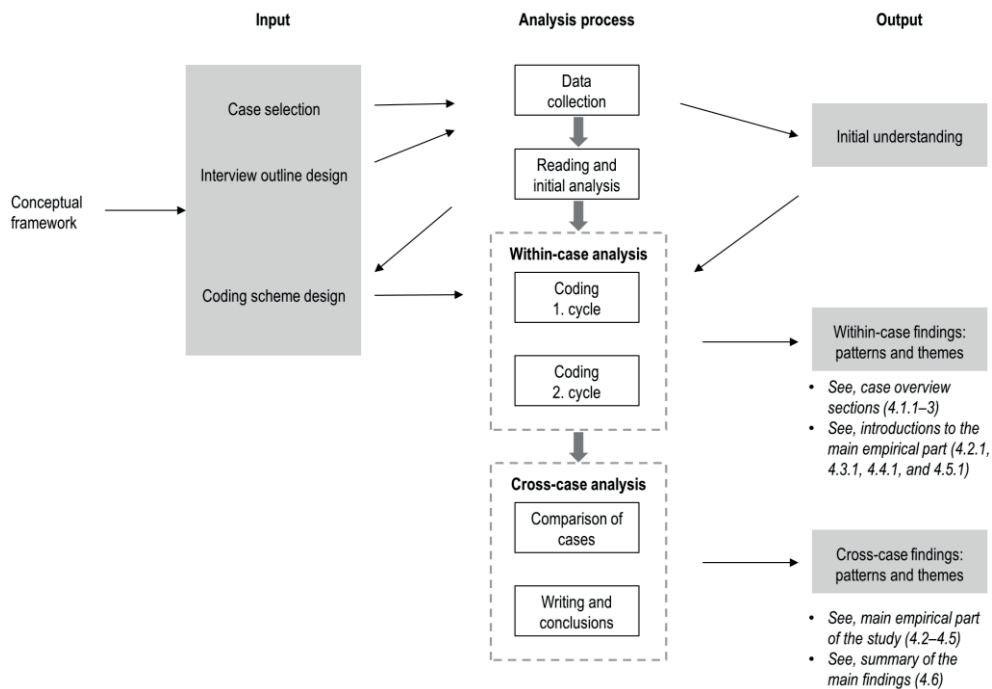


Figure 4. Analysis process

The qualitative analysis process of this study consisted of three main flows of activities: data condensation, data display, and drawing and verifying conclusions (Miles, et al., 2014, pp. 12–14; cf. Yin, 2003, p. 111). Data condensation included selecting analytical categories, coding of the interview data, and writing analytic memos. Data displays covered numerous matrices, charts, and graphs that were sketched, modified, and abandoned throughout the research process. Some of these displays were then selected to illustrate the final findings and conclusions (e.g., Table 16, Table 17, and Figure 13). Finally, drawing and verifying conclusions covered the interpretation of what the findings of the study mean in terms of patterns and

explanations. The next two sub-chapters describe in more detail how the data was analyzed and conclusions were drawn.

3.5.2 Within-case analysis

At the within-case stage, the data was first coded using a coding scheme (see, Table 12) that was mainly based on the conceptual framework of the study. The objective of coding was to categorize and cluster similar data chunks to set the stage for further analysis and conclusion drawing (Miles, et al., 2014, p. 72). Qualitative analysis software Atlas.ti was used throughout the analysis stage to enable efficient coding, analysis, and management of the data. Microsoft Excel spreadsheets were also used to document key issues and facilitate comparisons between interviewees, key variables, and cases in cross-case analysis.

Table 12 presents the applied coding scheme, description of the codes, and quantities of the coded excerpts. Code families ‘Offering development modes’ and ‘CI forms’ consisted of *a priori* codes, and the other code families emerged during the first coding rounds. In addition, a full list of the used codes and distribution of the codes across cases are presented in the annexes (see, Annex 2: Coding usage).

Table 12. Coding scheme of the research

Code family	Code identifier	Code	Accounts of...	Number of coded excerpts
Offering development modes (a priori)	A1	IMP-CUR	<i>...current basic services and their development</i>	391
	A2	CUS-SERV	<i>...customer service elements and their development</i>	248
	A3	MORE-COMP	<i>...more complete offerings and their development</i>	325
	A4	MORE-ADV	<i>...more advanced services and their development</i>	370
	A5	GENERIC	<i>... portfolio in general and its development</i>	539
CI forms (a priori)	B1	NEEDS	<i>...customer needs</i>	835
	B2	FEEDBACK	<i>...customer feedback from services; or, customers giving feedback during interviews</i>	469
	B3	IDEAS	<i>...how ideas to develop portfolio are created; or, customer providing ideas during interviews</i>	56
	B4	CO-DEVELOP	<i>...co-development of services</i>	261
	B5	INNOVATION	<i>...customers taking the role as innovators</i>	0
Complementing codes (emerged)	C	FIRM GOAL	<i>...focal firm goals regarding portfolio development</i>	352
	D1	CUS-KNOWLEDGE	<i>...received or needed knowledge from customers; or, description of what knowledge customer provide to focal firms</i>	108
	D2	REFERENCES	<i>...references and their importance in the industrial service business</i>	15
	E1	Firm description	<i>...the organization represented by the interviewee, e.g., industry, products/services, and markets</i>	409
	E2	Interviewee responsibilities	<i>...interviewee's position and responsibilities in the organization</i>	78
	E3	Portfolio description	<i>...the focal firm portfolio, e.g., what are the components included and why</i>	56
	E4	Relationship	<i>...services purchased and the customer company's relationship with the focal firm</i>	83
	F1	Potential quotation	<i>...exceptional importance or interest for the researcher, e.g., potential quotation for the research report</i>	88
Case-specific codes (emerged)	C-B1	Systems	<i>...focal firm systems and their use (e.g., methods for customer feedback)</i>	15
	C-B2	Internal coordination	<i>...how a focal firm is internally organized</i>	25
	C-B3	Over serving	<i>...satisfactory service level</i>	6
	C-C1	Transactions	<i>...transaction-based pricing and shifting to its use</i>	24
			Total	4753

Following the conceptual framework, offering development modes and customer involvement forms provided the initial coding framework. When an interviewee discussed a particular offering development mode, it was labeled with a code from the offering development mode code family (A1–A5). For example, “A1 IMP-CUR” was used when the interviewee elaborated basic services, such as basic mechanical maintenance:

Mechanical maintenance (...) we don't see it as competitive advantage (...) it's quite standard stuff, those systems (...) are no rocket science, so others can service them too (service manager, AF3, SCALE).

In a similar fashion, accounts regarding other offering development modes were labeled with specific codes. For example, when an interviewee spoke about extensive service contracts, it was coded as "A3 MORE-COMP" to emphasize that the account expresses a view that belongs to the offering development mode "developing more complete offerings:"

We have one contract like that (...) replacing equipment or components is included in our price and (...) the package covers all the spare parts that are used, and still it's competitive price (group manager, BC1, DEVICE).

Furthermore, accounts regarding different customer involvement forms (B1–B5) were labeled appropriately. For example, when a customer gave feedback or a focal firm interviewee discussed about feedback, it was coded as "B2 FEEDBACK:"

[Focal firm is] quite reliable (...) also, the understanding of the needs of the bigger clients like us is increased. We do have good cooperation. It has developed over time. One could well say agile (...) they have always accepted feedback well and then tried to develop their operation (product manager, CC1, FLOW).

Along the same line, other customer involvement forms were labeled with respective codes. For example, accounts that dealt with customer participation in the service development were labeled as "B4 CO-DEVELOP" to distinguish them from other customer involvement forms:

[The way] should of course be that (...) we go to test our new service protoconcepts with customers (...) we haven't done it very actively, so maybe as I said we could go to try out what comes out of it (CFO, AF5, SCALE).

The *a priori* coding scheme was complemented with categories that emerged as relevant during the first rounds of coding. For example, focal firm interviewees typically described strategic goals that guided their service portfolio development. Thus, a coding category "C FIRM GOAL" was established to highlight these accounts that essentially characterized the focal firms' objectives in portfolio

development. As an example, when focal firm interviewees discussed priorities in service business development:

You call it proactivity or whatever you call it now but (...) we have installed base and customer relationships. We take care of them systematically and deliberately and seek the kind of business from there that we ourselves want (product group manager, BF4, DEVICE).

Moreover, a coding category “A5 GENERIC” was created to complement defined offering development modes as some interviewees’ accounts were not directly linked to particular offering development modes or it was unclear to which modes the interviewee referred to, as in the following quotation wherein the interviewee described their needs for services without referring to particular services or offering development modes:

We try to have a partner that fulfills our needs as well as possible. So (...) quality and delivery reliability need to be true. The level of costs needs to be right and on a decreasing curve so that we find those common development targets (vice president, CC2, FLOW).

These issues were taken into account and integrated into all offering development modes when found applicable.

In addition, a few other codes were used to specify the descriptions of the interviewee position and responsibilities, firm offerings (focal firm interviews), and purchased services from the focal firm and the relationship between the parties (customer interviews). Particularly interesting accounts were also specified as potential quotations or key findings at this stage to make them easily available in the later analysis. Moreover, some case-specific codes were used within individual cases to emphasize particularly prominent issues. As an example, accounts for transaction-based pricing were separately labeled in the case of FLOW. In total, 4753 coded excerpts were produced using the coding scheme. However, simultaneous coding was applied; therefore, many excerpts were coded with two or more codes (see, Miles, et al., 2014, p. 81) and taken into account in the analysis of the respective sections. The coding was an iterative process, and the coding scheme was updated throughout the process. For example, codes were renamed, combined, and broken down in the process. The coding scheme shown above presents the final scheme at the end of the analysis stage.

Initial coding of the data enabled the condensation of the data to key findings within each coding category. The coded data chunks were scrutinized, and the key findings under each coding category were gathered in Excel spreadsheets. First, the key findings of the individual interviews were collected in the form of cross-variable matrices, where the rows of the tables represented different offering development modes and columns represented the customer involvement forms. In total, 36 tables were filled in line with the interview data. Figure 5 illustrates the structure of the used matrices. Illustrative example findings and the focus of the analysis are marked as blue in the figure.

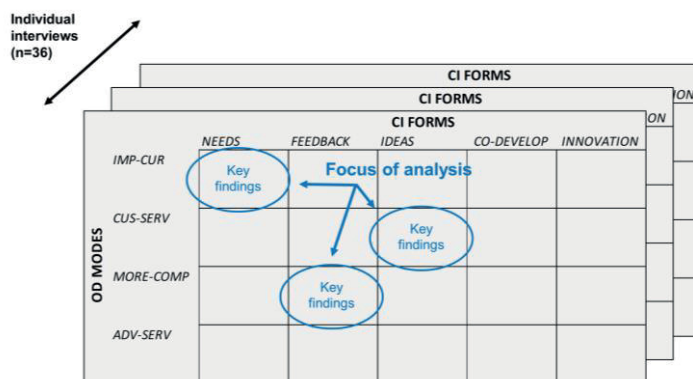


Figure 5. Illustrative example of the used cross-variable matrices for collecting the findings from individual interviews (within-case analysis)

At this stage, the key findings were presented as brief descriptions that illustrated the coded data. In the figure above, a cell in the upper left corner covered issues that were related to the needs for basic services. For example, in interview BC1 (customer of DEVICE), the key findings were as follows (see, Table 13):

Table 13. Example of key findings matrices: interviewee BC1 (B3 NEEDS/A1 IMP-CUR, within-case analysis)

B3 NEEDS	
A1 IMP-CUR	Non-core services can be outsourced
	Additional resources of external service providers are used, especially during shutdowns
	Total costs of ownership is evaluated, not seeking the cheapest service provider, maintenance and spare parts are a part of the evaluation, also safety aspects are important, need to have confidence in the service provider (quality, deliveries)
	Skillful service personnel emphasized, e.g. core skills (actual service), safety, ATEX-qualified, generic site knowledge
	OEMs often selected as maintenance providers because of their machine-specific know-how

NOTE: ATEX refers to European Union (EU) directives on allowed equipment and work space in an explosive atmosphere environment; OEM = original equipment manufacturer

In a similar vein, the key issues of every interview were gathered in the form of cross-matrices covering all offering development modes and customer involvement forms.

Next, the key findings matrices were re-organized according to offering development modes, which allowed the findings across interviews to be compared. In consequence, within-case findings were summarized for all four offering development modes in relation to separate customer involvement forms. Figure 6 illustrates the reorganized matrices and how the initial findings were summarized. Key findings addressing feedback from the basic services are used as an example in the figure (marked as blue).

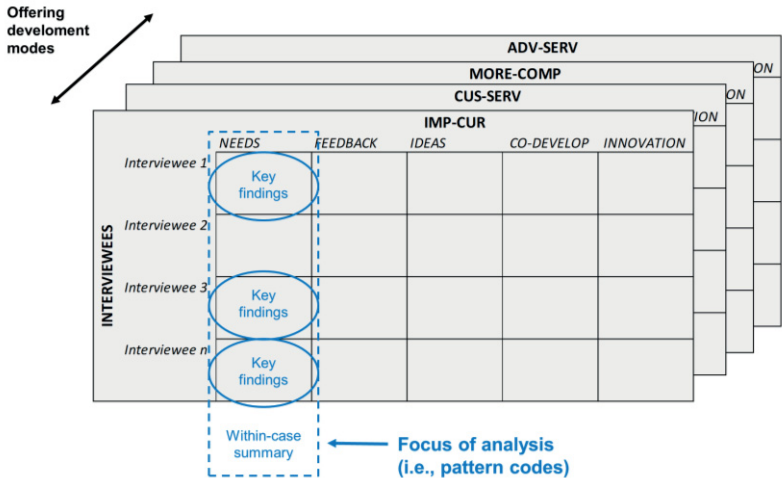


Figure 6. Illustrative example of case summaries (within-case analysis)

In this stage, the data was re-coded using codes that emerged in analyzing the categorized findings. This second cycle coding was done inductively to understand the unique patterns of the individual cases (Eisenhardt, 1989; Stake, 1995, p. 78). The aim was to identify common threads in the accounts of the interviewees in the form of emergent pattern codes (Miles, et al., 2014, p. 87). A result of the second cycle coding was the identification of themes that cut across the datasets (i.e., interviews within the cases). For example, the pattern codes of needs (B3 NEEDS) for basic services (A1 IMP-CUR) were labeled as “generic qualities,” “specific competences,” “external resources,” and “strategic considerations” within the customer dataset in the case of DEVICE. Using the previous example (see, Table 13), pattern codes were linked to the identified key issues as follows (see, Table 14):

Table 14. Example of pattern codes: interviewee BC1 (B3 NEEDS/A1 IMP-CUR, within-case analysis)

B3 NEEDS	
A1 IMP-CUR	Non-core services can be outsourced → Strategic considerations
	Additional resources of external service providers are used, especially during shutdowns → External resources
	Total costs of ownership is evaluated, not seeking the cheapest service provider, maintenance and spare parts are a part of the evaluation, also safety aspects are important, need to have confidence in the service provider (quality, deliveries) → Generic qualities
	Skillful service personnel emphasized, e.g. core skills (actual service), safety, ATEX-qualified, generic site knowledge → Specific competences
	OEMs often selected as maintenance providers because of their machine-specific know-how → Specific competences

The identification of the pattern codes was based on a qualitative content analysis (Hsieh and Shannon, 2015). The process was inductive and iterative by nature, and it was based on the reading and re-reading of the interview transcripts and key issue tables to let codes and cross-cutting themes to flow from the data. Using pattern coding, the key themes of the within-case analysis were summarized as shown above (see, Figure 6). The identified within-case themes provided a basis for the cross-case analysis discussed in the next sub-chapter. A complete list of the identified themes (i.e., emergent pattern codes) is presented in the annexes (see, Annex 3: Within-case themes, Table 26–Table 29).

In addition, the interviews of the focal firm and customer interviewees were treated as separate datasets in the within-case analysis. Both sets were first coded and analyzed separately by following the procedure described above. This allowed the comparison of firm and customer perspectives within the boundaries of the cases.

Figure 7 illustrates the distinct focal firm and customer datasets and their comparison. As an example, customer-provided ideas for improving basic services are highlighted in the figure (marked in blue).

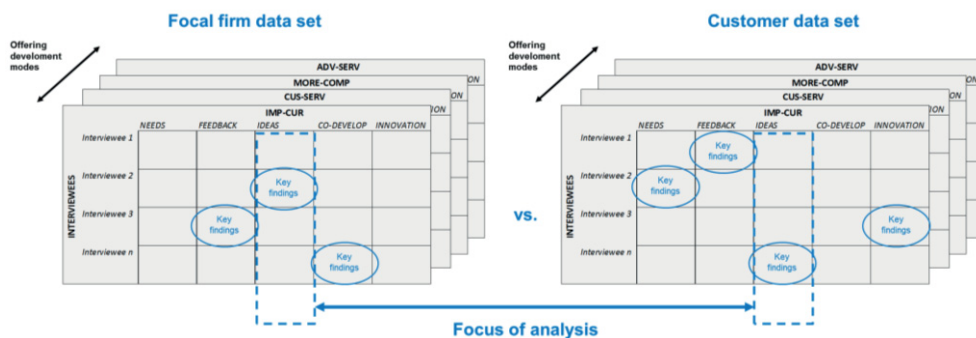


Figure 7. Illustrative example of customer vs. firm: customer-provided ideas for improving basic services (within-case analysis)

As an outcome of the within-case analysis, case descriptions were produced that illustrate the key issues in portfolio development within the cases studied. First, overviews of the cases are provided in the beginning of the findings chapter (see, 4.1). This section introduces the portfolio development in each case and especially focuses on focal firms and how they emphasized different offering development modes in developing their service business. Then, within-case findings in relation to particular offering development modes are elaborated in more detail in the introductory sections to the main empirical part of the study (see, 4.2.1, 4.3.1, 4.4.1, and 4.5.1). The main findings are highlighted and compiled into tables (see, Table 16, Table 18, Table 20, and Table 22) covering 1) the role of the offering development mode in the focal firm’s service portfolio, 2) the focal firm’s development focus within the particular mode, and 3) the role of customers in portfolio development. In addition, the primary services/contexts addressed are presented and illustrative quotations are provided.

3.5.3 Cross-case analysis

After analyzing each case, the focus of the analysis was shifted to the similarities and differences between and across the cases. The aim of the cross-case analysis was to deepen understanding and explanation of customer involvement in service portfolio development by searching cross-case patterns (see, Eisenhardt, 1989; Miles, et al.,

2014, p. 101). As in the within-case analysis, the conceptual framework of the study provided the starting point for the analysis. However, now the findings were compared across the cases. The analysis was essentially built upon the output of the within-case stage (i.e., identified key issues and patterns).

The within case analysis was based on a standard set of variables derived from the conceptual framework (i.e., offering development modes and customer involvement forms). This enabled the “stacking” of the case-level data and permitted a systematic comparison of the cases on the cross-case level (Miles, et al., 2014, p. 103). The logic of the cross-case analysis is illustrated in Figure 8.

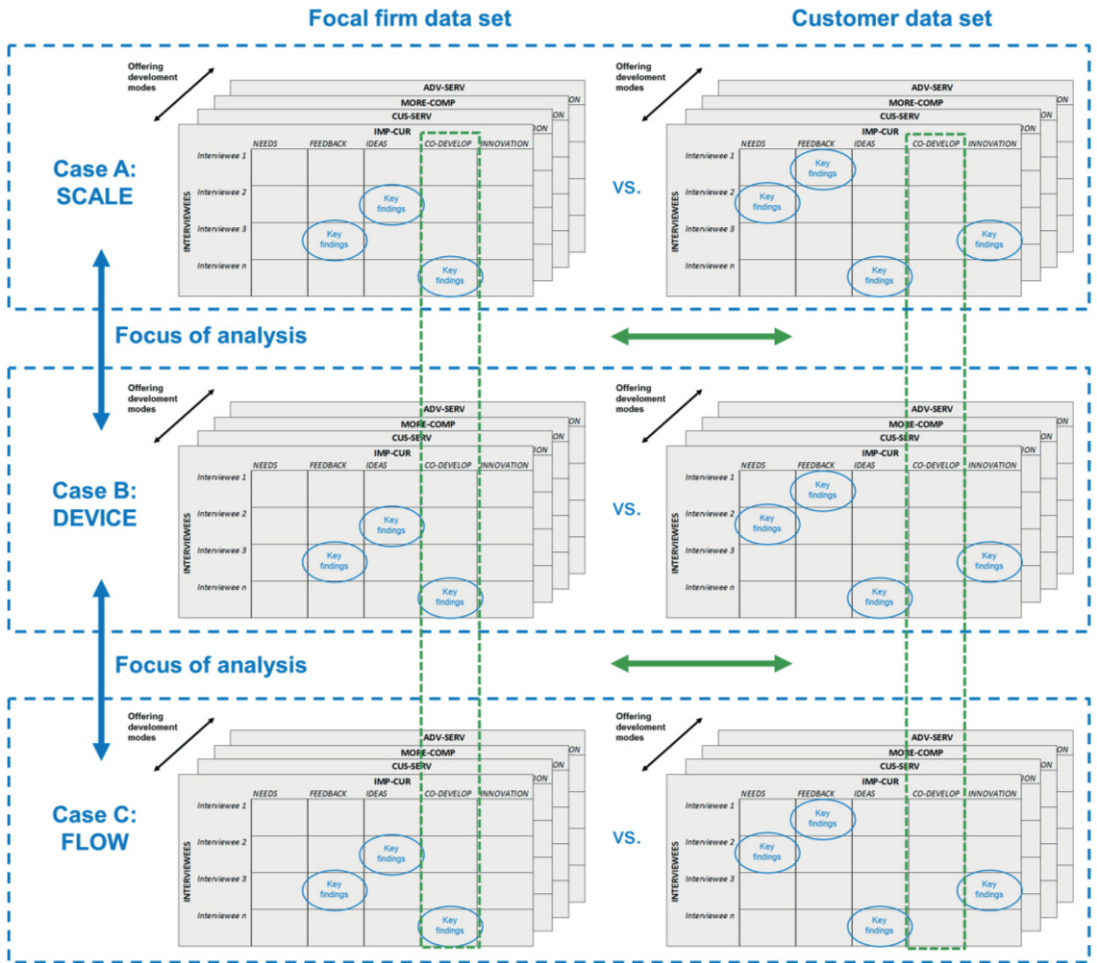


Figure 8. Illustrative example of cross-case analysis: co-development in improving basic services

Following the within-case coding scheme, the case data was compared with the three main analysis dimensions: offering development modes, customer involvement forms, and firm vs. customer perspectives. In Figure 8, the within-case findings of the individual cases consisting of both focal firm and customer datasets are shown. As an example, a dotted line (marked in green in the figure) represents a cross-case comparison of co-development (i.e., CI form) in improving basic services (i.e., OD mode). In a similar fashion, each customer involvement form was analyzed in relation to the different offering development modes and across cases. The analysis was of iterative and inductive nature at this stage.

In analyzing the findings, attention was paid to two phenomena that emerged as central themes in the cross-case stage : 1) how valuable was the knowledge to the focal firms that customers provided through customer involvement (see, Mahr, et al., 2014; Nonaka and Takeuchi, 1995) and 2) how deeply and intensively were customers involved by the focal firms (see, Alam, 2002; Sandén, Gustafsson, et al., 2006). By following an inductive research approach in the cross-case analysis stage, these dimensions emerged as especially suitable to illustrate the differences and similarities between the offering development modes. Moreover, comparing the customer involvement forms across these dimensions showed substantial cross-case patterns. As a consequence, the value of the available customer knowledge and the degree of the customer involvement were elaborated for all customer involvement forms in each customer offering development mode across the cases. Table 15 presents the applied framework that was used for the classification of the findings.

Table 15. Cross-case classification framework

Value of customer-provided knowledge	Value of knowledge is	High	Medium	Low
	When obtained knowledge is	<i>Explicit, rich, consistent, and novel</i>	<i>Moderately rich, consistent, or novel</i>	<i>Tacit, scant, mixed, and familiar to the company</i>
Degree of customer involvement	Degree of involvement is	High	Medium	Low
	When customer involvement is	<i>Frequent and systematic</i>	<i>Infrequent or random</i>	<i>Non-existent or rare</i>

The value of customer-provided knowledge and degree of customer involvement were both understood as continuous variables (see, Alam, 2002). In the current study, however, they were divided into three classes—low, medium, and high—for the purposes of exposition. The value of the customer-provided knowledge to focal firms was categorized as high when it was explicit, rich, consistent, and novel to the

focal firm (Mahr, et al., 2014; Nonaka and Takeuchi, 1995). Accordingly, when the knowledge was found to be tacit, scant, mixed, or familiar to the focal firm, it was classified as low. The degree of customer involvement in service portfolio development was classified as high when customers frequently and systematically participated in focal firm’s service development and as low when it was non-existent or rare (Alam, 2002; Sandén, Gustafsson, et al., 2006). Moreover, the variables were categorized as medium when they were between the ends of the high–low continuum. The value of customer-provided knowledge was classified as medium when the customers provided knowledge but it was found to be only moderately rich, consistent, or novel to the focal firm. The degree of involvement, in contrast, was classified as medium when customers were taking part in service development to some degree, but involvement occurred only infrequently or randomly.

The preceding cross-case classification framework was further applied as a basis for the visualization of the cross-case findings. Figure 9 presents an example of the visualization used.

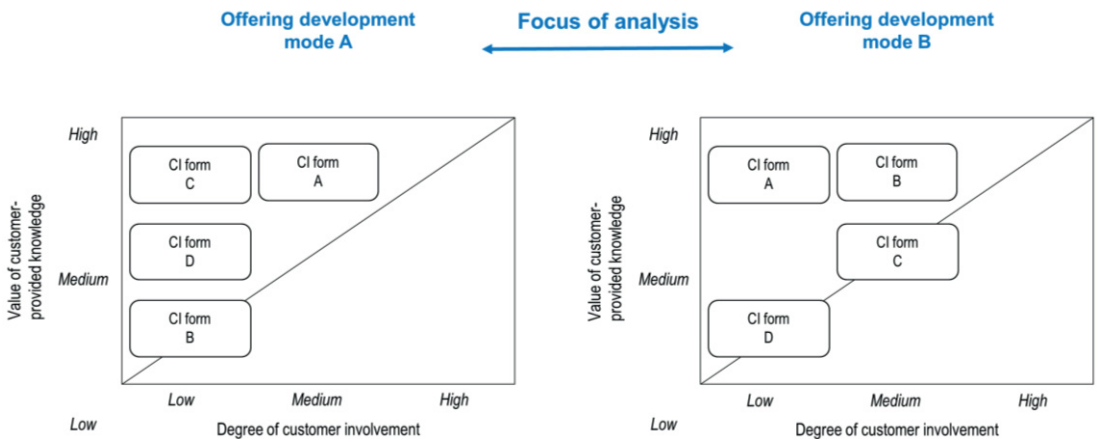


Figure 9. Examples of the used visualization matrices and cross-case comparison

By combining the variables into a two-dimensional matrix, the findings on the customer involvement forms were visually compared across the four offering development modes. In the matrix, a diagonal ranging from low–low to high–high corners denotes a balance between the value of the customer-provided knowledge and the degree of involvement. The upper part of the figure represents a situation wherein the value of the customer-provided knowledge is high in relation to the degree of customer involvement. Accordingly, the lower section of the model refers

to a situation wherein the value of the knowledge is low in relation to the current or intended degree of customer involvement.

Based on the analysis that included the cross-case classification framework and data displays (i.e., visualization matrices), it was possible to explore how customers were engaged in service portfolio development and how their contributions varied. Thus, it enabled drawing conclusions on how customers contributed to portfolio development in different offering development modes and how customer involvement forms differed in that respect. The cross-case analysis produced patterns that indicated both similarities and differences between customer involvement forms and across offering development modes. In the following empirical part of the study, the findings are introduced in detail using the classification framework (see, Table 15) and then illustrated through the matrices introduced above (see, Figure 9).

3.6 Researcher's role

The nature of the present research had implications for the researcher's role. As discussed previously (see, 3.1), this research adopts a philosophical position that is between the ends of the subjective–objective continuum of social sciences and follows epistemology that reflects interpretivism (see, Eriksson and Kovalainen, 2008; Hatch and Cunliffe, 2013; Morgan and Smircich, 1980). In this research, the role of the researcher was not to remain as an external observer who seeks to measure what she/he sees (see, Morgan and Smircich, 1980).

Instead, knowledge is seen as subjective, prone to multiple interpretations, and something that can only be acquired through social actors (see, Eriksson and Kovalainen, 2008, pp. 14–15; Hatch and Cunliffe, 2013, pp. 11–15). In line with this view, the researcher was seen as participating in producing the knowledge through social interaction in the role of the interviewer. Furthermore, the findings of the study are regarded as inevitably subjective, despite a bid to rigor in data collection and analysis (see, Harrison, et al., 2017). Therefore, the findings of the study present an interpretation, and it is acknowledged that other interpretations can take place.

Data collection was part of the S4Fleet research program (see, 1.3), where the author of this dissertation was one of the participating researchers. Within the research program, conducting the interviews were implemented as teamwork. In addition to the author, four other researchers participated in the data collection to some extent. The author participated in the planning of all the interviews, had a

primary role in interviewing in two of the three cases, and personally participated in 22 of the 36 interviews included in the study. The consistency of the data collection was ensured by using standardized interview outlines (common main themes) and by designing the data collection together with the other researcher. Designing this research, analyzing the data, and drawing the conclusion was conducted exclusively by the author of this dissertation. Some of the interviews were used to gather data also for other research objectives. However, these discussions were not taken into consideration in this study, if the topics were not related to the objectives of this study.

4 FINDINGS

The following empirical part of the study is organized around the classification of portfolio development into four modes: refining basic services portfolio, promoting customer service elements, developing more complete offerings, and extending portfolios with advanced services. The findings show how customer involvement was applied within the distinct offering development modes and how customers contributed to service portfolio development in the three cases studied. As an introduction, the chapter first provides an overview of the cases. Finally, the chapter ends with a summary of the main empirical findings.

4.1 Overview of the cases

4.1.1 Case SCALE: Raising digitalization to the front

Services had been an essential part of SCALE's focal firm overall portfolio as long as it had supplied equipment and systems to customers. However, the focal firm had been strongly product-oriented in the past, and services had been principally regarded as add-ons to the firm's product portfolio without a key role in the company strategy.

In earlier years services has been a necessary evil. We have emphasized equipment sales and then built services in a way that we now get, let's say, a customer kept happy and equipment running (R&D manager, AF1, SCALE).

The attitudes toward services had slowly changed over the years, and the focal firm of SCALE now highlighted the importance of developing service business as a central element in the company strategy. The firm saw many business opportunities in extending its service business. Increasing the share of services in the company revenues was also a key goal for the firm. In the past, service development within the firm had been sporadic and disorganized, and services had been mainly developed to keep customers satisfied. Now, the firm increasingly wanted to shift

toward more systematic service development. The focal firm of SCALE had also recognized that increasing the role of services necessitates changes in the organizational culture. Thus, merely adding new services to the firm portfolio is not sufficient; the company needs stronger service orientation throughout the organization.

In service portfolio development, the focal firm of SCALE was strongly focused on extending its portfolio with advanced services, particularly those based on the possibilities created by IIoT. The firm was interested, for example, in services that could take advantage of remote monitoring, predictive maintenance, and advanced analyses of condition and usage data.

It has been especially put to the strategy that we have to grow to these more advanced services and in that way, increase the share of the service business (vice president, AF2, SCALE).

The firm was strongly preoccupied with developing online connections to its installed base. Currently, it only had access to data during, for example, maintenance breaks when customers allowed remote access to the equipment. Moreover, the firm wanted to move toward service business that is based on inclusive service contracts with its key customers. It did not want to offer a wide range of individually sold services but rather comprehensive service packages through which the firm could take a bigger responsibility of the maintenance and upkeep of the supplied equipment.

The focal firm of SCALE regarded the basic after-sales services as an inevitable part of its service portfolio. Basic after-sales services, such as maintenance and spare parts, were expected by the customers, and the firm saw these services as the ones they must also offer in future. However, the basic after-sales services were not seen as an essential means through which the company could differentiate itself in competition.

Life-cycle services have not been a focus in any way so far (service manager, SCALE, AF3).

Furthermore, customer service was an issue that the firm had recognized to be of importance to customers. The firm had awoken to the fact that even though they may be able to solve a customer problem or some other issue, the customer's experience is not necessarily satisfactory. Consequently, the firm wanted to increase its understanding on how well they succeed in customer service.

Figure 10 presents the main directions of the service portfolio development within the case of SCALE and the relative emphasis put on each offering development mode by the focal firm. Dark grey with thick line represents strong emphasis, light grey with normal line represents moderate emphasis, and white with dash line represents low emphasis on the particular offering development mode. The figure also presents the main issues concerning each development mode.

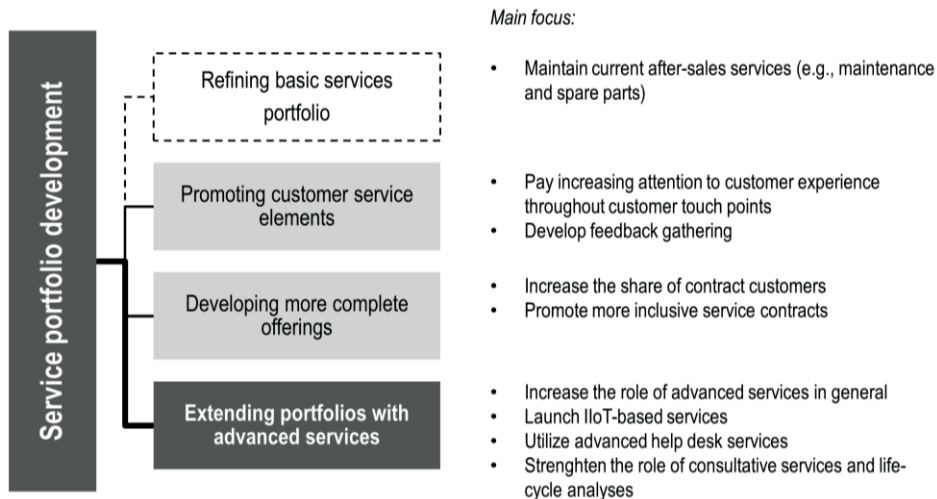


Figure 10. Portfolio development directions in the case of SCALE

4.1.2 Case DEVICE: Promoting standardization and inclusive service contracts

A wide service portfolio was a distinctive feature of the focal firm in the case of DEVICE. The focal firm manufactured a wide range of electric appliances, and it had developed an extensive variety of services to support customers through after-sales services, such as maintenance and spare parts. The services offered by the firm were usually described as product-related and, to some extent, their role always was to support product selling. The current service portfolio had taken shape over time. The portfolio had not gone through major changes in the recent years, and the focal firm stressed that is no need to radically renew the service portfolio in the near future either.

It [service portfolio] fits quite well in this market and in customers' wants and needs. Any radical upheaval isn't needed to be done either. It's like we haven't developed anything radical in the last years, but on the other hand, is there much demand for that either? (service manager, BF5, DEVICE)?

Nevertheless, the firm wanted to develop the service portfolio in several ways, for example, through standardizing services packages, developing service contracts, and putting more emphasis on advanced services. In general, the importance of customers in service development was highlighted by DEVICE, and it was regarded as a direction toward which the company wanted to proceed in future.

Developing more complete offerings through standardization of services had been a strategic choice for the focal firm.

We could say that the contract-based business has been some kind of choice (product group manager, BF4, DEVICE).

Most of the services supplied by the firms were sold as productized standard packages, and of those, around 50% were sold at listed prices. However, the firm wanted to develop its portfolio by further advancing service standardization. The focal firm also wanted to move toward more complete offerings by shifting from mere framework agreements with customers to more inclusive service contracts. Another way through which the firm wanted to develop its service portfolio was by putting more emphasis on consultative elements. For example, life-cycle analyses of the condition of the customers' equipment as well as recommendations on how to maintain and modernize obsolete equipment were seen as potential areas for the company. In addition, the firm was planning to launch remote-monitoring-based services that will take advantage of the possibilities offered by IIoT. However, it was not a key priority at the moment.

Regarding basic after-sales services, such as maintenance and spare parts, the focal firm considered its service portfolio as relatively comprehensive. Therefore, the firm was not actively looking for new ways to extend its basic services portfolio. Instead of launching new services, the firm aimed at standardizing and packaging services in novel ways as explained above. In general, the firm had decided to focus on those maintenance services that require more expertise than the simplest low-end services. As an original equipment manufacturer (OEM), the focal firm possessed profound knowledge about its equipment; thus, it was justifiable to take advantage of its skills and capabilities in differentiating itself in competition.

Knowhow (...) and being familiar with the installed base (...) are surely the strength (development manager, BF1, DEVICE).

Moreover, renewing customer service was not a key goal for the focal firm at present. The firm highlighted its local service organization and its long-term customer relationships that were based on mutual acquaintance. However, it was remarked that its wide customer interface and large organization can sometimes be a challenge to customers because it is not always clear whom to contact, especially if a customer did not have existing contacts inside the firm. Figure 11 presents the main directions of the portfolio development within the case of DEVICE and the relative emphasis put on each offering development mode by the focal firm.

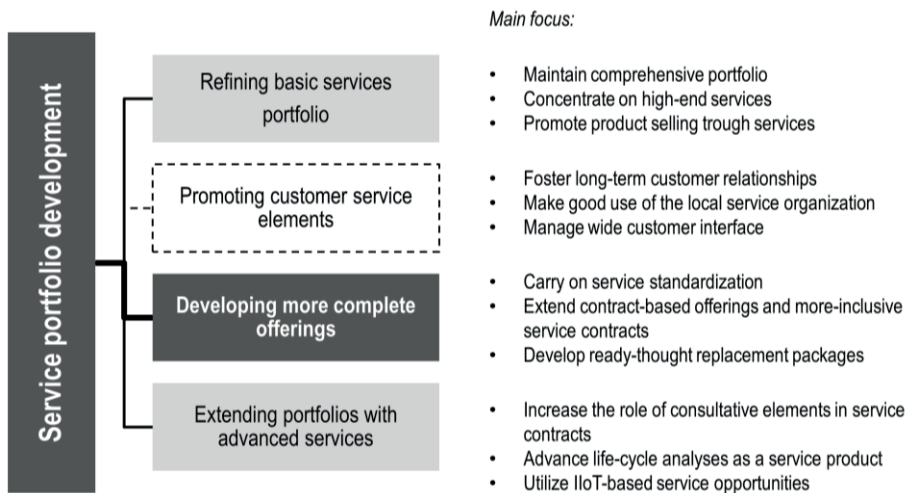


Figure 11. Portfolio development directions in the case of DEVICE

4.1.3 Case FLOW: Extending service solutions and consulting

The service portfolio of the focal firm of FLOW consisted of various industrial logistics services. The focal firm was essentially a service company, although small-scale manufacturing services in the form of contract manufacturing were included in its portfolio. Within the scope of industrial logistics, the firm was seeking new ways to expand its portfolio, for example, through novel, basic, and advanced services. With particular customers, the firm wanted to take over as many tasks and/or functions as possible, and it was typical of the firm that contracts with customers

were expanded over time. The firm had decided to strictly focus on the material flows of manufacturing industries.

We focus on the logistics of the industry, the material flows of the industry. So, it was a conscious choice (...) that we are specifically experts of the industry (key account manager, CF2, FLOW).

Nevertheless, the firm sometimes included other types of services, such as building maintenance or cleaning services, in its portfolio if the customers required it. If necessary, the firm also supplemented its portfolio by combining it with services offered by third parties.

In developing services, the focal firm of FLOW worked in close cooperation with customers. A majority of the service development took place during the development projects that the company conducted with particular customers. The focal firm also stressed that the ideas for new or improved services often came from customers; if not directly, these ideas came through solving customers' problems and other joint activities. The firm took advantage of the development results of particular customers by transferring the accumulated knowledge and good practices across the customer base:

We talk about the way to do work (...) when we have developed it [e.g., process or method] (...) we take it to another site (...) our own knowledge is transferred but we don't go and tell customer's [matters] (CEO, CF1, FLOW).

Furthermore, the firm emphasized its advanced knowledge of industrial logistics and developing the efficiency of the customers' processes. Strengthening the role of advanced expertise was a key goal for the firm. Within the existing customer relationships, the firm wanted to increase the amount of on-going development projects. Development projects were regarded as a means to improve profitability as well as to raise its own expert profile in the customers' eyes. The focal firm also sought opportunities to take advantage of its expertise by starting to offer consulting services as a business of its own.

Employees of the focal firm worked in close cooperation with customer employees and customer service was a daily matter. The firm also organized regular management meetings to take care of the customer relationships and provide opportunities to customers to give feedback and communicate their needs. As a part of the portfolio development, FLOW was not especially focused on developing the daily customer service. However, the firm highlighted the importance of generic

service attitude and that they have to remember to take customers into account in all service delivery situations as they are, in essence, serving customers.

We are purely a service firm and, if we are not customer-oriented then the preconditions for being so are quite flimsy (...) we do have recognized that it is the customer who is the basis for everything (business manager, CF6, FLOW).

Moreover, the focal firm of FLOW emphasized the importance of regular management meetings that they saw as a key element in customer service. The firm wanted to have a clear and easy-to-contact customer interface, and this was a priority in developing customer service elements.

In developing the individual logistics services, the focal firm acknowledged that such services are usually rather simple and there are limited possibilities in improving them. Thus, the firm emphasized the importance of more complete contracts, which allow for process development, flexible allocation of resources, and development of systems through which the overall efficiency can be improved. Figure 12 presents the main directions of the portfolio development within the case of FLOW and the relative emphasis put on each offering development mode by the focal firm.

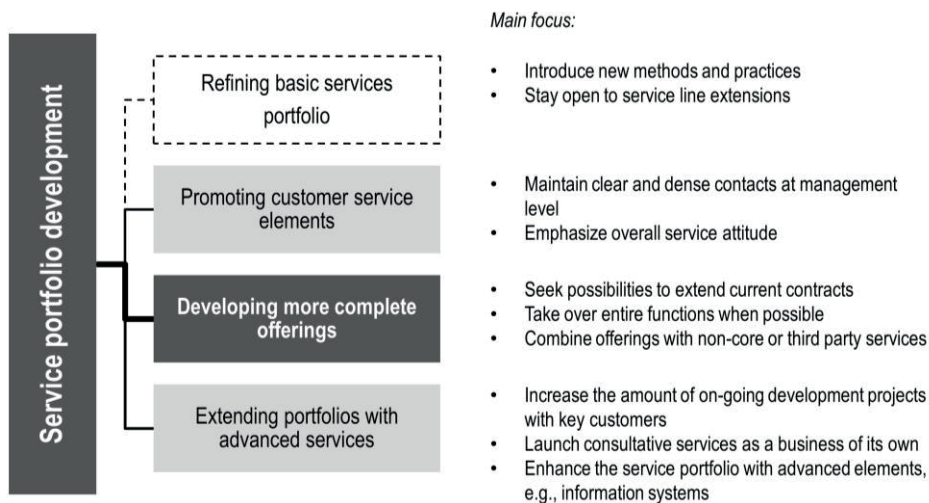


Figure 12. Portfolio development directions in the case of FLOW

4.2 Refining basic services portfolio

4.2.1 Focus and key issues within cases: basic services

The importance of the basic services in the focal firm portfolios varied considerably. The focal firm of DEVICE regarded its basic services as a key competitive asset. For the focal firm of SCALE, in contrast, basic services' role was much less important in terms of competitiveness, although basic services were considered as an inevitable part of the company portfolio. Basic services were of importance to the focal firm of FLOW as well. However, for the firm, the ability to deliver and manage a wide service portfolio was more important than particular basic services. None of the focal firms emphasized a strong need for renewing their basic services. Moreover, customers' role in service development was found out to be low (SCALE and DEVICE) or moderately low (FLOW) across cases. Based on the within-case analysis, Table 16 summarizes the key issues in developing basic services within the case companies.

Table 16. Summary of basic services development in the cases studied

Case	Context	Key issues in refining basic services portfolio	Illustration
SCALE	Periodic maintenance Repair services Spare parts Installations Startup services	<u>Role in total portfolio</u> : certain basic services were needed, although they were not a source of competitive advantage <u>Development focus</u> : maintain present services/service level <u>Customers' role</u> : involved through customer surveys, informal discussions, and customer pilots	<i>"There are suppliers that offer mechanical maintenance at a very cheap price. We cannot compete there. And we have acknowledged that okay; we won't stay to fight for that" (vice president, AF2, SCALE).</i>
DEVICE	Periodic maintenance Repair services Spare parts Installations	<u>Role in total portfolio</u> : wide range of basic services is a key competitive element <u>Development focus</u> : further service standardization; no need for radical changes <u>Customers' role</u> : involved through NPS, reclamations, and informal discussions	<i>"I see that we can increase our business (...) quite well with this present portfolio" (product group manager, BF4, DEVICE).</i>
FLOW	Packing Dispatching Warehousing Quality control In-site transportations	<u>Role in total portfolio</u> : ability to take over a wide range of logistics services in a central role <u>Development focus</u> : improving efficiency; extending contracts <u>Customers' role</u> : involved through periodically asked overall feedback, informal discussions, and joint development projects	<i>"Those are big things that a customer has decided to [give away] (...) and then, of course, expectations are high that we do it much better" (business manager, CF6, FLOW).</i>

NOTE: NPS = net promoter score

For the focal firm of SCALE, the basic services were an inevitable part of its service portfolio. Services, such as mechanical maintenance, spare parts, installations, start-up support, and training were regarded as essential elements of company's total portfolio. However, the basic services, especially mechanical maintenance and spare parts, were not seen as the main source of competitive advantage. According to the firm's representatives, there was a lot of low-cost competition in the basic maintenance, and customers could use other parts than the OEM spare parts. Consequently, the focal firm of SCALE had decided to focus on more advanced services as well as seek more comprehensive service contracts with customers to differentiate itself in competition (see, 4.1.1). Still, basic services were seen as an essential element that the firm, as an OEM, needed to have in its portfolio.

The focal firm of DEVICE had a comprehensive basic service portfolio that consisted mainly of product-related maintenance services for a wide product range. Within these services, the firm was focused on the demanding, high-quality services and did not want to engage in price competition in the low-end services. The service portfolio of the firm had remained unchanged in recent years, although some small extensions had been performed. The firm emphasized that there was no pressing need for radically renewing the current basic services. Instead of adding new or withdrawing obsolete services, the company focused on developing standardized service packages (see, 4.1.2).

The basic services of the focal firm in the case of FLOW consisted of a wide range of internal logistics services, such as reception of shipments, warehousing, transportation of materials and components to the production process, packing of finished products, and dispatching. The firm also provided workforce and was in charge of its management. Furthermore, the focal firm of FLOW was typically interested in taking over as many customer functions as possible, and the contracts with customers were gradually extended if the customer handed over more responsibilities. In basic services development, the focus of the firm was on improving the efficiency of the existing services.

4.2.2 Customer needs: Search for comprehensive understanding

In developing the basic services, customer needs were, to some extent, taken into consideration in all cases. However, customer contributions to portfolio development were rather scarce with relation to the rich and versatile knowledge that

customers were found to possess. In general, all focal firms had a relatively accurate overall conception of their customers' needs for the currently offered basic services. That is, their understanding of why customers purchase services and what are the main benefits achieved was not overly conflicting with the views of the participating customers. Nonetheless, interviews with customers offered a more elaborate and comprehensive picture of their needs than what the service providers expressed.

In all case companies, a vast majority of the interviewees on the focal firm side considered their understanding and utilization of customer needs somewhat incomplete. The interviewees noted that their understanding of the customer needs was not as good as it probably could be. For example, half of the interviewees from the focal firm of DEVICE explicitly noted that they do not have a full understanding of what their customers value. As an example, one interviewee pondered:

What is it really that the customer (...) is ready to pay for? (...) What is it that they want? Often, they are interested in many things but then in the end are not ready to pay for it (product group manager, AF4, DEVICE).

The same concern, not having a comprehensive picture of customer needs, was shared by a majority of the interviewees of the other two focal firms. Within the focal firm of FLOW, service development was not usually based on systematically gathered customer knowledge but more on the assumptions or occasional discussions with particular customers. The focal firm of SCALE, in contrast, had awoken to the fact that their understanding of customer needs had become obsolete over time. Consequently, the firm had invested time and effort in improving their customer understanding, for example, through a customer survey.

We have invested in understanding customers (...) those old thoughts and expectations about what customers want (...) they did not necessarily correspond to what is the current state (CFO, AF5, SCALE).

Nevertheless, the understanding of the customer needs was still regarded as inadequate by a majority of the focal firm interviewees in the case of SCALE.

All participating customers in the cases of DEVICE and FLOW provided both versatile and elaborate descriptions of why they purchase basic services and what kinds of benefits they look for. In the case of FLOW, customers were less focused on the basic services and less attention was paid to the issue.

First, a majority of the customers expressed a need for service-specific expertise that was sought by taking advantage of external service providers. This type of

expertise was mainly considered as non-core expertise that the customer companies neither possessed nor wanted to acquire by themselves. Therefore, it was justified to seek it from outside.

Without question, we start with that they [focal firm] have the expertise to the services and their development, we don't have that expertise and we don't keep it up (procurement director, CC5, FLOW).

Many customers also pointed out that service providers can have the kind of exclusive expertise that was not easily available from elsewhere.

We assume (...) that the suppliers know best about their own devices and device life-cycles (maintenance manager, BC6, DEVICE).

Furthermore, a few customers remarked that the focal firms offered access to some other services and/or products that they sought. For example, a service provider could offer services to similar equipment of other suppliers' devices or to some other type of equipment. In addition, trainings and technical support was discussed by a few customers.

Second, an overwhelming majority of customers expressed the need for not only services and service capabilities but also the qualities of the service providers. These included local presence and availability of resources, overall flexibility and adaptability to customer needs, references, and perceived price-quality ratio.

Experience and capability (...) definitely that it [service provider] can take up the flexibility challenge. The level of costs is of course important (...) Is it of uniform quality? (vice president, CC2, FLOW).

Moreover, the generic qualities for service providers that are not only related to basic services were highlighted by a majority of the interviewees. These generic qualities included, for example, a sufficiently big company size, financial standings of the service provider, and management of the health, safety, and environment (HSE) issues.

Third, variation in customer needs emerged as a focal issue. The interviews demonstrated that the needs of some participating customers varied over time and between different service/product groups. For example, some customers emphasized that they have different needs and criteria for different services offered by the focal firm. Consequently, if the delivered services were related to customers'

different functions or equipment, the customers specified their needs for the particular purposes or pointed out what is more critical and what is possibly less critical.

[Outgoing] parcels can still be on stand for a day, but if the incoming flow halts then it shows instantly (procurement director, CC5, FLOW).

Another example was the differing needs for reactive maintenance (i.e., repair) and periodic maintenance services. According to a few customers, the OEM expertise was highlighted in periodic maintenance, whereas in repair services, the response time was the most important criterion. Thus, these customers favored smaller, local service providers instead of OEMs. A particular customer also pointed out that they are much more dependent on the services of the focal firm when there is a newly installed product. However, the need for OEM support decreases as their own maintenance organization gets familiar with the particular product over time.

In the very beginning, we are totally depending on them. But then, of course, we have our own upkeep or maintenance organization (...) which learns that (...) Then the criticality decreases (manager, production development, AC5, SCALE).

In addition, a few customers stressed the possibility to procure additional services from the focal firms when needed, for example, when there were occasional needs for additional resources owing to a larger maintenance shutdown, a high volume of orders, or some temporary arrangement like a layout change in the factory.

4.2.3 Feedback: Inadequate methods to capture versatile remarks

In all three cases, a vast majority of the customers were discovered to possess explicit, versatile, and rich knowledge of how well the focal firms succeed in delivering the current basic services. Despite the evident potential, focal firms were found to gather and make use of customer feedback only to a limited extent. All focal firms received both positive and negative feedback from customers, but the feedback was not as extensive as what could have been possible. In fact, particular focal firm interviewees in each case even remarked that they usually get little feedback from customers. On the one hand, some customer feedback was received through everyday communication in the service delivery situations and various meetings with customers. On the other hand, more systematic ways to collect

feedback were utilized, such as a specific customer survey (SCALE), a net-promoter score (NPS) questionnaire (DEVICE), and asking and following numerical feedback in periodic meetings with customers (FLOW). Moreover, reclamations from customers were usually followed and handled as a particular form of feedback, although they are always negatively loaded.

Regardless of the applied feedback forms, the received feedback was disorganized and scant, and the focal firms' understanding of how well they succeed in delivering the basic services was relatively narrow. The focal firm of DEVICE asked feedback from customers on a regular basis through NPS questionnaires. NPS is a specific method based on asking how likely would a customer recommend the focal firm (Reichheld, 2003). However, the results provided by the questionnaire, or a separate reclamation system, were not sufficiently precise to really help the firm in improving its services, according to a clear majority of the interviewees.

[NPS-based feedback] gives quite little. If some criticism comes (...) let's say that repair services got a red card (...) it's an annoying thing but from where did it get that red card? What case? What went wrong (development manager, BF6, DEVICE)?

The focal firm of FLOW directly asked feedback from its customers in the periodic meetings held monthly or a few times a year. The feedback asked was in a numerical form and customers were asked to justify the provided grade, for example, why it has decreased since the last meeting. Despite the periodically gathered feedback, some focal firm interviewees specifically remarked that it only provided an overall picture of how satisfied the customers were and that much more comprehensive feedback was available through informal discussions with customers. The focal firm of SCALE, in contrast, had recently conducted a customer survey that produced some useful insights according to some respondents.

There were many, many things (...) quite critical feedback (...) there was response time, changes in response times (...), and then another was know-how. Apparently, there had been some little-more difficult cases and probably answers to those haven't been found out (R&D manager, AF1, SCALE).

Nevertheless, the feedback in the survey was neither gathered over time nor was it seen to provide a comprehensive picture of how well the company succeeded in the customers' eyes. Furthermore, one focal firm interviewee explicitly stressed that they do not know for sure how customers find their services at the moment.

In the cases of DEVICE and FLOW, many focal firm interviewees pointed out the importance of the informal feedback that is often received in various meetings and discussions with customer employees and managers. Such interactions took place either in the actual service delivery situation or through some other instances like sales negotiations. For example, the focal firms of DEVICE and especially FLOW pursued specific management-level meetings with key customers that would enable feedback-giving amongst other things. The individual remarks made by the customers in diverse informal situations were seen as extremely important by many focal firm interviewees.

Of course it would be good to get the feedback from products or services or from the related delivery processes or documentation (...) everybody should be aware of it (...) not only those lashings but also those praises (development manager, BF6, DEVICE).

However, it was also remarked by some interviewees in both focal firms that systematic documentation and knowledge sharing is a major challenge. Even though some front-line employees or sales managers may receive a lot of valuable feedback, its exploitation was described to be difficult as the firms lacked systematic methods of how to document and share knowledge.

A majority of the participating customers were able to provide rather extensive and versatile feedback of the present basic services when interviewed for the study, and all customers provided at least some feedback. However, the actual degree of how much feedback was given varied between cases. In the case of DEVICE, an extensive amount of feedback in the interviews dealt with basic services, whereas in the cases of SCALE and FLOW, customer feedback was not strongly focused on basic services. In all cases, the feedback covered a broad spectrum of issues including focal firms' operative performance, competences, responsiveness to customer needs, access to spare parts, service personnel's skills, and service reporting.

In comparison to the views of the focal firms, interviews with customers revealed both broader and more elaborate descriptions of the focal firms' services than what was the firms' current understanding. In all cases, a clear majority of the customers gave feedback regarding service outcomes like quality, delivery reliability, and reporting. Many customers were also able to evaluate the focal firm's performance from different angles, for example, by comparing focal firm's performance to that of the competitors or by discussing it from the viewpoint of price-quality ratio.

Response time is good and then, results are good (group manager, BC1, DEVICE).

It is quite expensive (...) [compared to] many others that we use, for example, in machine maintenance (...) the know-how is at a good level though (development director, AC3, SCALE).

Operative action is reliable (...) those tasks are taken care of, but surely they would be taken care of with many other actors too (production line manager, CC4, FLOW).

In addition, some customers made a distinction in the given feedback between different life-cycle stages and in the delivered services were product-related. Moreover, a few customers differentiated between various service/product groups of the focal firm. Thus, customers were able to provide feedback that was both versatile and based on complementary evaluation perspectives like comparing services with a focal firm's competitors' services.

In the cases of SCALE and DEVICE, the skills and expertise of individual service employees emerged as an important form of feedback that was not similarly pointed out on the focal firm side. A majority of customers in these cases stressed that the actual service performance depended on the particular service employees and their skills, for example, the service technician or warehouseman that was allocated for a particular task.

The first time he was over here (...) he didn't know how to work with a key device. We have to say, you have to do this, this, this. Okay, we had that discussion with them [focal firm] but the last time they send him again (...) that guy, it's [sighs] (production manager, AC4, SCALE).

In these two cases, customers give detailed feedback about not only the organizational level performance but also the performance of the individual service employees. In the case of FLOW, the issue was not as prominent, and feedback on the individual skills of the service employees emerged with only one customer.

4.2.4 Ideas: Few direct suggestions

The role of customers as a direct source of ideas for new basic services was low in all cases. Customers were neither found to be a substantial source of ideas nor were their roles significant in idea generation within the focal firms. In particular, direct proposals for novel services from customers were found to be rare, and the participating customers did not reveal any real suggestion for new services. The only

exception was an individual comment from a customer of FLOW, which considered a novel packing method to renew the focal firm's packing services.

[Current method] is not the most cost-efficient way to handle it (...) it needs to be developed together so that customer's need is fulfilled (...) but also so that it's faster and easier to do (vice president, CC2, FLOW).

In contrast, customers' indirect involvement in ideation was higher as ideas were occasionally based either on observations about potential customer needs or on cooperation with customers. Indirect customer contributions were especially typical in the case of FLOW, where a clear majority of the focal firm interviewees emphasized it as a main channel for getting ideas.

We don't have own [resources or expertise] from where we could draw ideas, or we could go to see fairs or would go to benchmarking competitors or like that. Much of them [ideas] do come through our customers (development director, CF5, FLOW).

The focal firm interviewees stressed that ideas often come through discussions and solving customers' problems, which can reveal latent customer needs.

Mainly it's problem solving. Problems occur and we go solving them and that can generate completely new business for us too (business manager, CF6, FLOW).

Some interviewees of the focal firm of FLOW also mentioned that sometimes they get direct suggestions for new services from customers. Nevertheless, one interviewee also remarked that much of the comments from customers relate to the existing services and how to develop them and that it does not help the company to know how to really renew the portfolio.

Within the focal firms of SCALE and DEVICE, the internal ideation of new services was more predominant. The focal firms were not actively looking for ways to update the basic services portfolio through completely new services either. Nevertheless, a few focal firm interviewees admitted that customers have a certain role in basic services development despite the strong in-house emphasis. For example, one interviewee from the focal firm of DEVICE stressed that service development was usually preceded by some sort of observations of customer needs.

Things are ideated, developed here (...) [however] there often are some kinds of observations about customers in the background. Ideas do not come into the world out

of thin air (...) could be that we ask something from the customers along the way [too] (R&D manager, AF1, SCALE).

Within the focal firm of DEVICE, a few interviewees also told that from time to time, customers bring up suggestions for new services in meetings. However, the role of these ideas in the portfolio development remained unclear, and the issue was not highlighted elsewhere in the data.

4.2.5 Co-development: Information exchange in main role

The findings of this study provided some examples of co-development between the focal firms and customers in all cases. Co-development took place through information exchange, customer participation in service delivery, customer pilots, and joint development projects. However, variation in the co-development forms between the cases was moderately high.

In all cases, the basic services covered by the study necessitated cooperation in the form of information exchange and participation by the customers in the service delivery stage. The exchanged information was related to the practicalities in service delivery, and it was not about giving feedback to the service provider, for example. The issue was strongly addressed in the cases of DEVICE and FLOW, where all interviewees addressed the issue to some extent. In contrast, in the case of SCALE, much less attention was paid to the matter, and only a few interviewees explicitly addressed the issue.

In the case of DEVICE, a need for overall orientation and instructions as a prerequisite for service delivery was highlighted by a majority of the interviewees of both the focal firm and customers. It covered issues, such as customer's site, safety, and contact persons.

Orientation for an outsider [e.g., focal firm service technician] is always organized (...) it deals with our safety instructions (...) it is about our hazardous gases (...) moving on the site (...) basics like these (maintenance manager, BC6, DEVICE).

The same applied to the information about the devices, machines, or systems under maintenance. For example, providing relevant technical details (serial number, product type, etc.) and maintenance history was pointed out as a prerequisite for service success by some interviewees. Furthermore, scheduling maintenance actions was usually dependent on customers and required information exchange between

the focal firm and customers. In general, neither the case companies nor the customers highlighted information exchange as a major challenge. According to a few interviewees, however, problems in keeping the schedules and informing the focal firm had occasionally caused resentment on both sides.

In the case of FLOW, the situation was different because the focal firm's services were not related to particular equipment and focal firm employees constantly worked in close interaction with customers. An issue that several interviewees indicated was forecasts for customer's production volumes for both short and long terms. When customers provided the information in time (i.e., in advance), it helped the focal firm to adapt its resources and optimize service delivery.

It often is a win-win situation for both of us. They get services cheaper because we can adapt our personnel, systems and materials accordingly (development manager, CF3, FLOW).

The challenge pointed out by some interviewees was that even the customer did not always know how their volumes change or the forecasts were not extremely accurate.

Within the cases studied, customer participation in service delivery took the forms of joint planning between the focal firm and customers; preparatory work, supervision and inspections; and providing tools, materials, resources, and infrastructure to focal firms.

In the installation stage, we go through them [delivered goods]. Then, of course, are installation meetings, where we look after the delivery progress (...) we make installation inspections and a start-up inspection at the initialization, and after that are pre-runs and warranty runs (maintenance manager, BC3, DEVICE).

All services covered by the study seemed to require some actions from the customers. Nevertheless, customer participation in service delivery was especially prominent in the case of DEVICE, where an overwhelming majority of the interviewees somehow highlighted the issues.

Despite the integral role of information exchange and customer participation in service delivery, it was neither acknowledged as a key issue from the portfolio development perspective nor as a central target for improvements by the focal firm interviewees. There were also examples of cooperation among the cases studied that were particularly aimed at developing services together, that is, piloting new services with customers and developing methods and tools together. Moreover, customer

pilots were not a standard way of working for any of the focal firms, but there was an increasing interest in them by the focal firms.

In the case of SCALE, some focal firm interviewees explained that the firm had identified a need to involve customers more strongly in service development than what had been done in the past. For example, SCALE had asked feedback from some of their key customers on how to productize services.

When these services have now been productized, they have been looked through with certain key customers (...) and then the feedback what we got, we have tried to take [it] into account (CFO, AF5, SCALE).

The focal firm of SCALE had also engaged in customer pilots and allowed some customers to try out the services that were under development. As another example, the focal firm had developed a mobile application that had been tested by a few customers. According to focal firm interviewees, the results of these trials had been encouraging, and the firm had decided to pursue customer piloting as it was regarded as a potential way to promote service development.

In the similar vein, the focal firm interviewees of DEVICE acknowledged that customers' role in service development had been rather low, and some interviewees argued that they need to increase customer involvement through customer piloting by allowing them to test and give feedback during the service development stage. Some services offered by the focal firm, for example, life-cycle auditing services, had already been developed in a more co-operative manner. In contrast, with some other services, the degree of co-development had been low, and an increase in customer involvement was considered as more necessary.

Co-development in the case of FLOW was more focused on process development and consultancy services (see, 4.5.1). Nevertheless, a few examples were provided that were related to the co-development of the current basic services. For example, the focal firm had developed a packing line together with one of the participating customers.

They had developed in cooperation with us a sort of packing line by which the boxes were assembled (...) it was our property, [and] that moved to them (...) so then they could start to make boxes also for others (production technology manager, CC5, FLOW).

Later, the ownership of the line was shifted to the focal firm, and it became integrated into the focal firm's service portfolio.

4.2.6 Innovation: Customers not inventing on their own

The final CI form was about customers taking the role as innovators. The explored cases did not provide any examples wherein the focal firms had delegated the role of innovator to the customers. The participants had not considered customer innovation as an alternative to firm-centric innovation and did not emphasize it as a feasible strategy at this point. The same applied to the other three offering development modes discussed in the following sub-chapters. Therefore, the customer involvement form “customers as innovators” is not elaborated in more detail in the remaining empirical part of this study.

4.2.7 Summary: Refining basic services portfolio

In summary, the findings demonstrated that customers possess significant amount of explicit and rich knowledge that could be of importance to industrial firms in renewing the basic services portfolio. An overview of the empirical findings is presented in Table 17.

Table 17. Findings summary: Refining basic services portfolio

Customer involvement form	Value of customer-provided knowledge	Degree of customer involvement	Justification	Examples of addressed issues
Communicating customer needs	High	Medium	<u>Knowledge:</u> explicitly communicated needs, rich and elaborate knowledge, and moderate novelty <u>Degree:</u> utilized but understanding incomplete	<i>E.g., specific service expertise, OEM knowledge, service provider qualities, and variation in customer needs</i>
Giving feedback	High	Low	<u>Knowledge:</u> explicit, rich feedback, and complementary perspectives <u>Degree:</u> low received/gathered feedback and inadequate methods	<i>E.g., operative performance, competences, skills of individual service employees, comparison with competitors, and price-quality ratio</i>
Providing ideas	Low	Low	<u>Knowledge:</u> few, individual ideas <u>Degree:</u> indirect utilization	<i>E.g., in-house ideation vs. ideas through cooperation with customers</i>
Co-developing services	Medium	Low	<u>Knowledge:</u> promising contributions in piloting and low novelty in service delivery <u>Degree:</u> use infrequent despite some experimentations	<i>E.g., information exchange, customer participation in service delivery, piloting, and joint development projects</i>

The participating customers were generally well-aware of their needs, and they were able to elaborate them accurately. Customers were also able to provide versatile feedback from basic services using complementary perspectives. For example, customers compared the service performance of the focal firms with competitors’ services. Furthermore, the study showed that despite gathering some feedback from customers, focal firms’ knowledge of customer needs and how well they succeed in customers’ eyes was imperfect within basic services. Customers’ role in ideating novel basic services was found to be small, even though customer needs, whether known or expected, were taken into account to some extent. Co-development of services was not a standard way among the focal firms. However, it was generally regarded as a potential avenue for future portfolio development, for example, through piloting and joint development projects with customers.

Finally, Figure 13 provides an additional illustration of the addressed customer involvement forms by combining the two analysis dimensions “value of customer-provided knowledge” and “degree of customer involvement” in a two-dimensional matrix that was introduced in the methodology chapter (see, Figure 9).

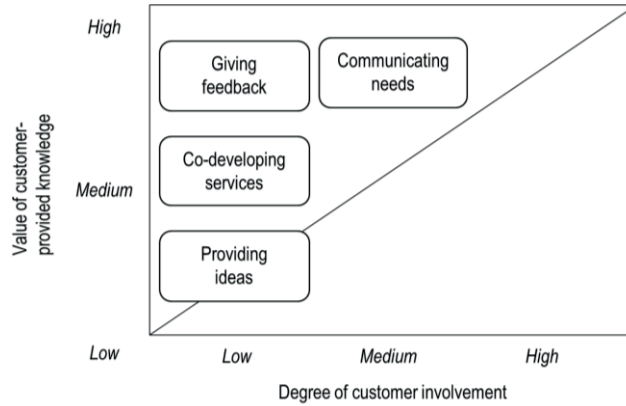


Figure 13. Customer involvement forms in refining basic services portfolio

4.3 Promoting customer service elements

4.3.1 Focus and key issues within cases: Customer service elements

Developing customer service elements was not a main priority for any of the focal firms that participated in the study. The role of the customer service elements and customer service in general was low (DEVICE) or moderate (SCALE and FLOW) in the focal firm service portfolios. Moreover, the role of customers in developing customer service elements was found to be low in all cases. Customers mainly provided knowledge in the form of feedback and customer needs. However, the collection of customer knowledge was occasional and scant, and it was not systematically applied by the focal firms in developing the customer service elements. Based on the within-case analysis, Table 18 summarizes the key issues in developing customer service elements within the cases studied.

Table 18. Summary of promoting customer service elements in the cases studied

Case	Context	Key issues in developing customer service elements	Illustration
SCALE	Periodic maintenance	<u>Role in total portfolio:</u> becoming more central in creating competitive advantage	<i>"[Customer experience] is one important sector, a part of all that we do, and with that [we] can create competitive advantage" (R&D manager, AF1, SCALE).</i>
	Repair services	<u>Development focus:</u> advancing customer experience and improving feedback gathering	
	Help desk service	<u>Customers' role:</u> involved through customer surveys and random discussions/feedback	
	Projects		
	Non-transactional meetings		
DEVICE	Periodic maintenance	<u>Role in total portfolio:</u> support product selling through local services; customer service elements are not in focus	<i>"When you have good service, close to the customer, and talk in the same language, it helps in selling our new products substantially" (sales manager, BF2, DEVICE).</i>
	Repair services	<u>Development focus:</u> foster existing relationships and mutual acquaintance with customers	
	Installations	<u>Customers' role:</u> involved through NPS, reclamations, and random discussions/feedback	
	Consultative selling		
FLOW	Service delivery	<u>Role in total portfolio:</u> customer service is continuous and daily but not a primary development objective	<i>"We would like that a customer gives it [feedback] to us as clearly and precisely as possible (...) plus that we ask the customer satisfaction monthly" (development director, CF5, FLOW).</i>
	Managing service units	<u>Development focus:</u> improving overall service attitude	
	Management meetings	<u>Customers' role:</u> involved through periodically asked overall feedback and informal discussions on different organizational levels	
	Customer satisfaction		
	measurement		

In the case of SCALE, customer service took place at regular intervals in relation to periodic maintenance or more sporadically when customers needed technical support or repair services. In many situations, help desk service was involved as a central element in customer service. Customer service was also related to the acquisitions and modernizations of the machinery and systems. In addition, it covered non-transactional meetings between the focal firm and customers. When there was an on-going project (i.e., acquisition or modernization), keeping contact with customers was dense. Otherwise, customer service usually took place a few times a year, although the variation was rather high between the customers. Although the focal firm of SCALE had not been particularly focused on customer service elements in the past, it had lately awoken to the growing importance of customer service. For example, it had launched initiatives on improving customer experience wherein customer service elements had a somewhat central role.

The focal firm of DEVICE also delivered periodic maintenance services to customers on a regular basis because the appliances and systems it produced required regular maintenance. More sporadically, the firm also provided repair services to the installed base. In both instances, services were usually delivered on the customer's

site by the service technicians of the focal firm. Moreover, acquisition of the new appliances as well as modernization of the installed base included customer service in both design and installation of the equipment. Similar to SCALE, the focal firm of DEVICE was not in continuous contact with customers, although there was a variation in how often customers were contacted. In general, customer service was mainly premised on the basis of long-term customer relationships and mutual acquaintance between the focal firm and its customers. However, developing customer service elements had not been a priority because the focal firm had traditionally preferred technical features and product selling.

The role of customer service was different in the case of FLOW. The focal firm of FLOW was in continuous contact with customers, and customer service was continuous and daily. Supervisors and unit managers of the focal firm usually participated in customers' weekly meetings and employees were constantly in contact with the customers' employees. In addition, the focal firm organized management-level meetings with customers monthly or at least a few times a year. There were also on-going development projects with customers that required cooperation at varying intervals. In consequence, the focal firm emphasized the importance of clear and well-functioning contacts, regular meetings, and asking feedback from customers to be customer-oriented. Nevertheless, developing customer service elements of particular services was not strongly addressed by the focal firm.

4.3.2 Customer needs: Cooperation and contact persons in a vital role

Customer service elements were somewhat important to all customers. The participating customers not only sought core service attributes but also stressed the importance of how the services of the focal firms were delivered in the customer service sense. A majority of the participating customers communicated explicit needs for customer service elements. For example, qualities of good customer service, levels of cooperation, contact persons, and frequency of meetings were emphasized. This was in contrast with the focal firm interviewees, who recognized the role of customer service elements but were not particularly focused on them in developing their service portfolio. Moreover, none of the focal firms had specifically looked into customer needs for customer service elements or systematically focused on developing the customer service side of the service portfolio.

Although the actual core service activities would have been well-performed by the focal firms, it did not guarantee customer satisfaction if problems occurred in

the customer service elements. Consequently, focal firms needed to ensure that both dimensions were adequately addressed to fulfill the needs of the participating customers. As an example, a customer in the case of SCALE highlighted that it is not sufficient that a service provider has technological competences only.

Those companies which have good products and flexibility of the services are good. So yes, procurements have been centered there (...) it is not enough that technological expertise is good (development director, AC3, SCALE).

Some customers even remarked that in addition to possible problems in the actual service delivery, problems in customer service could be a reason to change the supplier.

If I have an irritating guy sitting opposite me, then yes, my threshold [to change the service provider] drops considerably (procurement director, CC5, FLOW).

The focal firms, in contrast, did not highlight customer service issues as strongly as the customers. In all cases, the focal firms did underline the importance of good cooperation and contacts with customers. However, customer service elements were in a lesser role, and the focal firms' focus was more strongly on the core service attributes.

Cooperation and contacts emerged as the two main categories that all focal firms and a vast majority of customers highlighted when customer service needs were discussed. Cooperation covered a range of issues that concerned the qualities of good customer service, customer service at different organizational levels, and mutual familiarity between the parties. Qualities of good customer service included both day-to-day cooperation as well as more long-term relationship management to build conditions for future cooperation. Common to all cases, both customers and focal firms offered some descriptions about what they thought was good or bad customer service. For example, one participant described an ideal customer service as follows:

I'm not publicly mocked that "stupid, you don't know what you're doing" (...) [it is] professional, teaching (...) social, and guiding, friendly, get informed if it takes longer (product manager, AF4, SCALE).

Qualities, such as friendly service, reachability, honesty (e.g., “telling bad news”), keeping the customer informed, not hiding behind technical terms, and local service in the native language were typically pointed out by a majority of the interviewees.

In addition to customer service that took place when services were delivered, relationship-management-related customer service was pointed out by a majority of the participating customers. For example, a wish to engage in a dialogue with external service providers outside the actual service purchasing and delivery was mentioned by some customers.

I like some of our suppliers that come to us yearly. They always call at some point about whether they can come to visit (...) we go through where we are going and then they tell that they have introduced these and these products (development manager, AC6, SCALE).

Cooperation at the management-level emerged as an important element in customer service, particularly in the case of FLOW. The focal firm of FLOW tried to enhance cooperation with its customers through regular meetings at the management-level. Half of the participating customers found this type of cooperation quite beneficial as it promoted open communication and relationship building.

With us, it's good to work so that the relationship is built. So we can fearlessly and openly discuss the different matters that come our way (vice president, CC2, FLOW).

In contrast, with the other half of the participating customers, there was much less management-level cooperation. With these customers, the entire relationship was more transaction-oriented, and the customers did not stress a strong need for management-level cooperation either.

Along the same line, the importance of contacts, and especially the contact persons, was common to all cases. A majority of the participating customers addressed the clarity of the contacts on the focal firm side as well as the reachability of the contact persons. However, the most prominent matters in this regard varied between the cases. In the case of DEVICE, a notable issue was the organizing of the customer interface. On both customer and focal firm sides, a majority of the interviewees emphasized the large company size of the focal firm and the importance of knowing the right contact persons.

We have one person, a contact person [from the focal firm] that we can get in touch whenever we need, and she/he then goes to fix up and search for the right people (maintenance manager, BC3, DEVICE).

However, if one did not know whom to contact, the situation was much more difficult. Consequently, some interviewees of the focal firm particularly stressed that they build long relationships with customers and that it is crucial to know customers well and vice versa.

In the case of SCALE, the issue of contacting centered, on the one hand, on the intervals of the meetings and on the other hand, on help desk service, which was the main contact channel for technical help. Regarding the frequency of the contacting customers, mixed results were obtained. Around half of the participating customers told that the frequency of the meetings was not an issue. That is, they met when it was necessary and there was no need for any additional meetings.

For me, everything is OK. I don't need more [communication] at this moment. Because when I call, they will answer. When we need to have a meeting, we have a meeting (process planning manager, AC2, SCALE).

In contrast, the other half of the participating customers expressed a need for a more proactive approach from the focal firm, including meetings, which enable relationship building, exchanging ideas, and getting to know what the focal firm could offer in future.

The role of help desk service was another contact channel between the focal firm of SCALE and the customers. In general, the focal firm interviewees saw the role of the help desk service as central in customer service. The interviewees especially highlighted that both technical assistance and customer service are equally important.

It [technical know-how] needs to be really good. And then of course the customer service expertise, that [a service employee] can handle that part as well (development manager, AF1, SCALE).

However, the role of the help desk service was mainly limited to emergencies; thus, it only formed a small part of the contacts as customers infrequently called the help desk. Consequently, none of the customers stressed the role of the help desk in the overall customer service, even though the actual service was regarded as essential. Moreover, some customers preferred direct contacts to help desks even when they needed technical assistance.

Contact between the focal firm and customers typically took place at different organizational levels in the case of FLOW. Focal firm unit managers, supervisors, and employees were all in contact with their counterparts on the customer side. Also, contacts in the upper management level were rather dense with half of the participating customers.

It is both about our production management and their management, and then myself and interlocutors, and then again our department managers and their corresponding level, and then supervisors and their equivalent level, the cooperation takes place on every level (procurement director, CC5, FLOW).

A majority of the interviewees on both sides stressed that it is necessary to have good relationships at different levels and that the roles are sufficiently clear to promote good cooperation. A few interviewees also noted that it is important that the key person gets along well as customer relationships are based on personal matters.

In addition to cooperation and contact-related issues, some customers emphasized the overall service attitude and customer service in practice.

Customer service basics (...) service inclination and floor level, how to talk to customers and all (...) it's one such requirement, and it has also been emphasized (vice president, CC3, FLOW).

This was especially highlighted by the customers of FLOW. A majority of the customers not only required the focal firm to manage the agreed service activities but also demanded the feeling of getting good service, that things are running smoothly, and that they are working together for the same goal.

The one who gives away that operation seeks easiness there, and yes, the operator should make the customer, in this case us, to feel that we also got it (production technology manager, CC6, FLOW).

That is, customers wanted to feel that when an external service provider is selected to perform some activities or functions, it burdens them less than before.

4.3.3 Feedback: Plentiful but mixed

Different customer service elements gave rise to a considerable amount of highly rich and versatile feedback. Based on their experiences, the participating customers gave a lot of feedback from various customer service elements during the interviews, and all customers had at least some comments or remarks to share. In contrast, the issues were not intensely addressed by the focal firms. In general, the service providers were not aware of how well they succeeded in customer service elements, and they were not actively gathering feedback from them either. The focal firm of SCALE had some customer-survey-based feedback at their disposal, DEVICE gathered feedback particularly through NPS questionnaires, and FLOW asked and followed generic feedback at a regular basis. Nevertheless, none of the focal firms especially focused on customer service matters when gathering feedback. The findings also demonstrated that customers provide both positive and negative feedback on customer service and that this feedback can sometimes be rather controversial.

In line with the previous sub-chapter, cooperation and contacts emerged as the two main themes in terms of feedback from customer service elements. In addition, customer service in the tender and purchasing stage emerged as a category of its own. Cooperation covered issues, such as feedback from day-to-day collaboration, cooperation on both employee and management levels, and communication between the parties. In general, all case companies received quite positive feedback from the majority of the customers in terms of cooperation.

That [cooperation] is working good (...) [for example] after a meeting we have a conclusion from them (...) these are the points that we have discussed. This communication itself is really, really good (production manager, AC4, SCALE).

We have been working [with the persons in charge] for a long time, so the contact interface is quite easy (...) most of the staff is there nearby (...) they do know each other (group manager, BC1, DEVICE).

The cooperation arrangement is outstandingly good in my opinion, and they clearly invest in [cooperation] too. Even their CEO is participating every now and then (...) the dialogical connection is excellent (procurement director, CC5, FLOW).

Different key issues were emphasized in the cases studied. For example, a majority of the customers highlighted the operative communication with the focal firm of

SCALE as easy and working well; long-term customer relationships and mutual acquaintance with the focal firm were stressed by several customers in the case of DEVICE; and the regular meeting practices were complimented by all customers of the focal firm of FLOW.

However, a clear majority of the customers also gave negative feedback regarding some customer service elements. Customers made critical remarks about particular issues and incidents that they had faced. In the case of SCALE, these included lack of keeping the customer informed, language and cultural difficulties in working with a foreign company, complacency among employees, and availability of customer support on weekends. Customers of DEVICE made some critical remarks about the wrong customer service attitudes of some newly employed service technicians, informing the customers in advance when schedules change, and that invoices were running late. For example, when customers were not adequately informed about changes in service schedule, it provoked critical remarks.

Surprisingly many [maintenance operations] had to be shifted anyway. It doesn't bother when it comes to our knowledge enough in advance, but even this time it wasn't informed (maintenance manager, BC2, DEVICE).

The focal firm of FLOW received negative feedback from the lack of professionalism of some managers and from the lack of good customer service attitude. A particular issue that had resulted in negative feedback was the customer service attitude of the focal firm employees who had previously worked for the customer company. As the focal firm of FLOW had taken over some internal logistics functions, they had also taken over the former customer employees of the functions. According to some participating customers, this has caused resentment and resulted in problems in customer service.

They have made it work, the question is not about that (...) [we] haven't achieved the goal that this would have become a fluent partnership like that (...) although the guys there should be in the service provider's employ, they tend to struggle against us (production technology manager, CC6, FLOW).

The participating customers said they understand that some resentment can take place. However, they felt that the situation had continued too long and that the focal firm had not adequately solved the issue.

Contacts emerged as the other main theme in giving feedback in the context of customer service elements. Reachability of the contact persons and clarity of the

customer interface (i.e., who to contact in which situation) were issues that produced a lot of feedback across cases. In the cases of SCALE and DEVICE, the feedback from the contact persons was mixed. Around half of the participating customers stressed that focal firms' customer interface was obscure or too splintered. Within DEVICE, the issue was especially related to the size of the organization and its wide service portfolio.

As their organization is that large, you don't know (...) who handles what. There have been problems (maintenance manager, BC2, DEVICE).

In the case of SCALE, some customers criticized the focal firm's splintered contacts and mentioned that they need to contact several departments of the focal firm to deal with some issues. The focal firm of SCALE also went through organizational changes that influenced the customer interface, causing a lot of confusion for some participating customers.

That [organizational change] has caused quite a lot of confusion (...) we didn't know who sells what (...) [and because of that] we bought from the competitors (development manager, AC6, SCALE).

Moreover, the issue of high employee turnover was brought up in the case of DEVICE. Consequently, some customers remarked that changes in the contact persons had caused problems in customer service. However, customers mainly criticized the lack of keeping them informed as it was understandable that organizational changes take place and people change jobs.

Both SCALE and DEVICE received positive feedback from contacts and reachability from the other half of the participating customers.

Not only with the manager, I [also] have a contact with Sales Director (...) I have a contact with many different suppliers and I think they are one of the best [in terms of contacts and reachability] (process planning manager, AC2, SCALE).

According to these customers, contacts were at least sufficiently clear or even at a good level, thus demonstrating that focal firms can get rather mixed feedback and that customer experiences from customer service can vary considerably between customers.

In the case of FLOW, the feedback from the contacting and contact persons was mainly positive. A majority of the customers emphasized that they have many

contacts within the focal firm at different organizational levels. Moreover, the role of individual contact persons was highlighted by some customers in getting good customer service and knowing the customer needs. Nevertheless, there were also variations in how well the focal firm succeeded in keeping contact at the upper management level. Half of the customers said that they are very satisfied with the more strategic cooperation at the management-level.

I'm satisfied with the communication [between their management] and with the attitude of the persons I work with and their willingness to serve and understand [our needs] (vice president, CC2, FLOW).

However, the focal firm of FLOW was lacking this kind of contacts with other participating customers.

Furthermore, the personification of contacts was a matter that was highlighted in all cases to some extent. Within the cases of SCALE and DEVICE, some customers pointed out that they know their contact persons very well and are used to doing business with them successfully.

I always call that one same person who is not necessarily responsible for maintenance in any way. But, on the other hand, that too is flexibility from them that the one same guy takes care of that matter as well (manager, production development, AC5, SCALE).

These customers emphasized that when they have the right contacts, it is easy to contact the focal firm, and their contact can help them with whatever matters they have. In contrast, the personification was occasionally found to be a disadvantage. A few customers said that they could be too dependent on the individual contact persons.

It has personified quite a lot (...) there's our contact person (...) and it has been very good cooperation (...) [but with others] we haven't got a contact like that (development manager, AC6, SCALE).

At worst, the participating customers expressed that they do not get good enough customer service from others or they were afraid that if the contact person leaves the focal company, she or he cannot even be replaced.

Finally, customer service in the tender and purchasing stage emerged as a theme, which a majority of the customers commented on besides the service delivery stage. A majority of the customers in the case of SCALE found the tender stage thoroughly

managed and documented by the focal firm, even though some of the interviewees also raised critical voices. Depending on the viewpoint of the interviewee, the tender stage was either professionally managed and documented or too rigid and bureaucratic in comparison with some more agile competitors. The focal firm of DEVICE received a feedback that buying from them is generally easy and matches the expectations of the customers, and only one negative experience came up in the interviews. In the case of FLOW, the tender stage and buying services from FLOW were not addressed by the customer companies at length. Possibly, this was because the focal firms and customers typically made longer and more comprehensive contracts and customers usually did not purchase any additional services during the contract period.

4.3.4 Ideas: Lack of customers in ideation

Neither did the participating customers provide ideas for new customer service elements nor did the focal firms report that they received ideas for new or significantly improved customer service elements from the customers. Nevertheless, as shown in the previous two sections, customers communicated their needs for and were able to provide versatile feedback from the customer service elements. Consequently, the focal firms could indirectly utilize ideas from customers. For example, positive feedback from contacting practices with a particular customer could initiate broader benchmarking. Or, feedback from obscure contact persons could lead to improvements and re-organization of the customer interface.

4.3.5 Co-development: Promoting and inhibiting customer service

Co-development of customer service elements was not a major issue in the cases of SCALE, DEVICE, and FLOW. Nonetheless, the cases studied indicated that customers could, to some extent, influence and have a co-developing role in promoting customer service elements. Two distinct issues emerged. On the one hand, the environment where the service delivery took place had an influence on the customer service elements. On the other hand, a trust relationship between the parties promoted customer service. In both situations, customer service was at least partly dependent on the customers and their behavior.

In the case of FLOW, customers had an effect on the prerequisites of good customer service. The focal firm employees worked in close cooperation with

customer employees and mainly at the premises of the customers. For example, one of the participating customers indicated that it is also their responsibility to offer a pleasant and well-functioning environment, which enables good customer service in the first place.

We should be able, as well as possible, to estimate or to forecast the [work] load (...) and then [inform] about all kinds of changes (...) perhaps also that the interface, the cooperation, is somehow pleasant or nice even though there are people from different companies (production line manager, CC4, FLOW).

Another customer acknowledged that their own work is organized in a way that not always helps service providers to offer good customer service, for example, by unnecessarily burdening the contact persons.

At worst, maybe fifteen assistants from our sales (...) get in touch, ask the status of their own product of which they are concerned for the moment [*laugh*] (...) so yes, I'd be frustrated for sure [in their position] (production technology manager, CC6, FLOW).

Consequently, their own way of working was hindering rather than promoting possibilities for good customer service.

A trust relationship between the focal firms and customers was also seen to promote good customer service by a few participating customers. When there was mutual trust between the parties, it facilitated cooperation and made it easier to handle, for instance, deviations or changes in service delivery.

If such [a situation] occurs that we have to change [e.g., schedules], customers do take that quite understandingly. If we suggest a change in the schedule, customer considers it and do not go to check first what was printed [in the contract] in small letters (service manager, BF5, DEVICE).

Thus, customers had an influence on the customer service development through the way they cooperated with the focal firm. If not directly participating in the actual development, customers at least indirectly promoted or inhibited the conditions of customer service development.

4.3.6 Summary: Promoting customer service elements

In summary, the findings demonstrated that in addition to the core service attributes, customer service elements were of importance to the participating customers. Customer service elements were also an issue that was more strongly addressed by the customers than the focal firms. First, customers were found to elaborate their needs accurately and at length. Second, customers were able to provide explicit, rich, and versatile feedback from the customer service elements. The degree of customer involvement, however, was found to be low, and customers did not provide ideas for renewing customer service elements. Finally, the co-development of the customer service elements was generally scarce. However, customers influenced the preconditions of good customer service, for example, through setting the environment where customer service took place. An overview of the findings is presented in Table 19.

Table 19. Findings summary: Promoting customer service

Customer involvement form	Value of customer-provided knowledge	Degree of customer involvement	Justification	Examples of addressed issues
Communicating customer needs	High	Low	<u>Knowledge</u> : explicitly communicated needs and importance to customers <u>Degree</u> : customer service needs are not strongly addressed by the focal firms	<i>E.g., cooperation quality and levels, contact persons, meeting intervals, and service attitude</i>
Giving feedback	High	Low	<u>Knowledge</u> : explicit, rich, and mixed feedback is available <u>Degree</u> : received/gathered feedback is scant	<i>E.g., cooperation, contacts, and buying/tender stage</i>
Providing ideas	Low	Low	<u>Knowledge</u> : lack of customer-initiated ideas <u>Degree</u> : non-existent	<i>Only indirect development ideas emerged</i>
Co-developing services	Medium	Low	<u>Knowledge</u> : customers influenced the customer service environment <u>Degree</u> : promotes or inhibits portfolio development	<i>E.g., environment offered by customers and quality of relationship between the parties</i>

In addition, Figure 14 illustrates the customer involvement forms in relation to the two analysis dimensions “value of customer-provided knowledge” and “degree of customer involvement.”

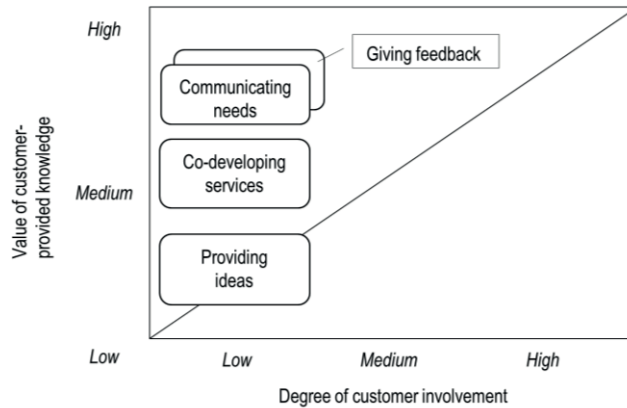


Figure 14. Customer involvement forms in promoting customer service elements

4.4 Developing more complete offerings

4.4.1 Focus and key issues within cases: more complete offerings

Developing services toward more complete offerings was either highly (DEVICE and FLOW) or moderately (SCALE) important to all focal firms that participated in the study. The focal firms, however, placed emphasis on the different aspects of how services can be packaged or combined to form more complete entities. The focal firm of SCALE especially highlighted an increase in the contract-based service business. Within DEVICE, in contrast, the focal firm was particularly focused on promoting productization of services and service packages. Moreover, the focal firm of FLOW sought growth from extending its current contracts by taking over new responsibilities. Based on the within-case analysis, Table 20 summarizes the key issues in developing more complete offerings within the cases studied.

Table 20. Summary of developing more complete offerings in the cases studied

Case	Context	Key issues in developing more complete offerings	Illustration
SCALE	Service contracts	<u>Role in total portfolio</u> : strategic importance of service portfolio becoming more central	<i>"The direction certainly is that the service portfolio needs to be developed. If we stay in these current services, that's where the competition increases" (R&D manager, AF1, SCALE).</i>
	Service packages	<u>Development focus</u> : increasing the number of service contracts; combining services to standard packages	
	Standardization		
	Partnerships	<u>Customers' role</u> : customers set boundaries; key customer(s) actively engaging in service development	
DEVICE	Service contracts	<u>Role in total portfolio</u> : comprehensive service portfolio, local service organizations, and standard services a key competitive strategy	<i>"And then this contract side (...) this productization and commercialization. I see that we still have quite a lot of potential there" (product group manager, BF4, DEVICE).</i>
	Service packages	<u>Development focus</u> : further standardization of services; promoting contract-based service business	
	Standardization		
	Third parties	<u>Customers' role</u> : customers set boundaries; a need identified to improve customer understanding regarding service contracts	
FLOW	Service contracts	<u>Role in total portfolio</u> : extensive service contracts as a key element in the company strategy	<i>"I cannot say that all customerships can grow but most of them can. And that's really the easiest way to grow" (key account manager, CF2, FLOW).</i>
	Service extensions	<u>Development focus</u> : extending current service contracts; enhancing portfolio with new service	
	Third parties	<u>Customers' role</u> : customers set boundaries; key customer(s) are active in influencing the portfolio	

The focal firm of SCALE stressed the importance of the wide-ranging service portfolio and that in developing services, it is important to focus on service portfolio as a whole. The focal firm wanted to shift toward more comprehensive and longer-term contracts with customers. In other words, it wanted to move away from individually sold services and hour-based invoicing toward more inclusive contracts that were expected to save time and effort as well as add value to customers. The services supplied by the focal firm of SCALE were regarded as rather customized, and combining services to standard, productized packages was seen as a potential way to develop more complete offerings. Currently, the focal firm had service contracts with a limited number of customers, and it offered some service packages. However, the firm was looking for a significant increase in both.

Within the case of DEVICE, the focal firm had a wide product-service portfolio that provided a basis for customer-specific selection of particular services and products. Offering services as standard packages had been a firm policy, and the majority of the services were sold as productized. Standard pricing was also applied to many of the services. Still, the focal firm thought that there are possibilities in further developing service standardization. A contract-based service business was a strategic goal for the firm. The focal firm of DEVICE wanted to move from the

simple maintenance contracts (i.e., framework agreements at maintenance prices) toward more inclusive, fixed-priced service contracts. Furthermore, the use of subcontractors was an issue typical of the case. The focal firm of DEVICE complemented its portfolio by combining it with third party services, for example, additional installation resources were often combined with its own work force.

The focal firm of FLOW pursued comprehensive contracts with its current customers. The firm wanted to take over as many internal logistics processes as possible and even the overall responsibility of all the internal logistics functions of customers. The customers usually did not want to outsource all functions at once. Therefore, it was typical of the focal firm that it extended its contracts over time. The firm had an extensive service portfolio that covered various internal logistics services as well as additional, non-core services including manufacturing, building maintenance, and cleaning services. The focal firms of FLOW was also interested in adding new services to its portfolio in the context of internal logistics, such as consulting on logistics processes or systems. However, the focal firm had a pragmatic approach to service extensions because it also considered novel, non-core services as long as they added value to customers and remained in a relatively minor role.

4.4.2 Customer needs: Contracts, centralization of purchasing, and partnerships

In the cases studied, more complete offerings included, for example, bundling of individual services, standardization of service packages, and combining of services with products. All focal firms in the study had also considered the possibilities of taking over some customer functions either partly or entirely, although only the focal firm of FLOW currently took over customers' activities or entire functions in the form of outsourcing. All the participating focal firms and a majority of the participating customers emphasized a generic need for complete offerings instead of individual services. The findings demonstrated that even though the development of more complete offerings was not centered on customer needs, customers were somewhat involved in setting the boundaries of how extensive services the focal firms could offer. In addition, the role of certain key customers was found to be significant in urging the focal firms toward closer partnerships in all cases studied.

All interviewees of the focal firms emphasized the importance of developing more complete offerings and that customers are increasingly looking for entities instead of individual services.

The world is constantly going in the direction that one would rather buy outcomes (...) and that way (...) the biggest growth is specifically on the service business side (CFO, SCALE, AF5).

Similarly, a vast majority of the focal firm interviewees of DEVICE and FLOW emphasized that customers are increasingly interested in purchasing bigger entities, such as more extensive service packages or outsourcing functions to external service providers. This was in line with a majority of the customer interviewees across cases, in which the participating customers generally emphasized comprehensive offerings, turnkey deliveries, and taking an overall responsibility over individual services.

It is always an asset if one can offer entities (development manager, AC6, SCALE).

All those costs need to be included in the price [of the contract] (...) so we then know the whole price (group manager, BC1, DEVICE).

All [service] providers were not ready to go to such a total package at all (...) it would be good for us if it [service package] is by the same supplier (vice president, CC3, FLOW).

However, the focal firms offered different service combinations to match the needs of their customers. The focal firm of SCALE sought to combine its products with extensive service packages that included, for example, periodic maintenance, spare parts, and help desk services with remote access in the form of yearly service contracts.

[Typically] it is help desk and maintenance (...) and then specifically a [service] contract. We try to achieve that yearly contract (product manager, AF4, SCALE).

Within DEVICE, the focal firm placed emphasis on service standardization. According to the focal firm interviewees, the objective was to bundle services in standard packages and when possible, apply standard pricing to make purchasing easier. In their case, standardization covered not only most of their basic maintenance-related services but also more advanced services, such as modernization and replacement services. As an example, the focal firm of DEVICE offered replacement packages for obsolete appliances that included both new equipment and the related installation and disposal services.

Within the focal firm of FLOW, a majority of the interviewees stressed that their wide-ranging and flexible service portfolio is an asset. The focal firm allowed customers to choose the exact set of services to be delivered from their total portfolio. Accordingly, some interviewees also pointed out that the firm can combine their portfolio with services from third parties or with additional services outside of their core field.

Quite well, we can do what a customer wants. There are no limitations, and if limitations turn up, we can buy that service [from third parties]. Usually, customers do want to buy that total service (development director, CF5, FLOW).

Furthermore, some interviewees emphasized that their offering for particular customers typically extends over time. When customers were satisfied with the services delivered and the cooperation with the focal firm, it opened up possibilities to complement the contract with new services.

For a majority of the participating customers, setting the right type and level of service contracts with the focal companies appeared to be essential. Through the service contracts, customers set clear limits on how extensive solutions they expected, if any. For example, what services were included in the contract, and did the contract only cover the prices of services or if some service responsibilities were included as well. Few participating customers did not have a contract at all, some had only framework agreements with fixed prices, and some had more comprehensive service contracts for a given time period that included, for instance, periodic maintenance visits, guaranteed service support, and certain spare parts.

Within the cases of SCALE and DEVICE, a majority of the customers emphasized that they are not interested in full-service contracts with a fixed yearly price. For example, it was highlighted that these types of extensive contracts can be too expensive and confusion about what is included may occur.

The problem with these [extensive contracts is that] (...) when they are sold, they includes this and that but then when you start using it, it doesn't include anything. Everything will be invoiced separately anyway (development director, SCALE, AC3).

At worst, service problems and confusion have led to the termination of a comprehensive agreement and being replaced with less inclusive contracts.

We had a so-called full-service contract (...) it wasn't technically successful (...) neither schedule-wise nor functionally (...) [now we only] have distinct ready-agreed

maintenance packages, which are ordered separately (maintenance manager, BC3, DEVICE).

As an example, it demonstrated how customers often set limits to the comprehensiveness of the contracts. The focal firms in the study also admitted this. A majority of the focal firm interviewees acknowledged that not all customers are interested in the most extensive service contracts, and it is up to the customers to set the boundaries.

A majority of the participating customers also underlined the importance of more complete offerings in terms of centralizing service purchasing. According to these interviewees, the customers particularly sought efficiency improvements by concentrating on the procurement of fewer service providers that could offer a wide selection of services and/or bigger entities.

We focus on main suppliers (...) we can improve the service efficiency. So, I think that the amount of suppliers decreases [still in future] (maintenance manager, BC3, DEVICE).

This favors the service providers who are sufficiently large and capable of delivering a wide range of services and/or services to geographically dispersed customer locations.

In all three cases, a few customers expressed a need for closer partnerships with the focal firms. These key customers had a longer customer relationship with the focal firms and they purchased a variety of services from them. Moreover, the delivered services played a rather critical role in the customers' production process. For example, customers AC7 (SCALE), BC5 (DEVICE), and CC5 (FLOW) stressed that they were satisfied with the focal firm as such. However, they remarked that they could benefit even more by working closer together. For example, a customer believed that closer cooperation with the focal firm of SCALE could help them to renew as a company.

We buy, for example, a system like that (...) fine, we get it and everything works well. But, what about after that? How should we continue, so that kind of openings, good proposals. We do have the courage to test this and that here as long as good ideas come, more like closer collaboration (manager, production development, AC5, SCALE).

Furthermore, a few customers emphasized that by working closely together, the focal firm could know them better and thus help them to improve, for example, their processes.

We need to really work closer together (...) [we expect] our suppliers (...) to look more into our process and see where they can help us and improve our production (...) we need some kind of partnership (R&D director, AC7, SCALE).

The identified key customers urged the focal firms for closer cooperation and toward new forms of cooperation and partnership. Furthermore, there was a notable difference in the views of the focal firms, which were not found to seek closer partnerships to establish more complete offerings.

4.4.3 Feedback: More complete offerings not in focus

According to the focal firm interviewees in all the cases studied, firms did not get much customer feedback that focused on the completeness of their offerings. The interviewees did not highlight that feedback from customers had an important role in developing more complete offerings. The participating customers, in contrast, were able to provide moderately versatile feedback that covered, for example, contracts with the focal firms, management and coordination of more complete offerings, standardization of services, third party involvement, partnerships, and outsourcing. However, the total amount of feedback was fairly limited and the emerged feedback was fragmented by nature: the key issues were found to vary between the cases and individual customers, and the individual customers only indicated certain issues.

In all cases, some of the participating customers were able to provide feedback regarding the extensiveness of the available contracts as well as how well the contracts had been managed.

As for the contract management (...) they have complied to our contract well and we've been able to reach consensus on matters. Also, the cooperation between upper management and those responsible for the contract is good (vice president, indirect procurement, CC3, FLOW).

In addition to positive feedback, negative feedback emerged across cases. Within SCALE and DEVICE, some customers gave feedback on the expensiveness of the

proposed or implemented contracts, especially of the full-service contracts, which were considered as very expensive. Moreover, the management and coordination of the bigger deliveries in comparison with individual services was pointed out by around half of the participating customers across cases. The supplier's ability to handle bigger deliveries was pointed out especially by the customers in the cases of SCALE and FLOW.

We have been satisfied with those [extensive deliveries]. We get a total package (...) [covering] all these supporting functions as well as maintenance and planning solutions. So, you get a total package (development director, AC3, SCALE).

In the case of DEVICE, however, the feedback on the comprehensiveness of the offering was focused on how the supplier coordinated its work across the different organizational units that were involved in the service delivery.

Standardization of services was an issue that was brought up in all cases to some extent. Within the case of FLOW, where the focal firm emphasized customization of services over standardization as a firm strategy, one customer gave feedback that the focal firms could develop their service portfolio toward more standardized service concepts and that this would make it easier for customers to both assimilate what they can offer and manage the cooperation in practice. However, another customer noted that the focal firm had some standardized elements that have worked well in their opinion.

They have their own certain concepts. They have ready-made contract frameworks for many [things], templates like that (...) which is a good thing (vice president, CC2, FLOW).

Furthermore, one customer remarked that the entire concept of the focal firm is more customized, whereas some competitors have more standardized approaches.

In the case of SCALE, the issue of standardization was not strongly addressed by the customers. However, it was remarked by a customer that the maintenance services of the focal firm are not as well standardized as those of some of the competitors.

Other actors have productized their service a bit better (...) those are very customized services that they offer in fact (...) the [operation] model should probably be more productized (manager, production development, AC5, SCALE).

The participating customers in the case of DEVICE, in contrast, did not emphasize the standardization of the delivered services. This is noteworthy as the focal firm in the case of DEVICE put a lot of emphasis on service standardization, as discussed above (see, 4.1.2).

In addition, the use of third parties in the focal firm portfolios was an issue that a few customers commented upon. The focal firms of DEVICE and FLOW bundled services from other companies with their own services and offered them as an integrated package to customers. A few focal firm interviewees pondered if there is a risk in merging services from third parties into their portfolio. For example, the interviewees were afraid of decreasing service quality. Nevertheless, negative feedback from the customers regarding the use of third parties did not emerge.

And the operation [by third parties] too has looked quite like them (...) nothing to remark in that sense (maintenance manager, BC6, DEVICE).

At best, customers were actually quite satisfied with the focal firms when they took the responsibility over the third parties because it reduced management and coordination work on their side.

Furthermore, feedback regarding partnerships emerged as a salient issue for a few customers in the case of SCALE.

They're struggling with it because they are an organization which is (...) not used to (...) develop[ing] the systems on and on (...) it should be more like a constant development [partnership] (R&D director, AC7, SCALE).

In particular, one customer (AC7) gave explicit feedback regarding the readiness of the focal firm to move on to partnership-based cooperation based on continuous cooperation. How well the focal firm succeeded in cooperation that transcended individual projects and service transactions was a significant issue for the customer.

In the case of FLOW, the focal firm took over customer functions through a transfer of business. Consequently, outsourcing-related feedback was brought out as a central issue. Within two customer companies that participated in the study, some customer employees had become focal firm employees as the result of the arrangement. This had caused resentment and even strikes among the transferred employees. The situation had been difficult for the focal firm, and it was acknowledged by the interviewees of the customer companies when providing feedback.

4.4.4 Ideas: Internal ideation prevails

Customers were not found to be a primary source of ideas for novel, more complete offerings. The focal firms internally ideated more complete offerings, and the participating customers did not report providing substantial amount of ideas. However, a few individual suggestions from individual customers were detected. These suggestions included more standardized offerings, new service components that could complement focal firm portfolios, closer partnerships, and new partners for the focal firms. For example, a customer had recommended an installation service provider to the focal firm in the case of DEVICE, which had then become a subcontractor of the focal firm.

We have a good partner in cooperation (...) which we also have marketed to elsewhere and they [focal firm] have used it directly too (grid manager, DEVICE, BC5).

This demonstrated that in individual cases, ideas on how to complement portfolios, such as third party services, could come from the customers.

None of the focal firms that participated in the study emphasized that they get ideas on how to develop more complete offerings from customers. Nevertheless, the focal firm interviewees acknowledged that ideas could come indirectly through interaction and cooperation with customers, as discussed previously in the context of basic services (see, 4.2.4). In the case of FLOW, some focal firm interviewees said that ideas on how to extend current contracts often came from customers either through development projects or through daily cooperation between the customer and the front-line service employees or managers of the focal firm.

Usually then the supervisor of the unit already sees (...) what we could take over and what we have elsewhere (...) then those development projects bring visibility to customer's operations rather well and what we could do [more] (development manager, CF3, FLOW).

It was remarked by a focal firm interviewee in the case of DEVICE that even though front-line service employees could have an important role in developing basic services, they are not necessarily a good source when it comes to developing more complete offerings.

If we think of service... productization like this (...) a mechanic maybe sees it more like related to products (...) I don't know if they can think of the bigger entities or such service [business]... issues (development manager, BF1, DEVICE).

Thus, the interviewee supposed that developing more complete offerings may require an overall management perspective instead of strong technical expertise typical of front-line service employees.

4.4.5 Co-development: Key customers urge development

The co-development of services toward more complete offerings was addressed in all three cases. In particular, a few key customers played an important role in urging the development of more complete offerings. In every case, one key customer was found out to actively push the focal firm to renew the way it cooperated with customers. In the cases studied, co-development took place at different levels (e.g., projects and programs) and it was related to different topics (e.g., offerings, interfaces, and systems). Nevertheless, the key customers were the ones who actively pushed the cooperation forward.

In the case of SCALE, customer AC7 was found to actively seek more dense cooperation. The participating research and development (R&D) director regarded the focal firm as a key supplier whose role as a development partner could be further strengthened. Instead of buying individual equipment and systems, often carried out as projects, the customer firm wanted to launch a joint development program with the focal firm. The customer pressed the focal firm toward a new type of collaboration, and it provoked a positive response from the focal firm.

They said, OK, if we work like this together (...) we can guarantee you this kind of productivity increase (...) we want to work together more on our R&D level. And that's what we're doing right now. First steps (director of R&D, AC7, SCALE).

The cooperation is now taking shape, and the parties have sketched a joint development agenda.

In the case of DEVICE, the customer BC5 was looking for new ways to develop cooperation with the focal firm. According to the participating grid manager, the customer company sought common offering with the focal firm. First, the customer company and the focal firm combined services and offered them to end customers

as bundled service packages. The cooperation was reciprocal as the focal firm could also utilize the services of the customer.

They have then a possibility to buy expert service from us for their own projects. Two-directional [cooperation], that's the idea here. This reciprocal operation... we have strongly tried to develop [it] with their contact persons now (grid manager, BC5, DEVICE).

The way in which cooperation took place in practice had been developed in close cooperation with the focal firm. Second, customer BC5 combined services from the focal firm and other service providers into a consortium offering (i.e., comprehensive solutions) that none of the consortium members could individually provide.

[The focal firm] just offers that infra [-structure] and installation and that's it. [We suggested] that we could make a consortium contract, where we offer installation, demolition work, and construction work (grid manager, BC5, DEVICE).

Third, customer BC5 occasionally served as a single contact point for the end-users. Many of their customers (i.e., end customers) purchased a diverse selection of services from the focal firm of DEVICE, and sometimes, there was a need for an intermediary actor between the parties.

In the case of FLOW, customer CC5 encouraged the focal company to develop more complete offerings. The co-development took place in the form of development projects that were managed by the focal firm but urged and participated in by the customer company. According to a participating procurement director of the customer firm, they had first bargained over the price of the focal firm services, thus pushing the focal firm to rearrange the way in which services were delivered.

We really bargained a lot (...) they seriously needed to think how they would do these things, but they also responded right away that shouldn't we do those [tasks] together, you do that and that and that, then it's like win-win (procurement director, CC5, FLOW).

According to the interviewee, the pressure led the focal firm to initiate new development actions, for example, regarding service interfaces between the parties. As a concrete result, the customer had outsourced a small unit to the focal firm to avoid overlapping work.

4.4.6 Summary: Developing more complete offerings

In summary, the findings demonstrated that customers had a certain role in contributing to the more complete offerings and their development. In relation to customer needs for more complete offerings, the novelty of customer knowledge was mainly moderate because the conceptions of the focal firms and customers were somewhat aligned. In contrast, customers were found to influence the extensiveness of the delivered solutions, for example, by setting the boundaries of the service contracts. Customers also gave feedback on the completeness of the current solutions and contracts. However, the focal firms were not particularly focused on the feedback in that regard, and the potential customer contributions remained largely underutilized. Employing customer-originated ideas in the development of the more complete offerings was low as customers only provided few, individual suggestions. Finally, co-development was found to have a considerable potential in promoting more complete offerings. In particular, the role of certain key customers emerged as significant. Table 21 summarizes the key findings on developing more complete offerings.

Table 21. Findings summary: Developing more-complete offerings

Customer involvement form	Value of customer-provided knowledge	Degree of customer involvement	Justification	Examples of addressed issues
Communicating customer needs	Medium	Medium	<u>Knowledge</u> : explicitly communicated needs and moderate novelty <u>Degree</u> : customers set limits to the extensiveness of the solutions	<i>E.g., service packages, contract levels, outsourcing, centralization of purchasing, and partnerships</i>
Giving feedback	Medium	Low	<u>Knowledge</u> : some feedback was available and had moderate richness <u>Degree</u> : received/gathered feedback was scant	<i>E.g., contracts, management and coordination, service standardization, partnerships, and outsourcing</i>
Providing ideas	Low	Low	<u>Knowledge</u> : individual ideas only <u>Degree</u> : mainly incidental	<i>E.g., standardized services, new service components, closer partnerships, and new partners</i>
Co-developing services	High	Medium	<u>Knowledge</u> : key customers were active parties in co-development <u>Degree</u> : infrequent with other than a few key customers	<i>E.g., new collaboration forms, common offerings, and rearrangement of interfaces</i>

Figure 15 illustrates the customer involvement forms in developing more complete offerings through combining the “value of customer-provided knowledge” and “degree of customer involvement” dimensions.

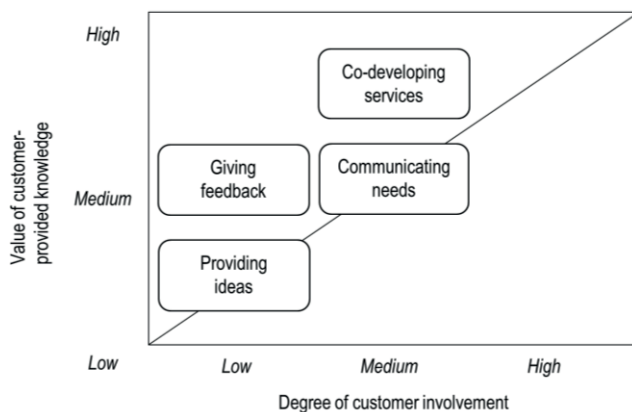


Figure 15. Customer involvement forms in developing more complete offerings

4.5 Extending portfolios with advanced services

4.5.1 Focus and key issues within cases: Advanced services

Extending advanced services was at least moderately important to all the focal firms that participated in the study. However, the firms emphasized on different types services, and the importance of the advanced services varied between the firms. In the case of SCALE, the focal firms emphasized IIoT and building new service business on data gathering and analytics. The focal firm of DEVICE highlighted its proficiency on the installed base and how it could be capitalized through developing expert services. In the case of FLOW, in contrast, the focal firm put emphasis on promoting its development capabilities among the existing customers as well as launching consultation services as a business of its own. Based on the within-case analysis, Table 22 summarizes the key issues in extending portfolios with advanced services within the cases studied.

Table 22. Summary of extending portfolios with advanced services in the cases studied

Case	Context	Key issues in extending portfolios with advanced services	Illustration
SCALE	IIoT-based services Data analytics Expert services Life-cycle analyses	<u>Role in total portfolio:</u> promoting advanced IIoT services as a key goal in extending service business <u>Development focus:</u> building online connections to installed base; designing data-enhanced services <u>Customers' role:</u> occasionally involved by asking feedback from key customers; need for increasing engagement is recognized	<i>"Adding proactiveness is really a must (...) IoT is just this kind of term, but bringing digitalization to a conservative industry like this [is a huge opportunity]" (product manager, AF4, SCALE).</i>
DEVICE	Consultative services Life-cycle analyses IIoT-based services	<u>Role in total portfolio:</u> increasing need for OEM-expertise-based services; IIoT services are technically realizable but not a priority in renewing the portfolio <u>Development focus:</u> increasing the role of consultative elements in service contracts; developing IIoT readiness <u>Customers' role:</u> some good experiences from customer pilots; role of identifying potential key customers is highlighted	<i>"How could we take them [contracts] from the traditional maintenance to consulting (...) so that they [customers] really buy what we have decided together" (product group manager, BF4, DEVICE).</i>
FLOW	Development projects Consultation	<u>Role in total portfolio:</u> development projects with customers are the central elements in the portfolio <u>Development focus:</u> further raising the amount of development projects with existing customers; increasing consultation business <u>Customers' role:</u> participation is essential in development projects; sometimes, customer commitment is inadequate	<i>"The objective is that for every bigger client like this, we have several development projects going on all the time. That we can (...) show that we really develop operations" (unit manager, CF4, FLOW).</i>

The focal firm of SCALE was strongly preoccupied with extending its service portfolio with more advanced services. The firm was particularly focused on the development of IIoT-based services, such as remote monitoring and predictive maintenance. The focal firm was also interested in developing advanced data analytics that would enable the development of expert services, such as life-cycle analyses of the installed base. As a first step toward IIoT-based services, the firm was working on the online connections to the installed base. Much of the service development took place internally and customers were not closely involved in the development work. Occasionally, the focal firm asked comments and feedback from key customers. However, involving customers was neither systematic nor continuous, although the firm had recognized the need for engaging customers more closely in advanced services development.

In the case of DEVICE, the focal firm was focused on increasing the role of the advanced elements in its service portfolio in two ways. First, the firm tried to include

more consultative elements in the service contracts with customers. The firm wanted to offer its expertise to customers by supporting them in planning investments in new equipment as well as making decisions on maintaining, modernizing, or replacing obsolete equipment. Second, the focal firm had invested in technologies that would enable remote-monitoring-based services. However, they were not planning to launch new services in the short run, although they anticipated service portfolio extensions to that direction at some point. The firm had some good experiences from engaging customers in piloting, where customers could test and provide feedback on the advanced services that were under development. Still, the firm stressed on more often and in-depth customer involvement in service development.

The focal firm of FLOW was particularly interested in providing advanced services in the form of process analyses and descriptions, layout planning services, and problem-solving techniques. The focal firm wanted to not only increase the role of consultation with its current customers but also start delivering consultative services as a business of its own. With the existing customers, the focal firm aimed at increasing the amount of on-going development projects as it was regarded as a good way to both demonstrate and develop its own expertise. In the development projects, customers' role was significant, and the focal firm was often dependent on the customers' efforts and participation.

4.5.2 Customer needs for expert services: Exploiting service provider proficiency

All three focal firms emphasized the importance of advanced services in their portfolios to meet future customer needs. Expert services and IIoT-enabled services emerged as the two main categories through which the focal firms extended their portfolios. The focal firm of FLOW was mainly focused on consultative expert services. In the case of SCALE, the focal firm emphasized the possibilities of IIoT but was also interested in promoting expert services to some extent. The focal firm of DEVICE was focused on both service types, although the firm put less emphasis on developing more advanced services. The participating customers were generally interested in novel advanced services, but they did not communicate their explicit needs for particular services. Moreover, development of advanced services was not strongly grounded in customer needs, and customers were not deeply engaged in service development in the cases studied. In the following, the findings on customer

needs for advanced services are divided into two sections. First, the discussion focuses on expert services (i.e., this subchapter), and IIoT-based services are discussed in the next sub-chapter.

In this study, expert services covered a range of services based on specific expertise that the focal firms held and had gathered over the years through supplying services and manufacturing equipment and working in close cooperation with customers. All three focal firms increasingly sought possibilities for harnessing this expertise for expert services.

The experience that we have in-house (...) to bring that know-how to the customer, it's such an asset really (...) in consulting or something like that (product manager, AF4, SCALE).

Potential new services included various analyses, consultative recommendations, managing development projects, and spreading knowledge on best industry practices and new technologies. However, the actual content of the novel services varied between focal firms, and the focal firm readiness to extend expert services was found to vary.

In line with the views of the focal firm interviewees, a majority of the customers expressed a generic need for the expertise of the external service providers in complementing their own capabilities. However, a majority of the participating customers did not currently take advantage of the focal firm's expertise or the utilization was infrequent or on a small scale. A few customers also voiced that they had not been offered the kind of services they were seeking or that the experiences had not been very good. The actual expertise that was sought by customers varied between the cases. Accordingly, proficiency in developing production processes was addressed in the case of SCALE, equipment-specific knowledge in the case of DEVICE, and logistics-processes-related expertise in the case of FLOW.

All focal firms sought opportunities to offer analyses and consultative services to customers on a larger scale. Currently, the focal firm of SCALE offers life-cycle analyses to their installed base and puts forward recommendations for updating customer equipment, for example, by replacing obsolete components. However, such life-cycle analyses had not become a major element in the firm portfolios even though the focal firm was looking for ways to increase the role of expert services.

The productization hasn't been quite successful yet. But, in practice, our experts go on site and check the mechanical or software condition of a system (...) we should utilize it more (product manager, AF4, SCALE).

The focal firm of SCALE had tested, for example, focused modernizations by delivering productized update packages to replace obsolete components. In addition, the focal firm had considered consulting services that would cover customers' processes more broadly than the processes of the part that they had delivered.

The participating customers in the case of SCALE, in contrast, did not highlight a need for life-cycle analyses or focused modernizations. However, a majority of them emphasized the need for expertise on updating the installed base and on production processes more broadly (e.g., digitalization). There was variation in the extent to which particular customers relied on the expertise of the focal firm. Some customers said that they already take advantage of the focal firm and its expertise in developing their products.

We have used them a bit like consultants. How they see our need and how they would solve it (manager, production development, AC5, SCALE).

Other customers did not utilize the focal firm's expertise as extensively. Nevertheless, a majority of the customers stressed the need for external expertise on production processes or particular applications and technologies.

These different automation solutions are interesting, and also information-technical solutions (...) there is a lot of [expertise] like that... it's no use having it by yourself in the company, this sort of top know-how if the need is very occasional, so you'd be pleased to buy it from outside (development director, AC3, SCALE).

Accordingly, customers in the case of SCALE did not address a current need for particular services but rather for external expert support from knowledgeable service providers, such as the focal firm of SCALE.

Moreover, in the case of DEVICE, the focal firm's analyses and consultative services were mostly related to their installed base. The focal firm conducted life-cycle analyses for customers and based on that, made suggestions if some appliances needed maintenance or modernizations or if some product components needed to be replaced. In general, the focal firm wanted to reassert the role of consultative services in its portfolios by adding consultative elements to service contracts, by participating in customers' projects that are already in the planning stage, and by trying to identify the customers who are inclined to use the firm in a consultative role.

Even more to develop [the portfolios] in the direction of having that consultative part (...) to think more about how we could develop the contract-based business (product group manager, BF4, DEVICE).

Some focal firm interviewees also pointed out that customers' own expertise in technical matters was decreasing and that it opened up opportunities for new expert services. The focal firm was aware that not all customers wanted to buy consultative services from them, and some interviewees remarked that they need to be careful not to exploit their role by over-selling.

Not to sell (...) something brand new, the fanciest, the most expensive, [when something] smaller would really be enough for a customer because they appreciate that in the long run, that they were sold what they need (development manager, BF6, DEVICE).

None of the participating customers, however, addressed a need for enhanced consultative elements by the focal firm. Some customers did express a need for the current life-cycle analyses and relating recommendations. Still, these customers were rather satisfied with the current state and were not actively seeking extended expert services.

In the case of FLOW, the focal firm had traditionally conducted analyses on customers' logistics flows in the beginning of new customerships. Development projects with existing customers also included similar consultative elements. Sometimes, customers paid for the service while sometimes the focal firm offered them free of charge to speed up sales negotiations.

Customers seldom have those proper process descriptions (...) in fact, they have often bought it from us; we describe the processes and give development suggestions. And, then we'll see if we can do business (development director, CF4, FLOW).

In practice, the focal firm applied expert tools, such as process descriptions, problem-solving diagrams, layout plans, and interface descriptions to analyze customers' processes and recommend how to improve them. The focal firm also sought opportunities to offer consulting services as a business of its own. Currently, the focal firm has a number of development projects with customers that are aimed at improving process efficiency. The focal firm regarded these development projects as a means to make their expertise more visible in the customers' eyes.

None of the participating customers in the case of FLOW, however, stressed a need for distinct consultative services. They all expressed that they expect the focal firm's expertise to be involved in the existing contracts. In fact, they all strongly highlighted the development of processes and functions that had been taken over by the focal firm.

We have outsourced these services to them, and we don't develop them by ourselves but we expect that they [focal firm] develop them very strongly (...) I expect from them that we get good development ideas every day (procurement director, CC5, FLOW).

Furthermore, a majority of the customers stressed not only the improvements of processes but also that the focal firm could bring specific methods and techniques on how to perform certain tasks, such as packing or dispatching, as efficiently as possible.

In addition, benchmarking and bringing best industry practices to customers emerged as a specific form of expert knowledge that some customers expected to obtain through external service providers in all cases studied. These customers emphasized that the focal firms operated with a wide range of stakeholders and that it gave them an ideal position to learn how different companies developed processes or issues, such as occupational safety.

[Service providers] could bring benchmark knowledge like that because nowadays they operate on several sites [of different companies] (...) surely there are good models that can be brought, such as how a process has been developed and measured (vice president, CC3, FLOW).

Moreover, a majority of the participating customers generally welcomed any suggestions and ideas from the focal firms. Particular customers, for example, highlighted information about promising technologies, systems, practices, methods, etc.

4.5.3 Customer needs for Industrial Internet: Enabler of service business

IIoT-enabled services emerged as the other main branch through which the focal firms seek to renew their portfolios within advanced services. As previously discussed, IIoT refers to the integration of physical machinery and devices, software, sensors, and analytics as a network that enables, for example, remote monitoring of

the connected machinery and devices (e.g., Boyes, et al., 2018; Ehret and Wirtz, 2017; Kiel, et al., 2017).

In the cases of DEVICE and especially SCALE, the focal firms invested time and effort in developing capabilities that would enable them to take advantage of IIoT and digitalization. IIoT was expected to enable the focal firms of SCALE and DEVICE to develop new, advanced services, such as those around predictive maintenance, remote monitoring, and controlling of devices as well as enhanced analytics. Thus, it would provide a basis for new service business. Some of the participating customers expected that focal firm, especially in the case of SCALE, to introduce innovative IIoT-based services at some point. However, there was no urgent need for novel services from the customer side, and customers were mainly waiting for new solutions that will come along. Furthermore, none of the participating customers were found to provide explicit needs for particular new services; they were also not deeply involved in the development of IIoT-enabled services.

In the case of SCALE, the focal firm actively worked on online connections to its installed base to enable IIoT-enhanced services. Currently, the focal firm has a help desk center through which they advise customers and take on-demand access to the installed base. In addition, the machinery and related software that the company had delivered to customers has already logged a considerable amount of data. Consequently, much of the needed infrastructure already existed. However, the focal firm had an access to the machinery data only when customers opened a remote access, for example, during maintenance.

A number-one priority is that we get our systems to talk with us and to produce that sensor and other information (...) the sky is the limit when it comes to services and analytics that can be built on here (CFO, AF5, SCALE).

All focal firm interviewees in the case of SCALE pointed out that through online connections and accessing data, they could provide more advanced services to customers in the form of remote monitoring and predictive, condition-based maintenance. In addition, some interviewees emphasized that access to data would enable the firm to develop advanced analytics that could be utilized in consultations as well as trainings.

We can offer various analyses and give development suggestions to customers regarding their production, including training. That has clear value (R&D manager, AF1, SCALE).

However, the focal firm did not have service concepts ready for the possible new services. For example, a majority of the focal firm interviewees had recognized a need for building new service concepts and business models. Accordingly, they stressed that the firm should learn to know their customers and customer problems better in that regard.

A vast majority of customers in the case of SCALE had expectations on the digitalization of the production in general and on IIoT-enhanced services in particular. Most of the interviewees emphasized that digitalization is already changing their production and that they were interested in finding out how services will transform in that regard.

I mean yes that [digitalization and IIoT] increases all along (...) we try to integrate distinct systems together. It's done all the time, it is coming (development director, AC3, SCALE).

Predictive, data-based maintenance, remote monitoring, and advanced analytics were emphasized as highly interesting by a majority of the participating customers.

Monitoring online could be interesting if it is reasonably priced, and of course, it can cost something if it clearly brings large benefits (manager, production development, AC5, SCALE).

However, the participating customers did not express explicit or urgent needs for particular services even though it was generally of interest to them. For example, customers did not indicate that there would be particular problems in their production that they believe remote monitoring could solve. Moreover, they did not have a clear picture of what kind of IIoT-based services they could need in future. In fact, some customers clearly expected or offered an opportunity to the focal firm to lead the way in that regard.

Especially on the digitalization side (...) they should take more responsibility [over further development] because they know what they have supplied (...) they should be on the crest of wave all the time (manager, production development, AC5, SCALE).

For example, some customers expected the focal firm to keep them up-to-date about technological advancements as well as the future service opportunities.

In the case of DEVICE, the focal firm was working on IIoT-based services. A majority of the focal firm interviewees emphasized that they were planning to launch,

for example, remote monitoring services at some point. From the technical point of view, delivering IIoT-enhanced services was not regarded as an insurmountable challenge.

Remote monitoring and like this are what we'll bring to markets (...) technically we could do really a lot already (product group manager, BF4, DEVICE).

Similar to SCALE, some focal firm interviewees emphasized the importance of understanding how the firm could build new service business based on IIoT. It was anticipated, for example, that remote monitoring would bring value to customers who are struggling with diminishing maintenance resources.

Maintenance staff will still be decreased in future, and they see that it [remote maintenance and monitoring] brings them the possibility [to cope with that] (...) they have so little people that they cannot do everything and this why they need help (manager, BF3, DEVICE).

Nevertheless, the focal firm did not have a comprehensive picture of what customers would especially value in that respect. Furthermore, remote monitoring or other IIoT-based services did not emerge as a key issue for the participating customers. Accordingly, customers in the case of DEVICE were more concerned with the consultative and basic maintenance services, and none of them strongly pointed out needs for IIoT-based services.

Access to data and data management were additional concerns in the cases of SCALE and DEVICE. In both cases, some focal firm interviewees expected that not all customers are willing to provide access to their equipment. They anticipated that for some customer industries, such as energy or aerospace, access would be very difficult owing to security reasons.

It's not only the security of that online pipe (...) it is the data management, who owns the data, how personal protection is fulfilled. There are a lot of questions that are really without an answer (R&D manager, AF1, SCALE).

Nevertheless, a majority of the interviewees were confident that many customers would eventually provide access to data. Comments of the participating customers supported this view as none of them categorically denied access to data. A few customers particularly emphasized that as long as the access provides clear benefits

to them, there would probably be a way to connect equipment and manage data securely.

4.5.4 Feedback: Restricted to existing services

Feedback from the more advanced services mostly concerned those advanced services that the focal firms already delivered to customers. Some feedback was given for services that were under development, but it mainly concerned the overall idea of the service because the participating customers were not deeply engaged in service development. The existing advanced services included remote diagnostics, help desk, consulting and modification services in the case of SCALE, life-cycle analyses and consulting in the case of DEVICE, and analyses on logistics processes, development projects, and benchmarking in the case of FLOW. In all cases, customers were discovered to provide more versatile feedback than what was the focal firms' understanding of how well they succeed in customers' eyes. Still, the gathered feedback regarding the current advanced services was found to be fragmented and scant, and the feedback was not systematically applied in service development. Advanced services that were under development included IIoT-based services within the cases of SCALE and DEVICE and consulting services within FLOW and SCALE. The amount of both given and received feedback regarding services under development was low in all cases.

In the case of SCALE, the focal firm was partially aware of how well they succeed in the help desk and remote diagnostics services through which they advised customers and provided technical support. According to focal firm interviewees, they were able to solve a majority of the cases remotely, which was regarded as a very good service rate. In contrast, some interviewees remarked that a good success rate does not automatically imply that customers are satisfied even if their problem is eventually solved. For example, the service could have been slow, customer service could have been weak, or the customer may not have been well-informed.

Over the remote access, we can either fix or offer a solution to 85% of customers' problems at the moment (...) but how a customer really [finds it], we don't really have a means to measure it for the time being (service manager, AF3, SCALE).

According to one interviewee, the focal firm had received, for example, critical feedback that problems take place too often and that expertise has not been adequate in the help desk.

The participating customers were able to provide mixed feedback for the service. On the one hand, some customers spoke well of the help desk and remote diagnostics services as problems had been solved professionally and fast.

Usually, they can remotely take care of [it] quite fast. We always get the system moving in an hour or two (development manager, AC6, SCALE).

On the other hand, other customers challenged the expertise and availability through help desk and remote diagnostics services.

[Technical] support is, in our opinion, expensive and not so flexible (...) we see sometimes that the knowledge of the telephone desk is lower than our own knowledge (director of R&D, AC7, SCALE).

Some customers also criticized that the quality of the service had been varying, especially on weekends. Consequently, the responses of the participating customers were somewhat aligned with the focal firm's own understanding of varying experiences.

In addition to help desk and remote diagnostics services, the participating customers in the case of SCALE were able to provide some feedback on consulting and modification services. A majority of them emphasized that they would like to see the focal firm in a consultative role in developing their production processes. Currently, however, customers did not take advantage of the focal firm's expertise at large. Consequently, some customers gave feedback that the focal firm did not offer its expertise actively enough.

They could have quite a lot to give here in my opinion (...) if there is a qualified guy [she/he] sees right away that "hey, the problems are over here" and what we can do (development director, AC3, SCALE).

Furthermore, the participating customers provided mixed feedback regarding modification services. On the one hand, some customers adopted a critical stance toward modifications by the focal firm. For example, the focal firm had been reluctant to do some modification that one customer wanted. On the other hand, some customers had been satisfied in the way modifications had been managed. Finally, the study did not reveal any real feedback considering initiatives on IIoT- or data-enabled services.

In the case of DEVICE, customer feedback from the advanced services was scarce in general. Half of the participating customers were able to provide some feedback about using the focal firm as a consultant in updating and modernizing equipment.

That really critical path should always be found (...) what has gone to obsolete (...) what we should start replacing (maintenance manager, BC3, DEVICE).

In general, customers gave positive feedback regarding advising and recommendations. Some customers also noted that recommendations are usually at an acceptable level in the sense that the focal firm is not trying to sell too much or offer solutions that are technologically too advanced. However, one customer remarked that the focal firm could know their processes better and that some competitors succeed better in that regard. In general, the focal firm was not aware of how well they succeeded in a consultative role or in making recommendations.

Regarding the IIoT-based services that the company was planning to launch at some point in future, the focal firm had received contradictory feedback. Some customers had expressed an interest in the possibilities, whereas others had replied that they are not interested in the solutions offered by the focal firm. Those customers that participated in the study did not provide any feedback about the possibilities of remote monitoring, and the issue did not emerge as topical to them.

In the case of FLOW, feedback regarding advanced services was focused on development issues and especially on how well the focal firm performed in developing the efficiency of logistics processes. All the participating customers were able to provide rather rich feedback on how satisfied they were with the focal firm in this regard. The findings here were mixed. Of the six customers participating in the study, one was very satisfied, two were somewhat satisfied, and three were to a certain degree disappointed by how the focal firm had managed development issues.

They have been able to reduce the size of the staff a little and that way increase efficiency (...) then they have succeeded in getting us to work more systematically (production technology manager, CC6, FLOW).

Nevertheless, a majority of the customers had expected more from the focal firm in that regard.

In the beginning, we thought that they bring a lot of advantage in the internal logistics, how to place stuff, etc., but we have been a little disappointed (production technology manager, CC6, FLOW).

These customers had expected that an external service provider would be able to bring some completely new ideas and expertise and that this would significantly improve the efficiency of the functions in question.

A majority of the customers also commented that the development suggestions were obtained from the focal firm in the form of either expert advice or benchmarking of other service units of the focal firm. On the one hand, some customers gave good examples of successful recommendations by the focal firm. For example, the focal firm had suggested the implementation of systems or methods regarding warehouse management and packing. On the other hand, some other customers emphasized that the focal firm was not able to meet their expectations of sharing knowledge and good practices.

4.5.5 Ideas: Low novelty typical

Customers did not emerge as a main source of ideas for novel or renewed advanced services. None of the focal firms highlighted the role of customers in initiating advanced services. However, customers were not totally absent in the ideation as some observed or expected customer needs were usually taken into account by the focal firms. In accordance with the focal firm interviewees, none of the participating customers expressed that they had greatly influenced the ideation of new advanced services. Only a few ideas for novel advanced services emerged when asked about how focal firms could supplement their portfolios. The novelty of these suggestions was typically low as they were mainly aligned with the way in which the focal firms already developed or planned to extend their portfolios.

In essence, two types of ideas emerged: individual suggestions for possible new services and new technologies that were desirable to customers. In the case of SCALE, some customers suggested IIoT-based remote monitoring and predictive maintenance services.

In the future (...) one guy will be somewhere (...) [remotely] monitoring the system, repair[ing] the system (...) totally, fully connect[ed] by [the] Internet (process planning manager, AC2, SCALE).

This suggests exactly the same direction for service development in which the focal firm was already working on. Some customers also suggested particular technologies that they thought relevant and could be combined with the offerings of the focal firm, such as 3D printing, simulations, certain types of robots, and information networks.

Similarly, in the case of DEVICE, some customers proposed a few individual ideas on how the focal firm's service portfolio could be complemented with new advanced elements. These included sensors and mobile connections to the installed base, advanced analytics for maintenance purposes, improved life-cycle analysis reporting, automated service warehouses for spare parts, and integration of information systems. That is, customers put forward ideas that were more or less in line with how the focal firm was already developing its portfolio or was at least considering it.

In the case of FLOW, customers did not provide ideas for novel advanced services. Nevertheless, a majority of the focal firm interviewees emphasized that they get ideas by working together with customers. Interviewees had noticed that customers seldom proposed ideas if asked directly about what they would need.

Let's have a meeting here and go [through] if you have some [ideas] now. "You don't."
(...) They cannot tell that now we have a problem or a need for something (...) [we have to by ourselves] understand that there was (...) something that a customer needs
(key account manager, CF2, FLOW).

Instead, cooperation and joint problem solving with customers were regarded as better ways to understand customer needs, and this could lead to new ideas in the context of advanced services.

4.5.6 Co-development: A lot of untapped potential

Co-development of advanced services took place in different forms in all cases studied. These forms included cooperation in customer pilots, joint development projects, provision of data access to service suppliers, and providing a specific role for key customers in service development. Findings demonstrated that customers could have a significant role as co-developers through service pilots and development projects, and in particular, the role of key customers was central in feedback and testing services that were under development. Nevertheless, the focal firms did not commonly apply the co-development of advanced services. Moreover,

providing access to data emerged as a specific form of co-development that was essential within IIoT-based services.

Within the cases of SCALE and DEVICE, customer participation in service development was not particularly common. Nevertheless, at some occasions, customers had been involved as co-developers. For example, the focal firm of DEVICE had organized customer pilots for developing life-cycle analyses and equipment exchange services.

In the life-cycle audit, we have had piloting and a customer has been a little involved, and likewise in (...) equipment replacement services (...) so, we don't first develop and then pilot. We pilot and develop at the same time (development manager, BF6, DEVICE).

Some focal firm interviewees stressed that this type of co-development should be applied more often. Pilots were seen especially important within more advanced services, where the pace of the technological development was high and customers were keen to follow the latest advancements more closely. Of the customers involved in the study, BC2 had been participating in service development through a pilot that was related to so-called smart solutions.

We have done some pilot projects (...) it's getting more common (maintenance manager, BC2, DEVICE).

Some focal firm interviewees especially emphasized that they should recognize those key customers, such as BC2 above, who are willing to share their opinions instead of trying to engage a large group of customers.

Similarly, in the case of SCALE, a majority of the focal firm interviewees pointed out that they should engage customers in service development more regularly. According to one interviewee, the focal firm had closely cooperated with research organizations and they should extend such collaboration to key customers. Currently, the focal firm occasionally asked feedback from a few key customers on services that were under development.

It's no use to develop [things] here in secrecy (...) [If] 80% of the customers' goals are different, you have done useless work. So openly tell what we are developing (...) customers do tell their opinions (vice president, AF2, SCALE).

Even though it was recognized as a good practice by the interviewees, gathering customer views or any other type of customer involvement in developing advanced service was neither particularly frequent nor systematic.

In the case of FLOW, the issue of customer participation in service development was addressed differently. Owing to the nature of their business (i.e., taking over customer's logistics functions), service development was continuously linked to customers' processes.

We develop our own activities all the time, but of course with a customer since all our own functions are customer's functions (CEO, CF1, FLOW).

A majority of the focal firm interviewees emphasized the importance of involving customers in development projects. On the one hand, the focal firm was not able to develop things on their own. For example, the focal firm often needed permissions from customers to change processes. Moreover, different inputs from the customers' side were often required, such as decisions, information, and access to systems.

We need better information from customer's information systems (...) often, they cannot do it or it's too expensive or they need permission from somewhere (development director, CF5, FLOW).

Some interviewees said that this had sometimes led to problems, such as projects that were running late.

Furthermore, the role of the key customers in co-developing advanced services was addressed in the case of FLOW. Customer CC5 had urged the focal firm to develop its portfolio as discussed previously (see, 4.4.5). The pressure from the customer side not only influenced the extensiveness of the offerings but also influenced service development. According to the participated customer:

Ideas started to come very well of how we could develop it [delivery process] so that costs could be taken off (...) both think that we do good work but then we don't see that we do overlapping work or something that the other one doesn't in fact need (procurement director, CC5, FLOW).

Consequently, the focal firm had launched new development initiatives that led to not only changes in the distribution of work between the parties but also the implementation of new methods and systems.

Finally, providing data or access to data emerged as a specific form of co-development in IIoT-based services. The issue was especially topical in the case of SCALE. As described previously (see, 4.5.3), an online access to the installed base was seen as the first step toward data-enabled services. Currently, all the data generated by the equipment was stored and owned by customers. Therefore, the focal firm needed to find a solution, which would let them access and use the data.

The ownership of the data per se is by a customer, but we could have a possibility to use it. Maybe this kind of approach (...) but we need to be able to show to a customer that this is what you get when you offer that to us, added value to them (product manager, AF4, SCALE).

Accordingly, some focal firm interviewees emphasized that data-enhanced services necessitate willingness to cooperate from the customers' side, that is, co-development.

4.5.7 Summary: Extending portfolios with advanced services

In summary, customers only had a limited role in extending portfolios with advanced services. The participating customers generally had some expectations for new, advanced services. However, communicating explicit and elaborate needs for novel solutions proved to be difficult to a vast majority of customers. They were able to provide some feedback for the advanced services they were familiar with. However, they were rarely engaged in the actual service development and thus could not give much feedback for the services under development. Regarding idea generation for advanced services, customers provided few ideas for novel services. However, these ideas were typically of low novelty as they were mostly aligned with the current ideas and plans of the focal firms. Finally, co-developing advanced services with customers was found to provide highly valuable knowledge. The focal firms were looking for new ways to engage key customers, for example, in pilots and joint development initiatives. However, such co-development practices were not systematically applied as yet. A summary of the findings is presented in Table 23.

Table 23. Findings summary: Extending portfolios with advanced services

Customer involvement form	Value of customer-provided knowledge	Degree of customer involvement	Justification	Examples of addressed issues
Communicating customer needs	Low	Low	<u>Knowledge:</u> customers are interested but communicating the explicit needs is difficult <u>Degree:</u> service development is internally initiated and needs are expected rather than known	<i>E.g., life-cycle analyses, consultation, best practices, remote monitoring, analytics, and data management</i>
Giving feedback	Medium	Low	<u>Knowledge:</u> concentrated on existing services <u>Degree:</u> received/gathered feedback is scant and fragmented	<i>E.g., existing services, such as help desk, consultation, life-cycle analyses, and best practices</i>
Providing ideas	Low	Low	<u>Knowledge:</u> individual ideas and new application areas; low novelty <u>Degree:</u> indirect utilization	<i>E.g., IIoT-based services and new technologies</i>
Co-developing services	High	Medium	<u>Knowledge:</u> Key customers are inclined to participate <u>Degree:</u> Not widely applied yet; degree is growing	<i>E.g., customer pilots, development projects, key customers' role, and data access</i>

Figure 16 provides an additional illustration of customer involvement forms in extending portfolios with advanced services through combining the “value of customer-provided knowledge” and “degree of customer involvement” dimensions.

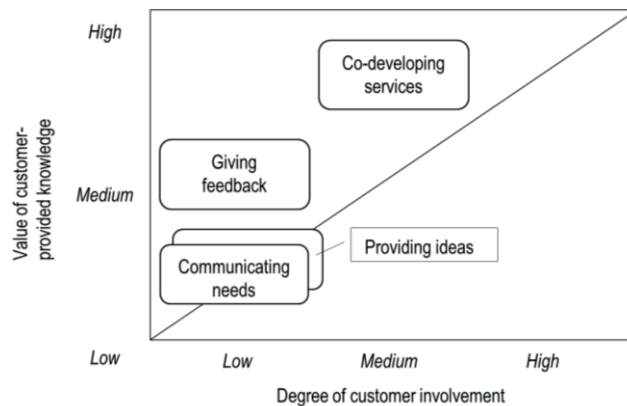


Figure 16. Customer involvement forms in extending portfolios with advanced services

4.6 Summary of empirical findings

This study investigates how customer involvement manifests itself in industrial service portfolios development. In-depth exploration of three cases—SCALE, DEVICE, and FLOW—revealed the differences and similarities between the four distinct offering development modes, between the specific customer involvement forms, and in relation to the emerged primary analysis dimensions “value of customer-provided knowledge” and “degree of customer involvement.” The exploration of the cases above showed far more similarities than differences between the cases, therefore enabling a recapitulation of the findings across individual cases. The perceived case-specific differences were elaborated in detail in the preceding specific sub-chapters on offering development modes. Consequently, Table 24 summarizes the main findings on a cross-case level.

Table 24. Findings summary

		Offering development mode			
		Refining basic services portfolio	Promoting customer service elements	Developing more complete offerings	Extending portfolios with advanced services
Value of customer-provided knowledge	Communicating customer needs	High	High	Medium	Low
	Giving feedback	High	High	Medium	Medium
	Providing ideas	Low	Low	Low	Low
	Co-developing services	Medium	Medium	High	High
	Customers as innovators	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
Degree of customer involvement	Communicating customer needs	Medium	Low	Medium	Low
	Giving feedback	Low	Low	Low	Low
	Providing ideas	Low	Low	Low	Low
	Co-developing services	Low	Low	Medium	Medium
	Customers as innovators	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>

NOTE: *n/a* = not applicable

First, a comparison of the findings across offering development modes (i.e., columns in Table 24) shows that the utilization of customer-originated knowledge was either

low or medium throughout the four offering development modes. None of the offering development modes indicated a high degree of customer involvement in any of the involvement forms studied. In contrast, in all offering development modes, customer-provided knowledge showed either high or medium value except in providing ideas, where the discovered value of knowledge was low throughout the modes. Moreover, the findings indicated clear similarities between refining basic services portfolio and promoting customer service elements on the one hand and between the development of services toward complete offerings and extending portfolios with advanced services on the other. Within the first two modes, communicating customer needs and providing feedback showed a relatively high value of customer-originated knowledge, whereas the value of co-developed knowledge was particularly prominent within the latter two.

Second, a comparison of the findings across customer involvement forms (i.e., rows in Table 24) shows apparent differences in the value of available knowledge and the degree of customer involvement. In all offering development modes, except extending portfolios with advanced services, customers were able to provide highly or moderately valuable feedback as well as accounts of their needs. However, the utilization of customer needs and feedback was rather low in comparison with the identified, potential value of the knowledge originating from the customers. Moreover, the findings did not indicate a significant role of customers in idea generation in any of the offering development modes studied. Then again, co-development provided highly or moderately valuable knowledge across the offering development modes. In particular, developing more complete offerings and extending portfolio with advanced services showed high potential for increased co-development in comparison with the currently moderate application of co-development. Finally, there were no examples that customers had taken the primary responsibility over service development and innovation (see, “not applicable” (n/a) in Table 24).

Finally, it is possible to compare the analysis dimensions “value of customer-provided knowledge” and “degree of customer involvement” across both offering development and customer involvement forms (i.e., upper vs. lower section in Table 24). The comparison generally shows that the value of customer-provided knowledge is higher than the degree of customer involvement. The only exception is the idea provision that shows low results in both sections. Accordingly, the findings illustrate that there is underutilized potential in involving customers more deeply in industrial service portfolio development, regardless of the addressed offering development mode or the customer involvement forms at hand.

5 DISCUSSION

The following chapter discusses the meaning of the empirical findings in light of the existing understanding of industrial service portfolio development and customer involvement. Accordingly, three formulated sub-questions are elaborated, and the findings of this study are compared with those of earlier research. In addition, the chapter discusses the relation between customer involvement and service strategy within the industrial service context.

5.1 Extending the scope of customer involvement

The following was the first sub-question (RQ1): *How do customers contribute to service portfolio development in different service offering development modes?* This study shows that customers can contribute to portfolio development in the many ways through which industrial firms develop their service portfolio. In this study, contributions covered four applied offering development modes: 1) refining basic services portfolio, 2) promoting customer service elements, 3) developing more complete offerings, and 4) extending portfolios with advanced services. The study revealed both differences and similarities between the studied offering development modes.

For example, the findings indicated high value when customers communicated their needs and gave feedback on refining basic services portfolio and promoting customer service, thus emphasizing customers' role as knowledge contributors (see, Bogers, et al., 2010; Cui and Wu, 2016; Edvardsson, et al., 2006; Witell, et al., 2011). In contrast, when service providers developed more complete offerings and advanced services, the highest value of customer involvement came through co-developing services with customers, thus highlighting the role of customers as co-developers (see, Blazevic and Lievens, 2008; Cui and Wu, 2016; Mahr, et al., 2014; Moeller, et al., 2013) (see, 4.6 for a complete findings summary).

By demonstrating the versatility of customer contributions in service portfolio development, this study extends the current scope of customer involvement to the service-strategy-related dimensions that have remained in a somewhat limited role in the earlier research including issues, such as customer service elements and

interfaces, service packaging and standardization, interorganizational collaboration, and development partnerships. All these strategy dimensions are linked to several or all services supplied by a firm (i.e., service portfolio) and therefore reflect the way in which the firm develops services in the long term (Alam, 2002) and intends to compete with services in general (Raddats and Kowalkowski, 2014). Moreover, the strategy dimensions reflect many key characteristics of B2B services, such as the importance of long-term relationships and customers as co-producers of value (Fitzsimmons and Fitzsimmons, 2008, pp. 11–12).

Two issues were especially prominent in extending the scope of customer involvement. First, customers were generally found to provide considerable knowledge that transcends the level of individual services. Thus, this study extends the scope of customer involvement in NSD and generally supports Alam (2002, 2006) by stressing the importance of the portfolio-level in understanding customer involvement in an NSD setting. The study demonstrated that customers possess substantial portfolio-level knowledge related to the NSD dimensions, such as customer interface or service delivery system (cf. Edvardsson and Olsson, 1996; den Hertog, 2000; Jong and Vermeulen, 2003) that typically cover several or all firm services. The same applied to customer service elements (cf. Grönroos, 1990; Storey, et al., 2016; Storey and Easingwood, 1998) and service standardization and modularity (cf. Brax, et al., 2017; Carlborg and Kindström, 2014; Iman, 2016). Regarding service standardization and modularity, the study specifically showed that standardization issues are visible to customers and are of interest to them (cf. Iman, 2016; Pekkarinen and Ulkuniemi, 2008).

A vast majority of the prior research on customer involvement, however, has been centered on the development of the core attributes of individual services (e.g., Mahr, et al., 2014; Storey and Larbig, 2018; Westh Nicolajsen and Scupola, 2011). Moreover, radical changes and advanced services have been addressed in customer involvement research as a sole focus of studies or through comparing radical and incremental changes (e.g., Carbonell and Rodriguez Escudero, 2015; Cui and Wu, 2017; Hsieh and Hsieh, 2015; Westh Nicolajsen and Scupola, 2011). In addition, two of the offering development modes, promoting customer service elements and developing more complete offerings, have rarely been highlighted as potential areas for customer involvement (cf. Hsieh and Hsieh, 2015; Storey and Larbig, 2018).

Second, this study demonstrates that customer involvement can contribute to the key dimensions of the service growth phenomenon in a multidirectional and multifaceted setting (see, Kowalkowski, et al., 2015). The study is one of the first that specifically links customer involvement to cover the design and selection of

service transition trajectories (Matthyssens and Vandenbempt, 2008; Oliva and Kallenberg, 2003; Penttinen and Palmer, 2007), offering development dimensions (Mathieu, 2001; Rabetino, et al., 2015; Raddats and Kowalkowski, 2014), and service strategies (Gebauer, 2008; Raddats and Kowalkowski, 2014; Tukker, 2004). In particular, the study shows that industrial service providers can utilize customer involvement in developing the relational aspects of service development and delivery (see, e.g., Table 19 and Table 21), in building more complete service packages or solutions (see, e.g., Table 21), and in promoting product-independent services like consulting (see, e.g., Table 23). In earlier research, these have been generally highlighted as key dimensions in service growth and placed at the center of the phenomenon (see, Kowalkowski, et al., 2015; Oliva and Kallenberg, 2003; Penttinen and Palmer, 2007; Raddats and Easingwood, 2010; Raddats and Kowalkowski, 2014). However, the role of customer involvement in supporting service growth has been rarely addressed before.

Moreover, this study offers complementing empirical evidence that industrial service providers need to concurrently manage different services and parallel business logics (see, e.g., Figure 10–Figure 12). In addition to earlier research in the manufacturing service context (Kowalkowski, et al., 2015, 2017), the present study shows that service firms can face the same challenge (i.e., FLOW). Consequently, the study supplements the emerging research demonstrating that industrial firms typically offer a wide range of diverse services (Raddats and Kowalkowski, 2014), concurrently follow different service transition trajectories (Matthyssens and Vandenbempt, 2010), and thus need to adopt parallel business logics (Windahl and Lakemond, 2010).

5.2 Customer involvement form matters

The following was the second sub-question (RQ2) formulated: *How and why do particular customer involvement forms differ in portfolio-level service development?* As a response to the question, this study showed that customer involvement forms were variously applied across the offering development modes and yielded different contributions within specific offering development modes. Comparison of the customer involvement forms across offering development modes revealed clear differences between the customer involvement forms (i.e., customers as knowledge contributors, co-developers, and innovators) and between specific customer knowledge forms (i.e., needs, feedback, and ideas). Thus, this study responded to a

generic call for research to better understand the applicability of different customer involvement forms (Cui and Wu, 2017, 2016; Witell, et al., 2011) by showing how and why customer involvement forms differ vis-à-vis industrial offering development modes.

The study illustrated that when customers were familiar with the content of what was developed, they were able to provide explicit and rich feedback and were able to explicitly describe their needs. This was applicable especially to developing basic services and customer service elements. In turn, when customers were not as familiar with the content of development, as in extending portfolios with advanced services, the value of customer knowledge contributions was much lower. Moreover, the study did not find the role of the customers to be significant in idea generation in any of the offering development modes. Co-development, in contrast, emerged as a desired approach in certain modes, especially in developing more complete offerings as well as extending portfolios with advanced services (see, 4.6 for a complete findings summary).

The findings of this study are aligned with those of prior studies, which suggest that different customer involvement forms have their own advantages and are suitable for different conditions (Cui and Wu, 2017; Witell, et al., 2011). Using customers as a knowledge source, for example, through traditional market research, is regarded to function better when customer needs are not latent but spoken and clear (Witell, et al., 2011). Moreover, it is known that a lot of the knowledge that originates from customers relates to the existing services and products and is therefore likely to support incremental changes (Blazevic and Lievens, 2008). The findings of the present study support this view to some extent. In the boundaries of this study, much of the customer-provided knowledge (e.g., needs and feedback) considered currently supplied services, related customer service elements, or how the existing services were combined into packages or solutions without radical changes. Therefore, much of the emerged customer contributions were likely to drive incremental changes.

Regarding customers as a source for new ideas, the findings did not support the view that customers are a valuable source of information that could provide, for example, more original ideas than those originating from inside the firm (see, Kristensson, et al., 2002; Magnusson, et al., 2003). In contrast, the study found that in addition to ideating radically new services, customers' role in idea generation was sparse throughout the offering development modes. A lack of specific idea generation methods (see, Edvardsson, et al., 2012) may at least partly explain this because none of the focal firms were particularly focused on ideating new services

with customers. Moreover, the findings did not indicate any differences between the offering development modes in that regard.

This study also demonstrated that co-development could provide highly valuable knowledge, especially for developing more complete offerings and extending portfolios with advanced services. Earlier research has suggested co-development-based approaches to overcome some weaknesses of using customers as a knowledge source in service development (Edvardsson, et al., 2006). In particular, earlier research has pointed out that traditional market research techniques can be insufficient in understanding latent customer needs (Edvardsson, et al., 2006; Witell, et al., 2011) and produce less innovative ideas and knowledge (Blazevic and Lievens, 2008; Mahr, et al., 2014; Witell, et al., 2011). In particular, with advanced services, the identified benefits of co-development followed this logic as customer participation in service development was expected to help in the identification of the latent needs by giving customers an opportunity to provide feedback in the early stages (see, Alam, 2002, 2006; Chang and Taylor, 2016; Witell, et al., 2014).

In developing more complete offerings, this study discovered that some customers pursued development partnerships with the focal firms and sought to influence how the focal firms cooperated with customers in that regard. These customers were found to be key customers to the focal firms, and they showed at least some lead-user characteristics (see, Franke, et al., 2006; von Hippel, 1986; Lüthje and Herstatt, 2004). Even though the study could not prove that these customer were actual lead users by showing that their needs become general in future (von Hippel, 1986), it showed that they were both qualified and willing to contribute in the development of more complete offerings (see, Lüthje and Herstatt, 2004). The roots of the lead-user method are in product development (Sandén, Matthing, et al., 2006); however, the current study showed that the approach is particularly suitable for industrial service setting and especially for advancing development partnerships (see, Gebauer, 2008). Moreover, the current study revealed that customers can be the active party in pushing the cooperation forward and can actively seek a lead-user position by themselves, thus showing that finding lead users is not necessarily a challenge in the industrial service setting even though it has been regarded as a weakness of the method in general (see, Edvardsson, et al., 2012).

The role of customers as innovators (see, Cui and Wu, 2016) was non-existent in the present study. An explanation for this could be that innovation toolkits, online innovation communities, and open software communities that enable customers to innovate themselves (Antikainen, 2011; von Hippel and Katz, 2002; Nambisan, 2002) typically represent the vanguard in service development. However, the

industrial service business does not usually represent the front line of service innovation. Alternatively, developing services is not always the primary focus of industrial companies, and this could have delayed investments in advanced customer involvement tools or platforms.

5.3 Exploitative and explorative approaches needed

The following was the third sub-question (RQ3) of this study: *How, and through what kinds of approaches, can industrial service providers best utilize customer contributions?* To answer this question, the study showed that service providers could capitalize on customer involvement through two generic approaches—one emphasizing the exploitation of customer contributions and the other the creation and exploration of new knowledge with customers. In the empirical part of the study, the cross-case classification framework (see, Table 15) provided a basis for illustrating and comparing the findings in terms of value of customer-provided knowledge and degree of customer involvement. Two configurations were evident in the matrices used to display the findings (see, Figure 13–Figure 16). In some of the analyzed situations, the value of customer-provided knowledge was higher than the degree of customer involvement (either high vs. medium or low, or medium vs. low). In other situations, the value of customer-provided knowledge was at the same level as the degree of customer involvement (either low–low or medium–medium), thus providing a basis for two distinct approaches to utilizing customer contributions—exploitative and explorative customer involvement.

On the one hand, service providers could take advantage of the knowledge that customers possess by increasing the degree of customer involvement when the degree is low in relation to the value of available knowledge. In these situations, the service providers could extend the use of passive market research techniques, such as customer surveys, interviews, and focus groups (see, Cui and Wu, 2016; Griffin and Hauser, 1993; Witell, et al., 2011). Moreover, the use of other techniques could be increased, for example, those that address informal interactions with customers (see, Edvardsson, et al., 2006) or those that increase the use of customer collaboration (see, Cui and Wu, 2016). On the other hand, if the value of available knowledge levels is lower than the degree of customer involvement, customer knowledge contributions cannot be further utilized by simply increasing customer involvement. In those situations, the value of the potential knowledge should be first increased. Here, a customer could be involved in service portfolio development

more deeply through proactive approaches by allowing them to participate, for example, in idea creation, designing solutions, or re-designing service processes (Edvardsson, et al., 2006). The aim would be to create new insights and knowledge including both spoken and latent needs (Witell, et al., 2011).

These two approaches that inductively emerged as an outcome of the empirical analysis are aligned with the generic organizational learning strategies of *knowledge exploitation* and *knowledge exploration* (March, 1991). Exploitation refers to capitalizing the existing and attainable knowledge, whereas exploration is about rethinking, creating, or searching completely new knowledge (Hatch and Cunliffe, 2013; March, 1991; Menor, et al., 2002). Figure 17 presents the cross-comparison matrix that is complemented with the knowledge exploitation and exploration approaches.

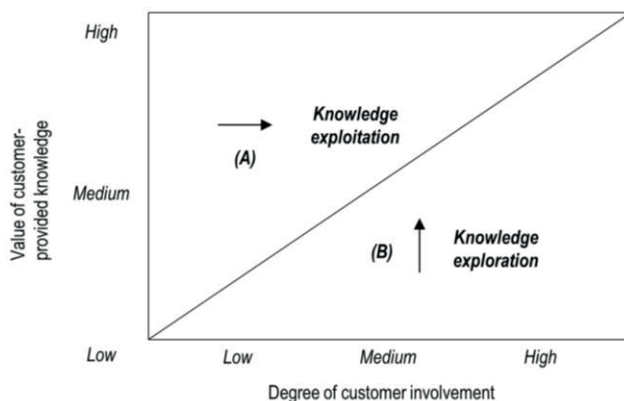


Figure 17. Knowledge exploration and exploitation in customer involvement

In the figure, a horizontal movement (arrow A) toward the diagonal illustrates knowledge exploitation, which is the primary approach in the upper part of the figure. Because the value of available knowledge is higher than the degree of utilizing customer involvement, a firm can “exploit” its customers’ knowledge potential directly by increasing the use of customer involvement, for example, through traditional market research methods as discussed above (see, Cui and Wu, 2016; Griffin and Hauser, 1993; Witell, et al., 2011). A vertical upward movement (arrow B), in contrast, represents knowledge exploration, which is the primary approach in the lower part of the model. Here, the available customer knowledge is low in relation to its current or intended use. That is, either customers do not possess valuable knowledge or the knowledge is tacit and therefore difficult to communicate (see, Nonaka and Takeuchi, 1995). Thus, there is a need to search or create new

knowledge through “exploration” before it can be exploited in the service portfolio development. As discussed above, a firm may need to engage in customer involvement techniques that go beyond traditional market research toward genuine co-development (see, Cui and Wu, 2016; Edvardsson, et al., 2006; Witell, et al., 2011).

Obviously, either type of movement could be possible in both parts of the figure (i.e., upper and lower sections). Horizontal movement toward the right in the lower section would represent a situation wherein insufficient knowledge takes precedence, for example, if attention is paid to individual customer views that do not represent the customers’ views at large. Thus, it is not a recommended approach. In contrast, an upward vertical movement in the upper section would represent an advocated approach as it opens up further possibilities to exploitation through the creation of new knowledge.

Table 25 further illustrates how the exploitation and exploration approaches appeared in relation to the offering development modes and customer involvement forms in this study. The table is directly derived from the findings matrices (see, Figure 13–Figure 16) following the above illustrated logic.

Table 25. Exploitation and exploration across offering development modes and customer involvement forms

Customer involvement form	Offering development mode			
	Refining basic services portfolio	Promoting customer service elements	Developing more complete offerings	Extending portfolios with advanced services
Communicating customer needs	<i>Exploitation</i>	<i>Exploitation</i>	<i>Exploration</i>	<i>Exploration</i>
Giving feedback	<i>Exploitation</i>	<i>Exploitation</i>	<i>Exploitation and/or exploration</i>	<i>Exploitation and/or exploration</i>
Providing ideas	<i>Exploration</i>	<i>Exploration</i>	<i>Exploration</i>	<i>Exploration</i>
Co-developing services	<i>Exploitation and/or exploration</i>	<i>Exploitation and/or exploration</i>	<i>Exploitation</i>	<i>Exploitation</i>
Customers as innovators	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>

The table demonstrates that both exploitation- and exploration-based approaches are needed if service providers want to efficiently utilize customer involvement in multidirectional offering development (see, Kowalkowski, et al., 2015; Matthyssens and Vandenbempt, 2010; Raddats and Kowalkowski, 2014; Windahl and Lakemond, 2010). The table also illustrates that in terms of exploitation and exploration, the offering development forms could be divided into two groups. In refining basic services portfolio and developing customer service elements, customer needs and feedback seem as potential targets for exploitation, whereas in idea generation and

co-development, exploration prevails. In developing more complete offerings and advancing portfolios with advanced services, in contrast, co-development seems as a potential area for exploitation, whereas the role of exploration is more substantial in other customer involvement forms.

5.4 Different customer involvement for diverse service strategies

Although this study showed many similarities in how customer involvement was applied, there were also some notable differences between the cases studied. These differences may stem from the distinct service strategies (or combinations of strategies) of the focal firms; thus, they reflect the distinct ways in which the firms competed in the given market (see, Raddats and Kowalkowski, 2014). The focal firms also held different positions in the value chain that may explain the differences especially between service-centered FLOW, who offered services to manufacturing firms, and the two other cases of SCALE and DEVICE, where the focal firms were manufacturing firms. Consequently, this study implies that there is link between a firm's service strategy and the application of customer involvement (i.e., intended scope, used forms, and exploitative/explorative approaches) within the industrial service context. It seems that when a firm's service strategy is centered on customers' processes instead of their own products, the firm is more likely to pursue more in-depth customer involvement.

Earlier research on industrial service strategies has demonstrated that firms typically follow generic service strategies that represent different overall roles of services in the firm strategy (Gebauer, 2008; Raddats and Kowalkowski, 2014; Tukker, 2004; Windahl and Lakemond, 2010). Product-oriented firms may be centered on providing equipment, and services are in a supporting role without being strong differentiators in competition (Raddats and Kowalkowski, 2014). In contrast, some firms put more emphasis on services and compete by providing availability to customers, or firms may even take over customer activities and offer performance-based solutions (Tukker, 2004; Windahl and Lakemond, 2010). Some firms may also emphasize development partnerships with customers as a key element in their service strategy (Gebauer, 2008). In addition, firms may be strongly focused on improving the efficiency of the current services and compete as cost leaders and industrializers (Gebauer, 2008; Kowalkowski, et al., 2015).

This study illustrated that the differences in the focal firm service strategies were somewhat reflected in the way firms treated customer involvement in service portfolio development. First, when product-oriented strategies were prevalent, firms put stronger emphasis on internal service development. Second, when the offered solutions were based on outsourcing and performance provision, the focal firms continuously pursued development projects with all of their key customers. Moreover, owing to the nature of the business, customer participation was found to be a necessity in developing the firm service portfolio, and the focal firm was highly dependent on customer resources, permissions, and knowledge in service development. Third, industrialization of the services was mainly regarded as an internal issue, where customer involvement was not identified as a primary tool in service portfolio development. In contrast, development partnerships emerged as a strategy, where certain customers were especially keen to be involved in focal firm service development. In addition, the participating focal firms had different positions in the value chain, which likely influenced the way in which customer involvement was treated. For example, owing to temporary outsourcing contracts, the focal firm of FLOW wanted to build dense contacts with customer on different organizational levels. The focal firm also needed to show that it was actively developing customers' processes. Hence, involving customers in development projects had tactical value in terms of relationship building with customers.

This study covered all the previous service strategies to some extent. However, none of the studied firms exclusively followed a certain service strategy but rather combined the elements of different strategies in a multifaceted manner (cf. Kowalkowski, et al., 2015). The study showed that the service strategies of the two manufacturing firms (focal firms of SCALE and DEVICE) were somewhat aligned as both emphasized services as a differentiator in competition. However, the former put more emphasis on selling availability whereas the latter was more focused on industrialization (e.g., productization of services) in its service strategy. The third case (FLOW), in contrast, differed from the other two cases because the focal firm essentially competed by providing performance- and outsourcing-based solutions. All focal firms also stressed on development partnerships in their strategy. However, within the case of FLOW, development partnerships were in a more central role in the focal firm service strategy in comparison with the two other cases.

Consequently, this study implies that the prevalent service strategy(s) can both explain the applied customer involvement approach of the industrial service providers and guide its selection in a normative sense. In the earlier research, the link between service strategy and customer involvement has not been thoroughly

investigated. This deficiency could be explained by the strong focus of the earlier customer involvement research on the individual services and projects (cf. Alam, 2002; Mahr, et al., 2014; Storey and Larbig, 2018; Westh Nicolajsen and Scupola, 2011) that may have directed the focus on the core service attributes. Customer involvement research also originates from the product context, where service strategy, obviously, is not a central concept. Moreover, much of the customer involvement literature in the service setting has not focused on B2B services but has included B2C services (e.g., Carbonell and Rodriguez Escudero, 2015; Hsieh and Hsieh, 2015; Storey and Larbig, 2018). In a B2C setting, the customization of the offerings to meet customer needs within long-term relationships as well as the co-production of value typically have a smaller role than in the B2B setting (Fitzsimmons and Fitzsimmons, 2008, pp. 11–12). This may also explain why only little attention has been paid to some service strategy dimensions, such as firm–customer collaboration.

6 CONCLUSION

This research produced several implications that together inform the main research question of the study. This chapter elaborates this main question and summarizes both scientific and managerial contributions of this research. Then, the trustworthiness of the study is discussed, and directions for future research are suggested.

6.1 Scientific contributions

The overall goal of the study is to provide novel, scientific understanding of how customer involvement can benefit industrial service providers in developing their portfolios. Accordingly, the main research question of the study is as follows: *How can industrial service providers benefit from customer involvement in service portfolio development?* The study concludes that in developing the service portfolio, industrial service providers can benefit from customer involvement more strategically than what the existing understanding generally indicates (cf. Alam, 2002; Cui and Wu, 2016; Mahr, et al., 2014; Storey and Larbig, 2018; Witell, et al., 2011). However, fully capitalizing on customer involvement requires that service providers understand the distinct characteristics of the customer involvement forms and their applicability to different purposes. It also requires different customer involvement methods and approaches to be used concurrently.

Following the discussion in the previous chapter, this study specifically illustrates that service providers can utilize customer involvement in the multiple directions that characterize industrial service development, take advantage of different customer involvement forms but for different purposes, and need to combine exploitative and explorative customer involvement approaches to fully utilize customer contributions. This study also illustrates that service strategy is linked to customer involvement and could provide a basis for the selection of a firm's customer involvement approach. In addition, the study empirically supports the conception of industrial service offering development as a complex, multidirectional phenomenon, which necessitates versatility from customer involvement. Figure 18

complements the initial positioning of the study (see, Figure 18) and provides an overview of the customer involvement concept in the industrial service portfolio setting.

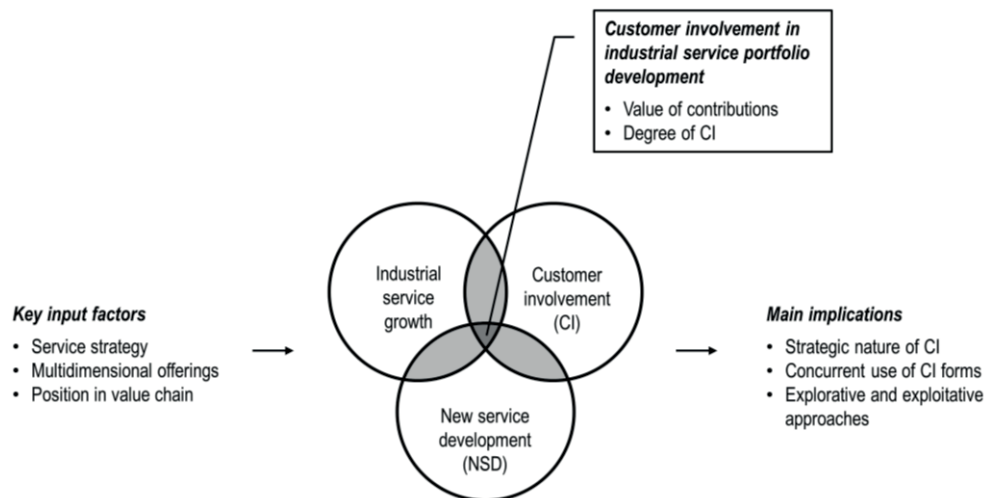


Figure 18. A summary of the customer involvement concept in the industrial service portfolio setting

This study contributes to the service growth, NSD, and customer involvement literature in several ways. First, the study contributes to the service growth literature by complementing emerging research on the multidirectional and multifaceted nature of industrial service development (Kowalkowski, et al., 2015; Matthyssens and Vandenbempt, 2010; Raddats and Kowalkowski, 2014; Windahl and Lakemond, 2010). The study demonstrates that service providers concurrently develop their offering on several fronts (i.e., offering development modes in the present study), as argued especially by Kowalkowski et al. (2015). By focusing on customer involvement, the study shows that customers could contribute to concurrent offering development by providing versatile and rich knowledge and by participating in service development in multidirectional and multifaceted settings, thus showing that customer involvement can be an efficient management tool in multidirectional offering development (cf. Kowalkowski, et al., 2015).

In particular, this study demonstrates that industrial firms could take advantage of customer involvement in their transition toward services. Within the service growth setting, this often means specifying service transitions, trajectories, or service offering dimensions, which are at the center of the phenomenon. In contrast to the

present study, the prior research has not paid much attention to customer involvement in defining these dimensions. Instead, the focus of service growth research has been on the manufacturers' side (see, Brax and Jonsson, 2009; Story, et al., 2017; Vaitinen, 2019). Thus, the current study supplements service growth literature by showing that customer involvement not only supports the development of individual services but also contributes to the choices of how a firm seeks growth through services on a more strategic level.

Second, this study contributes to the customer involvement and NSD literature by illustrating the strategic nature of knowledge that originates from customer involvement. Much of the prior research on customer involvement has been centered on the level of individual services (e.g., Mahr, et al., 2014; Storey and Larbig, 2018; Westh Nicolajsen and Scupola, 2011). However, the present study elucidates that customer involvement can produce knowledge, which is relevant to multiple services or the entire service portfolio. Accordingly, customer service elements and interfaces, service packaging and standardization, interorganizational collaboration, and development partnerships were highlighted as issues that require attention on a multiple services level and where customer involvement can supplement internal development. In the earlier customer involvement research, these issues have received only intermittent attention, despite their centrality as innovation dimensions in NSD (see, Gebauer, 2008; den Hertog, 2000; Jong and Vermeulen, 2003; Storey and Easingwood, 1998; Voss and Hsuan, 2009).

Moreover, customer involvement is sometimes opposed because the captured knowledge often relates to existing offerings and is therefore expected to mainly drive incremental changes in the service portfolio (see, Blazevic and Lievens, 2008). The present study, however, demonstrates that knowledge about existing offerings can be of high importance to industrial service providers as it may offer novel insights and complementary views, which can be difficult to access otherwise. The previous research on industrial service growth has also pointed out that service transitions often take place through incremental rather than radical changes (Matthyssens and Vandenbempt, 2008). Thus, the knowledge that promotes incremental advancements has particular value in the industrial service setting, as shown by the present study.

Third, this study complements earlier studies on customer involvement by showing that both exploitation- and exploration-based approaches (March, 1991) are needed if industrial service providers aim to fully utilize customer involvement in developing entire service portfolio of a firm. In line with previous research (Cui and Wu, 2017; Witell, et al., 2011), the study demonstrates that different customer

involvement forms are suitable for different purposes in the industrial service setting. In particular, the study contributes to customer involvement literature by showing that customer involvement should not be treated as an “either-or” issue. The prior research often deals with customer involvement forms as a selection between customers as knowledge providers and co-developers (e.g., Blazevic and Lievens, 2008; Cui and Wu, 2017; Witell, et al., 2011). Instead, the study indicates that different customer involvement forms should be seen as complementary techniques, which produce different but supplementing results under different conditions.

Finally, this study contributes to the service growth and customer involvement literature by emphasizing a link between a firm’s service strategy and the use of customer involvement. It explicates that a firm’s service strategy may direct customer involvement and therefore can both explain the differences in how firms take advantage of customers as well as give normative guidance to the selection of the firms’ customer involvement approaches and forms. This study supplements earlier research as the link between a firm’s service strategy and customer involvement has not been commonly addressed in the earlier research.

For example, if a service provider follows an equipment supplier strategy that highlights after-sales services in supporting product-centered business (Kowalkowski, et al., 2015; Tukker, 2004), they are advised to seek customer knowledge in the form of customer needs and feedback from the existing customers (i.e., exploitation). In contrast, if a company intends to compete using advanced availability-based services as a key differentiator (Gebauer, 2008; Kowalkowski, et al., 2015), it is recommended to include customers in the various stages of service development to create new knowledge, produce novel insights, and reveal the needs that are of latent nature (i.e., exploration). Then again, a development partnership strategy (Gebauer, 2008) may suggest co-development of the collaboration model with the selected key customers or lead users. Finally, concurrent service strategies (Kowalkowski, et al., 2015; Windahl and Lakemond, 2010) suggest the parallel use of different customer involvement forms and approaches that take into account the relative emphasis placed on the particular service strategy dimensions.

6.2 Managerial implications

The exploration of customer involvement in service portfolio development revealed insights that have managerial relevance to industrial service companies and possibly to other B2B service firms. First, managers of industrial service firms are urged to

broaden their conception of the potential benefits of customer involvement. Customer involvement not only provides useful knowledge for the purposes of service or product development but also supports service business development more broadly. In this regard, developing service standardization or packaging, promoting customer service elements, or organizing customer interface and interorganizational relationships are issues for which firms could increasingly turn to customers. In fact, customer involvement could be more useful in supporting issues other than ideating radically new, advanced services, which is often highlighted in discussing the usefulness of customer involvement. Thus, industrial service managers are encouraged to challenge the notion sometimes held by business practitioners that customer involvement is not advisable because it does not provide meaningful knowledge or the obtained ideas are not sufficiently innovative or otherwise justifiable.

Second, managers can seek support from customers in outlining service-driven growth strategies. Customers can provide valuable insights to managers in many key dimensions through which industrial firms proceed toward service business, such as developing product-independent services, process-oriented services, bundling of services, solutions, or relational services. Moreover, key customers or lead users could be highly interested in engaging with service portfolio development in the industrial setting. For example, developing partnership-based collaboration with customers is a potential area for capitalizing on customers' involvement. Thus, customer involvement can work as a management tool in putting customer-centricity into practice within the framework of service growth.

Third, industrial service firms are encouraged to be aware of the inherent differences between customer involvement forms and their suitability for different purposes. Firms can benefit from customer involvement in a number of ways, but managers need to understand the characteristics of customer involvement forms and their applicability to different purposes. Moreover, to fully benefit from customer involvement, it is recommended that industrial service firms both exploit the already available customer knowledge and explore completely new knowledge. Finding a right mix of selected methods requires consideration of the firm's service strategy and the main goals in the portfolio development, for example, if the firm places emphasis on fine-tuning existing services, creating new competitive advantage through completely new services, or promoting close cooperation with customers. Furthermore, industrial service firms are recommended to use a mix of different customer involvement forms instead of relying exclusively on traditional market

research techniques, co-development approaches, or innovation toolkits and communities in the service portfolio development.

Finally, the frameworks developed in this study can be used as management tools when industrial service firms make decisions on how to develop their service portfolio in practice. For example, the conceptual framework of the study could be used as a checklist in ensuring that different dimensions of portfolio development are taken into consideration and that different customer involvement forms are considered. Moreover, cross-comparison matrices can be used to exemplify what kind of customer knowledge a firm receives or lacks and how the knowledge relates to different portfolio development dimensions. This can help industrial service firms to design the use of customer involvement in a way that is balanced and aligned with the firm's objectives and the distinct qualities of different customer involvement techniques. Comparison matrices may also direct attention to the complementary use of knowledge exploitation and exploration, which is advisable to fully benefit from customer involvement in service portfolio development.

6.3 Evaluation of research and limitations

The traditional evaluation criteria of *validity* and *reliability* have their roots in quantitative research. In qualitative studies, especially when research relies on relativist ontology and subjectivist epistemology (see, 3.1), it is recommended to substitute validity and reliability for the evaluation criteria that better accommodate the philosophical premises of qualitative approaches (Eriksson and Kovalainen, 2008, p. 294). Lincoln & Guba (1985) replaced validity and reliability with a concept of trustworthiness, which covers four aspects: *credibility*, *transferability*, *dependability*, and *confirmability*. In the following, each of these issues is elaborated in relation to the present study.

Credibility refers to the idea of how plausible are the findings and conclusions of the research, for example, whether practitioners and readers find the study credible and does it generally make sense (Miles, et al., 2014, p. 312). In the current study, credibility was ensured especially through familiarization of the researcher(s) with the case contexts and through member checking (Stake, 1995, p. 115), thus making sure that the understanding gained by the researcher makes sense (see, 3.4). This was done in three stages during the research. First, workshops were organized with the focal firms to introduce the case context to the researcher(s) before data collection. Second, the preliminary findings were discussed in workshops with focal firm

personnel. Finally, each focal firm was allowed to review and comment the final findings and conclusions. Moreover, quotations were abundantly used for presenting the findings to offer the reader a good sense of the data in the form of “thick description” to demonstrate the credibility of the data and the reasoning for meeting the research objectives (see, Geertz, 1973).

Transferability refers to the wider applicability of the findings with other contexts and connection with prior research and theories. It is not about generalizing or replicating the findings to other settings as this is not the goal of qualitative case studies; it is about showing the similarities with other research contexts (Eriksson and Kovalainen, 2008, p. 294; Miles, et al., 2014, p. 314). In this research, transferability was first addressed by describing the sample and its characteristics as well as data collection and analysis to enable comparison with other settings (see, Miles, et al., 2014, p. 314). Second, the conceptual framework of the study was derived from the prior research, and the research findings on customer involvement from other settings were reviewed in the theoretical background chapter. The present study also demonstrated that the findings have relevance to prior research (see, 5 and 6.1). Finally, the implications for further research are discussed to encourage the replication of the findings in other contexts (see, 6.4).

Dependability is concerned with the quality of the research process in terms of logic, consistency, traceability, and documentation (Eriksson and Kovalainen, 2008, p. 294; Miles, et al., 2014, p. 312). To ensure dependability and transparency, the present research has followed the guidelines typically recommended for qualitative case studies and interviews (e.g., Gibbert and Ruigrok, 2010; Piekkari, et al., 2010; Stake, 1995; Yin, 2003). For example, all interviews were conducted face-to-face, recorded, and transcribed in verbatim; the sample and the basic characteristics of the interviewees were documented and introduced; the data collection and analysis process were described in detail; the applied coding schemes and interview outlines were presented; and illustrative quotations of the data were provided when presenting the findings.

Finally, confirmability refers to the idea that the findings and conclusions are not imagined by the researcher but have been derived from the data in a traceable manner that is understandable to others (Eriksson and Kovalainen, 2008, p. 294). In the present study, confirmability was secured by providing a detailed description of how the chain of reasoning proceeded from data collection to drawing conclusions. Moreover, the research process was documented during all steps of the research, and the data and other documentation was stored according to good research practices to permit audit or reanalysis if needed (see, Miles, et al., 2014, p. 312).

It is admitted, however, that this study, as is likely the situation with any other case studies, cannot completely satisfy all trustworthiness criteria (Gibbert and Ruigrok, 2010; Miles, Huberman and Saldaña, 2014, p. 311). As pointed out by Miles et al. (2014, p. 311), the problem of quality and authenticity of the findings and conclusions is always present in qualitative research. In essence, the current study has followed the generally recommended case study practices, as discussed above, and ensured transparency in reporting to show how the research was conducted in practice in order to ensure a sufficient level of trustworthiness.

Nevertheless, some limitations in relation to the study and its research design remain. Some of these limitations could also provide a starting point for future research. First, the findings of this study are based on the exploration of three cases and as such, only represent a small sample of the vast realm of B2B services and industrial service business. For example, the study only covered some industrial service categories, and services such as administrative services, financial services, and recycling services were not included in the service portfolios studied (see, Rabetino, et al., 2015). Moreover, the selected cases were mainly centered on Finland, and despite having a few participating customer firms from other countries (Belgium, Poland, and the Netherlands), the used sample represented only a narrow snapshot of the extensive, international, and rather heterogeneous B2B service business realm. The findings likely have some resonance with similar contexts, for example, with other industrial service firms, services, or countries. Nevertheless, the implications for the study are not claimed to hold in other settings outside the scope of the cases studied.

Second, the views of the interviewees, especially on the customer side, only represent individual views and not necessarily the views of the entire organization, even though the objective was to select highly knowledgeable interviewees (see, Eisenhardt and Graebner, 2007). The participating customer organizations were also suggested by the focal firms. Although the selected customer firms were chosen to represent typical customers of the focal firms, it is possible that the sample does not present a balanced view of the focal firms' customers. For example, it is possible that the selected customers had a closer than average relationship with the focal firms or that their views were more positive toward the focal firm than the other customers that would have been randomly selected.

Third, the research design only enabled the exploration of service portfolio development in a cross-sectional setting. A longitudinal research approach would likely provide a more comprehensive picture, especially as "development" is fundamentally a dynamic phenomenon. Fourth, owing to the explorative nature of

the research, the conceptual framework focused on the rather generic categories of both customer involvement forms and offering development modes. Admittedly, a more fine-grained classification would be possible and could likely provide complementary results. As an example, there are specific customer involvement tools and methods available, especially in the B2C context (Edvardsson, et al., 2012), that were excluded from the study (see, 1.2).

Fifth, the research process was conducted following an inductive approach, and access to data was limited to the scope of the S4Fleet research program (see, 1.3). This meant that some issues only emerged from the data during the analysis stage. At that time, however, it was not possible to change data collection and the used interview outline, for example, by addressing some issues more in-depth with the interviewees. Therefore, such issues remain to be addressed by the future research. For instance, the role of the key customers in encouraging service providers to develop partnership-based collaboration was one such issue that inductively emerged in the analysis stage.

Finally, this research theoretically draws from the service growth, NSD, and customer involvement literature. The extensive volume of research conducted on these research fields limits the possibilities of taking into account all earlier research that could be relevant to the present research topic. As for the service growth literature, a recent bibliometric study alone identified over 1000 related scientific articles in the field (Rabetino, et al., 2018). This posed a challenge in reviewing the earlier research and getting hold of the theoretical background in this research. In contrast, it also opens up the possibilities to alternative theoretical framing and thus warrants complementary research that can further increase the understanding of the research topic. A partly obscure and excessive theoretical background may also be a potential explanation of why earlier research has not combined service growth, NSD, and customer involvement in a similar fashion.

6.4 Future research opportunities

This research was the first attempt to study customer involvement in service portfolio development within the industrial context. As discussed above, the purpose of this study was not to pursue generalization of the findings to other industrial service settings or other B2B service contexts. Instead, the study was focused on elaborating the existing understanding of customer involvement and service portfolio development (see, Ketokivi and Choi, 2014). As the findings of the study

were based on three cases and a particular set of services in the industrial service settings, future research could take a similar approach in other settings, for example, within other B2B service settings, such as engineering, facility, R&D, security, or staffing services. Moreover, the future research could either replicate the applied research setting (i.e., same type of industrial services) or choose a different setting to find similar or contrasting results (see, Yin, 2003, p. 47).

An operationalization of the offering development modes could also be considered to enable measurement and testing of the applied conceptual framework using quantitative research approaches. Prior research on customer involvement forms already offers some ways of quantitatively testing customer involvement forms (see, Cui and Wu, 2017, 2016; Gruner and Homburg, 2000; Mahr, et al., 2014; Witell, et al., 2011). These studied could be complemented by combining them with the operationalized offering development modes. It would be highly interesting to see how customer involvement forms appear under different offering development modes when tested with a broad set of data either in an industrial setting or across different industries.

Moreover, the present study did not find any examples wherein the role of innovation had been delegated to customers (see, Cui and Wu, 2016; von Hippel and Katz, 2002; Kaulio, 1998). Future research could take up this shortcoming and try to identify cases wherein the role of innovation is given to customers in the industrial service setting. For example, if innovation toolkits, online innovation communities, or open software communities (Antikainen, 2011; von Hippel and Katz, 2002; Nambisan, 2002) are applied, it would be of interest to see if and how they benefit service portfolio development and distinct offering development directions.

This was one of the first studies that explicitly linked customer involvement to the service strategies, service transition trajectories, and offering development dimensions that essentially characterize the service growth phenomenon (see, Kowalkowski, et al., 2015; Oliva and Kallenberg, 2003; Penttinen and Palmer, 2007; Raddats and Kowalkowski, 2014). Although the present study demonstrated that customer involvement could contribute to the definition of service trajectories and offering dimensions and could be influenced by a firm's service strategy, it did not investigate the issue in depth as the focus of the study was on the different offering development modes. Nonetheless, the role of customers and their potential contributions to the service growth seem to be particularly intriguing topics in the light of the present study. Therefore, more research is called for on customer involvement in relation to service trajectories, offering dimensions, and service

strategies. The first steps toward this direction would be explorative inquiries, such as case studies that lay ground and generate understanding of the key concepts and relationships.

A similar approach could also be applied to broaden the scope of customer involvement to other relating research fields. Business model innovation (Björkdahl and Holmén, 2013; Chesbrough, 2007; Foss and Saebi, 2016; Schneider and Spieth, 2013; Spieth, et al., 2014) and service modularity (Bask, et al., 2011; Brax, et al., 2017; Carlborg and Kindström, 2014; Iman, 2016; Voss and Hsuan, 2009) are examples of relatively new research fields that could benefit from the introduction of the customer involvement perspective. In both fields, the role of customer involvement has been mainly neglected so far.

Finally, a voluntary involvement of key customers or lead users in promoting development collaboration in a firm–customer relationship is a phenomenon that corresponds with an emerging research field of customer engagement (Brodie and Hollebeek, 2011; van Doorn, et al., 2010; Hollebeek, et al., 2019; Jaakkola and Alexander, 2014; Pansari and Kumar, 2017). Consequently, more research on key customer engagement in the B2B setting is called for to extend the initial findings of this study.

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Annex 1: Interview outlines

Focal firm interview outline

1. Introduction
 - Aim and confidentiality of the interview
 - Background information of the focal firm and the interviewee
 - Interviewee's position and duties within the firm

2. Current state of service portfolio
 - How would you describe the firm's service portfolio?
 - What are the components that form the portfolio?
 - Why is the portfolio structured as it is?
 - What kind of extensive solutions are offered? How are they combined?
 - How important is the service portfolio to the firm?
 - How does the portfolio differ from competitors' portfolios?

3. Development of service portfolio
 - How is the service portfolio developed?
 - How has the portfolio changed over time?
 - What is the main direction and aim in developing the portfolio?
 - From where does the firm get ideas on how to renew the portfolio?
 - What is the role of customers in portfolio development?
 - How are customers involved?
 - How is customer experience taken into account?
 - What are the firm's strengths and weaknesses in service development?

4. Customers in service development
 - What kind of knowledge does the firm gather from customers?
 - What kind of knowledge is needed in portfolio development? How is it used?
 - How is the obtained customer knowledge shared internally within the firm?

- What kind of knowledge is lacking, especially for portfolio development?
 - What are the challenges in collecting, sharing, and utilizing customer knowledge?
 - How could customers be better utilized to support portfolio development?
5. Future development needs
- How will customer needs change in future?
 - What are the three most central development needs in terms of service portfolio development?
 - What are the three most central development needs in relation to customer knowledge usage?

Customer interview outline

1. Introduction
 - Aim and confidentiality of the interview
 - Background information of the customer firm and the interviewee
 - Interviewee's position and duties within the firm

2. Service portfolio of the focal firm
 - How is the business relationship with the focal firm? How has it changed over time?
 - How would you describe the focal firm as a company and as a partner?
 - What services does the firm buy from the focal firm? Why?
 - How would you describe the portfolio of the focal firm? How well does it meet the needs of your firm? Is something missing?
 - How important/critical are the services of the focal firm to your business?
 - Why has your firm chosen the focal firm as your supplier? How does the focal firm differ from its competitors?

3. Purchasing services
 - How does the firm usually purchase services? What are the key criteria?

- How easy/difficult is it to buy services from the focal firm? Could it be made easier somehow?
 - How clear are the entities to buy? Do you get a clear picture of what will be received based on the bid/tender?
 - How is the customer service during the planning and tender stage?
 - In what kind of situation would you change the service provider?
4. Services and cooperation in practice
- How is the cooperation with the focal firm in practice, e.g., scope, contact persons, frequency, information exchange, and coordination?
 - What information is needed from your firm to enable the focal firm to deliver the services? How openly do you provide information about your business and needs? In what form is the knowledge?
 - How do you participate in service delivery and development? How important is it to the outcome?
 - How could cooperation with the focal firm be developed?
 - Do other service providers have practices from which the focal firm could learn?
 - What are you especially satisfied and/or dissatisfied with regarding the focal firm and its services?
 - What are the central benefits of cooperating with the focal firm? What is the outcome of the services?
5. Future service needs
- What are the key challenges, opportunities, and trends within your industry?
 - In which direction is your service purchasing developing in future?
 - How should the focal firm develop to better meet your needs in future?
 - Would you recommend the focal firm to other companies? Why?

Annex 2: Coding usage

Code family	Code identifier	Code	Accounts of...	SCALE		DEVICE		FLOW		In total
				Firm	Customer	Firm	Customer	Firm	Customer	
Offering development modes	A1	IMP-CUR	...improving current basic services	15	50	118	105	32	71	391
	A2	CUS-SERV	...developing customer service elements	27	75	37	35	22	52	248
	A3	MORE-COMP	...developing more complete offerings	55	30	89	45	54	52	325
	A4	MORE-ADV	...developing more advanced services	93	74	57	28	61	57	370
	A5	GENERIC	...developing portfolio in general	96	123	16	0	174	130	539
Customer involvement forms	B1	NEEDS	...customer needs	132	170	143	95	121	174	835
	B2	FEEDBACK	...customer feedback from services; or, customers giving feedback during interviews	20	170	39	105	38	97	469
	B3	IDEAS	...how ideas to develop portfolio are created; or, customer providing ideas during interviews	1	18	11	10	12	4	56
Complementing codes	B4	CO-DEVELOP	...co-development of services	16	16	34	54	76	65	261
	B5	INNOVATION	...customers taking the role as innovators	0	0	0	0	0	0	0
Case-specific codes	C	FIRM GOAL	...focal firm goals regarding portfolio development	121		96		135		352
	D1	CUS-KNOWLEDGE	...received or needed knowledge from customers; or, description of what knowledge customers provide to focal firms	52	0	0	0	53	3	108
	D2	REFERENCES	...references and their importance	0	4	0	4	7	0	15
	E1	Firm description	...the organization represented by the interviewee, e.g., industry, products/services and markets	58	40	82	37	129	63	409
	E2	Interviewee responsibilities	...interviewee's position and responsibilities in the organization	4	18	15	12	15	14	78
	E3	Portfolio description	...the focal firm portfolio, e.g., what are the components included and why	18		18		20		56
	E4	Relationship	...services purchased and the customer company's relationship with the focal firm		26		39		18	83
	F1	Potential quotation	...exceptional importance or interest for the researcher, e.g., potential quotation for the research report	18	5	12	3	27	23	88
	C-B1	Systems	...focal firm systems and their use (e.g., methods for customer feedback)			15				15
	C-B2	Internal coordination	...how a focal firm is internally organized			25				25
C-B3	Over serving	...satisfactory service level			6				6	
C-C1	Transactions	...transaction-based pricing and shifting to its use					14	10	24	
Total				726	819	813	572	990	833	4753

Annex 3: Within-case themes

Table 26. Within-case themes: refining basic services portfolio

	SCALE		DEVICE		FLOW	
	<i>Focal firm</i>	<i>Customers</i>	<i>Focal firm</i>	<i>Customers</i>	<i>Focal firm</i>	<i>Customers</i>
<i>Needs</i>	Startup and training	Sudden problems, failures	Needed qualities	Generic qualities	Varying services	Particular services
	Basic maintenance Miscellaneous	Life-cycle perspective Choosing service supplier Miscellaneous	Strategic needs Finding out needs Customer goals Miscellaneous	Specific competences External resources Strategic considerations	Flexibility Efficiency improvements Miscellaneous	Non-core service provider Function criticality Overall characteristics
<i>Feedback</i>	Miscellaneous	Basic maintenance Installations Varying personal skills Miscellaneous	Generic feedback Reporting Service delivery Feedback through meetings Feedback through systems Miscellaneous	Reporting Response times and availability Personnel and competences Communication and cooperation Miscellaneous	Regular feedback asked Reclamations Miscellaneous	Day-to-day operations Packing expertise Measures and giving feedback Miscellaneous
<i>Ideas</i>		Miscellaneous	Miscellaneous			Miscellaneous
<i>Co-development</i>	Miscellaneous	Miscellaneous	Customer participation Joint discussions Joint projects or pilots Miscellaneous	Customer participation Information exchange Common offering Miscellaneous	Customer participation needed Miscellaneous	Production forecasts Access to enterprise resource planning system (ERP) Operative communication Miscellaneous

Table 27. Within-case themes: promoting customer service elements

	SCALE			DEVICE			FLOW		
	<i>Focal firm</i>	<i>Customers</i>	<i>Focal firm</i>	<i>Customers</i>	<i>Focal firm</i>	<i>Customers</i>	<i>Focal firm</i>	<i>Customers</i>	
<i>Needs</i>	Qualities and skills	Frequency of contacts	Long-term relationships and old contacts	Miscellaneous	Regular meetings	Makes our life easy			
	Contacts	Communication	Importance of web pages		Personal relationships	Right service attitude			
	Miscellaneous	Good service characteristics	Good customer service		Miscellaneous	Daily cooperation and contacts Common goals Miscellaneous			
<i>Feedback</i>	Customer interface	Contacts and relationship	Miscellaneous	Contacts	Miscellaneous	Service attitude			
	Miscellaneous	Communication and customer service		Tenders and buying		Contacts			
		Tender stage		Cooperation and communication		Cooperation			
<i>Ideas</i>		Third-party involvement				Miscellaneous			
		Organizational change							
		Miscellaneous		Miscellaneous					
<i>Co-development</i>			Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous			

Table 28. Within-case themes: developing more complete offerings

	SCALE			DEVICE			FLOW		
	<i>Focal firm</i>	<i>Customers</i>	<i>Focal firm</i>	<i>Customers</i>	<i>Focal firm</i>	<i>Customers</i>	<i>Focal firm</i>	<i>Customers</i>	<i>Customers</i>
<i>Needs</i>	Outcomes and solutions	Solution-like deliveries	Level of contracts	Level of contracts	Level of contracts	Level of contracts	Expanding customer relationships	More complete contracts	More complete contracts
	Contracts	Partnerships	Single customer interface	Efficiency through centralization	Efficiency through centralization	Efficiency through centralization	Broad and versatile services	Extending services over time	Extending services over time
	Standardization and customization	Contracts	Outsourcing	Partnerships	Partnerships	Partnerships	Differing autonomy and integration	Own firm references	Own firm references
	Miscellaneous	Miscellaneous	Service packaging	Miscellaneous	Miscellaneous	Miscellaneous	Customer's decision extensiveness	Changing management work	Changing management work
<i>Feedback</i>			Miscellaneous				Miscellaneous	Miscellaneous	Miscellaneous
		Project management	Contracts	Contracts	Contracts	Contracts	Managing contracts	Managing contracts	Managing contracts
<i>Ideas</i>		Partnerships	Miscellaneous	Focal firm internal coordination	Focal firm internal coordination	Focal firm internal coordination	Changes in relationships	Changes in relationships	Changes in relationships
		Miscellaneous		Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous
			Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous
		Miscellaneous		Common offering	Common offering	Common offering	Miscellaneous	Miscellaneous	Miscellaneous
<i>Co-development</i>									
									Miscellaneous

Table 29. Within-case themes: advancing portfolios with advanced services

	SCALE			DEVICE			FLOW		
	<i>Focal firm</i>	<i>Customers</i>	<i>Focal firm</i>	<i>Customers</i>	<i>Focal firm</i>	<i>Customers</i>	<i>Focal firm</i>	<i>Customers</i>	<i>Customers</i>
<i>Needs</i>	Remote services	Remote vs. on-site support	Remote monitoring, IoT	Consulting and development suggestions	Developing efficiency	Developing methods and systems	Developing logistics processes	Shift to transaction-based operation	Utilize benchmarking
	Capabilities regarding remote services	Digitalization in general	Life-cycle analyses and consultation	Advanced competences	Development suggestions	Lean management	System projects	Miscellaneous	Overall development approach
	Data transfer and use	Wider process support	Proactive service support	Miscellaneous	Over-selling	Consulting and recommendations	Development suggestions	Benchmarking	Handling outsourced units and personnel
	Modernizations and expert services	Proactive system support	New technologies and services	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous
<i>Feedback</i>	Novel services	Remote services	Remote monitoring	Development suggestions	Development projects	Overall development approach	Development suggestions	Benchmarking	Handling outsourced units and personnel
	Limitations in received feedback	Consulting	Miscellaneous	Over-selling	Consulting and recommendations	Development suggestions	Development projects	Overall development approach	Development suggestions
		Advanced problem solving	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous
<i>Ideas</i>		Miscellaneous	Miscellaneous	Information systems and data analyses	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous
		Remote monitoring	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous
		Advanced technologies support	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous
<i>Co-development</i>	Data access and management	Learning from focal firm	Customer pilots	Miscellaneous	Customer participation required	Development projects	Customer pressure	Development cooperation	Customer pressure
		Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous

