

Topias Rantanen

**DIGITAL VALUE-ADDED SERVICES IN
GOODS-CENTRIC COMPANIES**
Customer perceived value and value capture logics

Master's Thesis
Faculty of Engineering and Natural Sciences
Examiners: Professor Miia Martinsuo,
Khadijeh Momeni, post-doctoral researcher
April 2021

ABSTRACT

Topias Rantanen: Digital value-added services in goods-centric companies: Customer perceived value and value capture logics
Master's Thesis, 87 pages, 2 Appendix pages
Tampere University
Master's Degree Programme in Industrial Engineering and Management
April 2021

Physical and digital worlds are becoming more and more connected in business-to-business products and services. Goods-centric companies are now leveraging the technological development and enhancing product offering with digital value-added services. These novel services are targeted to, for example, support the business decision making and reduce risks by offering adaptive solutions. Digital services in this context are usually delivered to customer using digital service platforms which have the characteristics of bringing also multiple different service providers together. As the make-to-order (MTO) manufacturing companies are digitalizing their products and services there is a current need for researching the digital servitization in this context. Also since the digital services are not the main business for the companies in the context of this research, there is a need for thorough understanding on the possible value capture logics. These are not only the monetary values but also non-monetary values such as value from the data.

This research is done with a collaboration of a target company but is exploratory in nature. The goal is to identify the wide range of the customer perceived value in digital value-added services as well as value capture logics for the service provider. In the empirical part a qualitative data was collected with semi-structured expert interviews. The respondents were chosen to work as key informants to represent the target company's environment. Each of the respondents represented a company that has already digital services in their offering or were seen as otherwise valuable informants for the target company and its current situation.

The results show that the customer perceived value of digital services is related to real-time and reliable data, risk management, enhanced usability of the tangible product and business related benefits. The product usage data works as a base of all these customer values but eventually the digital service platform will enable unified customer experience that create sustainable and adaptive value for the customer. Service provider's role in value creation depend highly on the level of intelligence in the digital service offering. For early phase of digital service development monetary value does not play a big role. Instead, the value capture logics are based mainly on the product usage data. The data can be used for e.g., product development and customer behaviour analysis. However, as the context is in tangible product providers, ultimately the digital services create indirectly more sales and thus more monetary value.

The findings contribute to the current literature by highlighting those aspects that are especially interesting in the context of MTO manufacturing companies that does not offer capital goods. For the target company and companies in similar situation this research offers an overview on what values do the customers esteem in digital services as well as how to leverage the usage data. Also, this research offers practical roadmap for the target company on what activities should be done and which customer values are critical. However, more research is needed in terms of market related differences in customer value and the service offering itself. In addition to that, the concept of digital service platforms needs deeper research especially on the financials and multiple service provider collaborations.

Keywords: customer value, value creation, value capture, digital value-added service, digital service platform

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

TIIVISTELMÄ

Topias Rantanen: Digitaaliset lisäarvopalvelut valmistavan teollisuuden yrityksissä: Asiakkaan kokema arvo ja arvon haltuunotto
Diplomityö, 87 sivua, 2 liitesivua
Tampereen yliopisto
Tuotantotalouden diplomi-insinöörin tutkinto-ohjelma
Huhtikuu 2021

Fyysinen ja digitaalinen maailma yhdistyvät yhä tiiviimmin yritysten välisissä tuotteissa ja palveluissa. Tuotokeskeiset yritykset hyödyntävät teknologista kehitystä ja tuovat tuotevalikoimaansa digitaalisia lisäarvopalveluita. Nämä uudet palvelut auttavat asiakasta esimerkiksi tukemalla liiketoiminnan päätöksentekoa sekä vähentämällä riskejä mukautuvien ratkaisujen avulla. Digitaaliset palvelut tarjotaan asiakkaalle yleensä hyödyntämällä digitaalisia palvelualustoja, joille on ominaista monien eri palveluntarjoajien välinen yhteistyö. Koska valmistavan teollisuuden yritykset ovat tuoneet digitaalisia ominaisuuksia tuotteisiin ja palveluihin, on tällä hetkellä tarpeen tutkia digitaalisia lisäarvopalveluita tässä kontekstissa. Digitaaliset palvelut eivät myöskään ole näille yrityksille pääasiallista liiketoimintaa, joten on tarpeen ymmärtää perusteellisesti arvon haltuunottoa palvelua tuottavien yritysten näkökulmasta. Tämä ei tarkoita vain rahallisia, vaan myös ei-rahallisia arvoja, kuten käyttödataa.

Tämä tutkimus tehtiin yhteistyössä kohdeyrityksen kanssa, mutta se on luonteeltaan kartoittava tutkimus. Tavoitteena on tunnistaa asiakkaan kokemat arvot digitaalisissa lisäarvopalveluissa sekä arvon haltuunottologiikat palveluntarjoajalle. Empiirisessä osassa kerättiin laadullista tietoa puolistrukturoiduilla asiantuntijahaastattelulla. Haastateltavat valittiin edustamaan kohdeyrityksen toimintaympäristöä. Jokainen haastateltavista edusti yritystä, joka on jo tarjonnut digitaalisia lisäarvopalveluita, tai jonka nähtiin olevan muuten arvokas vastaaja kohdeyritykselle ja sen nykyiselle tilanteelle.

Tulokset osoittavat, että asiakkaan kokema digitaalisten palveluiden arvo liittyy reaaliaikaiseen ja luotettavaan dataan, riskienhallintaan, fyysisen tuotteen käytettävyyden parantamiseen sekä liiketoimintaan liittyviin hyötyihin. Fyysisen tuotteen käyttödata toimii kaikkien näiden asiakasarvojen perustana. Digitaalinen palvelualusta tässä kontekstissa mahdollistaa kokonaisvaltaisen asiakaskokemuksen, mikä luo asiakkaalle kestäväää ja toimintaympäristöön mukautuvaa arvoa. Palveluntarjoajan rooli arvonluonnissa riippuu suuresti siitä, kuinka älykkäitä digitaaliset palvelut ovat. Digitaalisten palvelujen kehittämisen alkuvaiheessa niiden rahallinen arvo ei ole merkittävin tekijä. Sen sijaan arvon haltuunottologiikat perustuvat pääasiassa tuotteen käyttödataan. Dataa voidaan käyttää esimerkiksi tuotekehityksessä ja asiakaskäyttäytymisen analysoinnissa. Koska tutkimuksen konteksti on kuitenkin fyysisten tuotteiden tarjoajissa, digitaaliset palvelut tuottavat lopulta epäsuorasti enemmän myyntiä ja siten myös rahallista arvoa.

Tutkimus täydentää nykyistä kirjallisuutta tarjoamalla tarkkaan kontekstiin rajatun kartoittavan tutkimuksen. Tutkimus myös nostaa kirjallisuudesta esille niitä tuloksia, joiden nähtiin olevan juuri tässä kontekstissa merkittäviä. Kohdeyritykselle ja vastaavassa tilanteessa oleville yrityksille tämä tutkimus tarjoaa yleiskatsauksen siitä, mitä arvoja asiakkaat pitävät merkittävinä digitaalisissa lisäarvopalveluissa. Lisäksi tutkimus antaa konkreettisia esimerkkejä käyttödatan hyödyntämiseen. Tutkimuksessa ehdotetaan jatkotutkimukseksi asiakasarvon markkinakohtaisten erojen tarkastelua. Tämän lisäksi digitaalisten palvelualustojen käsite tarvitsee syvällisempää tutkimusta etenkin taloudellisesta näkökulmasta.

Avainsanat: asiakasarvo, arvonluonti, arvon haltuunotto, digitaalinen lisäarvopalvelu, digitaalinen palvelualusta

Tämän julkaisun alkuperäisyys on tarkastettu Turnitin OriginalityCheck –ohjelmalla.

PREFACE

This thesis is the end of one journey and oh boy what a journey it has been. At the same time this thesis marks the beginning of something exciting yet to be discovered. Even though now it's time to be proud of myself, I want to give credit to those who have helped me during this project.

I want to thank the examiners, Miia and Beheshte, who have been guiding me throughout the whole process. Without your valuable advice, I would have been lost many times and the end result would definitely not be the same. A huge thanks goes also to the target company for enabling this thesis and the opportunity to create something valuable. Especially I want to thank my supervisors, Marko and Veikko, who were as excited about the subject as I was and gave golden insights during the project.

Last but not least, the writing process would not have been as smooth as it was if it weren't for my family and friends. Peer support from *Postia*-group contributed especially to important choices of product illustration in the figures. Thank you all for making sure that my wellbeing didn't get lost in the process.

Tampere, 17. of April 2021

Topias Rantanen

CONTENTS

1.	INTRODUCTION.....	1
1.1	Background	1
1.2	The target company	3
1.3	Research objectives and questions.....	4
1.4	Scope of the thesis.....	5
1.5	Structure of the thesis	6
2.	THEORETICAL BACKGROUND	8
2.1	Key concepts.....	8
2.1.1	Products and services	8
2.1.2	Value creation and value capture.....	10
2.2	Servitization in manufacturing companies.....	12
2.2.1	Drivers, development and risks of traditional servitization.....	12
2.2.2	Servitization in business models	14
2.2.3	Service offering frameworks	15
2.2.4	Digital servitization.....	17
2.3	Value creation and perceived customer value of services	19
2.3.1	Perceived customer value in general	19
2.3.2	Service-dominant logic and value cocreation	21
2.3.3	Perceived customer value in service offering and the changing customer needs.....	23
2.3.4	Perceived customer value in digital services and digitalized product platforms.....	25
2.4	Value capture logics in service business.....	27
2.4.1	Revenue models for product-oriented services.....	27
2.4.2	Revenue models and non-monetary value capture in digital service platforms.....	28
2.5	Synthesis.....	31
2.5.1	Customer value in digital service.....	31
2.5.2	Value capture logics	34
3.	RESEARCH METHODOLOGY	38
3.1	Research design	38
3.2	Data collection.....	40
3.2.1	Companies involved in this study	40
3.2.2	Interviews	41
3.3	Data analysis.....	42
4.	RESULTS.....	45
4.1	Digital servitization	45
4.1.1	Current state and future directions	45
4.1.2	Challenges and risks in digital servitization	48
4.1.3	Digital service platforms	50
4.2	Customer perceived value in digital services	53
4.2.1	Different customer needs	53

4.2.2	Perceived customer value	55
4.2.3	Service provider's perspective on customer value	60
4.3	Logics to capture value from digital services.....	61
4.3.1	Monetary value	61
4.3.2	Non-monetary value	65
4.3.3	Leveraging the characteristics of service platform	67
5.	DISCUSSION.....	68
5.1	Digital service offering	68
5.2	Customer perceived value of digital value-added services	69
5.3	Value capture logics in the early phase of digital service diffusion	73
5.4	Roadmap for the target company	76
6.	CONCLUSIONS.....	78
6.1	Academic contribution	78
6.2	Managerial contribution	79
6.3	Validity of the study	80
6.4	Future research	81
	REFERENCES	82
	APPENDIX A: QUESTIONS FOR INTERVIEWS	88

LIST OF FIGURES

<i>Figure 1: Key concepts around value</i>	10
<i>Figure 2: Servitization components: Drivers, development and risks</i>	12
<i>Figure 3: Service logic business model canvas (adapted from Ojala & Ojala (2018))</i>	15
<i>Figure 4: Typical structure of product information technology (adapted from Baines and Lightfoot, 2013, p. 171)</i>	18
<i>Figure 5: Components of customer perceived value (adapted from Kotler et al. 2012)</i>	20
<i>Figure 6: The model and process of customer value</i>	22
<i>Figure 7: Relative levels of different services over the technology lifecycle (adapted from Cusumano et al., 2015)</i>	24
<i>Figure 8: Revenue and dataflow in digital platforms leveraging Big Data (adapted from Trabucchi et al., 2017)</i>	30
<i>Figure 9: The research process</i>	38
<i>Figure 10: The research methodology following an onion model by Saunders (2009)</i>	40
<i>Figure 11: Digital service offering in participant companies</i>	48
<i>Figure 12: The structure and possibilities of digital service platform</i>	51
<i>Figure 13: Aspects affecting the pricing of digital value-added services</i>	62
<i>Figure 14: Data as a value for the digital service provider</i>	66
<i>Figure 15: Core customer value, value creations and success factors in developing digital value-added services</i>	69
<i>Figure 16: Main non-monetary values for the digital service provider</i>	75
<i>Figure 17: A roadmap for the target company</i>	77

LIST OF TABLES

<i>Table 1. Summary of service offering categorization.....</i>	<i>17</i>
<i>Table 2. Value creation and customer perceived value on selected articles</i>	<i>32</i>
<i>Table 3. Value capture logics on selected articles.....</i>	<i>35</i>
<i>Table 4. The target company</i>	<i>40</i>
<i>Table 5. Companies involved in this study.....</i>	<i>41</i>
<i>Table 6. Interviewed persons.....</i>	<i>42</i>
<i>Table 7. Main categories in the first round of categorization</i>	<i>43</i>
<i>Table 8. Core reasons why digital services are offered.....</i>	<i>45</i>
<i>Table 9. Competitive situation in digital services among respondents' markets.....</i>	<i>46</i>
<i>Table 10. Origin of digital service innovation</i>	<i>47</i>
<i>Table 11. Summary of the reasons for different customer needs and solutions that respondents mentioned</i>	<i>54</i>
<i>Table 12. Summary of the customer benefits of digital services.....</i>	<i>56</i>
<i>Table 13. Measuring the customer value and the success of a service</i>	<i>60</i>
<i>Table 14. How the price level of digital services is set.....</i>	<i>74</i>

LIST OF ABBREVIATIONS

B2B	Business-to-business
B2C	Business-to-consumer
BMC	Business model canvas
PSS	Product-service system
ICT	Information communication technology
G-D logic	Goods-dominant logic
S-D logic	Service-dominant logic
C-D logic	Customer-dominant logic
MTO	Make-to-order
CRM	Customer relationship management

1. INTRODUCTION

1.1 Background

Physical and digital worlds are tightly connected in today's world and typical consumers already navigate these complex systems without a blink of an eye. Now many business-to-business companies are experiencing the same shift where physical products are extended to digital realm creating a whole new set of services. According to Rigby (2014) most of the industries are still in the early phase of digital transformation and the biggest change and potential in manufacturing is yet to come. Rigby also stated that digital servitization is not just be seen as a way of changing the service or product but rather allowing companies to find new value-adding elements that strengthen their business. This thesis studies those value-adding digital service elements and provides comprehensive analysis in its specific context.

The thesis focuses on the business-to-business (B2B) environment and make-to-order products which are enhanced with digital services. Make-to-order (MTO) production is a strategic manufacturing position where products are fabricated based on customer orders and thus the manufacturing takes a customer-order-driven approach (Olhager, 2003). Besides just selling physical products, there has been already a long time a lot of discussion that companies should add services into their offering. The process of servitization not only offer companies additional revenue streams but also many other values. The conceptual change happening is to move from transactional based business to more relationship based business. (Oliva and Kallenberg, 2003)

Technological development brings huge opportunities for manufacturing companies to create new types of services. Digitalization is in fact seen in recent literature as essential part to fully benefit from servitization (Coreynen *et al.*, 2017; Kohtamäki *et al.*, 2020). Digital servitization requires in the context of this research digitalized products which are products that have additional properties compared to non-digitalized product, for example programmability, addressability, sensibility, communicability, memorizability and traceability (Yoo, 2010). Leveraging these properties, companies are building digital value-added services. In addition to forming just set of digital service, the offering is bundled into a platform. And since the physical product is the core the digital service, the products and digital services are forming also together platforms. These platforms can

exploit networks by offering services to connect actors, share resources or to integrate systems (Eloranta and Turunen, 2016). The digital service platform is the main focus area of digital services in this thesis as it is conceptual model of the way digital services are offered to customers.

Digital value-added services have a high variety of benefits to customers. Customer perceived values in digital value-added services are for example possibility to highly personalize the service (e.g. Goduscheit and Faillant, 2018) and reduced operational hold ups (Jonsson *et al.*, 2008). Digital services and especially digital service platforms are usually formed in a way that the customer is actually the main value creator and service provider works as a facilitator to enable the actual value creation. This creates a unique environment where service provider needs to strategically decide whether to deliver the value or just enable the tools for the customer to create the value.

On the other hand, not only customer benefit the digital services but also service provide have multiple values that it can capture. Obviously monetary revenue is the basis of all business and also digital service enable both traditional as well as innovative pricing methods, such as usage or performance based pricing (Bonnemeier *et al.*, 2010). As the digitalized products are built to lean on data collection and transfer, product suppliers can leverage these properties as an important value. Service providers use the data to enrich customer related data and thus create re-sale opportunities (Malthouse *et al.*, 2019), develop better products based on the usage data (Trabucchi *et al.*, 2017), use platform as a collaboration between different actors to reduce redundancies (Fehrer *et al.*, 2018) or enhance the internal process using the real-time usage data (Coreynen *et al.*, 2017). Most of these non-monetary values are targeted to sell the physical products more and thus eventually create also monetary value. All in all, the value capturing logics are diverse and digital servitization offer a great deal of opportunities for product providers also outside the additional revenue creation.

The current literature in this field is more or less focused to digital service in manufacturing companies, where the product is a capital good and thus maintenance services or process optimization services plays a big role (e.g. Baines and Lightfoot, 2013; Eloranta and Turunen, 2016). This thesis however adds the knowledge of digital servitization in manufacturing companies, whose product is not a capital good. In terms of customer value, the concept of customer is broadened to include also other stakeholders than the direct service receiver. Raddats *et al.* (2019) propose that future research should take into account other actors than the manufacturer in the service offering. Thus, this thesis takes the approach that manufacturers role in servitization is always conducted with the

network of other actors. Also, the digital service platform research especially in B2B setting is scarce and many of the customer value and value capture logics research is more applicable in business-to-consumer (B2C) setting (e.g. Trabucchi *et al.*, 2017). To sum it up, this thesis focuses on a unique context of B2B make-to-order manufacturing companies who offer value-adding digital services on top their product offering.

1.2 The target company

This study is conducted in a collaboration of a target company, later “the target company” (TRG). The target company is a manufacturer of mass customized product for B2B markets. The company has been a pioneer, the first players in its markets and grown rapidly over the last five years. Since the target company is identified as the pathfinder of the markets, the need for constant product development is crucial. In the past, the target company has set the industry standard for this particular segment and it has been the desired goal for competitors in terms of quality and technical properties. However, rapidly growing markets has recently fuelled the competition and thus differentiation based purely on product quality is getting harder. Based on these factors, the target company is currently creating a “new normal” by bringing the product into the digital world and enhancing the offering with services which enhances the market leader position of the company.

Adding a new innovative service into the offering of manufacturing company, requires a set of new organizational capabilities as well as different management accounting principles. The subject of this thesis stemmed from the target company itself and was further defined by the needs of the company’s key employees using informal interviews. As the target company’s core competence is physical products, the shift to the field of value-added digital services can be challenging. For example, backend support on different time zones, software development and digital platform partnerships are all components that are totally new for the target company but seen as being in the core of the company in the future. The need to study different business models and possibilities related to new digital services arose from this lack of internal experience and data.

As the target company truly trust the “new normal” they are creating with digital services, cost effective scalability of the business model will be crucial. The digital service that the target company is bringing to the markets will be working as a possible service platform. Thus, it broadens the operational landscape of the target company to much wider possibilities than pure product sales. Partnering, software development and intelligent insights will be big part of the target company’s future business. In a bigger picture the target company’s incentive is look to the future and determine in which direction this digital

service offering is going to be evolving. Thus, the empirical part of this study focuses on interviewing key informants with notable knowledge and experience in digital services and especially in the field of physical product in B2B markets.

The target company is a good example of the current state of the goods-dominant firms in B2B markets. Digitalization is bringing a whole new layer in physical products and customers are becoming more technology savvy and capable of leverage this digital layer. On the other hand, the possibilities of digital platform and digital-physical mashup on B2B products is enormous and thus traditional customers might not be aware of all the use cases and added value. The target of this research is to help similar companies to understand the possibilities and value of digital services for the customer as well as for the company itself. The question that these companies might think is, that can one adding a digital layer bring value to physical experiences and products.

This study is conducted in the early life of the new digital service. However, as the deliverable of the research is more future looking, the timing is not limited to the launch of the product itself. The thesis took place during the winter 2020-2021 and it was published in April 2021. Empirical part (as of interviews) of the study took place between December 2020 and February 2021.

1.3 Research objectives and questions

This thesis is conducted in a collaboration with a target company. The target is to benchmark chosen companies which are already offering digital services. From these finding the target company increases their knowledge on the current state of digital services and the possibilities that these types of service will bring in terms of value capture. Since the digital services usually enables many actors to work together in a unified platform the possibilities are vast. Thus, the goal of this study is to research the possibilities as well as the current state in the field of digital service platforms. Target is to have an idea of the most common structure of the digital service platforms, what things customer's value in it and what value does it bring to the company. In terms of value, it is also in the scope to identify the ways to measure the value and means to communicate the value to the customer. As a result, a target company will have an understanding of the best practices in the field as well as obstacles and challenges that might occur during the development of the digital service platform.

The field of digital services is still novel and especially in the field of MTO manufacturing firms. This research provides an exploratory review for manufacturing firms that are wid-

ening their offering beyond physical products. The research focuses mainly on the context of non-capital goods which means that the physical products offered are not used as core value adding elements in customer firms. Thus, especially the customer value of digital services might not be evident, and this research explores the possibilities in this field. This context will create valuable academic knowledge to widen the B2B digital servitization literature outside of the capital goods environment. Also, the exploratory nature of the research gives a good state-of-the-art description of the current state of digital servitization in the chosen context. This research gap was identified in the background section (Chapter 1.1) and one of the main objectives is to increase the knowledge both from managerial and academic points of view and also identify future research need for further study the matter.

The research question that this thesis will empirically find answers to are the following.

RQ1: What value can a manufacturer provide to customers with value-added digital services?

RQ2: In what ways can manufacturer capture the value of value-added digital services?

The research questions are set to the specific context of make-to-order manufacturing firms in B2B markets. It is to be noted, that the term *value-added digital service* means services from for example basic usage reports to holistic data integrating platforms. However, the digital service platform is the main focus area of digital services in this thesis as it is conceptual model of the way digital services are offered to customers. The results are subjective in nature and are to be evaluated keeping the context in mind.

1.4 Scope of the thesis

As this thesis is done in a collaboration of a target company, the findings are targeted to support the target company's business. This is reflected mainly to the empirical part, where respondents are chosen to represent the target company. This means that for manufacturers the focus is on make-to-order type of manufacturing in B2B business. Specifically, the manufactured product is a non-capital good which narrows the scope into a specific context.

Reflecting to the research question the main focus of this research is customer value and value capture logics. In terms of business model, this means focusing on the value side of the canvas and leaving for example costs, organizational resources and supplier networks out of the scope. Thus, this thesis does not study the organizational level of

digital servitization or organizational characteristics but focuses merely on the actual digital service offering.

In terms of digital services this thesis takes a broad view and does not limit the scope to a certain offering type. As this is exploratory research the goal is to identify all the different types of digital services and thus limiting the research in this matter would not justify the objectives. The main focus will be however in digital service platforms as it is seen as an important component to offer the variety of digital services.

1.5 Structure of the thesis

This master's thesis is divided into five sections after this introduction: *Theoretical Background, Research Methodology, Results, Discussion and Conclusions*. The structure of the thesis follows overall the division between the two research questions: customer value and value capture logics. In chapter 2 theoretical background is built to synthesize the current literature in this field and main findings on digital services. Key concepts and phenomena are explained. This thesis combines the customer value and value creation literature, and value capture literature of digital services. Thus, the synthesis is also separated into these two themes. Customer value of digital services sums the identified main values that the digital services bring to the customer of that service. It also sums the service provider's role in the value creation process. The customer value components are categorized based on the findings from the current literature. The second theme, value capture logics, follows similar structure as the customer perceived value. Synthesis of this matter presents the monetary as well as non-monetary value the digital services and digital service platforms bring to the service provider.

After the literature review, Chapter three is focused on the empirical part of the study. Research design, data collection and data analysis process are described here thoroughly. In research methodology the interviewed respondents are characterized so that the justification of the representativeness can be made. The results of the empirical findings are presented in Chapter 4. The empirical results are systematically summarized here without further analysis. Some categorization and conceptual frameworks are created but they base purely on the interviews. This section is divided in three parts, digital service offering, customer perceived value and value capture logics. It was found that the digital service offering is currently focused on sensing technology and services built on top of that. In the future the digital services will be forming a holistic platform where multiple actors work seamlessly together. From the customer perceived value, the benefits that the customer receives while using digital services can be summarized into four themes: real-time data, risk management, enhanced usability and business aspects. For

the service provider the main value to capture from digital services is the usage and customer data itself which can be used for example in product and service development.

In the discussion section the empirical findings are reflected to theoretical background to form coherent results to research question. In customer perceived value, the key aspects are to embed the digital service offering into the existing customer activities, use the data to support customer decision making and eventually form a holistic platform where the customer gets streamlined experience across the whole platform. Value capture logics are related to the efficient use of the collected data. This together with enhanced brand value will create long-term competitiveness and create indirect revenue with increased customer satisfaction and product sales. Structure follows the same logic as in Chapter 4 but is focused on concluding and reflecting the findings in the context of this research. Chapter 6, Conclusions, consist the academic and managerial contribution of this study as well as the limitations. This study complements the current literature with explorative research about the digital value-added services specifically in MTO environment. It also gives practical examples, like what are the challenges, for business managers who are planning on adding digital value-added services into their offering.

2. THEORETICAL BACKGROUND

2.1 Key concepts

2.1.1 Products and services

The thesis focuses on the B2B environment and make-to-order products. **Make-to-order (MTO) production** is a strategic manufacturing position where products are fabricated based on customer orders and thus the manufacturing takes a customer-order-driven approach (Olhager, 2003). Only the designing part is made beforehand. For modular mass-customized products the distinguish between make-to-order and assembly-to-order manufacturing strategies is blurry. However, if the modular components are procured based on customer orders and customization happens at early production stage, make-to-order policy is a must (Olhager, 2003). Tangible products like these can be combined with service offering which serve different aspects of the product depending on the context. Notable in this context is that the products are not customer specific solutions and thus service offering is somewhat standardized.

Service is on a conceptual level performed and intangible rather than produced like tangible products (Vandermerwe and Rada, 1988). This means services are case specific and consumed at the same time as they are offered. Widely used classification by Johnes and Storey (1998) differentiate services from physical products with four characteristics. According to this classification, services are processes rather than things (*intangibility*), services vary in quality since they are usually provided from person to person (*heterogeneity*), services are consumed at the same time as they are produced (*simultaneity*) and lastly services cannot be stored (*perishability*). More recent definition by Grönroos (2008) distinguishes three aspects of services: they are 1) performed activities and can be evaluated from 2) a perspective on customer's value creation or 3) from a perspective of service provider's activity. When services are offered as an add-in option, they are called value-added services. **Value-added services** are defined in the manufacturing context as services that increase the value of products to provide brand loyalty (Szeinbach *et al.*, 1997), meet consumer's demand and improve manufacturer's profits (Zhang *et al.*, 2014). Value-added services are not bundled with the product by default but sold as an option. Some scholars use also term *supplementary services* to describe the service offering which enhance the value of product or service (Frow *et al.*, 2013). Opposite to purely value-added services are services which are indeed bundled with the product, for example warranty services.

In comparison to offering services and products totally separately they can be embedded to form a comprehensive solution to a certain customer need. These are called in the literature **product-service systems** (PSS). PSS is summarized by Baines et al. (2007) as solution where product's functionality is extended with services to fulfil customer needs. The classification for PSS types widely used in the literature contains three types of systems: product-oriented services, use-oriented services and result-oriented services (Tukker, 2004). Product-oriented PSS adds complementary services into the sale of physical product such as warranty services. In the use-oriented PSS ownership of the product remains to the product provider but the use of a product is available for customer. Lastly in result-oriented PSS customers purchase only the agreed result. Neely (2009) adds two additional options to this framework: integration oriented and service oriented PSS. Integration oriented PSS is a type of product-centric service where a product provider integrates to different value chain parts such as transportation. Service-oriented PSS on the other hand offers additional value-added services coupled with the product itself like remote monitoring services.

Currently most advanced form of PSS is highly driven by digitalization, both in products and services. **Digitalized product platforms** are referred to as a combination of physical digitalized products and digital services that form together a range of layers (e.g. content and service layers) to create a new product (Gawer and Cusumano, 2008; Yoo *et al.*, 2010). Typically in the literature used example is vehicle industry which combines the digitalized product (car itself) with digital services that are enabled by information and communication technology (ICT) solutions in the platform to form new products (Kuschel and Dahlbom, 2007). Thus, the value is created in this multi-sided platform only if car users and service providers are present. In order to leverage the new types of services, products need to be digitalized. **Digitalized products** (also Internet of Things) are products that have additional properties compared to non-digitalized product, for example programmability, addressability, sensibility, communicability, memorizability and traceability (Yoo, 2010). **Digital services** are conceptually described as an intangible activity that is given from one party to another without transferring the any ownership. This activity is either independent or connected to a physical product. (Williams *et al.*, 2008). To sum it up, digitalized product platform is a type of product-service system where at least one part of the service transaction between the service provider and a customer is done via digital world. **Multi-sided platforms** are to bring together multiple distinct groups of customers where value is created only if all parties are present. The platform itself creates value by facilitating interactions between the groups. (Osterwalder and Pigneur, 2010, p. 77).

In a make-to-order manufacturing possibilities in service innovation is endless from simple value-added services to advanced digitalized product platforms. As this thesis focuses on the novel service offering enabled by digitalization the focus is more on digital services and platforms. The definition of value-added services is still valid since also digitalized products platforms have elements that act purely as value-added options and value creators.

2.1.2 Value creation and value capture

The focus of this study is on value creation and value capture logics and there are multiple different definitions depending on the context. The ones chosen here are seen as the most suitable for service business and especially in digital context. The concept definition builds from the core idea of *value* to the logics of creating and capturing it. The connections between the concepts are presented in Figure 1.

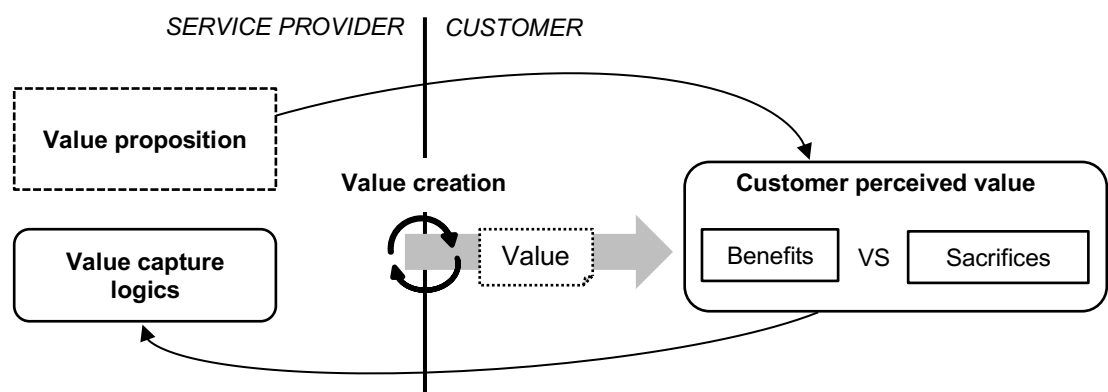


Figure 1: Key concepts around value

Value according to Kotler et al. (2012, p. 15) is a “*combination of quality, service and price*”. This means that when quality and service increases, so does the perceived value. With price the perceived value decreases when price is decreased. This rather simplified view however fits in well with the MTO type of products and can be seen as the base of value. It is the quality of the product, service elements and the price. Almquist et al. (2018) approach the definition of value as form of a pyramid where the bottom is objective elements and to more up it goes the more subjective the elements become. Objective elements are for example economic and performance values and more subjective elements are for example productivity and relationship values as well as personal and inspirational values. Interestingly Almquist et al. (2018) see price only as prerequisite of doing business not a value defining component itself, like Kotler et al. (2012) perceives it.

Value is not universal or objectively measurable, but every customer has its own way of perceiving it. This **perceived customer value** is typically the trade-off between benefits and sacrifices (Zeithaml, 1988). In the context of services customer perceived value is the value-in-use which means that the value of a service become relevant only when the service is performed and hence some outcomes are realized (Lusch and Vargo, 2006). In the context of this theses the value is examined subjectively from perceived customer value point of view. In the end, customers are individual actors and value is hard to generalize without taking the context specific conditions into account.

The core of doing business is to answer to the customer's needs. In other words, the core is to create value for the customer. The topic a company communicates to their potential customer is called value proposition. **Value proposition** is defined by Grönroos and Ravald (2011) as a promise about the potential future value creation. In other words, value proposition is definition of those value elements that a company is about to bring with its product or service. Process of creating a value proposition begins at defining the core value of a product or service and then tailoring the value proposition to answer these needs (Almquist *et al.*, 2018). Value proposition can also be modified, and it can be targeted to different customers based on the perceived core benefits.

Business model is, as according to Teece (2010, p. 173), a way "*enterprise creates and delivers value to customers, and then converts payments received to profits*". It is the comprehensive model of business components. In a simplified business model definition, there are three main components: value proposition, value creation and value capture (also benefit model or revenue model) (Aurich *et al.*, 2010). This thesis explores digital services in reflection of business model components: value creation and value capture.

The actor who ultimately **creates the value** is traditionally being the service or product provider. This way value is delivered to the customer and the process is purely one directional. More modern way of defining value creation is to lean towards the customer as in context of services value is always cocreated with the customer. (Vargo *et al.*, 2008) In most advanced view customer creates the value itself and the service provider just provides the value proposition (Heinonen *et al.*, 2010). In this thesis, the value of digital service is viewed as cocreated with the customer.

Value capture is another core element of business as it defines the mechanisms on how business creates profits (Teece, 2010). Some authors see value creation as purely monetary basis. For example according to Priem (2007) value is captured when payments are received from the customer and when these payment are retained within the company. However, value capture can also be other aspects than pure profits. Fehrer *et al.*

(2018) researched platform business and reflect value capture concerning complementarity theory, transaction costs and network. Thus, in this thesis the value capture is defined as both monetary and non-monetary value. Non-monetary value usually stems from data and networks.

2.2 Servitization in manufacturing companies

2.2.1 Drivers, development and risks of traditional servitization

This chapter elaborates the why manufacturers add services to their offering and in which different ways service offering can be established. Vandemerwe and Rada (1988) first describe servitization as a process where value is created by adding services into the products. Also more recent literature have a high consensus on suggesting manufacturer companies to add services into their offering (e.g. Oliva and Kallenberg, 2003). Figure 2 illustrates the structure and components of servitization in manufacturing firms.

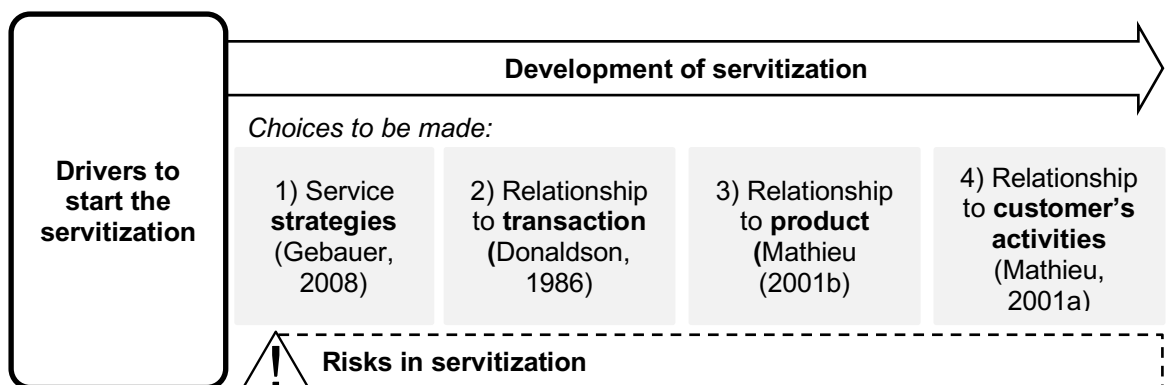


Figure 2: Servitization components: Drivers, development and risks

The drivers why manufacturing firms offer services are shown in the literature widely. Services are for example offered

1. to strengthen customer loyalty and to create revenue growth (Malleret, 2006; Baines et al., 2010),
2. to differentiate from competitors and enhance corporate image (Malleret, 2006),
3. to seek attractive market opportunities to utilize internal resources better (Neu and Brown, 2008), or
4. to offer solutions for customers that want to focus on their core competence (Neu and Brown, 2008).

In order to fulfil these objectives, service providers must do a variety of choices. Firstly, four service strategies can be identified: after-sales services providers, customer support providers, outsourcing partners and development partners (Gebauer, 2008). After-sales services are for example maintenance and warranty services and customer support con-

tains the interactions between the service provider and a customer both before and during the purchase. Outsourcing partner is a strategy where tasks are offered to be done for the customer and lastly development services are for example consulting and designing. In the context of MTO manufacturing consulting and designing is not that relevant since products are designed in a mass-customised way. After-sales and customer support services are usually the focus area for manufacturers to start to widen the service offering and overall servitization.

Early service literature developed around value-added services that were bundled with manufacturer's physical product and were mainly concentrated on customer service activities (Levitt, 1972; Vandermerwe and Rada, 1988). In this context services were classified using Lalonde and Zinzer's classification as pre-transaction, transaction and post-transaction services (cited in Donaldson, 1986). This is the choice number two in Figure 2. Mathieu (2001b) further extended the traditional view of services beyond product service and especially to service-as-a-product solutions (choice number 3 in Figure 2). Later a distinguish was made for traditional way of thinking (services supporting the product) and an advanced customer oriented view where services supported the customer's core activities (Mathieu, 2001a). This thesis is built on mainly the traditional way of thinking since the target industry does not manufacture products for customer's core activity. However, the customer of a service in this case can also be a single part of and customer's organization and thus the service offered might help its particular activity.

The organizational transition from products to services is described as *the product service continuum* where relative importance of services grow gradually (Oliva and Kallenberg, 2003). This is rather theoretical view but can be taken down into stages to form servitization strategy to product firms. Lütjen et al. (2017) identify three stage in the service transition; service initiation, service anchoring and service extension. In transition from products to services, service-dominant logic can be seen as the most advanced way of doing business. In service-dominant logic all parties in the network are being seen as resources, meaning that value is created both from supplier to customer and from customer to supplier (Lusch and Vargo, 2006). At this very end of product-service continuum, products are merely an add-on to services and value creation is based almost purely on services (Gebauer, 2008). Positioning oneself into this line depend on the strategic choices of the company and not always the most service weighted business model is the desired one.

Even though the literature puts high emphasis on servitization of manufacturing firms it not always pays off in terms of profitability and include some risks. The scaling of service offering might in fact not increase the profits of a manufacturing company. This is referred

to as *service paradox* by Gebauer et al. (2005). The increasing costs and lack of corresponding returns may result in decreasing profits even though revenue is growing. Furthermore, the cost structure of services (usually more fixed and indirect costs than variable and direct) combined with aggressive development and investments of service offerings may be one reason behind the service paradox (Mathieu, 2001b; Neely, 2009). However, companies that are already heavily service oriented this statement does not seem to occur (Suarez *et al.*, 2013). Also intuitively thinking the more organization is already adapted to service business the less fixed costs are allocated to certain individual service offering.

Manufacturers that add value-added services into the product offering can have difficulty in balancing between the two offerings: tangible goods and services. Increasing services and the quality of them might extend the product lifecycle to the extent that it decreases the sales of replacing products. On the other hand, increasing quality of the product itself might decrease the aftersales services revenues. (Oliva and Kallenberg, 2003) As mentioned before, going to the very end of product service continuum is not the intrinsic value and the service value for the service provider must be evaluated beyond the possible monetary benefits.

2.2.2 Servitization in business models

To view services on a strategic level, a business model approach can be taken. Business model is a way to visualise, capture, understand, develop and communicate the chosen business logic (Osterwalder and Pigneur, 2010). The traditional business models for product service systems are distinguished as *product-oriented model*, *use-oriented model* and *result-oriented model* (Tukker, 2004; Baines *et al.*, 2007; Aurich *et al.*, 2010). To go beyond the usage of a service, Aurich et al. (2010) suggest that business models for PSS should take a lifecycle cycle approach that considers aspects from customer-oriented design and development to product end-life activities. Thus, highly depending on the unique customer needs, service providers should offer the services that customers are perceived to value as well as keep in mind of the life cycle of the product.

To visualise the business model as a whole, Business model canvas (*BMC*) is widely used among managers (Osterwalder and Pigneur, 2010). However, the traditional model takes evidently a supplier-dominant logic and fits insufficiently to modern service business. In the original model the transactions are merely seen as a one-way interaction from the service provider to the customer. Ojasalo & Ojasalo (2018) revised the BMC to consider also the customer perspective on each component of the model. This model is called *service logic business model canvas* (Figure 3).

Key partners Networks and needed resources from the partners of both service provider's and customer's perspective.	Key resources Skills, knowledge, material and immaterial resources needed in the usage of the service	Value proposition The value that is sold and bought. Benefits and pain reliever that the customer gets	Value creation Embedding service into the customer activities and how customer creates long term benefits.	Customer perceived value Deep understanding of customer needs and behaviour.
	Mobilizing resources and partners Coordinating multi-party value creation and enabling customer to utilize a variety of internal and external resources.		Interaction and coproduction The ways that service provider and customer interact and what is needed from both sides.	
Cost structure Costs and sacrifices on both perspectives, customer and service provider.		Revenue streams and metrics Earning logics for service provider. From a customer perspective the value a customer is willing to pay and the potential financial benefits the customer receives while using the service.		

Figure 3: Service logic business model canvas (adapted from Ojala & Ojala (2018))

Since the nature of services rely on relationships, it is important to highlight the customer as an active actor rather than passive value receiver. This thesis focuses merely on the value side of the canvas, which is the right-hand side including value proposition, value creation, customer perceived value, interaction and coproduction and revenue streams. Furthermore, in the literature review by Zott et al. (2011) networks are given high emphasis in the field of business models especially in digital economy. Thus, this thesis not only focus on firm's and core customer's perspective but also other stakeholders who may act as beneficiaries and/or resource sharing partners.

2.2.3 Service offering frameworks

There are lots of different options of what types of services a firm can generally offer. This chapter presents the ones found in service literature and especially focuses on those that are relevant for MTO manufacturing firms. First of all, the service offering that specifically manufacturing firms can provide typically take advantage of the firm's resources. In order to get sustainable competitive advantage from these resources, they need to be 1) valuable, 2) rare in the competitive field, 3) imperfectly imitable and 4) and there cannot be equivalent product in the markets (Barney, 1991). This traditional definition of resource based strategic management is the base of long-term competitive advantage. The unique resources, and the one's that satisfy previous Barney's conditions,

specifically manufacturing firm commonly have are, as described by Ulaga and Reinartz (2018), installed base product usage and process data, product development and manufacturing assets, product sales force and distribution network and lastly field service organization. Using these unique resources gives manufacturing firm competitive advantage over pure service organizations. Additionally to the internal resources, the capability to use technology in service delivery is one important key factor to success (Neu and Brown, 2005). The usage of ICT technology in service offering is further explained in chapter 2.2.4.

Service offering classifications for manufacturing firms vary in the literature a lot depending on the methodology and the context of the research. Firstly, distinction between services supporting the product (e.g. after sales) and service supporting the clients action (e.g. training) can be made (Mathieu, 2001a). This classification is typical for companies offering process services or services related to capital goods. Another categorization found often is that manufacturer companies have three option on what level of servitization they choose to have; customer service, product services and service-as-a-product (Mathieu, 2001b). This division is based on the content of a certain service. In other words, to which area a service is connected; a transaction between company and customer, a product of a company itself or independent from company's products.

In a more strategic level, Baines et al. (2010) categorize services offered as protective or proactive. Protective services are for example installation and repair, where proactive services are more sophisticated solutions like financing and monitoring services that seek for new business. On a product level, categorization can be made based on whether the service complement a product or replace the purchase of a product (Cusumano *et al.*, 2015). In this taxonomy, complementary services can further be divided into two parts: smoothing (does not alter the product functionality) and adaptive (expands the product functionality significantly) service. Replacing services are not complementing a purchased product but sold as a whole such as pay-per-use business models, Software-as-a-Service or data processing services. The above listed classifications are created for a certain context and look services from different angles. However, these classifications help to understand of how value is created, how a service and possible product are linked together and what is customer's role in service delivery. From these three classification services can be categorized based on the following four aspects.

1. **Target** of the service (product supporting, client supporting) (Mathieu, 2001a)
2. **Content** of the service (transaction, product, independent) (Mathieu, 2001b)
3. Whether the service **protects** current business or **proactively** seeks new business (Baines *et al.*, 2010)

4. What level of **functionality** the service adds to a product (smoothing, adaptive, replacing) (Cusumano *et al.*, 2015)

The abovementioned categories are summarized in Table 1. However, as the classification look services from different angles this summary is not all-embracing but rather simplification of the service offering typologies.

Table 1. Summary of service offering categorization

Combined definition	(Mathieu, 2001b)	(Cusumano <i>et al.</i>, 2015)	(Baines <i>et al.</i>, 2010)	(Baines and Lightfoot, 2013, p. 66)
Services that do not alter the functionality of the product such and are connected to the transaction between supplier and a customer	Customer service	Smoothing service	Protective	Base services (product provisions) or Intermediate (product condition)
Services that affect the functionality of a product and is connected tightly to the product itself	Product service	Adaptive service	Protective or proactive	Intermediate (product condition)
Services that are independent from a product or are contract based such as rental or pay-per-use type of solutions	Service as a product	Replacing service	Proactive	Advanced services

The scope of this thesis is to identify the possibilities that digitalisation has in terms of services. The focus is not just on more advanced services or how much expertise is needed and does not restrict to any of the definitions or classifications. The typologies act as a framework to further classify most important types of services in the digital service world. This is to be discussed in Chapter 5.1.

2.2.4 Digital servitization

The development of technology moulds also services highly which further widens the offering spectrum. This chapter discusses the role of digital transition in servitization and service offering. Digitalization is seen in recent literature as essential part to fully benefit from servitization and thus digital servitization goes under the umbrella term of servitization (Coreynen *et al.*, 2017; Kohtamäki *et al.*, 2020). Already in the early servitization literature technology was mentioned as a way to enable firms to transport services in real time (Vandermerwe and Rada, 1988). On the other hand, technology was also a substitute for consumer service such as electronical razor for barbers or self-service checkout counters in supermarkets to substitute clerks (Levitt, 1972; Vandermerwe and Rada, 1988). In a more recent service literature, technology is seen as the enabler and

facilitator of value delivery which benefit both the customer and the service provider (Walker and Craig-Lees, 2015). Thus, technology only creates value indirectly not as an own entity.

Scaling of service offering related to installed base usually means that a company moves from transaction-based business model to more relationship-based services (Oliva and Kallenberg, 2003). Firm can no longer value customers only by number of transactions but rather as more long-term relationship considering the whole lifecycle of the product. Furthermore, digitalization of products and processes enable whole new of set of services and ways of delivering the services. Technology is used to offer customers additional, extended or support services that could not have been otherwise available (Walker and Craig-Lees, 2015). On the research by Coreynen et al. (2017) three different digital servitization categories were identified from the data of four manufacturing companies and their digital servitization: industrial servitization, commercial servitization and value servitization. Firstly, Industrial servitization focuses tangible value-added services, secondly in commercial servitization new forms of interactions are formed to integrate service provider more into the customer's processes, and lastly value servitization totally new digital products are offered that shake the current value chain.

Information technology is general is used in firms to “support information gathering, research, analysis, planning and monitoring” (Kotler *et al.*, 2012, p. 132). Similarly, for service offering can leverage these characteristics of information technology to form the digital service offering. To understand the connection between ICT system, physical product and services a simple flow of information between customer and a manufacturer is presented in Figure 4.

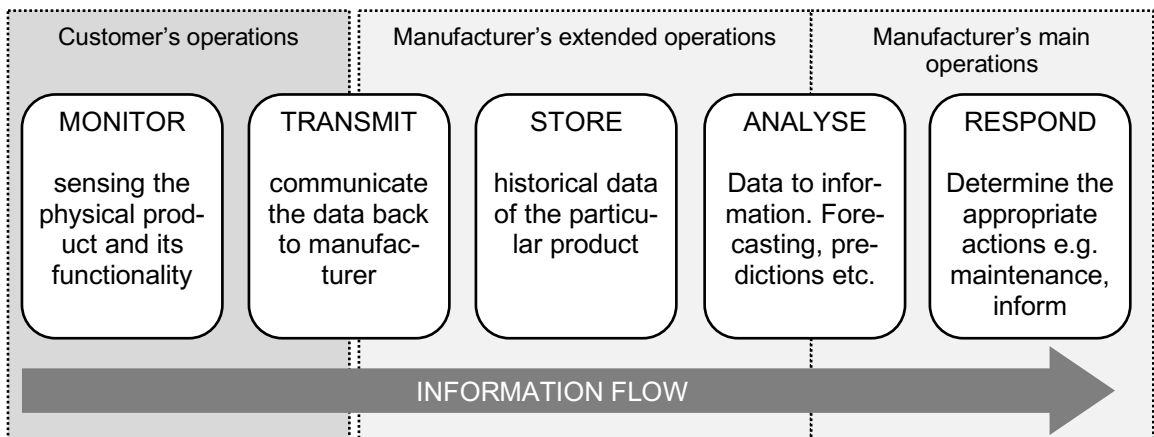


Figure 4: Typical structure of product information technology (adapted from Baines and Lightfoot, 2013, p. 171)

Based on the model above, different services can take advantage of these different stages of information technology. Firstly, Baines and Lightfoot (2013, pp. 41–42) argue that technologically savvy services require some sensing and remote monitoring of the physical product and new service opportunities are created based on technology push. Thus, technology enables services to create value. Furthermore, with the ability to collect information from individual users and products Shapiro (1999, pp. 36–37) writes that ICT enables highly personalized service products which gives unique value for customers. Digital service innovation thus tightly connects the customer base and product usage and process data together through ICT capabilities (Kindström and Kowalkowski, 2014). Adding some sort of sensing to physical products is a one way of developing the service offering for MTO firms.

Services that are enabled by ICT are not limited to only motoring and data collection of a physical product. In the complex world of information flows, products are more and more seen as platforms for enabling extended types of services using ICT (Baines and Lightfoot, 2013, p. 50). The advantage of platform thinking in service offering is to leverage the complexity of these systems. Digital product platforms can exploit networks by offering services to connect actors, share resources or to integrate systems (Eloranta and Turunen, 2016). Connecting actors -logic is aimed to gather external and internal actors together and provide opportunities for new offerings. Sharing resources logic encourages to combine resources of different actors to offer greater value to customer. Lastly integrating systems have the goal to enhance internal information flow. Similarly, Goduscheit and Faullant (2018) uses network of actors and resource characteristics, utilization and integration to determine the principles of modern service-dominant logic.

As a summary, ICT is seen as an enabler to provide and transfer the service. Thus, it does not necessary mean that the service itself is digital nor that the product is digital, just some part of the service transaction is based on digital platform or other ICT application. ICT also enables new types of services to emerge which were not possible to this extent before.

2.3 Value creation and perceived customer value of services

2.3.1 Perceived customer value in general

Many authors determine the customer value as a trade-off between the received benefits of using a service and the corresponding sacrifices (Zeithaml, 1988; Woodruff, 1997; Payne and Holt, 2001; Kotler *et al.*, 2012, p. 15). The perceived customer value is thus

divided into total customer benefits and total customer costs. Furthermore, the components of the both sides of perceived customer value is presented on Figure 5. (Kotler et al., 2012, pp. 419–426).

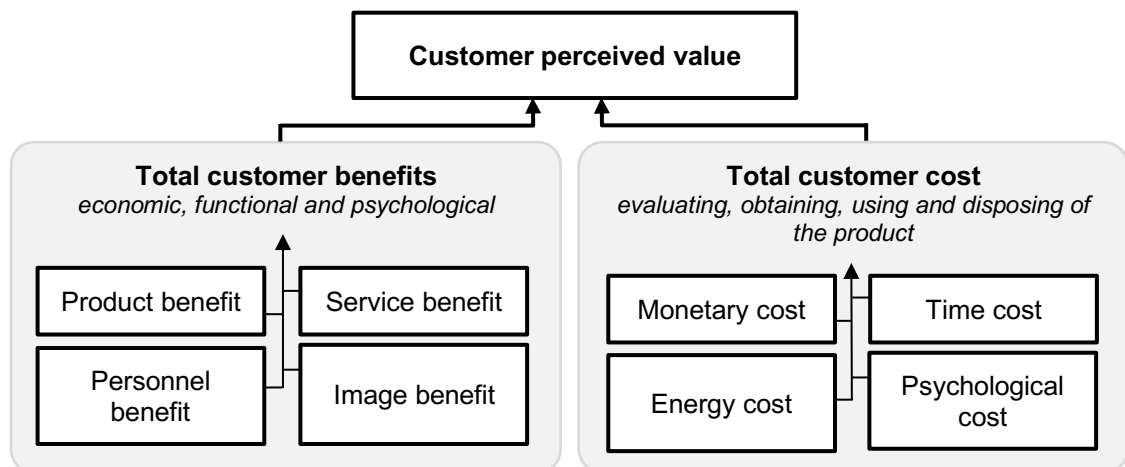


Figure 5: Components of customer perceived value (adapted from Kotler et al. 2012)

Later that model has been updated with more detailed types of benefits and sacrifices. For example benefits and sacrifices can be view from relational, social, ecological, economical, symbolic and emotional points of view as well (Leroi-Werelds, 2019). The benefits and scarifies are to be evaluated in every context but the basic model of Kotler works as a guiding tool to take into account different top-level perspectives. In the context of services, the total customer value is essential issue to assess to give indication of a right price the customer is willing to pay (Anderson and Narus, 1995). Studying more precisely industrial context, Simonen and Nieminen (2017) found in their case study that there are value creating and value destroying elements. Value destroying element in this context is for example ambiguous pricing that confuses customers. Value creating elements on the other hand are service provider's high responsiveness and service staff's competence. These previous findings by Simonen and Nieminen (2017) are some specific values that also make-to-order manufacturing firms should take into account when formulating the value propositions.

Customer value can be separated between the firm's perspective and the customer's one. Payne and Holt (2001) summarize the literature of customer value as value creation, customer perceived value and value of the customer. This thesis focuses on the value creation and perceived value while the value of the customer is left out of the scope. Following this classification, the first research question can be divided into two perspectives of value; *what firm's role in value creation in terms of digital services is and what is the perceived customer value of service.*

2.3.2 Service-dominant logic and value cocreation

Traditionally services were seen as add-ons to products and supplementary service were offered to support the lifecycle of a physical product. The target of services was purely in product sales and transactional business. (Ng *et al.*, 2012). This is referred in literature as *goods-dominant logic* (G-D logic) (Vargo and Lusch, 2004, 2008). Following this definition Vargo *et al.* (2008) specify the value creation for goods-dominant logic as value-in-exchange. This means that services are viewed as units of output which is then sold to a customer creating purely increasing revenue for the firm. This logic draw some critique as the customer was seen as passive actor and service were limited to exchangeable units such as man-hours or information (Ng *et al.*, 2012).

The more recent and more advanced service model is *service-dominant logic* (S-D logic) where value is cocreated with interaction with the customer and service is seen as process rather than product (Vargo and Lusch, 2004, 2008). Furthermore, Vargo *et al.* (2008) specify the value creation for service-dominant logic with the term value-in-use. In other words, value of service is seen from the firm perspective as a result of using the service (adapting and answering to customer's unique needs). Thus, from a customer's point of view a firm offers only potential value which then can be realized in the use of the service (Ng *et al.*, 2012).

The resources used in S-D logic can be divided into *operand* and *operant* resources (Lusch and Nambisan, 2015). Operand resources are usually tangible and static, and their role is to support and enable the value creation. Operand resources are for example technological solutions. Operant resources on the other hand are intangible and dynamic (such as skills and knowledge) which are used to operate on things to create value. Due to the technological development, Akaka and Vargo (2013) argue that technology can also be operant resource as it is capable of acting independently to create value even without human interaction. Resources can further be extended to include other than service providers' internal resources. Macdonald *et al.* (2011) states, that value-in-use could include wider network of resources than just the service provider and customer in value creation. The service-dominant logic is a way of thinking services beyond the borders of transaction and put customer service in the centre of business.

However, service-dominant logic drew some critique among scholars as it does not put customer itself into the centre but rather the service, service provider or interaction between service provider and customer. To answer this gap Heinonen *et al.* (2010) presented customer-dominant logic (*C-D logic*) which is views as a different perspective to S-D logic. In C-D logic focus is on the usage of services and how customers achieve their goals with the services. Similarly S-D logic is further summarized by Grönroos

(2008) as *customer service logic* and *provider service logic*. Customer service logic in this study means that a customer uses multiple resources from its network and uses own skills to create value in everyday practices. Provider service logic is a way of cocreating the value in an interactive relationship with the customer while they use the service.

Many recent studies have followed the service dominant logic and view that value is always cocreated with the customer during the use of the resource (e.g. Grönroos and Ravald, 2011; Fehrer *et al.*, 2018). Heinonen *et al.* (2010) discuss that specifically in customer-dominant logic a service provider acts as a facilitator to enable customer to create value similarly as technology is facilitating the advanced service offering. Thus, the value creation in C-D logic is leaning heavily to the customer side whereas in S-D logic value is created interactively between service provider and a customer. Regardless of the “sub logics” in service-dominant logic, this thesis takes the boarder service-dominant logic and the conceptual model of value creation and perceived customer value used on this thesis is presented on Figure 6. The model is based on a model by Martelo Landroqueq *et al.* (2013) with adapted to especially service-dominant logic (Lusch and Vargo, 2006; Vargo *et al.*, 2008) and service platform thinking (Lusch and Nambisan, 2015).

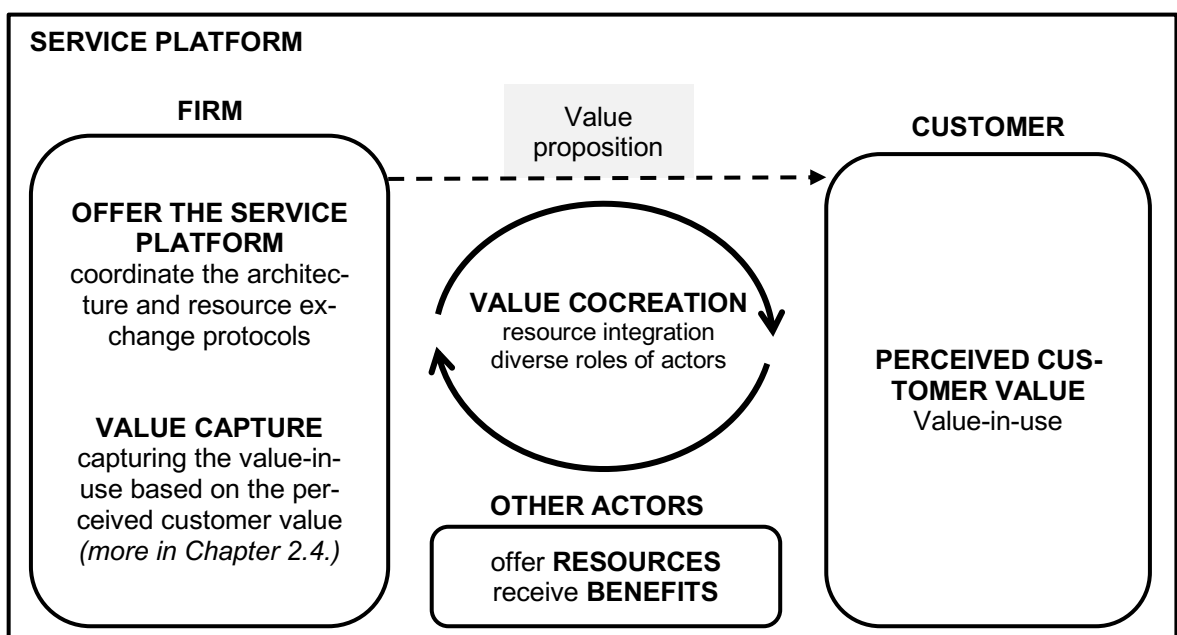


Figure 6: The model and process of customer value

The service platform is described by Lusch and Nambisan (2015) a structure that consist both tangible and intangible resources and act as a facilitator between the different actors. This is similar to the *shared service platform* concept where in the platform also other actors in the supply chain can provide services (Kowalkowski *et al.*, 2013). In the model in Figure 6, the value proposition is the only deliverable that a firm provides to a

customer when value itself is cocreated with the customer. Grönroos and Ravald (2011) define value proposition as a promise about the potential future value creation. Thus, it is a suggestion on what the customer might expect from the provided service. Lusch and Nambisan (2015) argue that since value is always context dependent and value experience dynamic, firms can only offer value propositions not the value itself. Similarly, Anderson et al. (2006) state that value proposition should be targeted to each customer differently depending on the context and the perceived customer value.

2.3.3 Perceived customer value in service offering and the changing customer needs

Services in general are offered, according to Norman (2002, p. 101), to perform certain tasks for the customer or to enable customer to perform additional value adding activities which would not be possible if it were not for services. Thus, the value a customer receives becomes two sided: spared resources or increased value creation opportunities. Furthermore, the benefits customer's receive from the services are not identical for each customer and thus one way to segment customers is by specific benefits (Kotler *et al.*, 2012, p. 386). Furthermore, customers of a service sales have typically more variety in needs than pure product sales and thus service providers should create a dynamic service portfolio (Kindström, 2010) where offering is modified depending on the customer benefit segment. In the meantime, reducing fixed costs is vital in order to service business be profitable as stated in defining the service paradox in chapter 2.2.4. One way of balancing between standardization and customization is to use service modules and thus mass-customize the service offering (Colen and Lambrecht, 2013).

Also, from a customer point of view the value can be either goods-dominant or service-dominant. On the customer value hierarchy presented by Woodruff (1997), desired product performance and attributes form a base of the hierarchy. This level can be categorized to be a part of goods-dominant logic where value is seen as a pure transaction. Next on the hierarchy there is desired consequences of the usage of a product or a service. Lastly, on top is the customer's goals. These latter two levels are aligned with the value-in-use thinking and thus follow the service-dominant logic. To sum it up, customer perceived value is changing with the development of the customer relationship when shifting from transactional business to long-term relationships.

In the literature, there are some specific values listed that customers of service sales value. Firstly in a case study of goods-dominant B2B firms with high service innovation, simplification is seen as a core value for customers of services (Neu and Brown, 2005).

That means that the overall customer experience becomes simpler and more straightforward when product is bundled with additional services. Additionally, Neu and Brown (2005) found in their research that customers value uniqueness and service programs that satisfy their individual needs. These two targets of services aim to the last customer value which is that customers are able to concentrate on their core competence. Baines and Lightfoot (2013, p. 88) summarize the value of services as a pain relievers or gain creators. In other words, services are to help customers to be more successful in their business whether by removing barriers or creating additional opportunities.

The needs from a customer also depends on the competitive conditions of service provider as well as the lifecycle of the technology. The stages in this development are characterized as ferment, transition and mature phase (Cusumano *et al.*, 2015). The relative levels of different service types are presented on Figure 7.

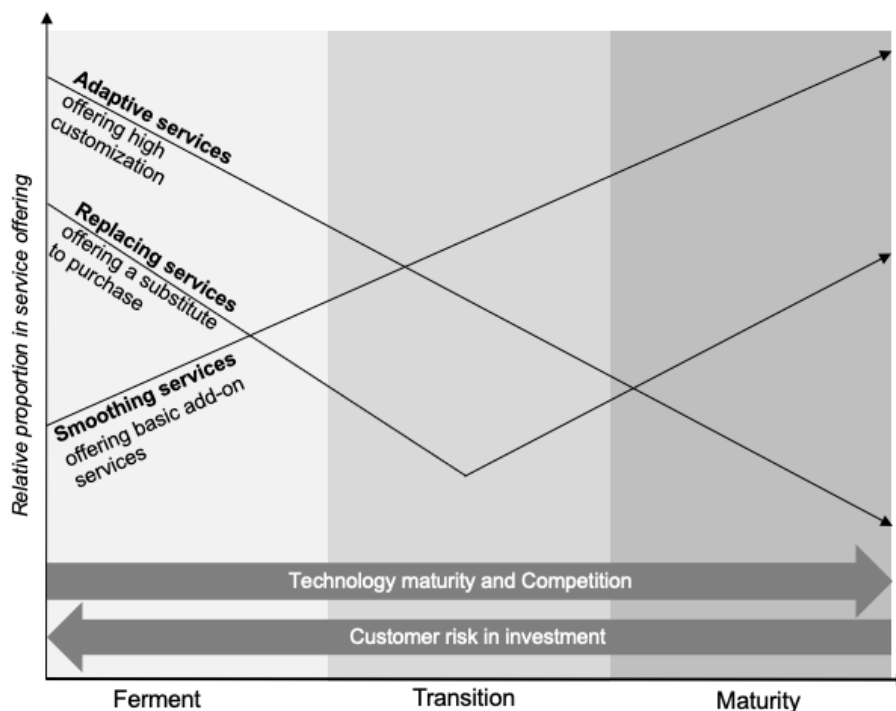


Figure 7: Relative levels of different services over the technology lifecycle (adapted from Cusumano *et al.*, 2015)

In the first phase, uncertainty plays a big role as the level innovation is high and competition is based on product performance (Abernathy and Utterback, 1978). In order to reduce the risks and possible costs customers prefer adaptive services, where high personal customization can be offered, or replacing services where customers do not need to take the risk of up-front investments. Also Baines and Lightfoot (2013, p. 99) see services as a low risk way to adopt new technologies. In the transition phase products are standardized and focus shifts to process innovations (Abernathy and Utterback, 1978).

In this phase, stabilized innovation environment values smoothing services and adaptive, customization centric services decline. The last phase of technology life cycle is purely focused on cost reductions as innovativeness decline and products are similar to each other (Abernathy and Utterback, 1978). The maturity phase offers thus opportunities in smoothing services for the price sensitive customers. Such smoothing services can be for example maintenance services. These services offer also possibility for an additional revenue stream from products in saturated markets. In addition, substitution services, like financial solutions, are offered to customers that are typically not buying the product.

To succeed in servitization manufacturers need to take into account the factors that enhance the adoption of services among customers. A study by Vaittinen et al. (2018) shows that availability, economic viability and service quality are primary factors in service adoption and not dependent on the decision being made. Similarly, Baines et al. (2010) found on their study that manufacturers' perception on why customer's adopt their services are mainly cost reductions, substitute for investment and reduced risk.

On the other hand, customer itself must be adaptive to the offered service and willing to change the internal routines in order to get the most effective result on it (Tuli *et al.*, 2007). Also Vaittinen et al (2018) found that optimism towards services, innovativeness and willingness to be part something new were enhancing the adoption of services. On the other hand, insecurity (not being in control of the data), and discomfort (not being control over the tasks performed) were more or less reducing the possibility of service adoption. Without taking into account these service adoption parameters, even service with high customer value may fail to succeed in markets.

2.3.4 Perceived customer value in digital services and digitalized product platforms

Creating value through digitalization started by emphasising the virtual value chain where information is used to create additional value to the customer or to the supplier (Rayport and Sviokla, 1995). The way of seeing the information flow as a potential business opportunity was later categorized by Lindhult et al. (2018) as virtual-based logic besides product- and service-dominant logics. In virtual-based logic value is not only the use of the product or service but further it is virtual and based on intelligent products. As studying multiple B2B firms in Denmark, Chester, Goduscheit and Faullant (2018) found that customer's value highly targeted and personalized services which are enabled by ICT. Similarly, in a case study of two IT service providers customization, modular opportunities and data visualization and usability were the main customer values of digital services related to end product (Saunila *et al.*, 2017). Both of these empirical studies are not

directly in the same MTO context as this thesis is focused on, but the findings include components that can be generalized.

Even more advanced usage of information in value creation is systemic-based logic where value is highly cocreated and a product can act as a platform between the customer and its partners to interact and bring more value to the system (Lindhult *et al.*, 2018). Systemic-based logic is shown as a customer's willingness to have close collaboration with the service provider and its networks in order to solve a specific need (Goduscheit and Faullant, 2018). In the context of IT service providers, systemic-based logic is the relationship value where customers value reliable and open partners that offer wide networks of resources. (Saunila *et al.*, 2017). B2B manufacturers need similarly utilize networks of resources and form reliable and close collaboration with the customer.

Since intelligent digitalized product platforms have the ability to collect and transfer data wirelessly, the way this data flows plays essential role in value creation. Jonsson *et al.* (2008) studied the services leveraging remote monitoring in shipboard crane industry and based on their research, data flow can firstly go from product to the provide where the service provider creates additional services on top of the data. Another option is that the data flows straight to customer's back office and thus customer takes active role on the value creation process. In a digitalized product this separation is important as it frames the opportunities and actors in value creation. As described in previous chapter, the first option is following the goods-dominant logic when the later falls more into the service-dominant value creation.

The value in services enabled by digitalized products is for customers greater convenience and control of more reliable information (Larivière *et al.*, 2013; Walker and Craig-Lees, 2015) and for the supplier it gives opportunity to response customer enquiries faster, improve internal efficiency and processes and create competitive advantage by raising switching cost of a customer (Walker and Craig-Lees, 2015). Drawing from this finding more personalized service and information products evidently create more value for customer and thus more opportunities to leverage value-based pricing for service providers. In addition Larivière *et al.* (2013) recognize social, identity and entertainment values emerging from the sharing of usage data in digital environment.

The future of tangible product will become more and more digitalized and thus also variety of specific needs and services arise in the future. Cheah *et al.* (2019) identified six service customers' needs based on discussions of expert panel. Firstly, personalization

in the most effective way and the deep knowledge about customer behaviour is considered essential. Secondly, future services require value cocreation and customer participation to be seamless. Third, customers will become more aware and answering to these more demanding customer requirements will test the company's ability to manage costs and usage of data. Fourth driven by ICT, the service delivery is to be faster, simpler and more seamless. This requires complex systems to support the process of effective services delivery. Fifth, customers want services to be delivered at the place and time when they are needed which requires service provider to have deep contextual awareness of the customer needs. Lastly, services are demanded to be more responsive, sustainable and reliable for continuous customer support.

2.4 Value capture logics in service business

2.4.1 Revenue models for product-oriented services

In the business model literature, capturing value is seen as essential procedure as creating the value in the first place (Teece, 2010). Teece (2010) further argues that the right revenue models requires understanding of the choices available, evidence based validations of e.g. costs, customers, competitors and distributors, and high understanding of customer needs and willingness to pay. This chapter tackles the first point as presenting the choices available and their suitability of the services in this context.

One of the targets in servitization is to create an additional revenue stream for a company. This means selling services to existing customers and thus increasing the value of one customer or reaching customers that would not be customers if it wasn't for service offerings (Baines and Lightfoot, 2013, pp. 90–92). Creating revenue through services might be hard since in the study of small and medium sized companies (SMEs) by Kowalkowski et al. (2013) it was found that large customers expect to receive the services free and managers have a hard time charging for services when the whole business is based on product sales. Additional services might also be non-profitable or free when used as a differentiation tactic to win sales opportunities. To tackle this challenge, services should be divided into *standard add-on services*, *optional services* which will generate revenue and *new service* (Anderson and Narus, 1995). Creating optional service package on top of the standard offering will also provide a tool to test the true customer value of infrequently offered services. The level of innovation in product also affects both revenue creation and the service type. Eggert et al. (2011) argue that firms that have high product innovation only services supporting the product (rather than ser-

vices supporting the customer's activity) create long term profitability. To wrap it up, services can create additional revenue and in best case long-term profitability, but this should not be expected for all services offered.

On the contrary to product sales, which is typically based on pure unit sales, service sales have a range of option on how to create revenue. Bonnemeier et al. (2010) distinguish revenue models as traditional and innovative models. Traditional revenue model for services is based on the supplier's work and is either cost plus or fixed fee model and the latter works best if the service can be clearly defined on the beforehand (Kalnins and Mayer, 2004). The traditional revenue models are clearly leaning towards the goods dominant logic as they interpret services as discrete transactions (Vargo and Lusch, 2004). Renting and leasing services for products are also included in traditional models. Furthermore, Besch (2005) found in the research of office furniture services that bundling different services together, such as additional services in rental or subscription service, could make customer retention more stable as a customer would lose more than just the product when terminating the contract.

Innovative revenue models, on the other hand, stem from the usage, level of performance or the performance result and are tightly connected to the value proposition (Bonnemeier *et al.*, 2010). The innovative models concentrate on close customer oriented view where the most advanced pricing method, value-based pricing, bases the pricing on overall value a service provides to a customer (Hinterhuber, 2004; Kindström and Kowalkowski, 2014). This revenue model follows the service dominant logic (Vargo and Lusch, 2004). Similarly to *traditional – innovative* revenue model classification, also Kindström (2010) found that revenue models depends on the maturity of the customer relationship and the level in which the service is focused on the customer's business. To sum it up, the more the service is targeted to customer's core activities the more innovative revenue model can be utilized.

Different pricing decisions are based on the underlying 1) competitive position, 2) market specific practices, 3) how visible the service and their value is for the customer, 4) the role of the service in a company and 5) whether the profitability is controlled and monitored by management (Malleret, 2006). Thus, pricing models for services can be complex especially on a goods-centric companies.

2.4.2 Revenue models and non-monetary value capture in digital service platforms

Besides traditional business-to-business services (e.g., repairs and maintenance) a new types of digital service platforms are emerging. These are digital services that either

wholly or partly use digital technologies in transferring the service from service provider to customer (Williams *et al.*, 2008). Similar to traditional services, also digital services can create monetary revenue for the service provider. Leveraging digitalization in service offering however enables firms to form new benefit-based revenue logics. Martinsuo and Vuorinen (2017) presented in a case study three stepped process for industrial firms to develop their revenue logics from digital services. The process starts from transaction-based revenue logic where data is used rather scarcely, and services are mainly reactive maintenance services. In the second phase the previous services are complemented with usage data-based service where revenue is based on the actual customer benefit. In the last phase services may dominate the whole offering and revenue is increasingly based on customer benefits and shared performance metrics of customer business. Essential part in this process is learning and developing the value co-creation procedures based on remote monitoring data. Only after creating reliable data use capabilities advanced revenue logics can be implemented. (Martinsuo and Vuorinen, 2017) Thus, deciding whether the revenue of services is based on fixed fee or customer benefit company must be wholly aware that which model customers prefer and is the company capable of delivering such a model. Similarly Kindström and Kowalkowski (2014) summarize that revenue model resources are based on product usage and process data, system knowledge (meaning that interlinkages to other services and products set the frames of what can be offered) and seamless offering (increases the flexibility of revenue options).

Digital services offer much more variety in terms of revenue streams than traditional services. The basic logics for revenue creation are subscription, pay per use or advertising (Shapiro, 1999, p. 34). If the customer pays for the service (either subscription or pay-per-use) based on user generated information, a company needs to understand the value which customer receives. On the other hand, if revenue is based on advertising customer information is provided to evaluate whether advertisers are able to sell their products or not. Additionally, there are many different strategies on how to price the service products. For example, versioning by features, capability or delay, offering basic service for free and complementary product with higher charge, or bundling information product into larger packages are just some to mention (Shapiro, 1999, pp. 53–91).

Due to the interactive nature of digital platforms, they enable two distinct ways to create additional value to be captured besides direct customer sales; client-as-a-target and client-as-a-source (Trabucchi *et al.*, 2017). However, these terms are not mutually exclusive and effective service strategy can leverage both ways. The combined strategy means that digital platform is used to gain user base for advertisers (client-as-a-target) as well as collecting user data to be either sold to third parties or used internally (client-

as-a-source). The idea of how Big Data is leveraged and thus used to create additional revenue for the service provider is presented in Figure 8.

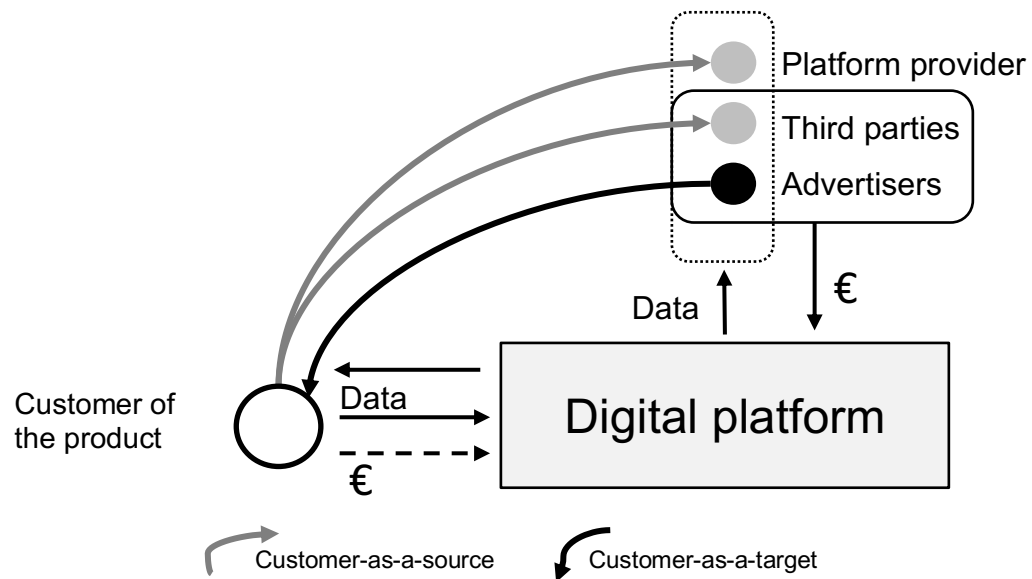


Figure 8: Revenue and dataflow in digital platforms leveraging Big Data (adapted from Trabucchi et al., 2017)

The user or usage information, which in Figure 8 is referred as *data*, can be collected by the service provider either by user registration or observing (Shapiro, 1999, pp. 34–37). In addition, customer itself can have its own processed data available for internal value creation. This is matter of data ownership whether customer have automatic access to this data or whether the data have to be acquired from the provider of the platform. According to Malthouse et al. (2019) the user data can be used to create and sell new data products or sold directly to third parties or advertisers. They also add that in digital platforms the customer base can be a valuable merchandise since platform providers can sell access to this customer base for advertisers. Similarly, Thomas and Leiponen (2016) summarize in their literature review that besides selling the data itself, services can be developed out of the data. The service provider model in data commercialization can for example mean aggregating, managing and creating the data and make it available for a particular purpose at the right time. In multi-sided digital platforms the service providers can aggregate multiple sources of data to form a unified insights and provide them as value-added services to companies. (Thomas and Leiponen, 2016).

Especially in digital services the value capture does not always mean monetary value but also other important benefits. Fehrer et al. (2018) summarize the value capture logics in platform business as *leveraging complementarities*, *reducing transaction costs* and *leveraging and sharing network externalities*. These are all either purely non-monetary

or affect revenue indirectly. Complementarity for platform is achieved according to Milgrom and Roberts (1995) when doing one activity increases the profits of another activity. This is for example a situation where platform connects actors in a way that it decreases redundant actions while increasing agile collaboration. Reduced costs of an actor are for example reduced service provider's time for problem solving when monitoring and sensing is used to locate the exact issue in a product. Lastly to leverage the positive network externalities a loyal and large customer base is needed. Similarly, according to Malthouse et al. (2019) the user data can be used for enhancing the relevance of the data in customer relationship management or internal research purposes. Overall internal process development was also found to be one competitive advantage of digital servitization in the research by Coreynen et al. (2017).

In order to leverage all the possible digital service value capture logics, service providers need to create loyal and large customer base. This can be achieved for example by *locking-in* the customers. Lock-in situation is established when switching costs, meaning costs for customer to switch between supplier plus costs for new supplier to offer their product to the customer, becomes higher than benefit this switch might create. To leverage this situation, service providers can create revenue by selling complementary services to the current customer base or to provide access to this customer base for third parties. (Shapiro, 1999, pp. 111–119, 142). Thus, also other actors in the network benefit from the positive externalities of the network.

2.5 Synthesis

2.5.1 Customer value in digital service

The selected literature on value creation and customer perceived value is summarized in Table 2. This chapter is focused on the first research question

RQ1: What value can a manufacturer provide to customers with value-added digital services?

The value provided to customer does not mean that the service provider is necessary the value creator but also that service provider enables customer to create value out of the service offering. Thus, the selected literature is summarized by the dominant logic used and main findings concerning service provider's role in value creation as well as customer perceived value.

Table 2. Value creation and customer perceived value on selected articles

Dominant logic model	Author	Research and context	Supplier's role in value creation	Customer perceived value
Goods-dominant logic (Vargo and Lusch, 2008) <i>Support value creation of beneficiaries</i>	(Besch, 2005)	Single case study in office furniture industry	<ul style="list-style-type: none"> Offer and perform the service coupled with a product. 	<ul style="list-style-type: none"> Improved lifetime and utility of the product
Service-dominant logic (Vargo and Lusch, 2008) <i>Value in use and in context → optimal value</i>	(Besch, 2005)	Single case study in office furniture industry	<ul style="list-style-type: none"> Coordinate the sharing economies 	<ul style="list-style-type: none"> Liquidity benefits and lower financial risk in renting services. Environmental concerns to be addressed in remanufacturing possibility
	(Neu and Brown, 2005)	Multiple case study in B2B firms	<ul style="list-style-type: none"> Provide end-to-end service program by utilising and combining internal resources. 	<ul style="list-style-type: none"> Simplified customer experience Tailored service for unique needs Enablement to concentrate on core business
Virtual-based logic (Lindhult et al., 2018) <i>Recognize and enhance the value in use by data and analytics</i>	(Goduscheit and Faullant, 2018)	Multiple case study on Danish B2B manufacturing companies	<ul style="list-style-type: none"> Understand and combine the granular data and have insights from customer without interacting directly with them 	<ul style="list-style-type: none"> Highly targeted and personalized service offering
	(Jonsson et al., 2008)	Single case study about remote monitoring in crane manufacturing	<ul style="list-style-type: none"> Data handling and coordinating the needed actions Provide expertise based on customer requests 	<ul style="list-style-type: none"> Reduced problems such as operational hold-up and user errors
	(Larivière et al., 2013)	Conceptualising value fusion in networks and mobile services	<ul style="list-style-type: none"> Provide and coordinate the usage of a platform 	<ul style="list-style-type: none"> Monetary, convenience, information, identity, social and entertainment value.
Systemic-based logic (Lindhult et al., 2018) <i>Taking advantage of whole ecosystem and variety of resources</i>	(Goduscheit and Faullant, 2018)	Multiple case study on Danish B2B manufacturing companies	<ul style="list-style-type: none"> Finding solutions through networks rather than building own competence 	<ul style="list-style-type: none"> Close collaboration to have more customized service to a specific need

While the industry scope of this thesis is limited to non-capital goods industry (goods that are not used to create core value such as machinery) otherwise broader view is taken. This is especially in terms of different customers and partners, and the roles of a service provider. Different customer segments can be for example direct customers, advertisers and third parties.

The early service literature was purely focused on services that were offered as an add-on to tangible products (Levitt, 1972; Vandermerwe and Rada, 1988). With the evolution of product-service systems (Baines *et al.*, 2007) and service-dominant logic (Vargo and Lusch, 2008) the focus shifted more towards offering solutions where services and tangible products are embedded to form value creating products for specific customer needs. In this sense the role of service provider in value creation is diminished since customer is viewed as the main value creator. As a result of rapid technological development ICT and analytics formed a way to enable more personalized, predictive and firm boundary expanding offering of services.

Depending on the dominant logic service provider's role in value creation is either the **actual creator** (*G-D logic*), **coordinator and end-to-end solution provider** (*S-D logic*), **digital platform facilitator and knowledge provider** (*virtual-based logic*) or **network and resource integrator** (*systemic-based logic*). In the complex world of digital services there might be aspects from all of the logics depending on the service provided. As for example Besch (2005) found for office furniture that some services indeed are performed by the service provider and for some services supplier's role is just to coordinate and facilitate the network of actors. Thus, the current literature lacks a point of view where all the logics are taken into account to form a coherent model of service provider's role in value creation.

Customer perceived value on the other hand does not depend that much on the dominant logic. To sum it up value-added digital services offer **customers improved lifetime and utility of the product** (Besch, 2005; Jonsson *et al.*, 2008), **highly personalized service for specific need** (Neu and Brown, 2005; Goduscheit and Faullant, 2018) and **indirect savings by streamlining the relationship and enabling to focus on core business** (Neu and Brown, 2008; Larivière *et al.*, 2013).

The literature gives a range of answers to the first research question and thus gives a good framework to the empirical part. Empirical part is targeted to take these findings into the field and seek the values and service provider's role that is relevant in this particular context. Thus, it is not necessary to stick into any dominant logic but rather form connections based on the findings from the empirical data. In a recent literature review

of servitization by Raddats et al. (2019) it is proposed that future research should take into account other actors than the manufacturer in the service offering. Thus, this thesis takes the approach that manufacturers role in servitization conducted with the network of other actors.

2.5.2 Value capture logics

The selected literature around value creation of service is summarized in Table 3. The table summarizes literature related to research question 2:

RQ2: In what ways can manufacturer capture the value of value-added digital services?

Value captured is categorized as monetary and non-monetary values. Non-monetary can create indirectly increased revenues but is considered as non-monetary as revenue does not come from transactions. Furthermore, reduced costs as a value are considered to be non-monetary due to the fact that it takes into account all cost components that are not always monetary.

Table 3. Value capture logics on selected articles

	Value captured	Author	Research method and context	Type of service in scope	Main findings
Monetary value	Revenue creation	(Bonnemeier <i>et al.</i> , 2010)	Single case study using expert interviews.	Product service systems	<p>Customer pricing methods</p> <p><i>Traditional</i></p> <ul style="list-style-type: none"> • Cost plus • Fixed fee <p><i>Innovative (preferable for PSS)</i></p> <ul style="list-style-type: none"> • Usage based • Performance based • Value based <p>Aspects affecting the pricing of service</p> <p>1) Competitive conditions, 2) market specific practices, 3) role of service in a company, 4) visibility of the service and the value for customer, 5) whether the profitability is controlled and monitored by management</p> <p>Leveraging user data</p> <ul style="list-style-type: none"> • The sales of new data products • Re-sale opportunities • Data trading and re-sale both for third parties as well as advertisers • Sale of access for advertisers <p>Levering user data</p> <ul style="list-style-type: none"> • Enhanced advertising for all possible advertisers • Data trading to actors in the network
		(Malleret, 2006)	Field study on industrial SME's	Traditional services	
		(Malthouse <i>et al.</i> , 2019)	Literature review	Digital platform	
		(Trabucchi <i>et al.</i> , 2017)	Single case study on user-data collecting apps	Digital platform	
Non-monetary value	User data as a value	(Trabucchi <i>et al.</i> , 2017)	Single case study on user-data collecting apps	Digital platform	<p>Levering user data</p> <ul style="list-style-type: none"> • Ethnography of the customer to be used in internal product development <p>Leveraging user data</p> <ul style="list-style-type: none"> • Enhancing the relevance of data in customer relationship management • Research on customer behaviour
		(Malthouse <i>et al.</i> , 2019)	Literature review	Digital platform	
	Complementarity	(Fehrer <i>et al.</i> , 2018)	Literature review	Service platforms	<p>Leveraging complementarities</p> <ul style="list-style-type: none"> • by connecting actors for collaboration and reducing redundancies. For example, by bundling various services, filter technologies and agile collaboration of activities
	Reduced costs	(Fehrer <i>et al.</i> , 2018)	Literature review	Service platforms	<p>Reduced transaction costs (monetary and non-monetary)</p> <ul style="list-style-type: none"> • through the system structure that enables collaboration and reciprocal evaluation.
	Positive network externality	(Fehrer <i>et al.</i> , 2018)	Literature review	Service ' platforms	<p>Positive network externality</p> <ul style="list-style-type: none"> • is achieved with large customer base or diffusion of certain standard. Service providers leverage this network by connecting more actors together and thus accelerating the positive externality effect. The platform facilitates interactions between actors.
	Internal process development	(Coreynen <i>et al.</i> , 2017)	Multiple case study on manufacturing firms	Digital servitization	<p>Shorter lead-times and increased operational efficiency</p> <ul style="list-style-type: none"> • Scalable systems help to shorter the lead-times and thus form competitive advantage. • Customer insight increases operational efficiency and enhance product innovation

This thesis summarizes and expands the current literature of value creation. With products enhanced by digital services value capture possibilities are broad. It is both based on monetary value, such as revenue creation and monetary cost reduction, but also non-monetary value which in some cases is the main value captured.

One target for manufactures to move from products to services is to create more revenue (Malleret, 2006; Baines *et al.*, 2010) which is shown in the value capture logics widely. Digitalization and ICT systems enabled product providers to leverage more **innovative pricing models** as well as leveraging the user data to form revenue streams that are not linked to customer relationships. However pricing of services overall is not always linked to the value it brings to customer but also affected by other factors such as the competition, market conditions and role of services in a company (Malleret, 2006). Even though pricing of services is possible to make innovative and based on the true value it does not always pay off or it is not the best option considering the overall business. Also

The user data is monetized **by the sales of data packages or insights to third parties or advertisers** (Trabucchi *et al.*, 2017; Malthouse *et al.*, 2019) or the user data can be leveraged to create **re-sale opportunities in existing customer base** (Malthouse *et al.*, 2019). Another way of creating direct revenue from digital services is **selling access to the customer base** for advertisers or other actors (Malthouse *et al.*, 2019). The process or problems in monetizing data is not studied in this research. The target is rather to collect unified view of different options and what are most relevant in this case.

On top of the previous, non-monetary value plays a big role especially for service platforms. The variety of different value capture logics depend highly on the structure of the service platform and customer base. Simplest case is capture value from the user data and use it in **internal product or CRM development** (Trabucchi *et al.*, 2017; Malthouse *et al.*, 2019). Service platforms are also valuable for service providers since they **decrease redundant actions, transaction costs** and **create positive network externality** by connecting multiple customers together (Fehrer *et al.*, 2018). **Internal processes** can be developed in a ways that enable competitive advantage such as shorter lead-times or enhanced product development based on customer insight (Coreynen *et al.*, 2017).

The value capture literature lacks an empirical research on digital service value capture especially in the context of services embedded with tangible products. Many of the recent digital service literature is focused on digital platforms such as mobile applications or software services. This thesis studies the digital services in the context of manufacturing

firm and thus widens the value capture literature. This thesis evaluates the pallet of different value capture logics and empirically studies these logics in the context of manufacturing firms.

3. RESEARCH METHODOLOGY

3.1 Research design

The design of this thesis is to conduct an exploratory study of the research questions. That is finding out new insights, define the actual problem in case or to get comprehensive picture of the phenomenon. Following the exploratory research there are three possible ways to conduct it: literature review, interviewing experts and focus group interviews (Saunders, 2009). This study exploits the first two options: literature review summarizes the main article about the topic and empirical interviews complete the findings in more detail to answer the research questions. Digital services and the chosen elements of business models are the studied phenomenon in this thesis and purpose is to explore and to recapitulate the common procedures in this context. Following the exploratory nature of this study the research process is presented in Figure 9

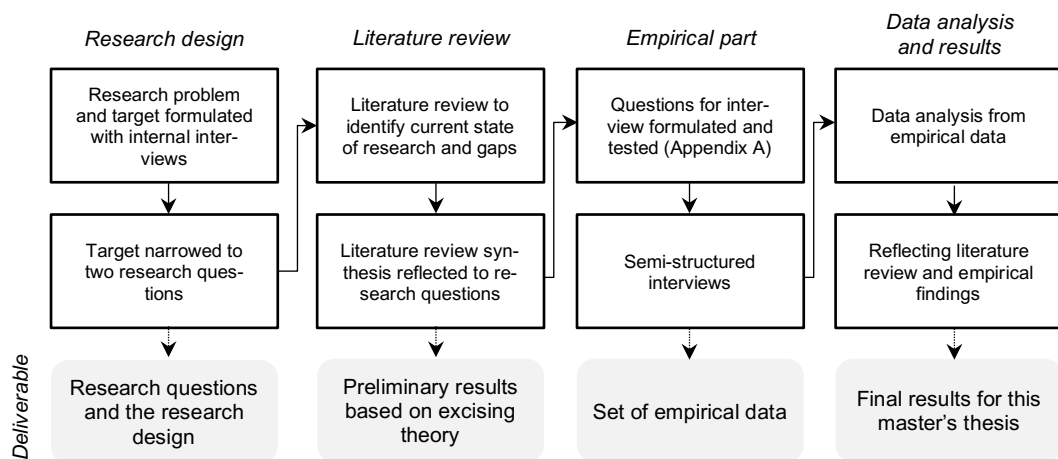


Figure 9: The research process

In this research the area of focus is viewed as subjectively created where human perceptions play a big role. Thus, the ontology of the study takes subjective approach. In subjective approach the social entities are created by and only exist dependent of the social actors (Saunders, 2009, p. 111). One main target of this study is to collect different aspects on digital service and the possibilities that lies in this realm. Thus, subjective point of view reflects the overall design of the research. Furthermore, the studied customer perceived value is highly subjective parameter which could not be possible to thoroughly measure using only quantitative and objective approach. This research takes abductive approach. In abductive research, the real life phenomenon is explored in con-

nection with the current literature to find the best explanation. This means that the theoretical background is used in dialogue with the empirical data. (Bryman and Bell, 2015, p. 27) The research questions are targeted to investigate the customer values and value capture, and to get an understanding of the topic, resulting that the abductive approach is suitable. Also, the research results are to be evaluated by reflecting them to the current literature and thus the back-and-forth dialogue is beneficial.

The research design of this thesis relies mostly on phenomenological research design. Phenomenology is a method where conscious experiences are emphasized, and target of an analysis is one selected phenomenon. The goal is to describe the reality from diverse subjective perspective of the participants. (Bhattacharjee, 2012) The underlying phenomenon is "*digital value-added services in the field of MTO manufacturing firms*". That is not the typical type of phenomenon in this research design as usually phenomenological study focuses on social sciences. Nevertheless, the research methods can be used in this research. The nature in this research is subjective and the data collection is based on qualitative interviews. Thus, the research process is formulated to follow the typical phenomenological study. That is data collection with qualitative interviews, transcribing the interviews and data analysis with e.g., identifying themes (Bhattacharjee, 2012).

Based on the overall design and background of this study, empirical data will be collected using semi-structured interviews. To explore business models of a value-added digital services, a qualitative research method was chosen. This was seen as the most suitable choice as with qualitative research typically the aim is to collect comprehensive information from the field and in real environment (Hirsjärvi *et al.*, 2007, p. 160). As the design of this research is highly exploratory, finding insights and via rather open discussions is a best way to gain more information. Also formulating questions for quantitative research methods would not be possible, as the interviews revealed some surprising findings that would not be possible to address in quantitative methods. This thesis will analyse the possibilities of digital services and thus having the possibility to dig into details of individual respondents' answers is a valuable characteristics of qualitative research method. Semi-structured interview was chosen as the main research method since the nature of the study is exploratory and target to get personal insights from the research participant and the reasons behind their decisions. Furthermore, the research demanded respondents to reflect their knowledge of their current work (Saunders, 2009, p. 324).

As a form of the research 'onion' (Saunders, 2009, p. 108) the design of this research is presented in Figure 10.

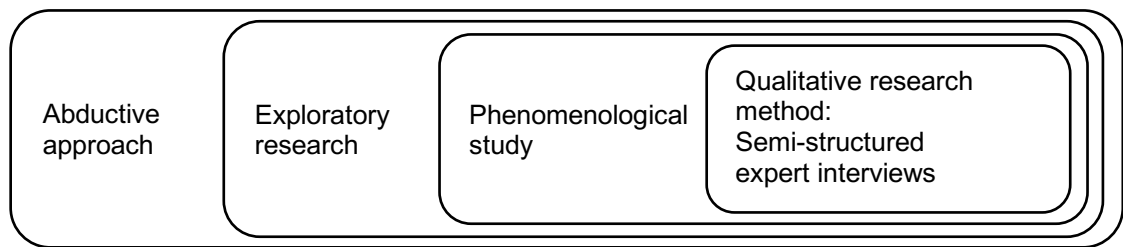


Figure 10: The research methodology following an onion model by Saunders (2009)

Next chapter elaborates more in detail the innermost layer of the model, data collection.

3.2 Data collection

3.2.1 Companies involved in this study

This research is carried out by order of the target company. The target company operates in B2B markets using make-to-order production. Besides, their product is not anyway capital good for the customer. This context builds the frames for this study as results are analysed from the eyes of the target company. The key figures and abbreviation for later use of the target company is presented in Table 4.

Table 4. The target company

Company	Revenue cluster	Number of employees	Industry	Manufacturer?
TRG	100 - 500 M€	350	Office Furniture	Yes

Empirical part includes also semi-structured interviews of selected companies. This method of gaining information for the research questions was chosen together with the target company. As the research questions are rather exploratory, studying other companies gives the target company not only insights for the particular problem but also an overview of the current state of digital value-added services. Offering digital value-added services is totally new type of business for the target company. Thus, interviewing companies with more experience helps the target company to decrease risks and also predict the future development of digital value-added services.

In qualitative research respondents are usually chosen by picking the most suitable candidates (Hirsjärvi *et al.*, 2007, p. 150). Hence the study relies on purposive sampling. Purposive sampling is applicable in this case since the sample size is relatively small. The respondents in this study were chosen from the network of the target company as well as with cold contacting on LinkedIn. As this research is carried out by order of the target company the respondent were chosen to best benefit the needs of the target company. The respondents were thus seen as representative cases that operates in a similar

business context as the target company. The criteria for the respondents were that they already offer digital value-added services besides their physical product offering, the physical product is preferred not to be a manufacturing machine or similar and that the company has already gained credibility in its industry. Also, one industry independent respondent was chosen to widen and support the results. This particular company is however offering digital service consultancy which reflects the high expertise of the respondent in the scope of this thesis. This way of picking the respondents is identified as typical case sampling by Saunders (2009, p. 239). Companies involved in this study are presented in Table 5 in a same way as the target company in Table 5.

Table 5. *Companies involved in this study*

Company	Revenue cluster	Number of employees	Industry	Manufacturer?
FOR	500–1 000M€	1 700	Forest machinery	Yes
LOC	100 - 500 M€	750	Locking systems	Yes
ELV	> 1 0000 M€	60 000	Elevators	Yes
PRO	500–1 000 M€	8 200	Property maintenance	Yes
CON	< 100 M€	N/A	IT-Consulting	No
OFF	> 1 000 M€	8 000	Furniture	Yes
LIT	< 100 M€	250	Lighting components	Yes

Interviews were carried out within the period from December 2020 to February 2021. All interviews were scheduled to take roughly one hour and were implemented using video conference tools Google Meet and Microsoft Teams. The recordings were transcribed using a third-party service provider and with clean verbatim format meaning eliminating all filler words. That level of transcription was enough for the purpose of this research as the content of the interviews was the material that is analysed in this research.

3.2.2 Interviews

In the early stage of the research informal discussions among the employees and management of the target company were conducted to pin out the main goals and deliverables of the research. These interviews were not recorded since the target was only to narrow the scope and discuss the needs and foreknowledge of the target company. The deliverable of this stage was research questions and the research design as presented in Figure 9.

Main empirical data was collected with semi-structured interviews. Interviews included specific themes and a list of questions but left room for open discussions for topics that the respondents had most knowledge about (Hirsjärvi *et al.*, 2007, p. 203). The target is

to let interviewee talk freely on the chosen topics which can be categorized as participant interview since the interviewer directs the interview and not the other way around (Saunders, 2009, p. 321). The themes, structure and the list of discussed questions are presented in Appendix A. In addition, the interviews were recorded to ensure that no specific point was missed. The language of interviews was either Finnish or English based on the primary language of the respondent. Thus, later presented quotes from respondents are not necessary word for word perfect as they are translated to English.

Table 6. *Interviewed persons*

Company	Interviewed person	Duration
TRG	Customer Experience Manager	45 min
TRG	Chief Information Officer (CIO)	60 min
FOR	Product Group Manager, Digitalization & Information systems	55 min
LOC	Head of Digital and Service Solutions	60 min
CON	Business Development Executive	60 min
ELV	Business Program Director	1h 5 min
PRO	Digital Service & Business design	60 min
OFF	Chief Technology Officer (CTO)	57 min
LIT	Global Service Sales Director	56 min

The titles of interviewed persons show a high variety of roles which are responsible of digital services. The persons were chosen to be in the core of digital service development in these companies. Usually that means executives or managers of some sort. To ensure that the informants had a required knowledge about the matter, a bunch of example questions were sent to the participants before the actual interview. Hence the research relies on key informants as the respondents are seen as knowledgeable about the topic and willing to share their perception about it (Kumar *et al.*, 1993).

3.3 Data analysis

Interview data was recorded and transcribed in clean verbatims using outsourced partner. In the analysis abductive approach is used as the classifications are formed based on the current literature but final results are the empirical findings supported by the current literature.

The goal in data analysis was to find common themes around the research questions as well as respondent context specific aspects. After the transcription all the answers were categorized in Excel. The method was to find the actual categories from the data itself

without making any pre thought themes. This way all the data was analysed as objectively as possible avoiding any biases. The main categories are listed in Table 7. Most important categories in regards of the research questions are bolded in the list.

Table 7. Main categories in the first round of categorization

Theme	Main categories
Context	Current digital service offering
	Future development of digital services
	Core reason to offer digital services
	Competitive situation
	Origins of digital service innovation
	Risk and challenges in digital servitization
	Structure of the digital service platform
Customer perceived value	Answering to different needs in different customers
	Answering to different needs within a customer company
	Benefits for the customer
	Reasons why customers do not purchase the services
	Communicating and measuring the customer value
Value capture logics	Service providers role in value creation
	Monetary value
	Profitability of the digital services
	Non-monetary value
	Customer data usage
	Values in digital service platforms

Categorisation was made first by theme such as “barriers for customer to purchase digital services” and “benefits for customer”. These categories were chosen based on the research questions and target of the study. The categories were then linked to the research questions itself. For perceived customer value, the main categories are above mentioned barriers and benefits for the customers. Both of these were discussed since the customer perceived value consist both benefits as well as sacrifices. Value capture logics includes categories such as “pricing of the services”, “non-monetary value” and “data-usage”. Value capture related themes are formulated to view the matter as broad as possible since the concept of value in this context is not tight to only monetary value. Target was to explore every possible value that is to be captured by the service provider.

After the first categorization the data were further categorised based on the content of the answers to find similarities as well as differences. This second round of categorising

forms the basis of the results. Since the target of this research highly relies on gaining new knowledge the number of times a particular theme was mentioned was not seen as very important parameter in data analysis. The emphasis here is the qualitative data but some quantitative analysis is however used to especially support the qualitative findings. For example, if all respondents mention same issue to be a barrier in digital services that can be viewed as important matter to be discussed. However, the number of mentions is not used as a basis to leave something out of the analysis.

The data collection and analysis happened partly simultaneously. This is typical approach in interpretivist research as this method helps the researchers to identify any flaws in interview structure and adjust it to better capture the phenomenon (Bhattacharjee, 2012). After the first three interviews the data was coded, and some parts of the interview were left out in order to concentrate on the most interesting and valuable parts. Also, the list of questions was kept flexible to adapt to every unique interview situation. This flexibility is a big benefit of interpretivist research and enabled the researcher to re-evaluate the targets during the interviews.

The results from the interviews are reported in Chapter 4 using rather systematic approach. The structure follows the main categories listed in Table 7. This stage of does not include analysis of the results but is rather a summary of the interviews based on the categorizations. On the results, the current state as well as future directions of digital servitization is presented to form the context. Also, the digital service platform and the structure of it is described more thoroughly as it was seen as the most interesting form of digital service and was also well covered in the respondents' answers. After forming the context, the research questions were covered one by one. Also in these results the approach is highly exploratory and thus all the categories and findings are presented.

All the answers are seen as individual opinions of the respondents. Most of the respondents however represented a certain company and questions were targeted to seek information of that particular company. Thus, the results are not to be generalised outside the context of this research.

4. RESULTS

4.1 Digital servitization

4.1.1 Current state and future directions

In this chapter the empirical data is summarized to form the results. Company abbreviations are explained in Table 5 and are used here to separate different respondents. The first theme in the interviews was digital service offering in the participant companies. This theme focused on the current state of digital servitization as well as future directions and development plans. The core reason why companies are offering digital services vary mainly based on the manufactured product and overall competitive situation. Summary of the reasons is on Table 8.

Table 8. Core reasons why digital services are offered

Core reason to offer digital services	Respondents
Support product sales	FOR, OFF
Differentiate from competitors	ELV, OFF, TRG, LIT
Generate more revenue	LOC, OFF, TRG, LIT
Generate more value for the customer	PRO, FOR, LOC
Make service provider's internal processes more efficient	PRO

For highly product-oriented firms (*FOR, OFF*) digital services are offered to support product sales and to win opportunities that would not be won if there were not digital services offered. In the markets where product digitalization is new and physical product development is more or less saturated quality-wise, digital service are developed to differentiate from competitors (*ELV, OFF, TRG, LIT*). On the other hand, the digital services might already be an industry standard and thus differentiation occurs in functionalities of the digital service (*PRO, FOR*). The competitive situation of respondents is shown in Table 9. Competition means in this case competition among other manufactures of similar products and thus this does not mean competition in pure software of other operating systems.

Table 9. *Competitive situation in digital services among respondents' markets*

Competitive situation	Respondents
Digital services are a market standard	FOR, LOC
Differentiation is based on functionalities	ELV, PRO, FOR, OFF, LIT
No competition in the markets	TRG

Some respondents also mentioned the desired outcome of digital services more in general. The gain of digital services is to generate more revenue either directly or indirectly (*CON, LOC, OFF, TRG, LIT*). Company LIT summarized well the core idea of their digital services:

“Core reason is of course money. But it’s not anyway in a short term... there’s more and more technology that can be copied... It’s not sustainable strategy the hardware side, it does not have value that much but rather the value shifts from hardware to services and data and data usage”.

Another popular theme mentioned was to generate value for the customer and thus serve the customer better (*PRO, FOR, LOC*). Above mentioned results were highly customer oriented but digital services also help internal process of the company and make them more efficient (*PRO, CON*). These internal processes are for example inventory optimization based on predictive maintenance and enhanced sales operations using measured customer value data and digital channels.

Digital services in the participant companies were either offered already a long time or the investments to this have just started. Common factor was that even though these digital services were offered already a good time, only recently they were put more emphasis on both from the company side as well as from the customer side. The basis of digital services lies on sensing technology which was mention by all the respondents. From the data collected different types of services are built. Basic service is reports from the usage data that is send to the customer (*ELV, PRO, FOR, LOC, OFF, TRG, LIT*). The reports are shown to customer in the form of service platform which is either internally developed or external software where the data is integrated to (*All respondents*). Based on the usage data, some respondents offer also consulting services to analyse and optimize customer’s operations (*ELC, FOR, LOC, OFF, TRG*). Also, predictive maintenance and integrated maintenance operations were seen as a default service emerging from the sensing technology (*ELV, PRO, TRG, FOR, LOC, LIT*).

The origins of digital service innovation are various. Summary of the development of digital services is presented in Table 10. The different themes in the table are not mutually exclusive and it is found that even within a single company the origins are various.

Table 10. *Origin of digital service innovation*

Origin of the digital service development	Respondents
Technology push: Internal development	ELV, LOC, LIT
Cocreation with a customer	FOR, LOC
Market pull: Answering to direct customer need	ELV, TRG, PRO, FOR

Digital services are found to be stemming from three origins: internal development, customer requests or cocreation with the customer. ELV and LOC identified that they have traditionally been highly technology-oriented companies. Service innovations have been developed internally and then sold with a good story to customers. This approach works, according to CON, when doing something totally new because a company cannot validate something that customers do not even know they need or do not wholly understand how the service functions. The other option to develop service is more customer oriented. Previously mentioned companies, ELV and LOC, both are moving more to this side and co-operate with the customer more. Also majority of the other respondents have been developed services either based on direct customer needs or by cocreation (*ELV, PRO, FOR, LOC, TRG*). This means for example customer value research, early co-operation with a case customer or cocreating a solution to a customer's problem. ELV has acquired partners to their digital service ecosystem based on customer requests, FOR creates digital services with a chosen customer and then commercialize the solution to wider customer base and LOC conducts market research with different institutions, like schools and universities. CON finally emphasise the importance of balance between technology-push and customer-oriented approach to simultaneously serve current customer needs but also create new markets.

For future of digital services, more data-oriented decision making, and platform environment is seen to have the most radical development. Data-oriented decision making will be based on real-time and accurate data (PRO, FOR, LIT). A quote from the company FOR:

“next step is to implement data analytics... to have more intelligent reports in order to make data driven decisions fast and real-time”.

Another big theme for future of digital service offering is the platform thinking. Company CON predicts that all the transaction between company and a customer will eventually happen in digital channels which needs an efficient platform. Interviewed firms viewed

platforms as way to integrate all value-added digital services into one holistic system (CON, ELV, PRO, FOR, LOC, LIT). Four of the participant companies (PRO, ELV, OFF, LIT) mentioned also automation based on the collected data as a future direction. Automation can in this context mean examples like “*ability to do automatic floor plans based on blueprints*” (OFF), “*automatization to support the manual service work*” (PRO), “*service robots, logistics robots or cleaning robots to connect into the digital ecosystem*” (ELV) or “*automated ventilation and heating adjustments based on space utilization data*” (LIT). Figure 11 presents the variety of digital services that were mentioned on the interviews.

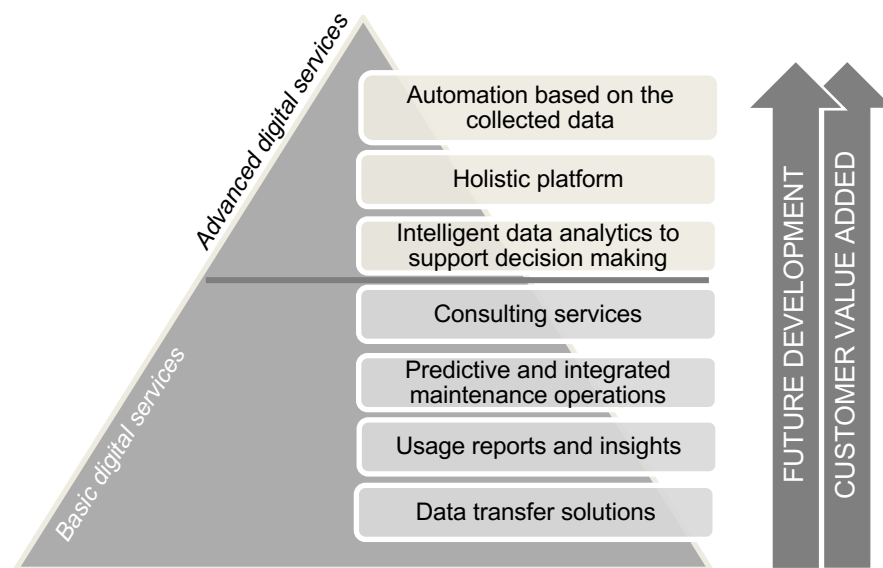


Figure 11: Digital service offering in participant companies

The basic digital services here are services that are enabled by ICT solutions and sensing technology. They do not necessarily require any partnering or third-party actors and can be offered as an add-on to the physical product. Advanced digital services are those that require some additional capabilities in regard to software development or networks. They do stem from the same IC technology but are more value-adding than the basic services.

4.1.2 Challenges and risks in digital servitization

As noted in the previous chapter the overall market of digital services is new and is put more and more emphasis towards all the time. This means that there are some obstacles that need to be considered when enhancing digital presence in the service business. These obstacles can be divided into **internal capabilities** and **external factors**. Internal

capabilities consist of issues that emerge from the company itself. External factors however are obstacles that stem from either the customer or third-party actors such as authorities.

Respondents' most-mentioned obstacle was old traditions and practices both from internal as well as external point of view. For highly goods-oriented firms, educating sales force to sell something that is not tangible and that brings revenue more long-term was the number one obstacle (*ELV, PRO, OFF, LIT*). As an example, ELV said that

"...and even explaining to a sales rep who has sold 30 years elevators that what is an API is not that straightforward".

Also, the ones who make purchase decisions for digital services might be totally different of those who purchase the tangible product. As a result, sales team need to form new connections and work with new customers who have totally different buying behaviour and needs.

Externally also customers have used to transactional business and changing that mind-set might be hard. In traditional B2B business, customers are used to buying in traditional way, they are looking for one sort of products or they might have considered only certain criteria as value (*ELV, PRO, OFF, LIT*). Thus, it might be hard to prove the business value or change the buying behaviour when traditions are playing a big role in buying process.

External factor that was mentioned by ELV and LOC is country specific regulation and legislation. Digital servitization is a novel business area and legislation is just starting to catch it. There are highly market specific procedures and, in some areas, whole digital servitization might not be possible:

"... the cost of wireless data transfer in New-Zeeland is 120 € per month. This means we can't take the service into that market as it is so damn expensive" (ELV).

On a technology perspective FOR mentioned connectivity to be one challenge to overcome as they operate in remote locations. Another thing they mentioned was data security which need to be thought out well. LOC on the other hand saw data security as a prerequisite to even be in this business. Creating an effective platform ecosystem was also mentioned to be one technology-related challenge (*LIT*). In other words, bringing variety of data sources together into integrated system that offer real value to customer is a challenge to be solved.

There are also company level risks related digital servitization. For goods-dominant firms that make quality products and are valued by customer, digital servitization might do

harm. CON mentioned that if a company starts to do something that is totally different from their core offering there has to be a strong story behind and the offering must be credible. If this is not the case the valued product business might be lost by failing in the digital servitization. Also, FOR had similar concerns that if customer does not see the value of digital services, the company might lose the product sales at the same go.

4.1.3 Digital service platforms

Digital service platform in some sort is a major development direction for all the respondents. The functionality of this platform is either internally developed software or that the usage data will be integrated into external platforms. Either way, the common theme is that in the platform different actors work together to form a unified experience and highest value to the customer. LOC summarized the future of the platform from their point of view as follows:

“It’s not going to be that end-customer pays to our dealer which again pays to us but rather that different actors make business together and change resources in multiple directions”

The basic structure of the possible offering of product providers related directly to the physical product is illustrated in Figure 12. The different option for the customer that respondents mentioned in terms of offering were 1) Digital service platform, 2) Data and Control. Those are presented in the middle of the Figure 12.

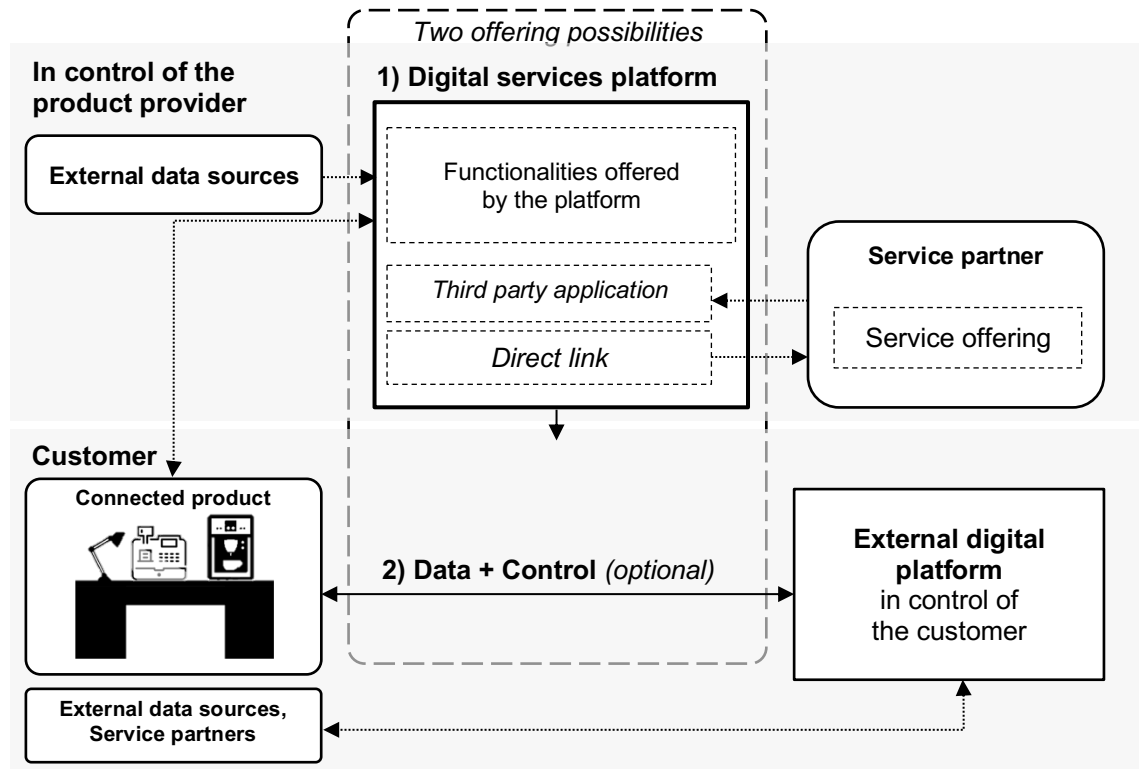


Figure 12: The structure and possibilities of digital service platform

There are plenty of technical options on how the respondents view this integration of actors to be built. One way of doing that is to have your own platform and to allow third-party service partners to offer apps into that platform. FOR has a platform where there are either apps inside the platform or a link to a partner's website or app. Also, companies ELV and Case are developing the service platform to work as an app store to offer customers also third-party services. The prerequisite of going this and controlling it is that the platform provider is the company itself. Thus, companies can decide which partners to involve and which not.

Another property of a platform is that different data sources can be combined. For the respondents that means either external sources that are integrated into the platform controlled by the company or external platforms where the data of digital service will be integrated to. Companies ELV, LOC, and TRG are having a platform where different data sources are to be integrated. These sources can be, for example, robotics (ELV), HR-systems to get employee data, CVT data (LOC) or other products and spaces (TRG). The other option, which was more common in the respondents' companies, is to offer the usage data or other collected data to the customer's existing platforms via open API-connections (ELV, PRO, FOR, LOC, OFF, LIT). In Figure 12 this is referred to as "Data". The connection can run in both ways, meaning that the functionality of a product can be controlled via the platform (In Figure 12: "Control") and the data is captured for reporting purposes (In Figure 12: "Data"). As an example, an elevator by ELV can be called via

external platform but also the operational data flows from the elevator to that same platform. Thus, the integration is working both ways.

There are multiple reasons why companies offer the possibility to connect their data to external platforms (*In Figure 12: The option 2*). From a company's perspective the respondents do not have the needed capabilities to offer quality software for this purpose (ELV, OFF, LIT). LIT emphasised the need for internal capabilities and resources. In order to expand their platform, it would need more resources and experts to analyse different kinds of data. Another point of view is software development capabilities. ELV and OFF did not describe themselves as software developers and thus relying on someone else's platform is smart. ELV said that

“there's no need to develop our own visitor management system, someone else has already done it and we can integrate to that”.

Also OFF mentioned that

“if there's an app owned by somebody that's more in tuned with dealing with the end user. You know, we just upload all our information, and it serves the purpose for the end user.”.

From a customer's perspective the reason for integration is to minimize the number of systems needed for customer. Customer might have already an app in use which controls other products as well and thus integrating into that is a natural direction (ELV, OFF, LIT) or even a prerequisite for purchase (PRO). Another typical use-case for integration is reporting. FOR, ELV, LOC and OFF all mentioned reporting systems as typical form of integration as companies want to have different data into one system. CON added to that, that there is a huge business opportunity also in this field as

“if you can offer a service where one sees the most important KPI's at one glance to base their decisions on, they are surely willing to pay for it”.

The integrations and usage of data is controlled by the ownership agreements of the usage data that a customer and the product produce. Per se the data is owned by the company whose product creates the data (ELV, FOR, LOC, TRG & OFF). LIT mentioned that legally the data is owned by the customer, but they do have rights to use it and it is store in their cloud. PRO was not sure who actually owns the data, but the company do have rights to use the data. When the company collects customer data, there are strict agreements on what they can do with the data. These agreements must be really transparent, and customer should have at least to some extent power to decided how the data is used (CON). Participant companies are in general really cautious that they use the data in anonymized way and not share it to third parties:

“We are pretty careful that at least we don’t use the data in a wrong way ... rather we make less use of it” (LOC).

Based on the interviews one can see that the concept of owning a data versus rights to use the data is not anyway systematic. Participant companies rely much on their agreements between the customer and the service provider. The lack of generally accepted procedures and rules reflect on the variety of terms used in interviews and the carefulness not to use the data in wrong.

The characteristics of a digital service platforms vary on the participant companies, but a common theme is to build a holistic platform where different sources of data is integrated, and actors make business together. Whether the platform is built by the manufacturing company or external service provider is a choice to make and based on the interviews one cannot say which is the right way to handle it. More emphasis is however put to the direction that a dedicated software company offers the platform where different players integrate to.

4.2 Customer perceived value in digital services

4.2.1 Different customer needs

The second part of the interviews focused on customer value with the target to find answers to the first research question: *what value can a provide to customers with value-added digital services*. The part started with describing all the customer segments for digital services. None of the respondents differentiate digital service customer segments from the customer segments their product business has. Some however identified that the customers of digital services are different than those of product business. For example, ELV had totally new customer contact to which they need to influence early in the buying process. CON mentioned that it is always important to keep the end-user in mind of the digital service and build business targets based on that.

In service business in general customers have highly variable needs and digital services are no difference. Respondents tackle this challenge in multiple ways. A summary of different reasons for varying customer needs as well as the solution mentioned by the respondents is presented in Table 11.

Table 11. Summary of the reasons for different customer needs and solutions that respondents mentioned

Reason for different needs	Solution	Respondents
Variable needs in different organizations	Customization for specific customer need	PRO
	Modular service offering	PRO, FOR, CON
Customer's capability to use the data and technology	Different levels of data analytics	OFF, FOR, LIT
Different needs within the customer's organization	Communication and education	ELV, CON, LOC
	Serving all parties mutually	PRO, FOR
	Focusing on one user	OFF, LIT

Customization for specific customer needs is one way to serve different needs (PRO). However, customization was seen by PRO an old-fashioned way of doing business and their target is to make scalable model that can be delivered to customers always the same way and with somewhat similar content. Another option is to make the service modular with a basic version and on top of that value-adding components. FOR, for example, uses this strategy and CON mentioned that companies should have only a few options to choose from to make the buying process as simple as possible. Adding to the amount of options CON stated that

“That kind of choice about the customer segment is really, really important. To some you can make really good service ... but even more important is the decision that who you don't serve”.

The customer needs also reflect to the state of how capable the customer is to use the data and technology. Respondents saw that some customers are more technology savvy and thus want to leverage the digital properties of the product themselves but some really need comprehensive service products (OFF, FOR, LIT). This can be tackled by offering different levels of data analytics to customers from pure data integration to service platform and insights.

In B2B markets it is typical that there are different needs of the one who makes a purchasing decision and the one who uses the product. Especially in this field of digital services the one who purchases might not see the benefit of the end user. ELV, CON and LOC mentioned communication as essential in this process. A company must educate the customer from different aspects of value and also help the buying party to sell the product internally to end-users. In order to do this communication, PRO mentioned that they must bring value to all the parties who are somehow involved in digital services,

whether it is acquiring or using it. In that way varying needs do not become obstacles in the first place. An example how to do this in practice, FOR has a platform which is configured to meet the needs of the different users. A driver (=end user) sees the things that are valuable to him/her and purchaser have totally different view. Opposite to the “generalist” strategy are OFF and LIT, who have decided to only serve the party who is bringing the revenue to the company. Thus, they are not focusing on bringing direct value to the end-user, but rather enabling the purchasing party to create that value.

Serving varying customer needs is all about choices that a company must make, whether to offer something for everyone or focus on one party over another. General buying process, a product itself and the end user needs seem to affect this decision.

4.2.2 Perceived customer value

Perceived customer value consists the benefits to the customer as well as sacrifices. This theme was discussed with the respondents by questions related the actual benefits of the customer and also the reasons why customers do not buy the digital value-added services. The themes that emerged from interviews related to the benefits were **1) real-time and reliable data, 2) risk management, 3) enhanced usability** and **4) business aspects**. The benefits are categorized to these themes based on researcher’s own judgement and for example the word “risk management” was not mentioned by the respondents. However, it describes the factors in it well. Summary of the benefits respondents mentioned is presented on Table 12.

Table 12. Summary of the customer benefits of digital services

	Benefit	Examples
Real-time and reliable data	Support the decision making	<p>“First of all, the user, the end customer has specific data that they can make decisions on” (OFF)</p> <p>“now with these systems I can push a button and I have the same information. And it’s really factual.... It helps the space owners to optimize their spaces and thus save money.” (LIT)</p>
	Transparency to the product fleet	“... very real-time and reliable data of the fleet, state of the machine. Where it’s located, what it does, how it works, is there some malfunction, does it need maintenances...” (FOR)
	Proof of customer value	“... we can calculate in minutes the savings for the customer, so after all it’s also for the customer the end-result monetary wise” (TRG)
	Ease of use	“... you can for example into Manager-mobile application note down a couple of things and the data transfers right away to all specified users to see. And you can also see it there later” (FOR)
Risk management	Better utilization rate	“... the utilization rate is highly important. If the machine is not working, it basically always creates loss” (FOR)
	Adaptability to changing environment	“...they [the customer] do not need to know at all what the end-user wants in five years from now ... whatever the customer wants in five years we can make the integration because the technology is already there” (ELV)
Enhance usability	Ease of use	<p>“One can make some notes for maintenance straight to the application. You don’t always need to carry the notebook with you.” (FOR)</p> <p>“For typical consumer it might mean that it is easy to get new access rights to the existing physical key, that is the ease of use” (LOC)</p>
	Ad hoc training	“It could be discovered based on the data that this operator [the user] segment needs maybe this kind of training”. (FOR)
	Enhanced product functionalities	“Another thing is security and high quality. In fact, high quality for us usually means high security”. (LOC)
Business	More revenue	<p>“How they get the most satisfied residents... or sell the houses as fast as possible. That is which is their measure. We have though a lot of how we can bring more revenue to our customer” (ELV)</p> <p>“if they make the right decisions that we would provide insights to, the employees would be happier, and if the employees are happier, they’re gonna be more productive.” (OFF)</p>
	Help differentiation	“It’s kind of the core why the digital services are so important to us, it’s because that is what differentiates our customer from their competitor.” (ELV)

Respondents typically discussed the benefits in user's perspective and organisational level perspective. The benefits do not necessarily belong either one of the categories but can be shared by both aspects. The user perspective consists all the users of the digital service. This can mean the end-user or the one who makes the decisions. In chapter 4.2.1 the company's perspective of the different needs of users was tackled. This chapter elaborates more the needs and benefits per se. Organisational level benefits are thus those aspects which affect the performance of the customer company. Based on the data it is difficult to make explicit categorization to organisational and user benefits and thus that is left out of the analysis.

First major theme which is same for the organization as well as the end-user is **real-time and reliable data**. The data being real-time means that the data a product creates is available for use without any delays. The real-time data enables then real-time decision making which further creates for example predictability and cost savings (FOR, OFF, LIT). The reliability of the data being a benefit for the customer was mentioned by the TRG company. Since digital services enables customer specific measures the value of the product can be measured and thus the data creates reliable way of proving the benefits for the customer. Also, the customer can trust that the product is functioning as it should. The quick data transfer itself also eases the use of a product from the user perspective (FOR).

The second theme was **risk management**. Respondents however did not mention the term "risk management" but benefits in this theme can be viewed as ways to manage risk. This theme per se is completely organisational level benefit and thus it is not considered as benefit for the user. First benefit that could be categorized as a way to manage risk is better utilization rate of the physical product. On the organisational level this means minimizing stoppages (FOR) or maximizing the life cycle of the product (TRG). The second benefit that lowers the customer's risk is adaptability of the product. Since digital properties enables the product to be updated without changing any physical parts, customer's do not need to worry that the product become redundant (ELV, TRG). This helps to justify the investing decision.

Third theme is **enhanced usability of the product**. With digital services the actual usage might become easier and more effortless. The other benefit that enhances the usability is that based on the data, a company can offer ad hoc training for the users. Third thing is enhanced product functionalities. For example, if value proposition focuses on high security, digital services might enhance this value proposition by offering solutions to get security on the next level.

Lastly, customer's core **business related benefits** were also mentioned. These are rather indirect effects as the majority of products are not used as capital goods. The digital services however can produce indirectly more revenue for the customer. This is achieved for example by enhancing employee productivity or increasing end-customer satisfaction. Another indirect business benefit for customer is that digital services might help them differentiate from their rivals and thus win more opportunities.

Additionally, service platform ecosystem offers some benefits that are specific for this technology. Service platform offers a way to localize and personalize the service into different markets (ELV). For ELV this means that

“... there in France there are French speaking partners and apps that fit to the French way of living. And in China there are those that resonate to Chinese markets... this ecosystem is a great way to provide these local services.”

The other thing that defines customer value is the sacrifices customer needs to make in order to benefit the service. The sacrifices that respondents mentioned to be barrier for purchase in a non-specific order are **1) price, 2) lack of proof about the business value, 3) concerns about privacy, 4) concerns about data security and 5) too complicated system**. Common factor among the barriers is that they are all more or less mental aspects. This all boils down to the novelty of the digital service business and traditions that live strong among customers.

First sacrifice for the customer is the monetary price. Chapter 4.3 discusses more about the pricing strategies but some respondents saw price of the digital service to be an obstacle in purchase (ELV, LOC). In project-based business budgeting and requirements might not allow any additional costs:

“I [the buyer] have a tight budget and my only job is to place there inexpensive metal box which moves up and down” (ELV) and

“... the mechanical is the cheaper option but still safe” (LOC).

FOR on the other hand mentioned that price will not be the turning point in selling digital services. However, that is more related to the chosen pricing strategy by FOR than the actual price not being any way significant factor in purchase decision.

Price is tightly connected to the second point which is lack of proof about the business value. In other words, it is hard for the customer to justify the price compared to the perceived value they get (ELV, PRO, TRG, OFF, CON, LIT). Even though digital services might have been around already some time they are still a novel business category for

the respondents. This results in a situation which PRO describe as “egg-chicken problem”:

“Kind of proving the business value is difficult, and when we are not able to do it we might not even sell the first project or the first pilot if we don’t have the proof” (PRO).

Proving the business value means also explaining the use case. Even with some examples use cases customers might have hard time understanding the need for the digital service in the first place. Traditional option might work just well for their needs.

Third aspect is data security. In order for digital services to work, they need data from the customer and the product. This raises the concerns about data security. FOR mentioned that customer’s do not necessary trust that for example employee data is securely stored. Other respondents also viewed data security as highly important aspect but did not see that as an immediate barrier for purchase (LOC, CON). Related to the measuring technology some customer might get the feeling that their behaviour is monitored. Thus, the fourth barrier is concerns about privacy. Product provider monitoring individual customers is for some customers too high of a sacrifice (FOR).

Lastly, the fifth barrier is too complicated system for the customer. Company might need to educate the customer in order them to understand the way new digital technology works or why it is valuable (ELV). Also TRG said that some customers need only one part of the bundled digital service and thus are not willing to pay for the whole package. Too complicated system is also related to the fact that customer might already have plenty of systems and software to handle and they do not want to have one more report (LIT, PRO). According to CON, there are two key aspects related this barrier. Firstly, when bundling a product and a service it needs to be done as smoothy as possible:

“they can’t be two separate things. That one redirects the customer to read more here and then suddenly you are in totally new universe...”

The other thing to take into account according to CON is that all purchase decisions are made by feeling and thus

“.. if one feels that they don’t understand something, the decision won’t be made”.

Perceived customer benefit in digital services is the total of the benefits and sacrifices. Benefits are to be maximized while minimizing the possible barriers or sacrifices a customer might have to make.

4.2.3 Service provider's perspective on customer value

When talking about customer value the perspective of a service provider shall not be total forgotten. Measuring the customer value and evaluating the success of digital services is really diverse among the respondents. Also, some of the respondents viewed measuring customer value more like measuring the success of the digital service. In other words, the more successful an offered digital service is the more value it must bring to customer. Summary of different measures is presented in Table 13.

Table 13. *Measuring the customer value and the success of a service*

	Usage of the measure	Measure	Respondents
Quantitative	Communicating customer value	Money savings or other savings (e.g., CO2)	PRO, TRG
	Success of the service	Active users, number of subscription renewals, number of customers with digital service	PRO, OFF, LIT
Qualitative	Communicating customer value	Reference cases	LOC
	Success of the service	Market studies for customer satisfaction	ELV

The measures that are used in communication the value to a customer can generally be divided into quantitative and qualitative measuring. Quantitative measures were mentioned by the respondents are money savings (PRO, TRG) or other savings like CO2 (PRO). LOC stated that they are very reluctant to give any numeric values to customers as they customer base is highly diverse. Measuring the success of digital service with quantitative measures is based on active users (PRO), number of subscription renewals (OFF) and number of customers who take the digital service from overall sales (LIT). This indirectly links to customer value as OFF stated:

“You know, how many people resign back up for the service after a year... That would be a metric to say they are satisfied therefore they are gonna reconnect and resign back up for another year that service.”

Also common among the respondents was to use qualitative measures in communicating the value and evaluating the success of a digital service. For communication, LOC relies on reference cases which works as a showcase of the value of a digital service. ELV on the other hand conducts market studies and surveys on a regular basis to get to grips on how satisfied customers are, what business model works the best and how much customers are willing to pay for certain digital service component. Market studies are more used in internal development than in communication the value to the customers.

The service provider's role in value creation process can be based on how actively a company pushes the value to the customer. Respondents viewed their role to be both, insight and value creator as well as value creation enabler and did not have a specific positioning on this (ELV, LOC, OFF, LIT). Value creation enabler was viewed as the starting point or an easy way of providing the service. ELV mentioned "*currently it's more like that here's the data, do whatever you want with it*". LOC also said that they help the customer to take advantage of their data themselves and thus is a value creation enabler. LIT on the other hand said that the customers are not yet ready to create the value themselves and thus insights are active participation is needed from the service provider's side. This is the other side of the spectrum where value is actively pushed to the customer. Product providers offer for example analytics and insights which guides the customer to act more responsible, safer etc. (LOC, LIT). For ELV this is the future direction that they want to offer "*intelligent knowledge*" for the customer's business. In a summary, service provider must keep in mind the end user and their needs. Some are more interested in the outcome of the data and thus service provider needs to be the value creator and bring user-friendly and simple service to the customer. On the other hand, service providers need to enable the customer to do broader analysis and research based on the raw data if that is what the customer wants and is capable of doing.

As most of the respondents are only at the beginning of their digital service journey, customer value measuring is diverse and not systematic. Quantitative and qualitative measures are used but qualitative measures are more common when communicating the value to the customers. In terms of the value creation respondents are both taking active role and also just enabling the customer to create the value themselves. As the development is only at the beginning generally customers need guidance and ready-made value. However, it seems that the future development will flow more towards the state that for basic services the service provider is more like a value enabler. If product providers create the value it must contain intelligence and something that customer is not capable of doing themselves.

4.3 Logics to capture value from digital services

4.3.1 Monetary value

The third part of the interview focused on value capture logics of digital services. Value capture logics can be studied in the perspective of direct monetary value as well as non-monetary values. This chapter focus on the monetary value of digital services. Also results for main costs and the profitability of the digital services are presented here. The next chapter (Chapter 4.3.2) focuses on the non-monetary value.

First value capture logics is the revenue which is generated by the digital services. This might be direct revenue, meaning that the customer pays for the digital service, or indirect which means that offering digital services will boost the physical product sales. The methods for generating direct revenue from the digital services were very diverse among the respondents. Pricing of digital services seem not to be the focus area at all for the participant companies. However, they also have variety of different pricing methods in place. Figure 13 illustrates the aspect affecting pricing of the digital services according to the respondents.

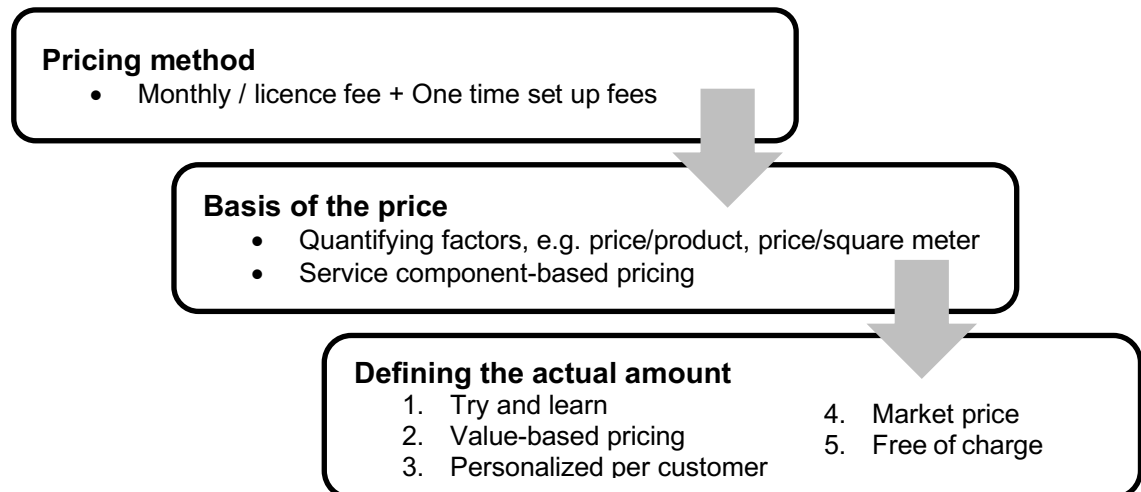


Figure 13: Aspects affecting the pricing of digital value-added services

Firstly, for digital service one typical pricing method was to invoice monthly fees or licence fees plus possible one time set up fees (ELV, LOC, TRG, OFF, LIT). As digital services are typically aimed for long term relationship, subscription-based pricing seem very feasible for them. Just like product sales is based on the quantity of products, also digital services are based on some quantified factor. If the service is tightly connected to the physical product the price of digital service is also per product (LIT, TRG, OFF). Another possible quantifier is the size of the property and thus price can be per sqm for example (PRO, OFF). Tying the price of digital service into some factual measure helps the customer to assimilate the end price and thus eases the negotiation process (PRO). LOC and ELV also mention that the digital service offering is sort of mass customized. This means there are either ready configured service packages or purely based on different components. For OFF and LOC this is something they have thought but not yet put into action to.

"We don't today [do component pricing], but we'll definitely thought about that.... if you want us to interpretate the data for you and provide you knowledge and insights, here's

a service that will do that for you. We haven't built that out yet. But you're a 100 % spot on with what we see this growing as." (OFF)

Thus, as a summary, the price can vary based on the chosen service components, some quantifiers such as space and is invoiced as recurring license with set up fees.

Besides deciding that how the services are invoiced companies must decide the factual price itself. To sum it up, respondents mentioned five methods that set the price of their services 1) **try and learn**, 2) **value-based pricing**, 3) **personalized per customer**, 4) **market price**, or 5) **free of charge**.

In the novel business where customers are not used to buying these services and there might not be any market price to lean on, first pricing strategy is simply trying and learning (LIT, ELV, TRG). Some factors are taken into account like operating costs of providing the digital service (TRG and LIT) or studies and questionnaires of what the customer would be willing to pay (ELV). However, in the end the price is something to be seen whether it is good or not,

"realistically we had to dip a toe in the water and see what they [customers] would be willing to pay, because there's no market price. No other does this..." (ELV).

The second option is base the price by the measurable value it gives to the customer. PRO was the only respondent who mentioned this pricing method and as an example the price can be tied into the cost savings the customer gets by using the digital service.

Thirdly the price can to some extent be personalized for each customer. CON stated that in B2B markets the more personalized the price is the better chances are to win in tenders. However only TRG mentioned that some additional discounts are to be given to favorable customers, but no other personalized pricing method was mentioned by the manufacturer respondents.

Fourth factor to affect the price level is markets and competition. This is valid for the respondents that actually have some reference points (FOR, LOC). FOR said that different markets have slightly different price levels. LIT on the other hand did not price the product based on markets. They recognize that different markets have different standards for the price of digital services but were reluctant to change the price according to these aspects. The reason is that the data and digital services are transferred online and thus LIT feels that it is a risk to have different prices for different markets. For LOC, the competitors highly affect the price LOC can set for their services. However, they also see a silver lining in competing pricing strategies:

“...new agile players come with novel pricing strategies, and that is in fact healthy in a way they teach those new models. That it is not only our job to change the thinking in this industry”.

Lastly the digital services are also offered simply free of charge. For FOR offering the services free of charge is currently the main strategy. When the monetary revenue in product sales is high per customer, winning even one prospect with free digital services might be profitable and wise. In these situations, digital services are thus mainly used as to win opportunities and to boost product or maintenance service sales. Similarly, OFF has priced their services only with minimum margin as their target is to win projects that initially cover the costs easily:

"So, if you win a 2-million-dollar project and your margins come out to be 800 0000 dollars on that, it doesn't take too many wins to make an argument that is self-funding"

(OFF).

According to CON offering digital services for free is also a great way to test novel technologies that are there any interest towards them. But in this case one must be very transparent on whether it is only a pilot and what happens after it. It can be hard to justify the customer to pay for something that has been previously free.

For the providing company the above listed five pricing methods represented the direct the financial income of digital services. The other side are the costs. Most of the overall costs in digital services are related to the software development (ELV, PRO, Case, OFF, LIT). However, that is something which is typically not followed or anyway allocated to future profits. It is more like an investment that was once made. Same kind of investment is building new capabilities in order to serve the needs of the digital service (OFF).

Operational costs related digital services are more closely followed by the respondents. The operational costs include variety of different things. First thing is the wireless connection which all the respondents mentioned, and which is the prerequisite of doing the digital service business. Regular updates for data security and incremental improvements also build up costs on regular basis. Digital services also require a lot of indirect work which are to be considered as a cost. These are for example testing, meaning the actual people, test environment and software (ELV), personnel costs for the customer support (TRG) and modeling the customer space as a digital form (LIT).

The monetary profits and costs end up ultimately to profitability. Only one respondent emphasized that they are actively measuring the profitability (LIT). Others did not mention how they calculate the profitability side other than estimating it. Either measuring the profitability or not, all respondents mentioned that profitability is not the target in digital

services in short term. CON stated that in these kinds of business developments it is critical to decide the timeline when profitability will be measured. According to them it better to be rather long term and companies should have patience to run this business line unprofitable for a while. One challenge in calculating the profitability of digital services is deciding what factors to take into the calculation. The emerged issues related this are

- Cost and revenue are not linked: *“it’s really hard to draw connection between the actual costs and the revenue.”* (ELV)
- Indirect revenue generation: *“if you said, for the jobs we won, we would have lost 50 %. You know, you could calculate what your additional revenue or additional lost would have been without the product”* (OFF)

LOC also mentioned that it is hard to compare the product sales and digital service sales in terms of the profitability since the whole business model is changing starting from the way they are invoiced.

The novelty of digital service in the interviewed industries shows also in revenue generation. There are lots of variety in different aspects of how companies see the monetary side of digital services. However, common factor for all was that since this business line is at the beginning of its life the monetary benefits and scarifies are not to be examined too closely.

4.3.2 Non-monetary value

Besides monetary benefits digital services offer a great deal of non-monetary value to the service provider. Non-monetary value that was mentioned by the respondents can be divided into two categories: **brand value** and **data related value**. Brand value increases through the innovativeness and expanding product portfolio which then again increases the sales (FOR, LIT). LIT stated that

“Brand value, that kind of valuation, I’ve heard from many customers and suppliers that their eyes sort of opens up towards [the company] that I though you’re only hardware supplier. That clearly creates value to our brand and leads to increasing business”.

The other major value is data. In the matter of fact, data is for most of the respondents the main value digital services bring. Figure 14 presents the logics of leveraging data as a value. Respondents mentioned process optimization, enriched customer data and product development as directly the non-monetary values from digital services.

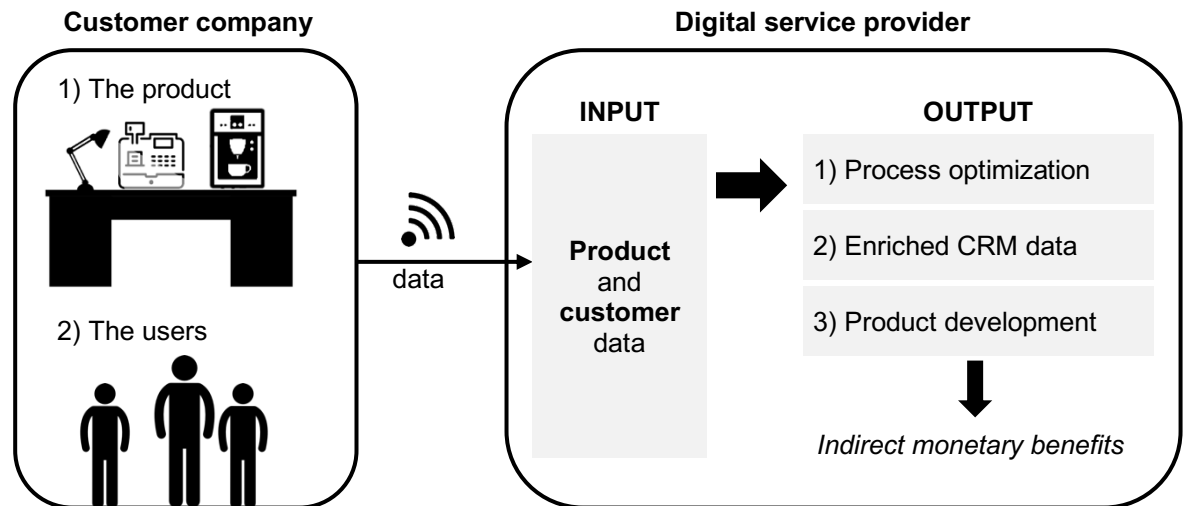


Figure 14: Data as a value for the digital service provider

First value as an output is internal process optimization. Respondents mentioned logistics, warehouse optimization (FOR) and sales process optimization (CON) as examples. Logistics and warehousing leverage especially the product data which is related to the components and their state. Spare part warehouses can be optimized based on the expected brokage of components. Companies using dealers as a sales channel or third-party maintenance service providers, the same optimization possibility flows to these actors also. Sales process optimization is related to the targeting the sales better (TRG) as well as making the process itself more efficient (CON). Sales process efficiency is achieved with digital sales channels which can be embedded to the digital service platform (ELV, CON).

Secondly, data about the customer company and user enrich the CRM data. Usage data creates additional parameters to the customer data and helps the company to understand how the customers act and how different customers use the product (TRG). Ultimately this data leads to better targeted sales and through that indirect monetary benefits.

Lastly internal product development takes advantage of the collected data. ELV and OFF referred the data as an “asset” which can be utilized to offer better products to customers in general and not just for the customer using the product. The way product data is being utilized in product development is well summarized by LIT:

“This offers a totally new possibility to understand that [our product] even more in a data level.... we can analyse that how certain products work the best, what are the best setups for those, and even in a hardware level on how fast certain products wears out

in certain use and certain spaces. Utilizing that we can in the future develop better product for this certain use”.

Thus, the value lies in being able to identify the core reasons for certain problems or the exact ways of how to develop the product to be better. The data also helps to identify products that are not favoured by the customer even though sales wise they are doing well. OFF gave an example on this case:

“a chair or something else, that’s not being utilized, and you see that over and over again in different customers, you start to recognize that maybe that product while aesthetically pleasing to the user is not functionally pleasing”.

Non-monetary value is an asset in digital services. The data from the product itself as well as the user and the usage of the product is highly valuable for the service provider. It is used internally process optimization, in CRM systems as well as in product development.

4.3.3 Leveraging the characteristics of service platform

Digital service platforms enable working with third parties and combining different data sources. Many of the respondent recognize the possibility of selling anonymized usage data to third parties but are not yet figured out a working business case to this (ELV, FOR, LOC, TRG, LIT). However, respondents mentioned some implications on what kind of data could be sold. FOR the focus is on the data that is not related to the usage but rather data that could be collected without connecting the data to any user or product. As an example, on this could be data related to the environment like weather and air quality. The other point of view is the actual usage data that could be commercialized. Many of the companies have thought about that this could be something to consider in the future when there is huge amount of that data. This is not the reality currently.

Selling data also includes some risks that were recognized by the respondents. A decision must be made that whether there is some incentive to commercialize the data and is it something that the company want to strategically do. Selling it might decrease the competitiveness of the company (ELV). Based on the interviews leveraging the possibilities of digital service platform is still scarce. Especially regarding the data and customer base companies try to avoid any conflicts or misuse of sensitive usage data.

5. DISCUSSION

5.1 Digital service offering

The empirical data shows that the core reasons on digital servitization is somewhat different from the traditional servitization, but same components can be identified. Companies that are highly goods-dominant offer the digital services to support the actual product sales. This forms revenue growth for the company which is also identified by Malleret (2006) and Baines et al. (Baines *et al.*, 2010). However, empirical data revealed that digital services are creating mainly indirect revenue meaning that they enable more product sales. In the future they also enable direct revenue growth, but the current state in respondents' companies highly emphasises only indirect revenue. Digital services also are used as a differentiation strategy at least in short term. This means for example offering some functionalities that are unique among competitors. Digital servitization is also found to enhance brand image. This is directly in line with findings on the research by Malleret (2006). Also, many of the respondent companies started the digital servitization just to be relevant and to utilize the current technology. It seems that thus the strategic point of view follows the actual development and not the other way around.

Digital service offering in respondents' companies seem to develop hand in hand with the technological development. Figure 7 presented relative levels of different services over the technology lifecycle. Based on the interviews digital services and the possibilities related to that technology is still on its early phase and thus similarities especially with the model Cusumano et al. (2015) are evident. High customization especially shows in respondents that have been offering digital services already for a while. Thus, adaptive services are relevant in this stage of development. This is however seen as diminishing strategy and the target is to go for more scalable solutions. Digital services are also well functioning as replacing services, in other words, substitute for purchase (Cusumano *et al.*, 2015), as they are usually charged as subscription based method. Customer's risk in trying these novel solutions and services is thus reduced as it will not require long commitment.

Based on the interviews digital services reach to many types of services that were mentioned in the literature review. That is because the mentality is to offer all the things that are possible with this technology. This means all from basic services that do not alter the product itself, like customer service (Mathieu, 2001b), smoothing services (Cusumano *et al.*, 2015) and base services (Baines and Lightfoot, 2013), to more

advanced services that either alter the functionality of a product or are independent from the product itself, such as proactive services (Baines *et al.*, 2010). Basically the empirical data shows that the logic is to use digital channels to deliver all the service in the future and thus no service type can be left out of scope.

5.2 Customer perceived value of digital value-added services

Interviews revealed that there are plenty of different values that the customer receives while using the offered digital service. They can be divided into four categories: 1) real-time and reliable data, 2) risk management, 3) enhanced usability and 4) business related benefits. Following the previous chapter about the digital service offering also customer perceived value is somewhat evolving while digital services are developing. Figure 15 illustrates the core customer value, value creation actors, and critical success factors in phases of digital value-added service offering. The success factors show the service provider's role in the whole value creation process. This picture is formed to tie the empirical findings into the existing literature in customer perceived value. This figure points out the most critical customer values which were highly emphasised in the interviews and also supported by the existing literature.

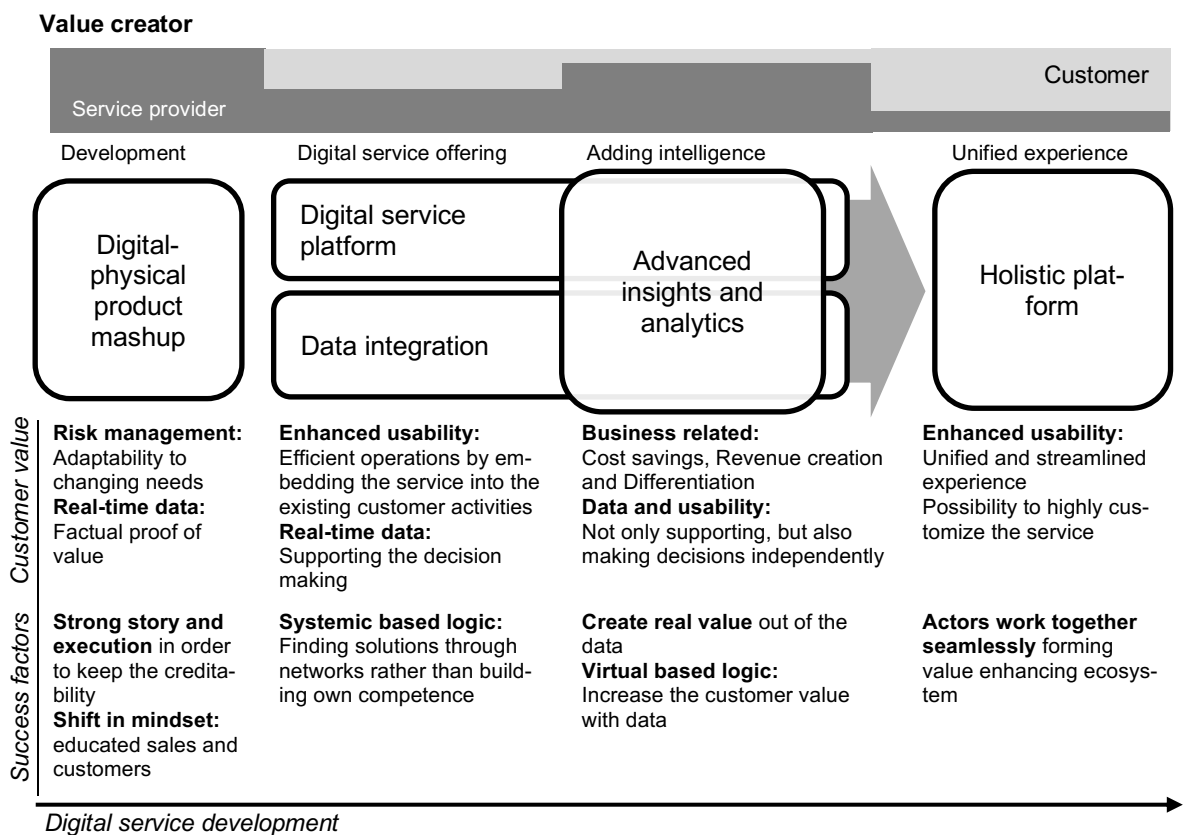


Figure 15: Core customer value, value creations and success factors in developing digital value-added services

In the early development phase service provider can be seen as the value creator since customers are not yet that competent in creating the value themselves. Customer perceived value is focused on risk management, meaning the adaptability to changing environment, as well as real-time data to proof the actual value. This interpretation is made based on the empirical data as the respondents highlighted the importance of proving the actual value to get the first customers interested. The finding is in line with the research by Baines et al. (2010) where risk management was seen as one of the main drivers of services adoption among customers. This research further widens the point of view to the success factors in this stage that are building strong and credible story behind the offering. Also shift in traditional mindsets was one of the biggest challenges in the first place and thus is important to tackle already in the early phase.

More complicated part follows the development phase. This is when the actual offering of the digital value-added services is realized. From the service business model canvas (Ojasalo and Ojasalo, 2018) value creation is characterised as embedding service into the customer's activities to enable customer to create long term benefits. Since the digital servitization in the type of business this research focuses on is still in its early phase embedding service into the existing activities might be challenging but still highly important. It is clear that customers need education and proof of concept in order to understand the value of the novel digital offering. Also empirical data shows that if the new offering can be embedded into the existing activities and create efficiency while doing it, it is highly probable that the customers adapt the service and create long-term benefit out of it. In addition, current literature in service adoption points out the economic issues (i.e. cost reductions) as adoption enhancing aspects (Baines *et al.*, 2010; Vaittinen *et al.*, 2018). This research more precisely complements this by stating that it is namely the efficiency in current activities that seems to make adoption more probable. If that cannot be done, and the digital service is something that is not directly easing customer's activities, or the service is not integrated into the existing activities the adoption is much harder.

Based on the interviews, the success factor in building efficient digital service offering is to leverage the resources available. This is referred in literature as systemic based view which describes this success factor well. The core idea in systemic based view is to take advantage of the whole ecosystem and variety of resources. (Lindhult *et al.*, 2018) Similarly, Goduscheit and Faullant (2018) argue that solutions are found through networks rather than building own competence. Also interviews revealed that companies are discussing this matter when evaluating what things to do themselves and what to outsource

and usually the shift is more towards finding ready solutions. In addition, Goduscheit and Faullant (2018) found that the customer perceived value in this kind of ecosystems is customization to specific customer need. That was not however covered clearly by the respondents. It indirectly can be interpreted that for example by localization and mass-customized service offering is targeted to personalize the service offering but respondents emphasized more the scalability of the service offering. Also, high customization and large set of different options was seen as a negative thing in adaption and overall customer satisfaction since it might confuse the customer. However, the respondents saw that in the future digital service platforms are built holistic and thus depending on the context they might be very customer specific solutions.

Adding advanced insights and analytics into the platform further increases the value of real-time data. Customers not only receive support to their decision making but respondents said that also the system itself will make independent decisions. In addition, business related benefits come more strongly into action as real cost savings and user errors can be avoided. Both Jonsson *et al.* (2008) and Larivière *et al.* (2013) embrace the business related benefits such as cost savings, monetary benefits and reduced problems to be valid in data oriented digital services. Thus this research targets these benefits to precisely for intelligent solutions and more advanced digital services.

The virtual based logic (Lindhult *et al.*, 2018) embraces the importance of creating value through data. Here the provider of the digital service platform should act as granular data combining actor and coordinator of the platform (Jonsson *et al.*, 2008; Larivière *et al.*, 2013; Goduscheit and Faullant, 2018). It is to be noted, that the platform provider is not necessarily the provider of the connected product but can be also a third party. Here the platform provider still has a large role in value creation as it brings real value through insights to customer. Whether the supplier of the connected product wants to take this position is a matter of choice and depend on available capabilities, but it boils down to previous step which was to decide whether to integrate data or to create own platform.

Lastly, creating a holistic platform releases a whole new set of benefits. Based on the interviews, unified and streamlined customer experience with in the future also possibilities to customize the platform in a highly unique customer needs are the core in holistic platforms. Similarly, a recent multiple case study by Cenamor *et al.* (2017) on servitization leveraging digital platforms highlights that the modularity of the platforms enable customizations without adding additional costs for the service provider. Another property in platform is that they manage connections between multiple actors (Eloranta and Turunen, 2016). This was seen as even more important aspect by the respondents since

actors working together seamlessly will create value in every interaction with the platform. Empirical data thus embraces the holism of digital services; the benefits of a platform are greater than the sum of the benefits in each part. In other words, the unified and streamlined experience is only accomplished by integrating different actors together. This will also further increase the operational efficiency of the service provider (Cenamor *et al.*, 2017). The findings of this thesis highlights the importance of the two benefits of platforms and thus complements the current literature.

It should be noted that there are different kinds of customers who want different levels of digital services. Thus, not all customers want the very end of the development but rather simplified and ready to use product. That is why, it is highly important to actually know the end-user, their needs and decide whether some customers are left out of the scope. From the empirical data it can be seen that respondents have tackled this with several different ways. Some offer different levels of data analytics to different customers while some focus on only one user group. Deciding on which customers are served and which not must be clear in mind. This decision also reflects to the value creator. The service provider's role in value creation is varying based on the stage of digital service development. Even though in the literature platform provider's role is usually seen as coordinator and thus only facilitating the value creation (Besch, 2005; Larivière *et al.*, 2013; Goduscheit and Faullant, 2018) respondents also emphasised the active role of a service provider in value creation. This is especially important when adding advanced analytics and insights into the platform. Service providers are thus actively bringing the value to the customer and not just enabling the customer to do the analysis themselves. In the *holistic platform* -part however, customer can be seen as the main value creator as they own all the data that is to be combined and use it in a way which is most valuable to them.

This research complements the current literature by highlighting those parts of customer perceived value that are seen as the most critical ones in this context. The importance of these aspects is formed based on the empirical data and reflecting them on current literature. The following aspects are found to be the most critical success factors for service providers in order to embrace customer value and decrease the barriers in adoption.

1. Embedding the digital value-added service into the customer's existing activities
→ Important to determine who is the customer that is served and who is left out of the scope
2. Integrating multiple different data sources into one holistic platform. Platform not necessary provided by the product provider.

→ Embracing streamlined experience where real value is created in every interaction

3. Advanced analytics not only support but also make the decisions

→ Create sustainable value by insights and intelligent solutions

As a proposition to the target company the story of digital service should be tightly integrated into the customer's existing activities while embracing the enhanced usability. Empirical data shows that reference cases and pilot projects work well in communicating the value proposition if no data nor quantitative measures can be provided. Besides the integration to existing activities customers also seem to value the integrating to existing data sources and platforms. This creates a holistic platform where user experience is streamlined, and real value is created in every interaction. Holistic platform also decreases the risks of a customer as it can be configured by customer's unique needs. Lastly, when a target company wants also to create the customer value and not only enable it, advanced analytics should first support the decision making and then be able to also make decisions for the customer. If a service provider can make valuable insights that support the customer decision making with factual data, it is evidently going to be adapted by the customer. Taking one step forward these data sources can further be harnessed to automate the decision-making processes in various different occasions.

5.3 Value capture logics in the early phase of digital service diffusion

This chapter summarizes the main value capture logics in the early phase of digital service diffusion. It is stated to be as "*early phase*" since the empirical data was collected from companies that have digital services in their offering but which is not the main business for them at the moment.

The digital service pricing in the companies involved in this study highly correlates the aspect of traditional service pricing found by Malleret (2006). This might be due to the fact that the companies in general are not focusing on the monetary value capturing from the services. Thus, creating innovative revenue models just for digital service does not seem feasible. In Table 14 the different properties of pricing are summarized. There are multiple factors that affect the price levels of digital services and based on the empirical data pricing is not anyway systematic. However, the reasons behind different price levels are in line with the current literature.

Table 14. How the price level of digital services is set

Aspects affecting pricing (Malleret, 2006)	Empirical findings	Effect on price level
Role of a service in the company	The core reason why digital service pricing and revenue creation is not high priority; digital services are not yet the core business of the B2B make-to-order companies.	Traditional pricing method as of fixed fee (Bonnameier <i>et al.</i> , 2010) is used to create scalable product to different markets.
Competitive conditions	If competitors offer digital service free, it is hard to put a price on it. Also lack of competition and benchmarks makes it hard to set the right price.	Some companies are forced to offer services free of charge
Market specific practices	Customers used to buy in a certain way or not pay for a service. Communicating the price and value is challenging.	Price is at the minimum level
Profitability is controlled by the management	Focus is not on direct profitability.	Price levels might be fluctuating since the right price levels are to be standardized by testing
Visibility of the service and the value for the customer	Especially important in digital platform ecosystems.	Very few of the respondents use innovative pricing method such as value-based pricing

One reason for the lack of focus in pricing is that based on the interviews, highly goods dominant firms view digital services as a support tool to increase product sales. Thus, currently the revenue and costs are not independently followed. In some cases among respondents, even the organizational structure might prevent effective controlling of profitability of the digital services. Also, digital services are viewed just a must have feature while the main focus still lies in product sales. In the early phase of digital service development profitability and revenue creation is understandably in low focus but in the long-term there is a need to create the processes of internal accounting.

Also, leveraging digital platform characteristics for monetary benefit is currently low based on the interviews. Customer base, big data and positive network externalities are rather scarcely used in respondents' companies. Platforms could enable selling advertisers access to the customer base (Malthouse *et al.*, 2019) or locking in customers to certain standard or network (Fehrer *et al.*, 2018). Respondents are not in general willing to get monetary benefits from the user data by selling it to third parties. There are also no indicators that the service providers attending this research would have incentive to lock customer in a certain platform or standard. Thus the findings of this research is

somewhat different than in the previous literature. However, the reasons behind this must be more deeply researched. Customer-dominant logic is in this context highly visible since respondents want to offer efficiency and easiness to customers. Thus, it is not clear that B2B digital service providers would be competing with different platforms but rather offer customer the solutions that is most valuable for the customer's activities.

In the respondents' companies the non-monetary value of digital services is evidently the main value for the service provider to capture. Non-monetary value of digital services can be divided into two streams: the data and the characteristics of a platform (Figure 16)

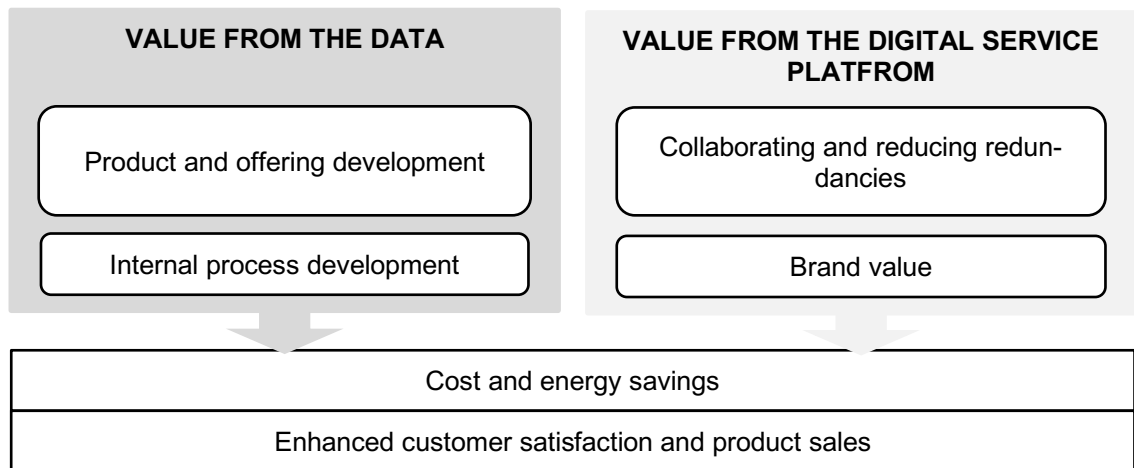


Figure 16: Main non-monetary values for the digital service provider

Current literature shows, that customer data is used in studying the customer behaviour and interaction with the product and thus enhancing the product development and customer relationship management (CRM) data (Trabucchi *et al.*, 2017; Malthouse *et al.*, 2019). Same interpretation can be made for the empirical data: customer data in product development is definitely one of the biggest values for the service provider who in the scope of this thesis is also the provider of a physical product. Better products however are not a value as its own but enables increase in customer satisfaction and product sales.

Internal process development was also found important for the respondents. For manufacturing firms internal process development creates competitive advantage by decreasing lead-times with scalable systems (Coreynen *et al.*, 2017). Similarly, respondents mentioned efficient logistics and warehouse management and predictive maintenance to benefit the company. Costs and energy savings are also generated by platform structure. Platforms in general add energy, time and cost savings with collaboration and reduced redundancies (Fehrer *et al.*, 2018). Empirical data shows that service providers

have a high incentive in collaborating with different actors in the platform. The reason is to concentrate on things that the product provider is good at and take advantage of the competencies of other companies. In addition to data and platform itself respondents mentioned that for product providers also brand value is highly important asset. By offering digital services a company sends a message to customers and suppliers that a company is technology savvy and in the front row of digitalization.

The product provider that offers digital services have multiple different values to capture. As a suggestion to target company and companies who are in similar situation three main streams of value capture can be summarized. These aspects were emphasized by multiple different respondents and also supported by the existing literature. The points were also seen as relevant in the early phase of digital service development.

1. Pricing and profitability should be evaluated only in a long term. However, free digital services are challenging to later turn into priced products.
2. User and product data should be effectively used in product development, customer relationship management and studying customer behaviour.
3. The main value in platforms is to reduce redundancies by collaborating with actors. This should be driven by the customer value, not by selling access to customer base. In other words, instead of finding partners that just want to leverage the customer base, B2B service providers should find partners that create real value for the customers' activities.

Since the idea of digital value-added services for MTO manufacturing companies seems to rely on connectiveness and monitoring solutions the data is ultimately the main value for the service provider. Solutions built on top of the data will for example increase product sales, reduce work that can be automated or outsourced to platform partners and eventually create recurring revenue.

5.4 Roadmap for the target company

Since this thesis was made in a collaboration with the target company, one of the goals was to make a practical proposal for them. Figure 17 presents a roadmap for the target company. This roadmap is built based on the main findings as presented in previous chapters. It is split into three phases, 1) make the value proposition clear, 2) continuously develop the digital service offering and 3) decide the company's place in the platform ecosystem. These phases include the main activity for the target company as well as critical customer perceived values and value capture logics. The phases also indicate the order of activities.

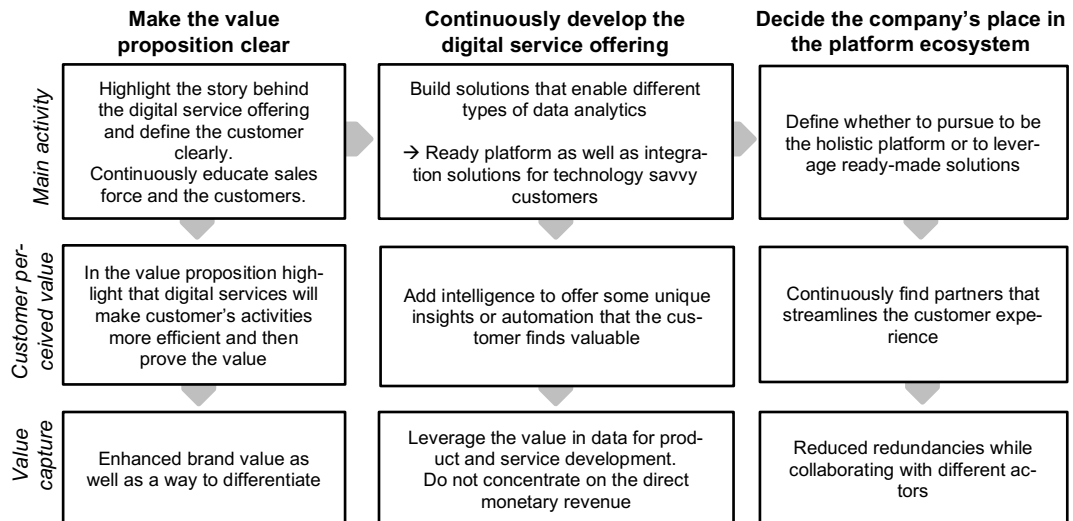


Figure 17: A roadmap for the target company

This proposal states that firstly the story behind the digital service offering should be clear. Also, the target company must define their digital service customer clearly. Also the sales force and customers must be educated in order to understand the purpose of these novel services. Customer perceived value is found in making the customer's activities more efficient. In this stage mainly the brand value will be increased for the target company. After that, target company should start to continuously develop their digital service offering. This means building solutions that enable different types and levels of data analytics. Customers will get value from intelligent solutions and possible automation. For the target company the usage data should be used for factual product and service development. Lastly, in the near future target company should decide its place in the platform ecosystem. This means defining whether to pursue to be the holistic platform or to partner with ready-made solutions. The decision should be driven by streamlining the customer experience. No matter the choice, the target company will leverage the platform in reduced redundancies while collaborating with different actors.

6. CONCLUSIONS

6.1 Academic contribution

This thesis supplements the current literature by providing an exploratory research on digital value-added services. The concept of digital servitization is studied in the current literature for example in an organizational change point of view (Coreynen *et al.*, 2017) and from a highly network perspective (Eloranta and Turunen, 2016). This study concentrates on customer perceived value and value capture logics for the service provider especially through the digital service offering itself. Some of the findings are similar to the current literature (customer perceived value (Cenamor *et al.*, 2017; Goduscheit and Faillant, 2018), value capture logics (Fehrer *et al.*, 2018; Malthouse *et al.*, 2019)) but this thesis adds the timeliness of the literature and forms practical proposals for the target company as well as similar companies. This research also highlights the findings from multiple different sources that are applicable in the context of MTO manufacturing companies.

Customer value in digital services has been studied in multiple contexts such as B2B manufacturing including mainly capital goods (Jonsson *et al.*, 2008; Goduscheit and Faillant, 2018), IT service providers (Saunila *et al.*, 2017) and consumer markets (Larivière *et al.*, 2013). Customer value in digital services also is referenced in more general digital service innovation research (Lindhult *et al.*, 2018). However, as the MTO manufacturing companies are more and more digitalizing their products and services there is a current need in researching the digital servitization in this context. This thesis addresses the research gap and provides more knowledge on the customer perceived value of this matter. The findings support well the current literature but also highlight some specific values that the context of this research forms. Especially embedding the digital service into the customers activities to make their core activities more efficient was found to be important in the early phase of the digital service development. In digital service platforms this research emphasised the customer value when multiple actors are working together and thus the customer experience is streamlined.

As of value capture logics in digital services, the current literature is focused on studies on business model research (Fehrer *et al.*, 2018), commercialization of the data and the platform (Thomas and Leiponen, 2016; Martinsuo and Vuorinen, 2017; Malthouse *et al.*, 2019) and leveraging the customer base (Trabucchi *et al.*, 2017). Also, non-monetary value of digital services is discussed in the literature reviews (Fehrer *et al.*, 2018;

Malthouse *et al.*, 2019) and in a case study of manufacturing companies (Coreynen *et al.*, 2017). This thesis explored a wide range of values that are to be captured by the digital service provider. Based on this research, it was found that the main value for the service provider in digital service offering is currently related to the data usage in for example internal product and service offering as well as reselling opportunities. This contributes to the current literature as in the context of this research the monetary value is not seen currently important, and emphasis is put on non-monetary values.

6.2 Managerial contribution

The research has variety of contributions to business managers. Firstly, it gives an overview of the current state of digital servitization in the chosen context. For business managers and businesses that are planning on adding digital services into their service offering this research could be valuable for investigating the different options. Also, many challenges in digital servitization are tackled here which are important aspects to keep in mind. Educating the sales as well as the customers is one key element that when not done proactively the whole digital service business might lose its ground.

Digital servitization is moving forward when customers actively demand the digital services and companies embed new digital offering to support customer activities. The interviews revealed that first barriers occur when customers do not understand the value of digital services such as service platforms. Use cases and pilot projects will be highly valuable for proving the value. However, it should be emphasised that free services are a pilot with fixed period and in a longer-term service providers should find a way to measure the profitability of digital service. Even though currently digital services are in the early phase of their lifetime and most of the respondents call them development projects, it is clear that in the future lion share of the business will lie in digitally enhanced services.

In digital service platforms the customer experience is one key element to success. In fact, OFF stated that, the ones who create the best customer experience could be seen as the winners in long term. This research points out the perceived customer value and further analyses it emphasising the variety of values that it consists. Eventually it all boils down to customer experience and how well a service provider can support business managers' decision making and effectively ease their core activities.

Value capture logics are also evidently various but in the early phase of development they rarely rely on monetary value. Usage data, brand value and collaborations between different actors are highly valuable for service providers on its own and thus the actual profitability might be challenging to measure. Business managers should decide the time

frame on which profitability is to be evaluated but it should not be anyway in the near future. Also deciding on how to calculate the indirect monetary benefits such as increased product sales into the profitability is still unclear and should be studied more.

6.3 Validity of the study

As any research also this study does not come without any limitation. The validity of the study is evaluated with the themes fitting qualitative research methods. The criteria here are dependability, credibility, confirmability and transferability (Bhattacharjee, 2012).

Firstly, **dependability** is a situation when two independent researchers arrive to same conclusion while studying the same phenomenon (Bhattacharjee, 2012). In order to ensure the dependability, chapter 3 presents thoroughly the research process and data analysis. Also, the underlying phenomenon is described in chapter 1. This way readers can have enough detailed information to confirm their inferences.

Credibility of the study is achieved if the reader feels that the results presented are believable (Bhattacharjee, 2012). Firstly, the literature review emphasizes the expertise of the researcher in this field and thus the inferences made can be viewed as valid. Data collection and analysis is systematically made using transcriptions with clean verbatims. The respondents are listed as well as the companies they represent. The titles of the respondents are also mentioned in order to confirm their expertise and the validity to this research. The way of using key informants as respondents is not however free of errors. Even though the knowledgeability of the key informant was ensured by sending example questions beforehand and asking descriptive questions about the theory of the research there is still a possibility of informant bias. Such bias may occur when the respondent is looking the problem in a narrow perspective.

Transcribing the interviews minimize the risk of biased interpretations and results can be objectively analysed. The researcher also uses many quotes in order to the support the finding and present the exact (even though mostly translated) wording of the respondents. However, the semi-structured interview method might cause some differences in the questions and overall content and thus the findings might include some biases (Saunders, 2009).

Confirmability is the way of allowing the respondents to confirm the findings and references a researches has made based on their input (Bhattacharjee, 2012). Respondents were sent a summary of the findings and quotes that stemmed from their interviews. This way researcher ensured that no wrong interpretations were made, and respondents agree with the inferences.

The **transferability** is left to be analysed by the reader. Researcher provides detailed description about the context in chapter 1 as well as the context of the interviews but whether the results can be transferred into other settings is not evident. It is to be noted that this research is made by assignment of the target company and thus some results are highly case specific. Pure objectivity is impossible to achieve in this setting.

Some limitations are related to the context of this research. This thesis was done in collaboration of a target company and thus some findings can be biased to benefit the target company. Also, the number of respondents does not give the validity to generalize the findings. With a larger sample in different markets the results could be analysed to form patterns and similarities within the different companies. It was stated in *Background* as well in *Results* that the digital servitization in this context is still in its early phase of development and thus the results are connected to this time and industry.

6.4 Future research

This research revealed many directions for future research. With larger sample size one could study patterns or market dependant issues. Digital service offering could be targeted differently in different markets, but this research does not give answers to this matter. This research act as an overview of digital servitization in chosen context and can be studied more thoroughly in multiple angles. For customer perceived value, more research is needed to identify the needs and benefits for different customer segments and how customer segmentation would impact in the digital service offering.

Data plays a big role in digital services and thus it needs more research. This research revealed that the collected data is an important asset for companies, but all the usage opportunities are to be researched more. Also, the longer-term value is an interesting topic. Also the monetary value in value capture logics have multiple different research directions. For example the actual pricing of the digital services is something would be beneficial to explore more deeply.

As it was stated, digital servitization is still in its early development phase and especially digital service platforms in B2B context develop rapidly. More research is needed in this field to study for example the financial impacts of digital service platform offering and possible partnerships. Many of the respondents were planning on expanding the partnership network in their digital service platform but the revenue sharing logics, data ownership and financial solutions need more support from the academic community.

REFERENCES

- Abernathy, W. J. and Utterback, J. M. (1978) 'Patterns of industrial innovation', *Technology review*, 80, pp. 40–47.
- Akaka, M. A. and Vargo, S. L. (2013) 'Technology as an operant resource in service (eco)systems', *Information systems and e-business management*, 12(3), pp. 367–384.
- Almquist, E., Cleghorn, J. and Sherer, L. (2018) 'The B2B Elements of Value', *Harvard business review*, 96(3), p. 72-81.
- Anderson, J. C. and Narus, J. A. (1995) 'Capturing the value of supplementary services', *Harvard business review*, 73(1), pp. 75–83.
- Anderson, J. C., Narus, J. A. and van Rossum, W. (2006) 'Customer value propositions in business markets', *Harvard business review*, 84(3), pp. 90–149.
- Aurich, J. C., Mannweiler, C. and Schweitzer, E. (2010) 'How to design and offer services successfully', *CIRP journal of manufacturing science and technology*, 2(3), pp. 136–143.
- Baines, T. and Lightfoot, H. (2013) *Made to serve : how manufacturers can compete through servitization and product service systems*. 1st edn. Chichester, West Sussex: John Wiley & Sons Inc.
- Baines, T., Lightfoot, H., Evans, S., Neely, A.D., Greenough, R., Peppard, J., Roy, R., Shehab, E., Braganza, A., Tiwari, A., Alcock, J., Angus, J., Bastl, M., Cousens, A., Irving, P., Johnson, M., Kingston, J., Lockett, H., Martinez, V., Micheli, P., Tranfield, D., Walton, I. and Wilson, H. (2007) 'State-of-the-art in product-service systems', *Proceedings of the Institution of Mechanical Engineers. Part B, Journal of engineering manufacture*, 221(10), pp. 1543–1552.
- Baines, T. S., Lightfoot, H., Benedettini, O., Whitney, D. and Kay, J. M. (2010) 'The adoption of servitization strategies by UK-based manufacturers', *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture*, 224(5), pp. 815–829.
- Barney, J. (1991) 'Firm resources and sustained competitive advantage', *Journal of management*, 17(1), pp. 99–120.
- Besch, K. (2005) 'Product-service systems for office furniture: barriers and opportunities on the European market', *Journal of cleaner production*, 13(10–11), pp. 1083–1094.
- Bhattacharjee, A. (2012) *Social Science Research: Principles, Methods, and Practices*. Textbooks Collection. 3. Global Text Project.
- Bonnemeier, S., Burianek, F. and Reichwald, R. (2010) 'Revenue models for integrated customer solutions: Concept and organizational implementation', *Journal of revenue and pricing management*, 9(3), pp. 228–238.
- Bryman, A. and Bell, E. (2015) *Business research methods*. 4th edition. Oxford: Oxford University Press.
- Cenamor, J., Rönnerberg Sjödin, D. and Parida, V. (2017) 'Adopting a platform approach

- in servitization: Leveraging the value of digitalization', *International journal of production economics*, 192, pp. 54–65.
- Cheah, S. L.-Y., Yang, Y. and Saritas, O. (2019) 'Reinventing product-service systems: the case of Singapore', *Foresight (Cambridge)*, 21(3), pp. 332–361.
- Colen, P. J. and Lambrecht, M. R. (2013) 'Product service systems: exploring operational practices', *The Service industries journal*, 33(5), pp. 501–515.
- Coreynen, W., Matthyssens, P. and Van Bockhaven, W. (2017) 'Boosting servitization through digitization: Pathways and dynamic resource configurations for manufacturers', *Industrial marketing management*, 60, pp. 42–53.
- Cusumano, M. A., Kahl, S. J. and Suarez, F. F. (2015) 'Services, industry evolution, and the competitive strategies of product firms', *Strategic management journal*, 36(4), pp. 559–575.
- Donaldson, B. (1986) 'Customer service-the missing dimension in marketing management', *Journal of marketing management*, 2(2), pp. 133–144.
- Eggert, A., Högrevé, J., Ulaga, W. and Muenkhoff, E. (2011) 'Industrial services, product innovations, and firm profitability: A multiple-group latent growth curve analysis', *Industrial marketing management*, 40(5), pp. 661–670.
- Eloranta, V. and Turunen, T. (2016) 'Platforms in service-driven manufacturing: Leveraging complexity by connecting, sharing, and integrating', *Industrial marketing management*, 55, pp. 178–186.
- Fehrer, J. A., Woratschek, H. and Brodie, R. J. (2018) 'A systemic logic for platform business models', *Journal of service management*, 29(4), pp. 546–568.
- Frow, P., Ngo, L. V. and Payne, A. (2013) 'Diagnosing the supplementary services model: Empirical validation, advancement and implementation', *Journal of marketing management*, 30(1–2), pp. 138–171.
- Gawer, A. and Cusumano, M. A. (2008) 'How companies become platform leaders', *MIT Sloan management review*, 49(2), pp. 28–35.
- Gebauer, H. (2008) 'Identifying service strategies in product manufacturing companies by exploring environment–strategy configurations', *Industrial marketing management*, 37(3), pp. 278–291.
- Gebauer, H., Fleisch, E. and Friedli, T. (2005) 'Overcoming the Service Paradox in Manufacturing Companies', *European management journal*, 23(1), pp. 14–26.
- Goduscheit, R. C. and Faullant, R. (2018) 'Paths Toward Radical Service Innovation in Manufacturing Companies—A Service-Dominant Logic Perspective', *The Journal of product innovation management*, 35(5), pp. 701–719.
- Grönroos, C. (2008) 'Service logic revisited: who creates value? And who co-creates?', *European business review*, 20(4), pp. 298–314.
- Grönroos, C. and Ravald, A. (2011) 'Service as business logic: implications for value creation and marketing', *Journal of service management*, 22(1), pp. 5–22.
- Heinonen, K., Strandvik, T., Mickelsson, K., Edvardsson, B., Sundström, E. and Andersson, P. (2010) 'A customer-dominant logic of service', *Journal of service management*, 21(4), pp. 531–548.

- Hinterhuber, A. (2004) 'Towards value-based pricing—An integrative framework for decision making', *Industrial marketing management*, 33(8), pp. 765–778.
- Hirsjärvi, S., Remes, P. and Sajavaara, P. (2007) *Tutki ja kirjoita*. 13. edition. Helsinki: Tammi.
- Johne, A. and Storey, C. (1998) 'New service development: a review of the literature and annotated bibliography', *European journal of marketing*, 32(3/4), pp. 184–251.
- Jonsson, K., Westergren, U. H. and Holmström, J. (2008) 'Technologies for value creation: an exploration of remote diagnostics systems in the manufacturing industry', *Information systems journal (Oxford, England)*, 18(3), pp. 227–245.
- Kalnins, A. and Mayer, K. J. (2004) 'Relationships and Hybrid Contracts: An Analysis of Contract Choice in Information Technology', *Journal of law, economics, & organization*, 20(1), pp. 207–229.
- Kindström, D. (2010) 'Towards a service-based business model – Key aspects for future competitive advantage', *European management journal*, 28(6), pp. 479–490.
- Kindström, D. and Kowalkowski, C. (2014) 'Service innovation in product-centric firms: a multidimensional business model perspective', *The Journal of business & industrial marketing*, 29(2), pp. 96–111.
- Kohtamäki, M., Parida, V., Patel, P. C. and Gebauer, H. (2020) 'The relationship between digitalization and servitization: The role of servitization in capturing the financial potential of digitalization', *Technological forecasting & social change*, 151, p. 119804.
- Kotler, P., Keller, K. lanve, Brady, M., Goodman, M. and Hansen, T. (2012) *Marketing Management*. 2nd edition. Edinburg: Pearson Education.
- Kowalkowski, C., Witell, L. and Gustafsson, A. (2013) 'Any way goes: Identifying value constellations for service infusion in SMEs', *Industrial marketing management*, 42(1), pp. 18–30.
- Kumar, N., Stern, L. W. and Anderson, J. C. (1993) 'Conducting Interorganizational Research Using Key Informants', *Academy of Management journal*, 36(6), pp. 1633–1651.
- Kuschel, J. and Dahlbom, B. (2007) 'Mobile Services for Vehicles', in *Proceedings of the 15th European Conference of Information Systems*. JUNE 07-09 2007, St Gallen, Switzerland.
- Larivière, B., Joosten, H. W. M., Malthouse, E. C., Birgelen, M. J. H. van, Aksoy, P., Kunz, W. and Huang, M.-H. (2013) 'Value fusion: The blending of consumer and firm value in the distinct context of mobile technologies and social media', *Journal of service management*, 24(3), pp. 268–293.
- Leroi-Werelds, S. (2019) 'An update on customer value: state of the art, revised typology, and research agenda', *Journal of service management*, 30(5), pp. 650–680.
- Levitt, T. (1972) 'Production-Line Approach to Service', *Harvard business review*, 50(5), p. 41-52.
- Lindhult, E., Chirumalla, K., Oghazi, P. and Parida, V. (2018) 'Value logics for service innovation: practice-driven implications for service-dominant logic', *Service business*, 12(3), pp. 457–481.

- Lusch, R. F. and Nambisan, S. (2015) 'Service Innovation: A Service-Dominant Logic Perspective', *MIS quarterly*, 39(1), pp. 155–175.
- Lusch, R. F. and Vargo, S. L. (2006) 'Service-dominant logic: reactions, reflections and refinements', *Marketing Theory*, 6(3), pp. 281–288.
- Lütjen, H., Tietze, F. and Schultz, C. (2017) 'Service transitions of product-centric firms: An explorative study of service transition stages and barriers in Germany's energy market', *International journal of production economics*, 192, pp. 106–119.
- Macdonald, E. K., Wilson, H., Martinez, V. and Toossi, A. (2011) 'Assessing value-in-use: A conceptual framework and exploratory study', *Industrial marketing management*, 40(5), pp. 671–682.
- Malleret, V. (2006) 'Value Creation through Service Offers', *European management journal*, 24(1), pp. 106–116.
- Malthouse, E. C., Buoye, A., Line, N., El-Manstrly, D., Dogru, T. and Kandampully, J. (2019) 'Beyond reciprocal: the role of platforms in diffusing data value across multiple stakeholders', *Journal of service management*, 30(4), pp. 507–518.
- Martelo Landroguéz, S., Barroso Castro, C. and Cepeda-Carrión, G. (2013) 'Developing an integrated vision of customer value', *Journal of Services Marketing*, 27(3), pp. 234–244.
- Martinsuo, M. and Vuorinen, L. (2017) 'Roadmap toward new revenue logics in software-based services', in *S4Fleet – Service Solutions for Fleet Management*. Tampere: DIMECC Publications Series, pp. 108–109.
- Mathieu, V. (2001a) 'Product services: from a service supporting the product to a service supporting the client', *The Journal of business & industrial marketing*, 16(1), pp. 39–61.
- Mathieu, V. (2001b) 'Service strategies within the manufacturing sector: benefits, costs and partnership', *International journal of service industry management*, 12(5), pp. 451–475.
- Milgrom, P. and Roberts, J. (1995) 'Complementarities and fit strategy, structure, and organizational change in manufacturing', *Journal of accounting & economics*, 19(2–3), pp. 179–208.
- Neely, A. (2009) 'Exploring the financial consequences of the servitization of manufacturing', *Operations management research*, 1(2), pp. 103–118.
- Neu, W. A. and Brown, S. W. (2005) 'Forming Successful Business-to-Business Services in Goods-Dominant Firms', *Journal of service research : JSR*, 8(1), pp. 3–17.
- Neu, W. A. and Brown, S. W. (2008) 'Manufacturers forming successful complex business services: Designing an organization to fit the market', *International journal of service industry management*, 19(2), pp. 232–251.
- Ng, I., Parry, G., Smith, L., Maull, R. and Briscoe, G. (2012) 'Transitioning from a goods-dominant to a service-dominant logic: Visualising the value proposition of Rolls-Royce', *Journal of service management*, 23(3), pp. 416–439.
- Normann, R. (2002) *Normannin liiketoimintateesit*. Helsinki: WSOY (Ekonomia).
- Ojasalo, J. and Ojasalo, K. (2018) 'Service Logic Business Model Canvas', *Journal of*

research in marketing and entrepreneurship, 20(1), pp. 70–98.

Olhager, J. (2003) 'Strategic positioning of the order penetration point', *International journal of production economics*, 85(3), pp. 319–329.

Oliva, R. and Kallenberg, R. (2003) 'Managing the transition from products to services', *International Journal of Service Industry Management*, 14(2), pp. 160–172.

Osterwalder, A. and Pigneur, Y. (2010) *Business model generation : a handbook for visionaries, game changers, and challengers*. 1st edition. Hoboken, New Jersey: Wiley (Strategyzer Series).

Payne, A. and Holt, S. (2001) 'Diagnosing Customer Value: Integrating the Value Process and Relationship Marketing', *British journal of management*, 12(2), pp. 159–182.

Priem, R. L. (2007) 'A Consumer Perspective on Value Creation', *The Academy of Management review*, 32(1), pp. 219–235.

Raddats, C., Kowalkowski, C., Benedettini, O., Burton, J. and Gebauer, H. (2019) 'Servitization: A contemporary thematic review of four major research streams', *Industrial marketing management*, 83, pp. 207–223.

Rayport, J. F. and Sviokla, J. J. (1995) 'Exploiting the virtual value chain', *Harvard business review*, 73(6), pp. 75–85.

Rigby, D. K. (2014) 'Digital-Physical Mashups', *Harvard business review*, 92(9), pp. 84–92.

Saunders, M. N. K. (2009) *Research methods for business students*. 5th edition. Edited by P. Lewis and A. Thornhill. Harlow, England: Pearson Education.

Saunila, M., Rantala, T. and Ukko, J. (2017) 'Characteristics of customer value creation in digital services', *Journal of service science research*, 9(2), pp. 239–258.

Shapiro, C. (1999) *Information rules : a strategic guide to the network economy*. Boston (Mass.): Harvard Business School Press.

Simonen, J. and Nieminen, H. (2017) 'Value creation and steering the service mix in industrial service business', in *S4Fleet – Service Solutions for Fleet Management* pp. 93–94. DIMECC Publications Series, Tampere.

Suarez, F. F., Cusumano, M. A. and Kahl, S. J. (2013) 'Services and the Business Models of Product Firms: An Empirical Analysis of the Software Industry', *Management science*, 59(2), pp. 420–435.

Szeinbach, S. L., Barnes, J. H. and Garner, D. D. (1997) 'Use of pharmaceutical manufacturers' value-added services to build customer loyalty', *Journal of business research*, 40(3), pp. 229–236.

Teece, D. J. (2010) 'Business Models, Business Strategy and Innovation', *Long range planning*, 43(2–3), pp. 172–194.

Thomas, L. D. W. and Leiponen, A. (2016) 'Big data commercialization', *IEEE engineering management review*, 44(2), pp. 74–90.

Trabucchi, D., Buganza, T. and Pellizzoni, E. (2017) 'Give Away Your Digital Services: Leveraging Big Data to Capture Value', *Research technology management*, 60(2), pp.

43–52.

Tukker, A. (2004) 'Eight types of product–service system: eight ways to sustainability? Experiences from SusProNet', *Business strategy and the environment*, 13(4), pp. 246–260.

Tuli, K. R., Kohli, A. K. and Bharadwaj, S. G. (2007) 'Rethinking Customer Solutions: From Product Bundles to Relational Processes', *Journal of marketing*, 71(3), pp. 1–17.

Ulaga, W. and Reinartz, W. J. (2018) 'Hybrid Offerings: How Manufacturing Firms Combine Goods and Services Successfully', *Journal of marketing*, 75(6), pp. 5–23.

Vaittinen, E., Martinsuo, M. and Ortt, R. (2018) 'Business customers' readiness to adopt manufacturer's new services', *Journal of service theory and practice*, 28(1), pp. 52–78.

Vandermerwe, S. and Rada, J. (1988) 'Servitization of business: Adding value by adding services', *European management journal*, 6(4), pp. 314–324.

Vargo, S. L. and Lusch, R. F. (2004) 'Evolving to a New Dominant Logic for Marketing', *Journal of marketing*, 68(1), pp. 1–17.

Vargo, S. L. and Lusch, R. F. (2008) 'From goods to service(s): Divergences and convergences of logics', *Industrial marketing management*, 37(3), pp. 254–259.

Vargo, S. L., Maglio, P. P. and Akaka, M. A. (2008) 'On value and value co-creation: A service systems and service logic perspective', *European management journal*, 26(3), pp. 145–152.

Walker, R. H. and Craig-Lees, M. (2015) 'Technology-Enabled Service Delivery: Reconciling Managerial and Customer Perspectives', in *Global Perspectives in Marketing for 21st Century*. Cham: Springer International Publishing (Developments in Marketing Science: Proceedings of the Academy of Marketing Science), pp. 141–146.

Williams, K., Chatterjee, S. and Rossi, M. (2008) 'Design of emerging digital services: a taxonomy', *European journal of information systems*, 17(5), pp. 505–517.

Woodruff, R. B. (1997) 'Customer value: The next source for competitive advantage', *Journal of the Academy of Marketing Science*, 25(2), pp. 139–153.

Yoo (2010) 'Computing in Everyday Life: A Call for Research on Experiential Computing', *MIS quarterly*, 34(2), pp. 213–231.

Yoo, Y., Henfridsson, O. and Lyytinen, K. (2010) 'The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research', *Information systems research*, 21(4), pp. 724–735.

Zeithaml, V. A. (1988) 'Consumer Perceptions of Price, Quality, and Value: A Means-End Model and Synthesis of Evidence', *Journal of marketing*, 52(3), pp. 2–22.

Zhang, X., Han, X., Liu, X., Liu, R. and Leng, J. (2014) 'The pricing of product and value-added service under information asymmetry: a product life cycle perspective', *International journal of production research*, 53(1), pp. 25–40.

Zott, C., Amit, R. and Massa, L. (2011) 'The Business Model: Recent Developments and Future Research', *Journal of management*, 37(4), pp. 1019–1042.

APPENDIX A: QUESTIONS FOR INTERVIEWS

INTRODUCTION

- Could you introduce yourself and your role in the company?

SERVICE OFFERING AND ESPECIALLY DIGITAL SERVICE

- What is the role of services in your company?
- What are the digital services you are currently offering?
- Where does the digital service development stems from? technology-push/customers etc?
- What is the biggest obstacle in utilizing digital services?
- Why are you offering the digital services? What is the core reason?
- What is the level of competition in your service field?
 - How do you differentiate from the competitors?

CUSTOMER VALUE

- What are all the actors considered as customers?
- What are the reasons that customer's buy your digital services?
 - What are the main benefits for them?
- What are the reasons customers decide not to buy them?
- How do you communicate the customer value of your service to your customers?
- How do you measure customer value (the value which customer receives? How do you use that measure internally and externally?)
- Do the needs of the customer vary? How do you respond to these varying needs?
- Also do the needs of the one who is responsible in buying the product differ from the end user's?
- How do you see your role as a value creator? Do you just enable customer to create value themselves or are you seeing yourself as an active part in the value creation process?

BUSINESS MODEL, ESPECIALLY EARNING LOGIC

- How are the service priced?

- What are the main costs regarding the service offering?
- How profitable the offered services are compared to product sales?
- Are there some things that might affect the profitability negatively?
- How's the collected data being used?
 - *If the data is owned by the customer, do you have some incentives to get the customer to share that data?*
- Are there additional revenue streams from the services?
- What other value does specifically digital services bring to the company?
- How ready is the customer to use the data and create additional value from it? In other words, does the customer want ready service products or to cocreate the value?
- Do you make use of ecosystems or networks built around services?

ENDING

- Are there any other comments or feedback regarding this matter?
- Where do you see the markets considering digital servitization develop in 10 years-time?