

Thank you SerVices!

- How to design a systematic model for service development

Helena Sörensson
Frida Hugne

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Lund University
Lund Institute of Technology
Department of Industrial Management and Logistics
Department of Business Administration
Box 118
SE-221 00 Lund
Sweden

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Abstract

- Title:** Thank you SerVices!
- How to design a systematic model for service development
- Authors:** Frida Hugne & Helena Sörensson
- Supervisors:** Bertil I Nilsson, Adjunct Assistant Professor, Department of Industrial Management and Logistics, Faculty of Engineering, Lund University

Ola Mattisson, Associate Professor, Department of Business Administration, School of Economics, Lund University

Axel Franck, Strategic Director, Hilti Svenska AB
- Background:** Manufacturing- as well as other companies have to develop their business models in order to stay competitive, one way to do this is by expanding the service offering in order to differentiate from competitors and gain a sustainable competitive advantage. Today it exists methods that can be used for service development, though they are considered generic and based on similar principles. As established manufacturing firms have considerable investments in capabilities, resources and existing customers, it is believed that the starting point in service development should be based on taking advantage of existing resources and capabilities. Therefore it is of academic interest to develop a model that uses the resource based view as theoretical framework, and provides firms with a systematic methodology to follow when developing and testing new service ideas.
- Purpose:** The purpose of the study is to analyse and investigate how, a company that operates in an industrial context, can expand their service offering, and thereby increase competitiveness and profits at current and potential customers. With this purpose in mind the study seeks to answer following research questions:
- How could a model for developing new service offerings be designed?
 - What is the applicability of the developed process model when applied on an established manufacturing company?

Methodology: The developed process model has a distinct base in theory, making the study deductive. To evaluate the applicability of the developed process model, it was tested on the case company Hilti Svenska AB. During the testing a large amount of semi-structured interviews was conducted as well as two workshops. This resulted in large amounts of qualitative data, which was categorized to identify patterns. The applicability of the model was analysed based on its ability to systematically generate relevant data, resulting in the identification of a service opportunity.

Conclusion: The overall conclusion is that a firm can expand their service offering by following a systematic process model when developing services. This process model should consist of four steps; the two first steps focus on describing the business model and the value creation of the company, the third step offers a methodology for the testing and development of the service in a real business context and the final step evaluate the developed service offer.

The process model allows established firms to test and experiment cost efficiently with new service opportunities in a dynamic way, enabling the discard of less promising opportunities at an early point. The authors' perception is that the process model, especially step 3, enabled the identification and verification of a problem hypothesis, resulting in a new service offering. The iterative process of step 3, which were performed in a systematic way and thoroughly documented, made the extensive process less complex. It was discovered during the process that phase 2 and 3 in step 3 was difficult to apply in a real business context, due to the lack of a systematic procedure to follow. The phases therefore were modified and activities added, which is concluded to improve the applicability of the process model.

Key words: Service development, resource-based view, value creation, case study, Hilti, manufacturing firms, service innovation

Acknowledgement

This Master thesis was written during the spring of 2014 as the final part of our Master's degree in Technology Management at Lund University. The thesis was performed in collaboration with Hilti Svenska AB, with the purpose to design and test a model for service development. The study resulted in an exciting journey through the construction industry, for which the authors are very grateful to have been a part of.

We would like to express our appreciation to our supervisor Axel Franck at Hilti Svenska AB, who has given us valuable guidance, feedback and access to the right people and information. Additionally, we would like to thank all employees at Hilti, who has assisted us with important comments and giving us insight into the company as well as the industry. Further, we would like to thank all people within the construction industry that has given their time to participate in interviews and workshops - without them this study wouldn't have been viable. Lastly, we would like to express our gratitude to Bertil Nilsson and Ola Mattisson, our supervisors at Lund University. They have been great supervisors providing us with excellent guidance as well as pointed us in the right direction.

We hope the reader enjoys the reading as much as we did enjoy the writing!

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Table of content

1	INTRODUCTION.....	1
1.1	BACKGROUND.....	1
1.2	PURPOSE & RESEARCH QUESTIONS.....	5
1.3	TARGET GROUP.....	5
1.4	STRUCTURE OF THESIS.....	5
2	METHODOLOGY.....	7
2.1	RESEARCH APPROACH.....	7
2.2	DEVELOPMENT OF THE PROCESS MODEL.....	8
2.3	RESEARCH DESIGN.....	9
2.3.1	<i>Hilti as case company.....</i>	<i>9</i>
2.4	DATA COLLECTION.....	10
2.4.1	<i>Choice of respondents.....</i>	<i>11</i>
2.4.2	<i>Phase 1: Semi-structured interviews internally and among industry experts.....</i>	<i>11</i>
2.4.3	<i>Phase 2 - External semi-structured interviews.....</i>	<i>14</i>
2.5	ANALYSIS APPROACH.....	16
2.6	CREDIBILITY.....	16
2.6.1	<i>Validity.....</i>	<i>17</i>
2.7	DATA DELIMITATIONS.....	18
3	THE PROCESS MODEL.....	19
3.1	CHAPTER OUTLINE.....	19
3.2	STEP 1 – INTERNAL MAPPING.....	20
3.2.1	<i>The Business Model Canvas.....</i>	<i>20</i>
3.2.2	<i>Resource-based view & Core capabilities.....</i>	<i>22</i>
3.2.3	<i>Summary step 1.....</i>	<i>23</i>
3.3	STEP 2 – EXTERNAL MAPPING, IDENTIFY CUSTOMER QUALITY GAPS.....	23
3.3.1	<i>The Service Opportunity Matrix.....</i>	<i>24</i>
3.3.2	<i>The Value Proposition Canvas.....</i>	<i>26</i>
3.3.3	<i>Summary step 2.....</i>	<i>27</i>
3.4	STEP 3 – HYPOTHESIS TESTING & VERIFICATION.....	28
3.4.1	<i>The Customer Development Model.....</i>	<i>29</i>
3.4.2	<i>Service innovation & Job mapping.....</i>	<i>30</i>
3.4.3	<i>LEAN.....</i>	<i>32</i>
3.4.4	<i>Summary step 3.....</i>	<i>32</i>
3.5	STEP 4 – ASSESSMENT OF IDENTIFIED SERVICE OPPORTUNITIES.....	33
3.5.1	<i>Profiting from innovation.....</i>	<i>34</i>
3.5.2	<i>Value creation for customers.....</i>	<i>35</i>
3.5.3	<i>Managing risks.....</i>	<i>36</i>
3.5.4	<i>Step 4 summary.....</i>	<i>36</i>
3.6	SUMMARY THE PROCESS MODEL.....	37
4	CASE COMPANY – HILTI SVENSKA AB.....	39
5	APPLYING THE PROCESS MODEL ON HILTI.....	40
5.1	CHAPTER OUTLINE.....	40

Thank you Services!

5.2 STEP 1 - INTERNAL MAPPING	41
5.2.1 <i>Capabilities & Key Resources</i>	41
5.2.2 <i>Summary step 1</i>	44
5.3 STEP 2 – EXTERNAL MAPPING, IDENTIFICATION OF VALUE GAPS/SERVICE OPPORTUNITIES	44
5.3.1 <i>Summary step 2</i>	45
6 STEP 3 - TESTING & VERIFICATION.....	46
6.1 PHASE 1 – STATE HYPOTHESES	46
6.1.1 <i>Summary phase 1</i>	47
6.2 PHASE 2 – TEST PROBLEM HYPOTHESES	48
6.2.1 <i>External data collection - The construction industry</i>	49
6.2.2 <i>Evaluation of hypotheses</i>	51
6.2.3 <i>External data collection – interviews with construction and installation companies</i>	55
6.2.4 <i>Job mapping and analysis of collected interview data</i>	56
6.2.5 <i>Modification of problem hypothesis and suitability with Hilti’s current business model</i>	58
6.2.6 <i>External data collection – Building installation systems</i>	59
6.2.7 <i>Verification of problem description – workshop with construction and installation companies</i>	60
6.3 PHASE 3 - TEST THE SOLUTION HYPOTHESIS	64
6.3.1 <i>Test of the solution on Hilti - Workshop</i>	64
6.3.2 <i>Test of the solution on customers – interviews</i>	65
6.3.3 <i>Modification of solution based on insights from customers</i>	66
6.3.4 <i>Summary phase 3</i>	67
6.4 PHASE 4 - VERIFY OR PIVOT.....	68
6.4.1 <i>Product/market fit</i>	68
6.4.2 <i>Who are the customer and how are they reached</i>	69
6.4.3 <i>Can we make money</i>	69
6.4.4 <i>Summary phase 4</i>	70
7 STEP 4 - ASSESSMENT OF IDENTIFIED SERVICE SOLUTION.....	71
8 ANALYSIS	72
8.1 STEP ONE – INTERNAL ASSESSMENT	72
8.2 STEP TWO – INITIAL EXTERNAL ASSESSMENT	73
8.3 STEP THREE – HYPOTHESIS TESTING & VERIFICATION	73
8.3.1 <i>Phase 2</i>	74
8.3.2 <i>Phase 3</i>	77
9 CONCLUSIONS.....	80
10 DISCUSSION	83
10.1 CONCERNMENTS WITHIN THE APPLICATION	83
10.2 ACADEMIC CONTRIBUTION	84
10.3 CREDIBILITY & EVALUATION OF RESULTS	84
10.4 FURTHER RESEARCH	85
BIBLIOGRAPHY.....	87
APPENDIX 1 – INTERVIEW SAMPLE	1

Thank you Services!

APPENDIX 2 – INTERVIEW GUIDES	4
APPENDIX 3 – STEP 1 INSIGHTS INTERNAL MAPPING	12
APPENDIX 4 – STEP 2 INSIGHTS REGARDING SERVICE OPPORTUNITIES	19
APPENDIX 5 – PHASE 1, STEP 3 PROBLEM HYPOTHESES	23
APPENDIX 6- EXTERNAL DATA COLLECTION – THE CONSTRUCTION INDUSTRY	25
APPENDIX 7 – COMPANY INFORMATION INTERVIEWED COMPANIES	31
APPENDIX 8 – INSIGHTS FROM INTERVIEWS WITH CONSTRUCTION AND INSTALLATION FIRMS	32
APPENDIX 9 – THE ROLE OF INSTALLATION COORDINATORS.....	37
APPENDIX 10 – SUMMARY OF INSIGHTS FROM WORKSHOP WITH CUSTOMERS	39
APPENDIX 11 – DESCRIPTION OF THE DEVELOPED SERVICE OFFER	43
APPENDIX 12 – STEP 4 ASSESSMENT OF THE SERVICE OPPORTUNITY	45

1 Introduction

The first chapter of the report provide the reader with a background description to motivate the purpose of this study.

1.1 Background

"Everyone faces service competition. No one can escape from it." (Grönroos, 2007, p. 14)

In the past decade a growing number of economists and management scholars have declared that the era of mass production and mass distribution is over (Pine, 1999). The economic environment of today is characterized as competitive and rapidly changing - companies are confronted with new information and communication technologies, shorter product life cycles, global markets and tougher competition. The rise of the Internet in the 1990s and the adoption of e-business and e-commerce have drastically changed the way companies do business. (Grönroos, 2007, p. 11) Because of this change the importance for companies to constantly adapt and update their business models according to the economic environment, is increasing.

The global economy is increasingly driven by services and growing service intensity among manufacturers. This has been noted as key to sustained competitiveness in the face of commoditization, slower growth, and declining profitability in core product markets (Grönroos, 2007, p. 10; Salonen, 2011). Firms operating on both business-to-consumer as well as on business-to-business markets have to focus on developing service offerings to survive in the market (Grönroos, 2007, p. 11). The service sector has grown rapidly during the last decades and there is no doubt that the contribution of the service sector to GDP and employment has become increasingly important (Triplett & Bosworth, 2004). A reason for this growth is that industrial manufacturers in recent years have put an extra focus on developing services in addition to their traditional core product business (Oliva & Kallenberg, 2003). This change in focus can be explained by that services, in general, have higher margins than products resulting in manufacturers identifying services as a platform for securing long-term growth and competitiveness (Jacob & Ulaga, 2008; Grönroos, 2007; Salonen, 2011). Additional advantages with services is that they provide a more stable source of revenue as they are resistant to the economic cycles that drive investment and equipment purchases. There is also a competitive argument since services are less visible and more labour dependent than products. Further they are more difficult to imitate and can thereby become a sustainable source of competitive advantage. (Oliva & Kallenberg, 2003; Salonen, 2011) Based on these views and the distinct service growth it can be concluded that developing services has become a necessary strategy among companies to stay competitive on the market.

Thank you Services!

According to strategy theory the two main views regarding what makes a company successful, is either the resource based view (RBV) focusing on firm-internal resources (Barney, 1991) or the value chain view focusing on the successful reconfiguration of the value chain (Porter, 1985). Both views are highlighting competitive advantage, though having different motivations to what a competitive advantage is and how it is created. RBV articulate the internal- and core capabilities and resources as the base for a company's strategy - it will not lead to a sustainable competitive advantage to rely on strategy that is highly based on external resources (Grant, 1991). Porter brought in the industrial organisation perspective where he claimed that external industry forces affect the work of managers. He suggested that external actors determine strategic choices and the two generic strategies developed were "differentiation" and "low cost". In 1985 Porter developed the value-chain model. The model focuses on underlying activities and functions of the firm as drivers for cost and differentiation advantages. A firm can by grouping and controlling their activities utilise cost and differentiation potentials. (Porter, 1985) The value-chain model highlights the external pressure and the ability to respond to it as the prime determinants of firm success. RBV instead propose that idiosyncratic and firm specific sets of imperfectly mobile resources determine which firm that will be successful (Hedman & Kalling, 2002). The criticism to RBV has been on the lack of empirical studies along with the shortage of process orientation as well as doubtful explanation of hypercompetitive industries (Hedman & Kalling, 2002). However, Sun (2013) conducted a study showing that innovation is based on the core competences of firms. Firms with a high level of innovation posses the core competences to adapt to the new environment and thus survive the external change (Sun, 2013). Teece, Pisano, and Shuen (1997) suggested that a resource as knowledge couldn't be easily obtained, transferred, or imitated by firms. Knowledge is obtained through knowledge sharing among firms and later transforms it into competences and competitive advantages (Sun, 2013). In order to perform well in innovation, firms must have positive threshold capabilities, critical capabilities, and cutting-edge capabilities (Sun, 2013). These capabilities are the ones that create the ability to adjust and survive external changes. In a study concerning the relation between information systems (IS) and strategy it was found that its economic value is determined by a firm's ability to trade and absorb IS resources, align them with other resources to diffuse them in activities and manage the activities. All in a way that creates an offering at uniquely low cost or which has unique qualities in relation to the industry they compete in (Hedman & Kalling, 2002).

Strategy research implies that firms can achieve competitive advantages in different ways. Based on described research the authors consider RBV as the view best suitable for service development. This since services mainly is based on intangible resources such as knowledge, making them difficult to imitate and therefore possible sources of competitive advantage. With the advent of serious changes in the business environment in recent decades firms need to seek to achieve persistent competitive advantages by adjusting their competences according to the latest

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change in environment. New service offerings then should be developed based on these competences. It is believed that what makes firms experience positive service innovation is the possession of the techniques and systems needed to achieve competitiveness and respond to the future. According to RBV the basis for competitive advantage lies primarily in the application of the firm's bundle of resources. Therefore it is believed that this view and not the value chain view should be the base when developing new service offers. RBV can be used to secure that the newly developed service is aligned with the core competences of a firm as well as contribute to the scarce empirical studies within the field.

The literature concerning service development focuses mainly on the service sector and tends to underexpose the goods manufacturing industry; in addition, most services marketing research focuses on consumer markets rather than industrial markets (Windahl & Lakemond, 2010; Salonen, 2011). Insight into how products and services could and should be integrated in the capital goods industry, the challenges connected to this integration, the extent of the service offering, and the factors to consider when deciding on the product-service mix in the capital goods industry is scarce (Oliva & Kallenberg, 2003). Yet it is uncertain how product manufacturers move beyond basic product related services to more advanced ones with a higher differentiation potential. Therefore more research regarding how different perspectives on service and solution innovation to produce a more accurate portrayal of the organizational logics and challenges involved in managing a transformation towards greater service intensity among industrial manufacturers is proposed (Salonen, 2011). With the growing competition in service markets it would be interesting with further research within the area of how to master the transition from product to service in business markets (Jacob & Ulaga, 2008). This since the 'pure' service sector represents three quarters of the developed world's economy and in some cases 'traditional' manufacturing firms generate over fifty per cent of their revenues from services. This makes it clear that services offers companies significant opportunities to create and capture economic value. Service providers should shift from being 'doers' to becoming 'problem solvers', capable of orchestrating the delivery of complex services, and continuously innovate their business models to obtain sustainable profits and growth. (Visnjic & Neely, 2011) This highlights the importance of that not only manufacturers operating in industrial contexts need to master service development. Most companies would benefit from considering their service strategy and the service opportunities within the markets where they are operating.

"In growing numbers customers consider manufacturers of physical products service providers. In order to maintain their competitive advantage it is time for manufacturers to start transforming themselves into service businesses" (Grönroos, 2007, p.434)

Thank you Services!

Summarizing the service business development literature it clearly confirm that the importance of services increases. It is obvious that firms operating in various industries and contexts should focus on developing differentiating services. Therefore it is considered essential with theory development in the research area concerning methods for designing new service offerings that customers are willing to pay for.

When scanning the service literature after models and methods for service development no model that uses RBV as a distinct base and framework was identified. The service literature offers some alternatives for seizing service opportunities. One is The Service Opportunity Matrix offering a systematic approach to create services-led growth where companies must begin by redefining their markets in terms of customer activities and customer outcomes instead of product and services (Sawhney, Balasubramanian, & Krishnan, 2004). Authors writing about innovation and more specifically service innovation all agree on the importance of not only understanding the customer needs but also to gain an understanding of the business environment of the customer (Visnjic & Neely, 2011; Bettencourt et al., 2013; Sawhney et al., 2004). Bettencourt et al., (2013) highlights the importance for firms to expand their focus beyond existing services and service capabilities to address the fundamental needs of their customers. Bettencourt et al., (2013) present a four-step process for firms to guide job-centric service innovation, called job mapping. When firms understand that customers hire products and services to get jobs done they can dissect those jobs to discover the innovation opportunities that are the key to growth (Bettencourt & Ulwick, 2009). This examples show that there exist some tools and methods for discovering new service opportunities with base in similar principles. These models and frameworks are based on analysing and understanding the customer's everyday activities and processes (Grönroos, 2007; Sawhney et al., 2004; Osterwalder, 2012). This is a highly relevant aspect although it would be beneficial with a model that isn't as generic and that highlights the importance of matching the services with the internal conditions at the company developing the service. Grönroos (2007) writes generally about services and service development but doesn't present any systematic tool or model than can be used for developing new services.

To summarize manufacturing- as well as other companies have to develop their business models in order to stay competitive, one way to do this is by expanding the service offering in order to differentiate from competitors and gain a sustainable competitive advantage. There exist some methods that can be used when developing new services, though they are considered generic and based on similar principles. RBV highlights the importance of internal conditions, and it would be of interest to further investigate how an industrial manufacturer could become more sustainable and competitive by focusing on internal resources and core capabilities in order to discover and seize new service opportunities. The external changes in the business environment clearly highlight the importance of service development to

stay competitive on the market - it is clear that there is a practical need for a tool that firms can use to discover new service opportunities. Therefore it is of academic interest to develop a model using RBV as theoretical framework that provides firms with a systematic methodology to follow when developing and testing new service ideas.

1.2 Purpose & research questions

The purpose of the study is to analyse and investigate how, a company that operates in an industrial context, can expand their service offering, and thereby increase competitiveness and profits at current and potential customers.

With this purpose in mind the study seeks to answer the following research questions:

- How could a model for developing new service offerings be designed?
- What is the applicability of the developed process model when applied on an established manufacturing company?

1.3 Target group

The primary target group of this report is the university; meaning students, teachers and professors interested in the area of service development and how this strategy can be applied in companies. The secondary target group is the involved people from Hilti Svenska AB, who are also the ones that initiated the topic of the study. Finally one target group is all additional people interested in the research field.

1.4 Structure of Thesis

Chapter 1, Introduction – this part presents the background to the project, problem discussion, purpose and the target group.

Chapter 2, Methodology – here the authors explain how the process model was developed, as well as the strategy when applying the model on the case company.

Chapter 3, Theoretical framework – the developed process model is presented stepwise, along with the theory used in the different steps.

Chapter 4, The case company – in this chapter the reader are presented with a brief description of the chosen case company.

Chapter 5 - 7, Empirical framework – this part follows the structure of the process model and takes the reader through the results from applying the model on the case company. The model consists of four steps and an extensive amount of empirical

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data was collected in this part, where all data isn't presented in the actual report and instead can be found in appendixes.

Chapter 5, step 1 & 2 – presents the reader with the results and methodology of applying step 1 and 2 of the process model on the case company, additional data can be found in appendix 3 and 4.

Chapter 6, step 3 – presents the reader with the results and methodology of applying step 3 of the process model. This is the most extensive step and additional data can be found in appendix 5-11.

Chapter 7, step 4 – presents a short summary of applying step 4 of the process model, additional data can be found in appendix 12.

Chapter 8, Analysis - the applicability of the process model is analysed and discussed in relation to theory and empirical data.

Chapter 9, Conclusion – here the final conclusions answering the purpose and research questions of the report are presented.

Chapter 10, Discussion – the report ends with a discussion regarding the results and the overall applicability of the model, as well as a discussion regarding the validity of the study and suggested further research.

2 Methodology

This chapter present the reader with the different steps performed to provide a trustworthy and interesting answer to the question of how a company can expand their service offering.

2.1 Research Approach

As the authors didn't have deeper knowledge within the area of service development in the beginning of this study, it started with a systematic literature review within this area. This review resulted in the creation of a process model that was modified along the process. When a study starts in theory, as is the case in this report, it is called deduction. The inductive approach differs since empirical research is the start and theory is the outcome (Bryman & Bell, 2011, p.11). The method can be divided into four parts. First the authors started with a thorough literature review followed by the part where the process model was designed. When the model was built it was applied on the case company. During this part a lot of data was collected and the model was therefore modified according to the data. The last part of the process was the evaluation of the applicability and this is discussed in the analysis chapter.

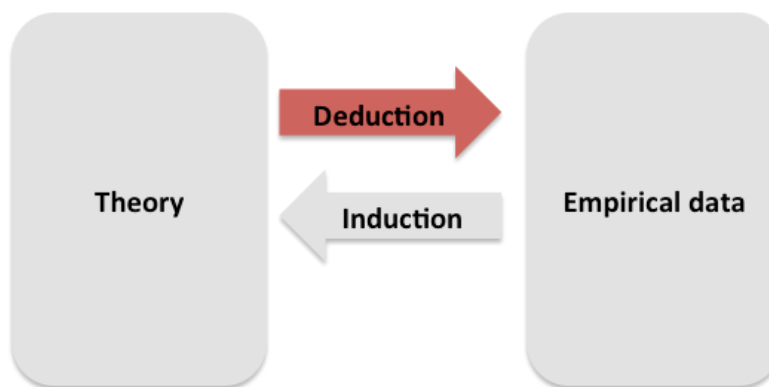


Figure 1 – Illustration of the deductive research approach

In order to satisfy the purpose of the study the research questions are divided into two parts, both using an exploratory approach. The first part is based on an open research question regarding developing a model for service development. Since the authors didn't have any knowledge or hypotheses in this area prior the study, this approach was considered suitable. The purpose of using this approach was to reveal

new knowledge about the phenomenon of service development by concretising what the phenomenon in question contains of. Based on this the researchers could state hypotheses and develop a model. The second part have a similar approach since the purpose was to apply the model on the case company and the authors didn't had any knowledge or hypothesis of what the results would be. An exploratory approach is good when new and relatively unknown knowledge should be gained (Jacobsen, 2002, p. 72).

However the study has descriptive elements, as an important part of this research was to describe value creation and test the model on a real company and their customers to gain information about customer's requirements and needs. This understanding was considered essential to be able to develop a service that would actually create value for customers as well as the company. This made it clear that a qualitative study should be conducted, as the qualitative approach focus on descriptive and rich data. This allows the authors to analyse a phenomenon more in depth as well as its environment (Bryman & Bell, 2011, p. 571).

2.2 Development of the process model

Since the central point in this study was to develop a systematic model, this section will present the strategy of the literature review and further how the model was constructed.

As earlier mentioned the study took its start in theory and initially an extensive literature review was performed in order to gain knowledge about where earlier research has ended and where new research should start. To successively evaluate the read theory, where it in the beginning was hard to define what kind of literature that should be studied, the literature review was an iterative process. The authors had to go back and track what seemed unclear as well as following up on interesting tracks that was identified along the way. The literature review generally followed the structure presented by Höst, Regnell & Runesson (2006), consisting of three steps:

Broadly search: The first stage was a broad search where the field of theory that was scanned was *value creation, resource based view, innovation, service development, customer development model, business models and customer satisfaction*. The topics was chosen in order to suite the purpose of analysing and investigating how a company that operates in an industrial context can increase competitiveness and profits by a broadening their service offering. Further reference lists in articles and books was used as starting point to find further research within the chosen areas. In this stage the articles were scanned in order to see if they were considered relevant for answering the purpose.

Selection: The understanding gained in the broad search was used as motivation when selecting the sources that seemed most relevant for the construction of the

model. This was for example the resource based view, Osterwalder's Business Model Canvas and Blank's Customer Development Model. The selected sources were studied more thoroughly than in the broad search.

Deep search: In this stage the research was narrowed down and the articles read even more carefully. The authors looked at reference lists and read the articles of authors especially active in the selected fields, e.g Grönroos, Sawhney, Barney and Bettencourt. Finally the theories were analysed and assembled to a model that were considered suitable for developing new services considering existing research within the field.

To summarise the literature review resulted in a process model, entirely based on theories originating from the "library" not considering the characteristics of the case company. This was considered important since the authors first created their own perception of how the model should be designed, and first after that tested the model and begun to collect data. By following this methodology the authors ensured the methodological contribution as the model was separately developed and then tested.

2.3 Research design

To ensure that the research was reliable, replicable and valid an appropriate research design had to be chosen. A single case study design was chosen as the authors wanted to test the model on a real company to be able to assess the applicability of the model. The company should preferably be an established manufacturing company as the aim was to see how it could expand the current offering towards service. The basic case study design was believed suitable as it necessitates the detailed and intense analysis of a single case (Bryman & Bell, 2011, p. 59). The thesis is therefore partially carried out at Hilti - a world leading company within development, manufacturing and marketing of high quality products within the construction industry. Below the reader will find a motivation to why Hilti was considered interesting to use as a case company.

2.3.1 Hilti as case company

The market of power tools, provided to the construction industry, is a saturated market with many actors. It therefore becomes increasingly difficult to differentiate from competitors. Hilti is considered as an interesting case company since it is a traditional manufacturing company, operating in an industrial context where market conditions make it important to identify and develop new service offerings to sustain competitive. Yin (1994, p.26) describes that an extreme or unique case is interesting to study on its own since it is rare. Hilti was considered an extreme or unique case since it is the only actor in its industry, controlling their entire supply chain, differentiating them from the major part of competitors within the industry. Further

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Hilti is a unique company due to their premium prices, making them one of the most expensive tool providers within the industry. This is an additional argument for choosing Hilti as a case company, as their high prices should imply an increased motivation for increasing the value in each product offering and thereby justify the premium prices. Hilti is considered as a company with a high service potential.

An additional factor that makes Hilti interesting for this study is the fact that they provide solutions for the construction industry. The industry is often described as sever changing and less innovative than other industries. This because many activities within the building process still is considered as craftsmanship that can not be industrialized resulting in the opinion that all building projects are unique (Bröchner, 2010). Bröchner (2010) refers to a conducted survey showing that construction companies were less likely to obtain outside advice for their innovation activities. A challenge could therefore be that the construction companies not are aware of what they need, don't see the potential of continuous improvements and what service that would add value to their operations and finally what type of services that exists and who provide it. The characteristics of the construction industry therefore makes it even more important for suppliers to find new ways to help their customers become increasingly effective - where one way could be to deliver value creating services. Especially customers whose costs are driven by what they purchase increasingly look to purchasing as a way to increase profits and therefore pressure suppliers to reduce prices. To persuade customers to focus on total costs rather than on acquisition price, a supplier must have a correct understanding of what its customer's value, and what they would value (Anderson & Narus, 1998).

Case studies typically combine data collection methods such as archives, interviews, questionnaires and observations (Eisenhardt , 1989). The ones used in this study will be further described below.

2.4 Data collection

To conduct this study it was as necessary to collect qualitative data. The data used to develop the process model is only based on existing theories and previous research. Though, to answer the second research question, collection of empirical data was needed. The collection of data was divided into two main phases.

1. Interviews were carried out among relevant employees at Hilti as well as among industry experts, in order to find an interesting area to investigate further.
2. In the second phase the scope was narrowed down to collection of empirical data within a specific area, and interviews were performed with a chosen segment of customers. In this phase the authors also arranged 2 workshops.

A complete overview of interviewed people can be found in appendix 1, and the complete interview guides, used in both phases can be found in appendix 2.

The technique used to create an understanding of the current situation and state problem hypotheses in both phases, has characteristics similar to the Delphi technique. The technique is a consensus development method where consensus is considered to be a viewpoint, acceptable to more than a basic majority, or by those with power (Turoff & Linstone, 1975). The method is based on that a panel of experts individually receive a number of questions for assessment. The responses are then compiled and sent out to the panel again, possibly with additional questions. The experts will have the opportunity to change their opinions based on the findings of the others' viewpoints. The intention with the method is to arrive at a common position. (Vernon, 2008) This was the structure of the data collection since some of the companies were interviewed multiple times, where they were asked new questions based on the replies from others.

It is important to state that the overall focus of the data collection has been on gathering rich and diverse empirical data. This to guarantee a correct understanding and description of reality, as well as increase the validity of the study. The overall strategy when choosing respondents in the two phases will be presented below.

2.4.1 Choice of respondents

In the search for the most relevant respondents to interview the authors evaluated in three steps proposed by (Jacobsen, 2002):

1. An overview of possible respondents was provided, which created an idea of who would be most relevant to interview.
2. In the next step the possible respondents were divided into groups, groups could for example be customers operating within different areas or Hilti employees working at different levels in the company.
3. The next step was to identify choice of criteria's on the respondents, for example that they should operate in a certain geographical area or have a certain turnover.

Below the activities within each of the data collection phases will be further described.

2.4.2 Phase 1: Semi-structured interviews internally and among industry experts

During the initial phase the goal was to conduct an internal mapping, describing value creation at Hilti according to the developed model. This initial mapping was

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comprehensive and the aim was to interview as many actors as possible to understand the current situation of the status quo in the industry.

To understand and map the internal conditions at Hilti a great amount of interviews was performed with employees in different roles and positions, see figure 2. A comprehensive empirical material was considered especially important as the basis of the model is on understanding key resources and core capabilities of the company developing the service.

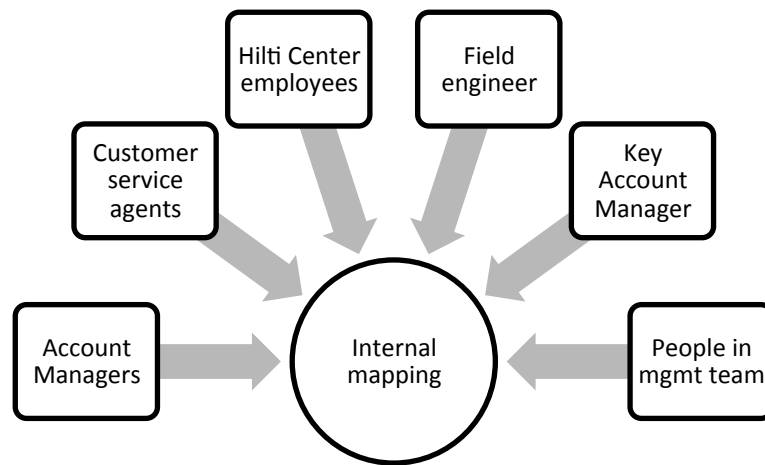


Figure 2 – Initial mapping, interviewed people at Hilti

Further the aim was to apply the model and initiate an external mapping to identify areas of potential service opportunities. To do this the authors performed several semi-structured interviews with Hilti employees, industry experts and customers, see figure 3.

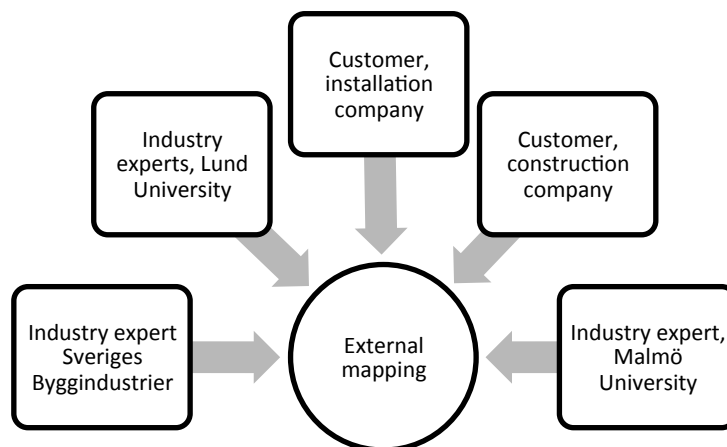


Figure 3 - External mapping, interviewed people

Thank you Services!

The questions asked during the internal mapping were open as the intention was to make the interviewed person speak freely about their thoughts, the company and the business model. The interview guide was based on the theories of Barney and Grant regarding resources and capabilities, together with questions developed from studying Osterwalder's Business Model Canvas.

The questions asked during the initial external mapping was also open to gain an understanding of the industry and the environment where Hilti operates. Compared to the interview guide used for Hilti employees, this guide was further focused on processes, conditions and trends within the construction industry.

Overall a so-called "snowball-method" was used during the entire phase. In this method an interview is performed and from that interview new ideas and impulses are given. With the newly gained ideas another interview was performed. The method requires analysing of each interview and can be very fruitful (Jacobsen, 2002). The authors analysed the outcome of each interview and modified the interview guide so that each question would give answers that were relevant for the study.

Observations

Except interviews, observations in different parts of the organisation were conducted to receive a rich and detailed picture of the case company. Observations were considered suitable to get an objective view and not only rely on interviews. Observation gives the opportunity to observe the behaviour rather than rely on what is said (Bryman & Bell, 2011, p. 495). The method used during the observations was open structured observations, as the employees knew that we overheard their conversation with the customer (Jacobsen, 2002, p.180).

The authors decided to perform observations in three of Hilti's different sales channels. This to observe the interaction with customers and gain insights regarding how Hilti creates value for customers.

- **Hilti customer service** – customer service agents were observed while assisting customers with errands over the phone. The authors listened to conversations held with customers, which created an understanding for what the customer's usually need help with.
- **Hilti Account Managers** – this observation was of the sales personnel where one day was set off for the authors to follow two different Account Managers, working in two different customer segments. The day provided the possibility to observe the customers in their every day work environment and gain insights of the setting were a potential new service could be implemented.

- **Employees Hilti Center** - the third part of the observations was conducted at the Hilti centres. By being present in the stores the authors could observe the customer, the customers' errands and the direct interaction with the Hilti employee.

Documentation

Documentation was another source of information used to understand the case company. It consisted of reports from the case company, as well as documents describing general rules in the construction industry affecting the company. To understand the context that the case company was operating in, the authors chose to study work descriptions written by industry experts.

2.4.3 Phase 2 - External semi-structured interviews

In phase two of the data collection the authors had identified an interesting area (motivation will be given later in the report) to investigate further – the interaction between two different actors involved in the construction process. To study the interaction the authors decided to perform semi-structured interviews with both actors separately. Interviews were performed with six construction firms and five installation firms, illustrated in figure 4. The interviews were made with the purpose to identify areas that could be improved within the processes of the customers. By interviewing two customer segments, construction and plumbing, the authors hoped to find synergies in their needs and be able to identify one common area of interest.

As the purpose with the interviews was to gain a better understanding of customer's processes, project leaders and purchasing managers was chosen as interviewees. They were considered positioned at a strategic level within the company, having the necessary overview but still knowledge of practical operations. The interview guides were formed, based on theories regarding service development and approaches to discover service opportunities; Grönroos, 2009, Sawhney et al., 2007, Osterwalder, 2012 and Bettencourt, 2012. The questions were based on theory, though openly constructed to allow the interviewed person to speak freely and give versatile answers.

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The interviews were held at the office of the customers and had the duration of approximately 90 minutes. All the interviews were transcribed due to simplify the analysis of the qualitative data. The process had elements of the “snow-ball” effect as the authors realized that it would be relevant to perform interviews with clients such as Akademiska Hus and LKF during the process. Interviews with the clients were conducted in order to map the relationship between all involved parts in the chosen process.

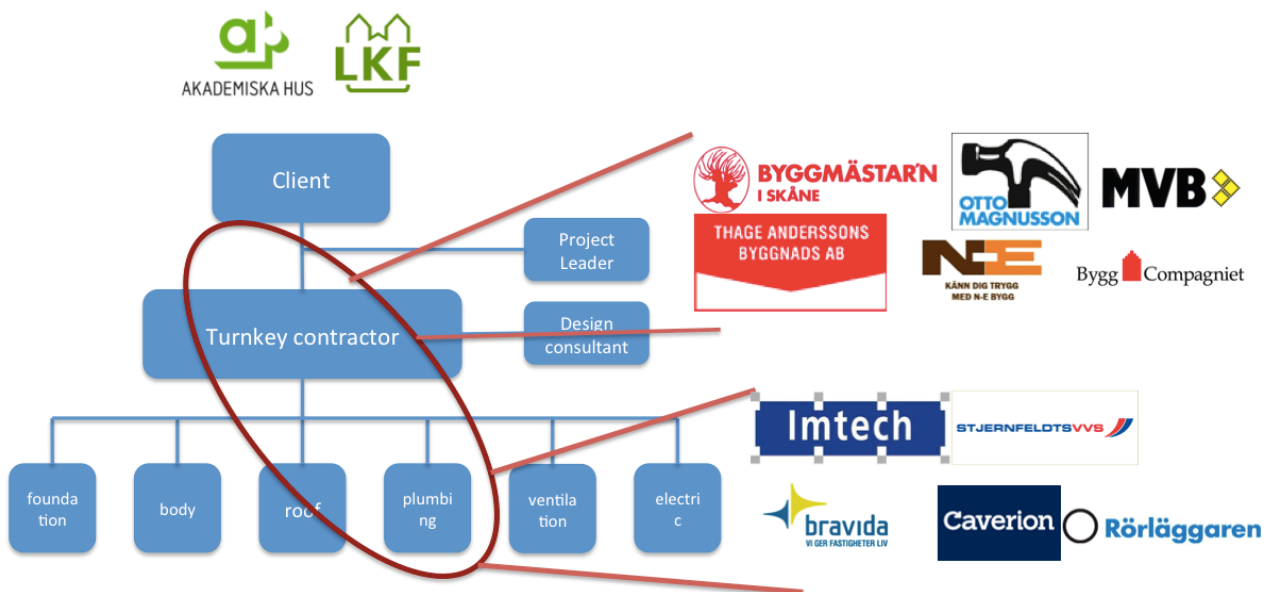


Figure 4 - Interviewed people during phase 2 in the data collection

Focus group

After conducting the interviews the authors decided to arrange a workshop/focus group, with representatives from both a construction and installation company. Here the participants was presented with the authors’ identified problem hypotheses and encouraged to discuss it together - this to verify the identified problem hypotheses by letting both sides discussing the chosen topics together. The structure in the workshop was to have the discussion as open as possible and then the authors interrupted once the participants moved away from an interesting subject too quickly avoid that details got lost (Jacobsen, 2002, p.178). The authors also interrupted in order to enable all participants to give their opinion. Another focus group were performed later in the process internally at Hilti, with Account Managers and Field Engineers. This focus group had the same structure as the first one.

2.5 Analysis approach

Since the aim was to test the applicability of RBV as a base in service development, the model's ability to provide a structure to enable this was evaluated. Further, to which extent the study has helped to in a systematic way test and develop a service opportunity was analysed. As the authors constructed a process model based on theory and not the characteristics of the case company the result of systematically following the process model applied on the case company was evaluated. The applicability of the model was analysed by looking at the ability to generate relevant empirical data, as well as if all collected data could be used in the model. Since the questions in the interview guides were based on the model, an analysis of the generated data gives an evaluation of the model's ability to describe value creation and its ability to identify service opportunities in customer's processes.

Further the analysis focuses on discussing if the different building blocks of the model, work in combination and if some are redundant. Each of the four steps in the developed model was analysed in this way, though the main focus will be on analysing the structure of step 3 as the main methodological contribution will be in this step. Step 1 and 2 of the model are mainly considered as a prerequisite enabling the execution of Step 3, and therefore the authors has put the greatest effort on developing this step. The aim with the step is to test problem hypotheses, and the analysis therefore focused on the model's ability to systematically perform hypotheses testing and evaluation in a real business context.

Step 3 of the process model generated large quantities of qualitative data, making it necessary to analyse it in an iterative manner. The purpose of the analysis of the data was to create structure in the great amounts of collected data. The chosen method for analysis was the editing methodology (Höst, Regnell, & Runesson, 2006). In accordance with this methodology, different categories of topics were created. The authors then interpreted the content in the data and the pattern in the collected data was used as a base for creating the different categories.

2.6 Credibility

During the first three weeks of the study, the authors spent time in the library where a solid foundation of theory was built without any influences of the case company. This clearly deductive approach increases the credibility of the analysis of the results, as the theoretical framework provide the authors with the integrity to relate to new information.

During the testing of the model, the authors were provided with an office at the case company. The authors had constant access to employees, internal document as well as being a part of the everyday environment at the site. The supervisor was as well

easily contacted and meetings were arranged at least every month and as often as needed. Interviews with internal employees, construction companies, installation companies, clients, as well as industry experts was all performed face-to-face with the respondents. In the end of the study when performing the final verification, an exception was made as phone interviews were used. This since the authors already had meet the respondents and the time that it would take to travel would be to costly in relation to what the added value compared to phone interviews would be. Bryman and Bell (2011, p. 45) describe the ecological validity as the extent to how the researcher and the chosen methods understand the daily conditions, opinions and attitudes. The ecological validity of this study is considered high since the authors were a part of the organisation during the time.

Transcription of each interview has been performed in order to facilitate the work as well as increase the validity of the sources. The method used in order to make the study as representative as possible was that the authors performed the external interviews with the customers, in the second phase of the data collection, without mentioning the case company. This choice was due to the fact that the answers of the respondents might have been affected if they had the case company in mind. The purpose for the anonymous approach was to influence the respondents as little as possible to gain an accurate picture of their process and issues as possible.

2.6.1 Validity

In the study great effort was put on verifying the problem hypotheses identified during the process. During the interviews a so called "snow-ball effect" was used in the sense that the information provided from pervious interviews were tested and verified or pivoted in the later ones. In this was way assumptions were tested on different persons and therefore considered trustworthy. The hypotheses were both tested internally in the case company as well as among industry experts. In order to build convincing theory, several sources of information should be used, so called

triangulation (Dubois & Gadde, 2002). Triangulation was used in order to solve the problem of construct validity since multiple sources of evidence essentially provide multiple measures of the same phenomenon (Yin, 1994 p. 92). Therefore three types of activities were performed when doing the internal mapping at Hilti; multiple interviews, observations as well as a document study, see figure 5. When several methods give the same result it increase the changes of being valid.

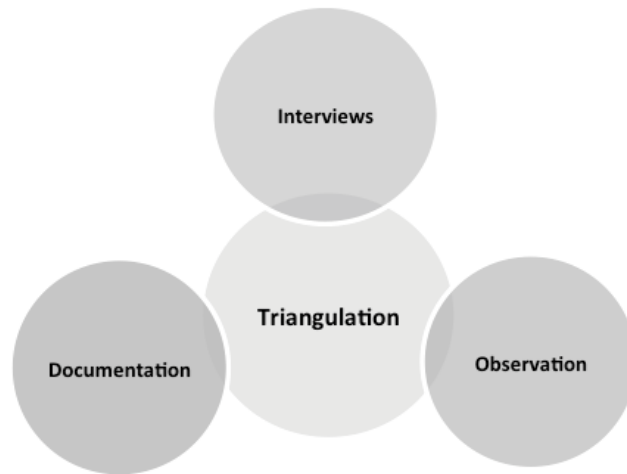


Figure 5 – The triangulation approach

As the study was performed on only one company the degree of generalization is not considered secured. This parameter is called external validity and is common to be a flaw in qualitative research. Survey research relies on statistical generalization, whereas case studies rely on analytical generalizations. In analytical generalization, the investigator is striving to generalize a particular set of results to some broader theory (Yin, 1994 p. 36). The main focus of this study was not generalization, instead focus was on developing a valid method for applying the developed model in order to get a rich understanding for the usability and the effects. Therefore what can be discussed is the applicability of the model in this specific case and assumptions can be made regarding the applicability on other companies.

2.7 Data delimitations

A number of data delimitations have been necessary in both scope and depth of the study. The authors chose to look at the Swedish market and the area of Skåne, therefore making a geographical delimitation. However, the patterns of these customers are considered representable for customers operating in the rest of the country. The study is further limited to focusing on two specific customer segment of Hilti's customers – a segment consisting of locally based construction firms with a high turnover and a segment consisting of big local installation firms. To narrow it down even further a specific process of these customer was analysed - the process of negotiation and coordination of sub-contractors in a turnkey construction project. Due to scarce resources in terms of time the actual implementation of the proposed service and follow up on the results is not considered within the scope of the thesis.

3 The process model

This chapter will present the reader with the developed process model and the different theories that this model is based upon. The purpose with this model is to provide firms with a structured method to follow when developing new services. The overall theoretical frame to the model is RBV, accentuating that the developed service has to be in line with existing resources and capabilities. The model will facilitate firms in answering questions regarding how to develop new services suitable with existing resources and capabilities and where there are quality/value gaps in the processes of the customer.

3.1 Chapter outline

The process model consists of four steps based on theories and models considered relevant when developing new service offerings, see illustration of model in figure 6.

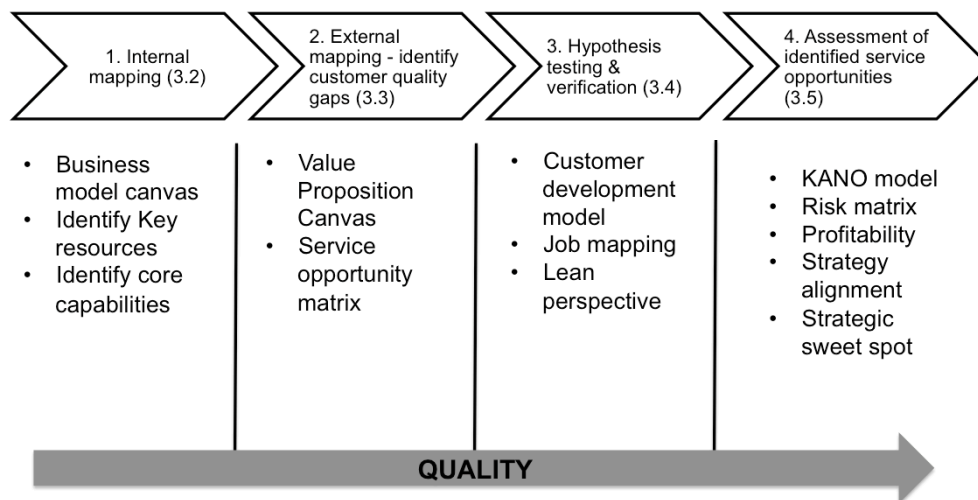


Figure 6 – Illustration of the developed process model

The structure of this chapter is that each step will be described stepwise according to the illustration in figure 6. Each step contains a description of the theories used in that step, and a motivation and description of how this step could be performed in practice. The different steps are designed based on several methods and theories, which are all presented and then followed by a motivation to why they are considered to work in combination. Each step is ended with a summary of the step and the actions needed to perform it in a real business context.

3.2 Step 1 – internal mapping

The aims with the first step of the model is to create a base for the service development by mapping the internal conditions in the company and clearly define the business model. This is considered important since the search for new service opportunities often begins inside the company with an evaluation of its capabilities (Sawhney et al., 2004). Through performing this step the firm will be able to answer questions regarding what they are good at, and if internal conditions and existing resources and capabilities limit the development of new service offerings.

There exist different tools and structures to follow when mapping and describing business models. The Business Model Canvas (BMC) is a structured tool for describing and analysing the business model, consisting of nine building blocks (Osterwalder, 2004). Further Chesbrough (2007) propose a business model definition consisting of six parameters (e.g. the value proposition, market segments, the value chain etc), by using this he argues that a company can identify where innovation might generate new value in an industry. Chesbrough (2007) also has developed The Business Model Framework (BMF) which is a model that sequences possible business models from very basic models to far more advanced, using the BMF companies can assess where their current business model stands in relation to its potential. Hedman & Kalling (2002) propose a generic business model consisting of 7 components similar to the parameters in Chesbrough's definition, though with the difference in the longitudinal process component, covering the dynamics of the business model over time. To perform step 1 in a structured way the authors has chosen to include the BMC in the step, this as it is considered as a simple tool for describing the business model. The authors mainly aim to use it as a tool to fast and structured map the business model as a prerequisite for the next steps in the model. The BMC is similar to Chesbrough's and Hedman & Kalling's definitions, while the BMF is considered as unnecessary complex having a great focus on the entire business model development. The BMC was further chosen as it easily can be used together with The Value Proposition Canvas that will be described in the next step.

3.2.1 The Business Model Canvas

To understand the underlying logic of The BMC, Osterwalder's definition of a business model is presented below:

"A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing a company's logic of earning money. It is a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams." (Osterwalder & Pigneur, 2010, p. 15)

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The BMC consists of nine basic building blocks, showing the logic of how a company intends to make money. As can be seen in figure 7, the nine blocks are; customer segment, customer relationship, channels, value proposition, key activities, key resources, key partners, cost structure and revenue stream. (Osterwalder & Pigneur, 2010, p. 14-16)

Osterwalder (2004) divides the canvas into the left and the right side. The right side is defined as the customer interface and external part since it include all the customer related blocks and therefore describe how and to whom the value proposition is delivered to. The different blocks are all connected and together they contextualize the different aspects of how the customer segment is connected to the value proposition through the customer relationships and channels. The left side of the canvas is called the infrastructure management and consist of the blocks related to the internal aspects of the business model. It describes which activities that are needed to serve the right hand of the canvas. (Osterwalder, 2004)

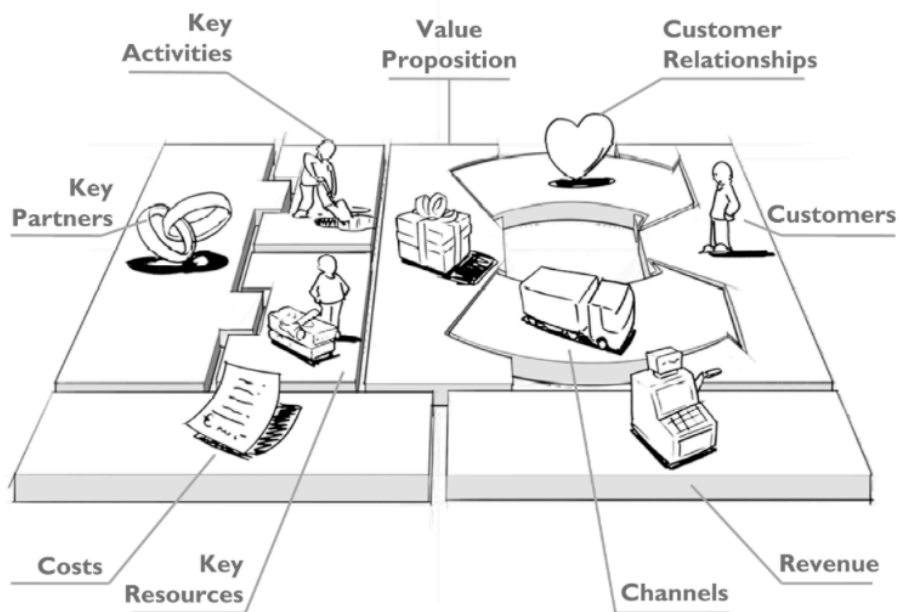


Figure 7 – Osterwalder's The Business Model Canvas

3.2.2 Resource-based view & Core capabilities

After mapping and describing internal conditions with help of The BMC, this should be complemented with the perspectives of key resources, core capabilities and competitive advantage.

As the world is in constant change and the environment that every business acts in is rapidly shifting it will not result in sustainable competitive advantage to rely on strategy that is based on external resources (Grant, 1991). Barney (1991) argue that firms in general, cannot expect to obtain sustained competitive advantages when strategic resources are evenly distributed across all competing firms and highly mobile. Therefore a strategy that is based on internal capabilities where the customer is not narrowed down is more likely to become a market leader (Grant, 1991). Six different types of resources are identified; financial resources, physical resources, human resources, technological resources, reputation and organisational resources. These six categories can be used in order to identify the different internal resources of a specific firm. (Grant, 1991)

Capabilities are considered as core capabilities if they differentiate a company strategically (Grant, 1991). Leonard-Barton (1992) adopts a knowledge-based view of firms and defines core capability as the knowledge set that distinguishes and provides a competitive advantage. Barney (1991) states that a firm is said to have a competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors. The most important capabilities for the majority of firms tend to be those that rise from integration of different core competences (Grant, 1991). Even if a company is working well and have strong core capabilities it should continually look for step-function changes by linking a new set of capabilities and customers (Laseter & Bennett, 2013). Three tests can be applied to identify core competencies within a company. First, a core competence should grant access to a variety of different markets. Secondly, a core competence should contribute to the perceived value that the customer receives of the end product. Finally, a core competence should be difficult for the competitors to imitate. (Prahalad & Hamel, 1990)

As capabilities can be described as the glue that binds existing businesses and also as the engine for new business development, it is important to be aware of what they are (Leonard-Barton, 1992). RBV has been developed by several authors and has in recent years been discussed by Sun (2013) who investigates if resources and capabilities that are shared with partners, called knowledge sharing, will lead to increased innovation. The conclusion of the study is that high dependency on partners' information will lead to great risks and that it is necessary for firms to have control over their own key resources and capabilities (Sun, 2013). This further highlights the necessity for firms to be aware of them. By utilizing The BMC together with these views, companies can continually analyse whether expansion into new

service arenas will take them outside the logical scope of their capabilities and organizational culture.

3.2.3 Summary step 1

- Describe the firm's business model by using The BMC.
- Identify key resources and core capabilities.

To be able to conduct this step it is important to define the scope of the study, which could be something like: *"Investigate the possibility to expand our service offering towards customer segment X"*. The scope can't be too narrow since the purpose with the process model is to allow existing firms to discover new opportunities either in current or new markets. However, some limitation of the scope is necessary in order to conduct the data collection and to enable the mapping of relevant internal capabilities. After defining the scope it is time to start the internal mapping by performing the data collection named phase 1 in the methodology chapter. This means collecting data by performing both internal and external semi-structured interviews as well as analysing secondary data. Observations and interviews with industry experts could be performed with advantage to get a comprehensive understanding of the company's core capabilities and the external environment. However, the entire list of the company's resources and capabilities will not be identified, only the ones that can be considered relevant or adjacent to the defined scope of the study.

The results from applying this step on the case company can be found in chapter 5.

3.3 Step 2 – external mapping, identify customer quality gaps

After step 1 it is time to use the insights generated in the internal mapping and begin to look at the external environment and talk to customers. This to create an understanding of the customers and identify gaps – areas where value could be created for customers, though this isn't the case today. Service business model innovation do not occur in isolation, instead a firm should focus on the business environment in which the service provider operates (Visnjic & Neely, 2011). The service literature offers different methods and approaches to use when looking for service opportunities. Windahl & Lakemond (2010) suggest a categorisation of integrated solutions, a model focusing on supplier and customers as a parameter and a product- or process oriented offering as another parameter. As the integrated solution is complex and the aim was to categorize where services could appear this was not considered as a suitable model. Raddats & Easingwood (2010) offer an approach for visualising service opportunities in relation to service strategies that has two dimensions. The first dimension distinguish between product-centric services and services in the customer's environment. The other dimension

distinguish between focusing either exclusively on the company's own products or also including the products of other companies. (Raddats & Easingwood, 2010) This model was not chosen as it focuses on other company's products as well, which not is in line with RBV. The Service Opportunity Matrix (Sawhney et al., 2004), a model offering a structured perspective of where to look for services, was considered as the best-suited model. This as the purpose should be to facilitate the process of where to look for potential service opportunities. This model is as well suitable for identifying services that already exists in the company, which is considered useful, as this was a part of the scope.

The Value Proposition Canvas (VPC) is a tool preparing the firm for customer interviews as well as guiding the testing and pivoting. It helps businesses to map, analyse, design and test the company's value proposition in relationship to customers' needs in a structured way. The BMC and VPC work best in combination (Osterwalder, 2012). Therefore the VPC was chosen as a tool to facilitate when describing the hypotheses that is underlying when it comes to value propositions and customers.

The authors therefore suggest that step 2 is based on the two models; *The Value Proposition Canvas* and *The Service Opportunity Matrix*. The reason for using these two approaches in combination is to create a more comprehensive view of possible service opportunities as the models offers different perspectives. Firstly The Service Opportunity Matrix offers the perspective of where to look for services, it can both be services tied to the product and those tied to the customer's process. Further the VPC helps the firm to analyse the match between the customer and the current value proposition offered by the company. Using both these methods will lead to identifying as many opportunities as possible. Service providers are shifting from being "doers" to becoming "problem solvers", capable of orchestrating the delivery of complex services (Visnjic & Neely, 2011). The chosen methods have in common that they focus on identifying these problems to solve for the customer by analysing and understanding the customer's everyday activities and processes.

3.3.1 The Service Opportunity Matrix

The Service Opportunity Matrix is a systematic method where firms can map the customer activity chain and relate this to a matrix, which will enable the exploration of opportunities for new services in four directions. A customer activity chain consist of the different activities a customer engage in to seek particular outcomes. Customer activity chains can be extended, filled, expanded or reconfigured with new services. To structure the investigation of these opportunities, it is useful to categorize them on the basis of the impact they have on the customer activity chain - which could be done with The Service Opportunity Matrix. Once companies are thinking about the customer activity chain, they can classify new services along two dimensions: the focus of growth (where does growth occur?) and the type of growth

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(how does growth occur?). The “where” question is typically answered by thinking about primary and complementary, or adjacent, activity chains. Primary customer chains have a direct link to the product offered and affect its functionality and availability. Adjacent customer chains are not directly linked to the product and have no effect on functionality and availability. The second dimension concerns how growth occurs and it distinguishes service opportunities by adding new activities and secondly by reconfiguring existing activities. Merging the focus of growth with the type of growth results in the two-by-two service opportunity matrix, see figure 8. The four elements of the framework include:

1. *Temporal expansion*: Growth from services that add new activities to a primary activity chain.
2. *Spatial expansion*: Growth from services that add new activities to an adjacent chain.
3. *Temporal reconfiguration*: Growth from services that change the structure and control of activities within a primary chain.
4. *Spatial reconfiguration*: Growth from services that change the structure and control of activities within an adjacent chain. (Sawhney et al., 2004)

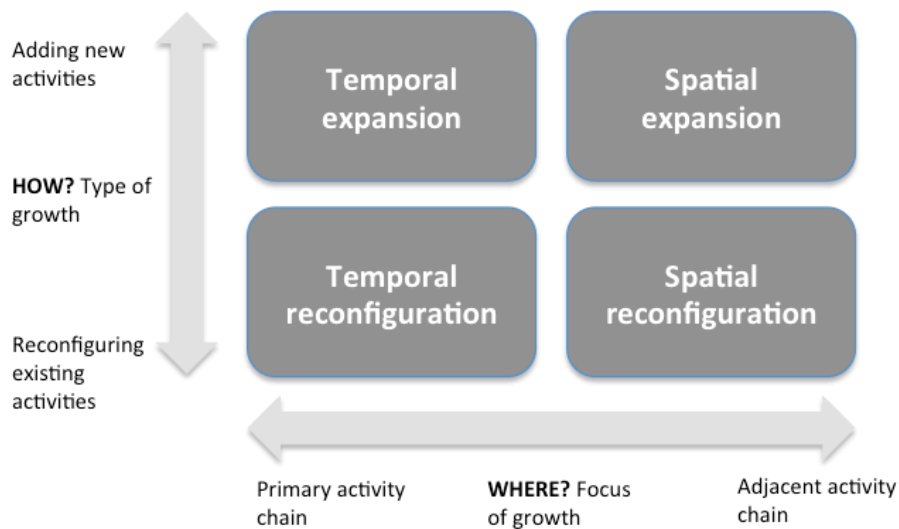


Figure 8 – Sawhney's Service Opportunity Matrix (Sawhney et al., 2004)

3.3.2 The Value Proposition Canvas

The previous described BMC consists of nine blocks and focuses on the big picture while the VPC focuses mainly on two of these blocks; the value proposition and the customer segment (Osterwalder, 2012). The aim with this model is to describe these blocks in detail and analyse the fit between them, so that companies can design value propositions that match their customers' needs. The VPC is divided into two sides, the customer side and the value proposition side, see figure 9.

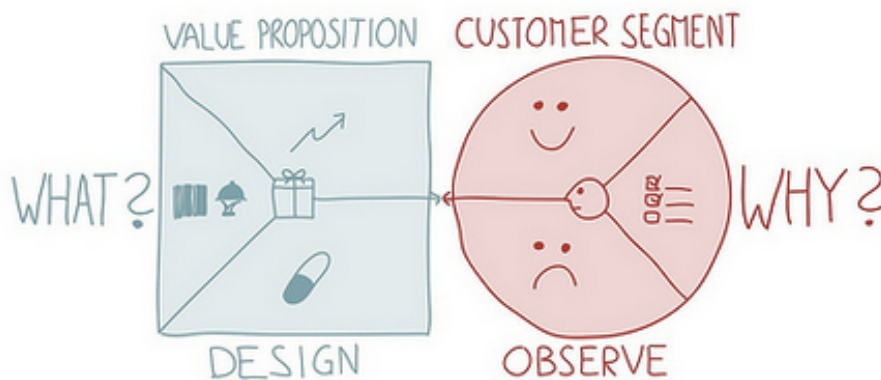


Figure 9 – Osterwalder's Value Proposition Canvas

The customer side

At first it is important to understand the customers by sketching out the customer profile, to do this Osterwalder (2012) propose the firm to look at three things; customer jobs, customer gains and customer pains, see illustration in figure 10.

Customer jobs - describe what the customers you are targeting are trying to get done. This could be the tasks they are trying to perform and complete, the problems they are trying to solve, or the needs they are trying to satisfy.

Customer Pains - describe negative emotions, undesired costs and situations, and risks that your customer experiences or could experience before, during, and after getting the job done.

Customer Gains - describe the benefits your customer expects, desires or would be surprised by. This includes functional utility, social gains, positive emotions, and cost savings.

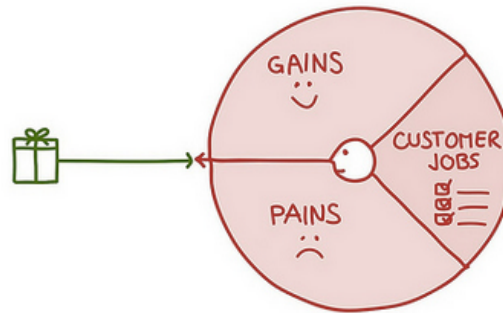


Figure 10 – Illustration of the customer side in The Value Proposition Canvas by Osterwalder

The value proposition side

After the customer profile is described it is time to look at the value proposition, which can be divided into three areas; products & services, pain relievers and gain creators.

Products & Services - firstly list all the products and services that the value proposition is built around. Then ask yourself which products and services you offer that help your customer get either a functional, social, or emotional job done.

Pain Relievers - this area analyse how the offered products and services create value. Describe how the products and services alleviate customer pains. How do they eliminate or reduce negative emotions, undesired costs and situations.

Gain Creators - finally it is important to describe how your products and services create customer gains. How do they create benefits your customer expects, desires or would be surprised by, including functional utility, social gains, positive emotions, and cost savings.

3.3.3 Summary step 2

- Structure and identify where to look for service opportunities by using The Service Opportunity Matrix.
- Perform an initial external mapping with help of the VPC, where customers' pain and gains are matched against the current value proposition.

Organisations need to understand what drivers create value for customers in order to build a competitive advantage (Lapierre, 2000). This step is about understanding the customer, by focusing the service innovation process on this it is believed that

the firm's ability to create breakthrough service offerings and processes will increase. When the customer job is the focal point of value creation, companies not only can improve their existing offerings but also can target new, or "blue ocean," market space (Bettencourt et al., 2013).

As the aim in this step is to understand the customer it is important to get out of the office and talk to the customer and other stakeholders involved in the process of performing the job. Semi-structured interviews should be held, preferably with different customers in different roles to get a comprehensive picture. After using the VPC a company has described who they think their customers are and what they think would create value for them, resulting in a list of product and customer assumptions. Based on these assumptions new and better value propositions could be designed. To make sure that the customers really want what the company design, they need to test all the assumptions made based on the canvas. This could be done by using The Customer Development Model that will be described in the next section. By doing this a firm can later adjust which pains and gains they want to focus on, based on their customer insights and then redesign the value proposition accordingly.

The result of this analysis will therefore be a list of identified opportunities and value gaps, within the defined scope of the study. These opportunities will then be used in the next step as a basis for formulating customer problem hypotheses.

The results from applying this step on the case company can be found in chapter 5.

3.4 Step 3 – hypothesis testing & verification

There is no way to know today exactly what your company's future business model will look like. The only way forward is to conduct some experiments, gather the evidence, identify the most promising direction and then run some further experiments. (Chesbrough, 2007) The third step in the model is about testing and verifying the formulated hypotheses, which is considered as the most important step of the model since it can be very costly and time consuming to develop a service that isn't what the customers really need. It is crucial to test and experiment with new business models (Gunther McGrath, 2010; Brink & Holmén, 2009; Neely and Visnjic, 2011; Chesbrough & Rosenbloom, 2002; Björkdahl & Holmén 2013). Blank & Dorf (2012) argue that the best way to do this is hypothesis-driven theory testing which is the main element of The Customer Development Model. This step of the process model therefore will follow the structure of the first step of The Customer Development model. However as this structure is considered as quite generic it was complemented with additional methods during the process, such as job mapping and the LEAN perspective, enabling the creation of a more distinct and systematic structure to follow when testing problem hypotheses.

3.4.1 The Customer Development Model

The customer development process consists of four steps: *customer discovery*, *customer validation*, *customer creation* and *company building*. Step one and two deal with searching for a business model, while step three and four deal with executing a business model. The theory used in this study is mainly related to the first step regarding *customer discovery* and therefore focus will be on describing this step. The other parts of the Customer Development Model are mainly related to start-ups and not relevant for the scope of this study. (Blank & Dorf, 2012)

The Customer Discovery step is divided into four parts, see overview in figure 11. Customer Discovery first captures the founder's vision and turns it into a series of business model hypotheses. Further it develops a plan to test customer reactions to those hypotheses and turn them into facts (Blank & Dorf, 2012). The technique used in order to do this is the Delphi technique that is used to reach consensus regarding the hypotheses. The four phases will be briefly described in the section below.

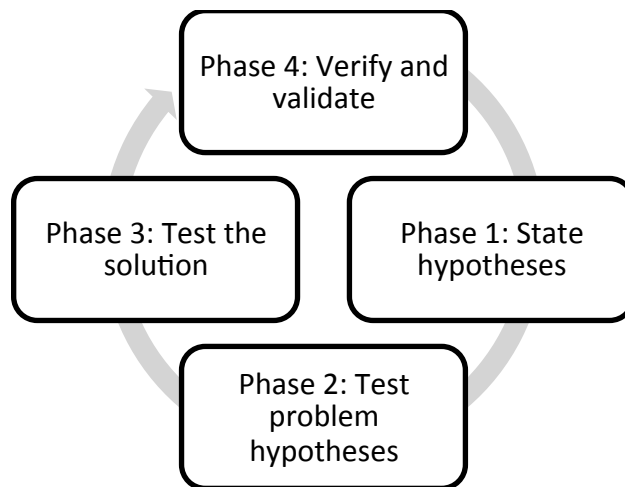


Figure 11 – The four phases of the customer discovery step, illustration by Blank & Dorf

1. Stating the hypotheses:

In this phase a list of hypotheses is written about each part of the BMC. In this phase it is extremely important for the involved people to “leave the building” to get out to test what they think is true about the customer. (Blank & Dorf, 2012)

2. Test the problem hypothesis

The mission in the second phase is to turn the formulated hypotheses into facts by designing experiments that tests the hypotheses and carry out these tests on potential customers. This phase also about look past the data, understand the customer and gain insight of what they really want. (Blank & Dorf, 2012)

3. Test the solution hypothesis

Now the focus is shifted from the problem of the customer to the solution. The goal is to test if the solution is interesting enough in order for the customer to buy it. The first phase is to review and update the business model, based on the deeper understanding of customers and their problems. This phase needs to conclude whether the company has discovered a problem with a large enough market where customers are eager to get this problem solved. (Blank & Dorf, 2012)

4. Verify or Pivot

In this phase the overall purpose is to make sure that the hypothesis have been turned into hard facts. There are some critical questions that could be asked in order to know if the business model is scalable, repeatable and profitable. The questions that can be analysed are:

- Is there a product/ market fit?
- Who are the customer and how do we reach them?
- Can we make money?

If the company is not convinced that they should proceed with this particular business idea, it is necessary to go back to phase 1 and start over again. Therefore the discovery process is an exhausting process and often requires several iterations. (Blank & Dorf, 2012)

3.4.2 Service innovation & Job mapping

“Current approaches to service improvement constrain innovation by focusing on service as the unit of analysis, rather than on the fundamental needs of the customer.” (Bettencourt et al., 2013)

In this step it is proposed that the firm should conduct all four phases of The Customer Discovery step. The motivation for working with hypothesis-driven testing is the challenge in, that even if trends and problems are known, it is hard to foresee how to best capture the value from these (Gunther McGrath, 2009). Therefore it is important to develop new services and business models in close relation to customers and users to fully understand their problems and needs (Drucker, 1985; Sawhney et al., 2004; Neely and Visnjic, 2011). To enable the execution of phase two (*test the problem hypothesis*) – the model suggest the firm to base the data collection and customer upon the theories of job-centric service innovation and job

mapping (Bettencourt et al., 2013; Bettencourt & Ulwick, 2009).

Job mapping and the job-centric approach are quite similar as the goal is to address the fundamental needs of the customers, including the jobs and outcomes the customers are trying to achieve. It is of great importance for firms to expand their focus beyond existing services and service capabilities and address the fundamental needs of their customers, this includes the jobs and outcomes the customers are trying to achieve. By shifting the question to focus on what the customer is trying to achieve, managers are better equipped to create value with the customer, and not just for the customer. Bettencourt et al., (2013) therefore present a four-step process for firms to guide job-centric service innovation, see figure 12.

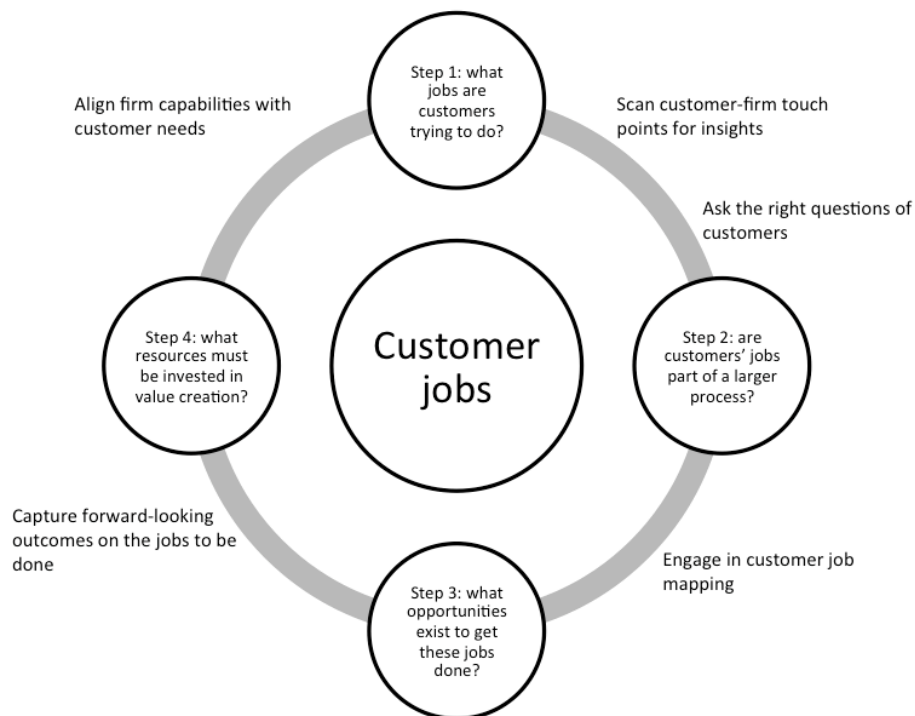


Figure 12 – Illustration of Bettencourt's job-centric approach

To be able to conduct the job-centric process a firm has to perform a job mapping to identify the different jobs that the customer is trying to get done. Job mapping differs from process mapping since the goal is to identify what customers are trying to get done at every step, not what they currently are doing. All jobs are processes and have a distinct beginning, middle, and end, and comprise a set of process steps along the way. The starting point for identifying innovation opportunities is to map

out, from the customer's perspective, the steps involved in executing a particular job. Once the steps are identified, a company can create value in a number of ways; by improving the execution of specific job steps, eliminating the need for particular inputs or outputs, removing an entire step from the responsibility of the customer, addressing an overlooked step, resequencing the steps, or enabling steps to be completed in new locations or at different times.

3.4.3 LEAN

Another perspective that is considered important when performing this step is the LEAN mind-set. The LEAN perspective takes its base in the 5 S's that stands for sorting, straightening, sweeping, standardizing and sustaining. The theory has its base in Hiroyuki Hirano in Japan who emphasised the importance of removal of unnecessary items to be performed before considering the layout and flow of a work place. (Knechtges, Bell, & Nagy, 2013) The theory also emphasis the standardisation as a tool to save time, even if there is only small amounts of time per study the aggregated impact will be large (Knechtges, Bell, & Nagy, 2013). Other aspects that are included in the LEAN perspective are overproduction, needless wait, unnecessary transports and incorrect processes (Liker, 2009). By looking for bottlenecks and other factors having a negative impact on the production flow, possible service opportunities could be identified during the data collection.

3.4.4 Summary step 3

- Perform phase 1 and state value proposition hypotheses.
- Conduct phase 2 and use the approaches of job mapping and the LEAN perspective when designing the data collection strategy in terms of interviews and workshops.
- Test the solution in phase 3, for example by arranging workshops with customers.
- Verify the solution in phase 4, focus on analysing numbers and how to reach the customer.

The Customer Development Model presented by Blank and Dorf (2012) combines the acquisition of customer insights with an iterative and incremental product/service development, which will ensure that the new business model will be profitable. By utilizing hypotheses, the firm can make assumptions about what can be a potential problem and what can be a potential value proposition that can be offered to the customers. By conducting this step the firm can test the assumptions, to design new value propositions and ensure that the customers really want what

the company design. Each step in the model is iterative, which is the major difference from traditional product development, it will take several iterations before getting it right. This will decrease the chances of failure since the problem already has been tested towards the customer several times before launching it. The customer feedback is crucial in this step and it is beneficial to focus on creating a good relationship with the customer to ensure that the customer is interested in providing valuable insights to facilitate the development of the new service offering. By using the job-centric approach, a firm can establish service innovation priorities that are consistent with its capabilities and technology know-how, rather than merely reacting to customers' ever-changing desires for the latest must-have feature or copying the actions of competitors (Bettencourt et al., 2013).

The success of this step is highly dependent on the quality of the results from Step 1 and 2. These steps is therefore considered as a main prerequisite, though step 3 is extremely important as it is here that the hypotheses are developed and turned into a real solution. To test the ideas and create or reject the hypothesis, it is essential to have continuous contact with customers in this step. This could be trough interviews or workshops that will allow customers to verify the problem and test the solution. To conclude, the method offers a structured approach to test and experiments for new service offerings in a real business context.

The results from applying this step on the case company can be found in chapter 6.

3.5 Step 4 – assessment of identified service opportunities

The final step of the process model makes an assessment of the new service offering. Even if the previous steps has ensured that the service is in line with the company's capabilities, resources and that the customers want it, the testing step can lead to the development of a service that might change the business model radically and imply great risks. This step therefore should ensure that:

- The new service offering's competitiveness compared to other actors' offerings.
- The new service will generate long-term profits.
- The service and modified business model is in line with the current strategy of the company.
- It will create value for customers.
- Associated risks will not have a significant negative impact on the existing business and customers.

Collis & Rukstad (2008) defines *the strategic sweet spot* of a company as where it meets customers' needs in a way that rivals are not able to, given the context in which it competes, see figure 13. In this step it is therefore important to look at competitors' strategies and predict how they might change in the future. The

creative part of developing strategy is finding the sweet spot that aligns the firm's capabilities with customer needs in a way that competitors cannot match given the changing external context (Collis & Rukstad, 2008).

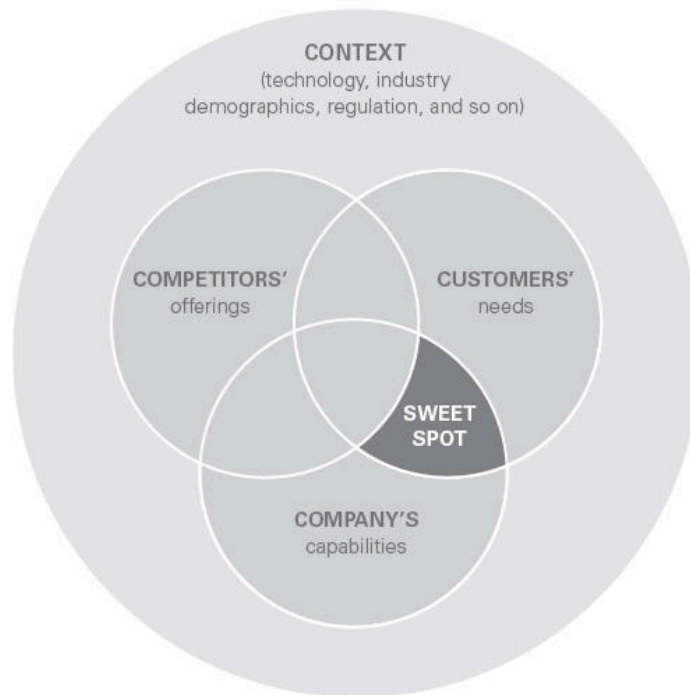


Figure 13 – Collis & Ruukstad's illustration of a strategic sweet spot

Sawhney et al., (2004) highlight that it is important to consider whether expansion through a service business model take the firm outside of its strategic intent, beyond the scope of its existing capabilities and resources. Consequently it is of interest to assess whether the developed service offering corresponds to the strategy of the organization. Continuing, it is of interest to analyse to what extent new resources and capabilities are needed and how they correlate to the existing ones. If the business model makes use of new resources and capabilities to a large extent it might hinder the firm's ability to perform.

3.5.1 Profiting from innovation

One known phenomenon in markets when it comes to innovation is that competitors and imitators may profit more from the innovation than the firm first to commercialize it. Teece (1986) presents a framework consisting of three elements that are of fundamental value in assessing a firm's ability to profit from innovation and determine who of the actors who wins from innovation: the innovator, follower firms or firms that have related capabilities that the innovator needs. The framework

consists of following elements (Teece, 1986):

- **Appropriability regimes** - refer to the external factors that have to be taken into consideration that influence the innovators opportunity to capture value from the innovation. External factors could be legal instrument consisting of patents, copyrights and trade secrets.
- **Dominant designs** – refer to that innovations experience different focuses depending on the era of development it experience. Once a dominant design emerges, competition shifts to price and away from design.
- **Complementary assets** - assets other than the actual sold products that give an advantage to the firm in capturing value. Examples are specialized manufacturing, distribution channels, complementary technologies, marketing etc. The ownership of specialized complementary assets is identified to be essential in who profit from innovation. Established firms, that experience technological shifts, are exposed to danger of losing significant market shares to new entrants if complementary assets become obsolete. (Teece, 1986)

3.5.2 Value creation for customers

Another important aspect is to guarantee that the new service offering will create value for customers. The Kano model is a model based on theory of attractive quality and developed to categorize the attributes of a product or service based on how well they are able to satisfy customer needs (Tan & Pawitra, 2001). The Kano model divides the customer need/quality attributes into three categories:

- **The must-be or basic needs** - these needs correspond to the basic requirements on a product and customers become dissatisfied when performance of the product attribute is low. However, if the product attributes are present or have sufficient performance, they do not bring satisfaction.
- **The one-dimensional or performance needs** - for these needs, customer satisfaction is a linear function of the product attribute - high attribute performance leads to high customer satisfaction.
- **Attractive needs** - regarding these needs, customer satisfactions increases super linearly with increasing attribute performance. Though, there is not a corresponding satisfaction decrease with a decrease in attribute performance. These attributes are neither required nor expected by customers. (Tan & Pawitra, 2001; Paraschivescu & COTÎRLEȚ, 2012)

With the Kano model in mind it become clear that it is not enough to merely satisfy customers by meeting their basic- and performance needs. To build a higher value level the customer need attractive quality to satisfy their "emotional needs", therefore the supplier must offer something extra and unexpected. (Tan & Pawitra, 2001)

3.5.3 Managing risks

To move towards becoming more service oriented as a firm can be both difficult and risky. To improve the chances of succeeding managers must be well prepared, which means being conscious of the involved risks. There are three major categories of risk:

- **Capability risk** – the internal perspective, companies need to continually question whether expansion into new service areas will take them outside the logical scope of their capabilities and organizational culture.
- **Market risk** – the customer perspective. It is important to analyse whether there are a possibility that customers may not adopt the service or that the service may take so long to reach critical mass of customer adoption that the company can't afford to continue to fund it.
- **Financial risk** – the business model perspective. There is a risk that some service growth opportunities offer attractive revenues but not profits. (Sawhney et al., 2004)

3.5.4 Step 4 summary

- Secure that the new service offering will differentiate the company on the market - find a strategic sweet spot.
- Ensure that the new service offering will generate profits.
- Confirm that the offer will create additional value for customers by focusing on "over-satisfying" customers.
- Analyse possible risks.

To conclude, the move towards becoming more service oriented as a firm can be both difficult and risky. To improve the chances of succeeding managers should therefore be well prepared and aware of the greatest risks. The firm should focus on over-satisfying customers by offering a service that offer something extra and unexpected. The Customer Development Model enables this perspective since it put great focus on understanding what the customer really want. Firms have to consider

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the aspects of appropriability regimes and specialized complementary assets that are present within the company. These factors are seen as important to acknowledge as they can have major impact on the potential of the new service offering's ability to capture value.

Further, the effect that a new service offering and modified business model has on existing customers need to be assessed in order to discover if it presents a risk of affecting the current customer base. For example there might be complications associated with large customers to the company if they experience that a new business model has a negative impact on their business.

To succeed with the execution of this step, it is important to talk to the employees who are involved in the implementation of the service and within the actual business area. This as they could provide important information and insights regarding risks and possible challenges with the launch of the service.

The results from applying this step on the case company can be found in chapter 7.

3.6 Summary The Process Model

The first step, *internal mapping*, is based on RBV and Leonard-Barton's (1992) definition of core capabilities further developed by Hedman and Kalling (2002) and Sun (2013) regarding knowledge sharing among firms. The Business Model Canvas is used since it provides a structured tool for assessing and mapping the business model (Osterwalder, 2004). All these perspectives are considered important to have in mind as this model is developed for established firms. This step is followed by, *the external mapping step*, where the customers and their processes are observed with the aim to identify value gaps. Important in this step is to use a structured approach for how to approach service development, together with The Value Proportion Canvas which Osterwalder suggest to use in combination with The Business Model Canvas. The first steps are easily executed and based on well-known methods, and therefore mostly a prerequisite for performing step 3. The third step, *hypothesis testing & verification*, follows the structure of the first step in The Customer Development Method, to make sure that the customers really want the suggested service. In this step a job mapping is performed to understand what the customer really want to achieve, further the LEAN-perspective is used as perspective to identify process improvements. The final step, *assessment of identified service opportunities*, consider if the new service will create additional value for customers, increase profits for the firm and evaluate associated risks.

As can be seen in the illustration of the model, quality is an element that is essential to consider during all steps of the process model. In order to create a good total customer perception, an understanding of the quality dimensions and what dimensions that affect the quality most is necessary (Grönroos, 1982). Quality can

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both be to search for quality deficiencies when interviewing customers, as well as when developing a new service focusing on understanding what quality aspects that are important to the customer. Characteristics of the service industry is that firms do not offer a service, they offer prerequisites for a customer process to take place, and in this customer process the customer is present as a co-producer and creates the outcome of the service. In order to create a good total customer perception, an understanding of the quality dimensions and what dimensions that affect the quality most is necessary. Different authors have different ideas about what quality dimensions that exist and what dimensions that is most important for services. Garvin's traditional product quality dimensions are presented, though more can be found when scanning the service quality literature. Zeithaml et al., (1990) argue that the most important quality factor is trust/dependability. In order to improve the trust/reliability factor the service companies' employees and the service providers have a crucial role. If the customer experiences a service provider as competent and as a provider of great knowledge combined with a willingness to serve, it normally generates trust. (Zeithaml et al., 1990)

Since this study aims at testing and developing a model, the model will be revised during the testing on the case company. The different parts in the model are considered appropriate, as described in the method chapter, based on a comprehensive review of the existing service literature. The model's structure and elements will have to be tested, modified and verified to be able to conclude the applicability.

The model will be tested on the case company that will be further described in chapter 4, and then the results and empirical data will be presented in chapter 5-7.

4 Case company – Hilti Svenska AB

Hilti is a toolmaker, founded in Liechtenstein in 1941 by Martin Hilti. The company has developed from being a small family company to being world leading within development, manufacturing and marketing of high quality products within the construction industry. Martin Hilti Family Trust is the sole shareholder, which gives the opportunity to the company's independence, stability and continuity. The company provides products, systems and service offerings to the global construction industry. The headquarters of the Hilti Group are located in Schaan in the Principality of Liechtenstein. Hilti manufactures drilling, mounting, and fastening equipment and supplies for customers in the mining, solar energy, and construction and building maintenance industries worldwide. Hilti's products include drilling and demolition tools, direct and screw fastening systems, diamond coring and cutting tools, anchoring and positioning systems, fire stop and foam products, measuring systems and cutting and sanding systems. (Hilti AB, 2014)

"We passionately create enthusiastic customers and build a better future!"
(Corporate goal and mission statement, Hilti, 2014)

Today Hilti has 22.000 employees and is present in more than 120 countries globally, 60 percentages of its sales is in Europe (Hilti AB, 2014). The 270 dedicated employees in Sweden are employed in the areas of sales, technical support, marketing and customer support. Hilti Sweden AB provides their products and services to professional customers in the field of construction, installation, energy, steel, metal and industry. Hilti is traditionally recognized for tools such as rotary hammers, breakers, screw drivers and hammer drills. What is not as well known is that Hilti also provides consumables in terms of building materials and suspensions to installation systems, which constitutes a large share of sales. The main product line within this field is anchoring systems, screws, pipe hanging systems (channels, brackets, pipe rings), as well as passive fire prevention products. (Hilti AB, 2014)

5 Applying the process model on Hilti

To answer the question regarding the applicability of the process model, the model was applied on the case company Hilti Svenska AB.

5.1 Chapter outline

The focus of the application of the model will be on step 3, as the main contribution of the study is the design of a systematic methodology for performing the hypothesis testing and verification. Therefore the main effort of the application process was put on this step, as well as the major part of empirical data was collected in this step. Step 1, 2 and 4 are important, though as there already exist established methods for how to conduct these steps, they are considered as a prerequisite and step 4 as an assessment. The presentation of the results from testing the model will follow the design of the four steps of the process model, see figure 14. The application resulted in great amounts of empirical data. Only some parts of this data are presented in the actual report, to keep the focus on the testing methodology. The reader can find additional empirical data in appendixes 3-12, in the end of the report.

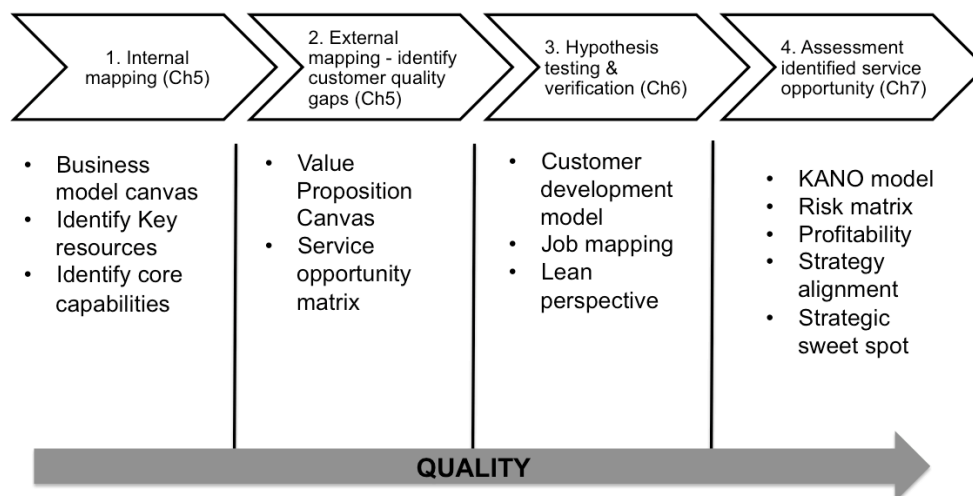


Figure 14 – The Develop Process Model

The results from applying step 1 and 2 are presented in chapter 5, and extra material can be found in appendix 3 and 4. Step 3 will be thoroughly described in chapter 6, where additional material can be found in appendixes 5-11. Finally step 4 is presented in chapter 7, where a more comprehensive assessment can be found in appendix 12.

5.2 Step 1 - Internal mapping

As the model takes its base in RBV, the purpose of this step is to describe Hilti's value creation based on the process model. To conduct this, key resources of the case company are mapped and thereafter, internal capabilities based on these resources are identified. These will then serve as the base in step 2 where the focus is on identifying relevant service opportunities based on Hilti's value creation. To narrow down the direction of the study, following scope was defined by the authors based on guidance from supervisors at Hilti:

Investigate the possibility for Hilti to start charge customers for existing services provided free of charge by Hilti today, or try to identify a new service to expand the current service offering towards customers in the construction industry

The internal mapping was performed based on data collection activities such as interviews, observation and the study of Hilti documents and company reports. A summary of the most interesting insights regarding internal conditions, attitudes towards service development and a description of Hilti's business model based on The BMC, is found in appendix 3.

5.2.1 Capabilities & Key Resources

Based on the mapping of internal conditions and the business model, Hilti's existing key resources and core capabilities related to the defined scope of the study was identified and is presented below.

Key Resources

A description and a motivation to why these resources are considered key resources when developing services will be presented below. Only the resources considered important to the set scope will be described.

The Hilti Brand

"The Hilti brand is as well-known in the construction industry as Coca Cola is in the soda industry" – Strategic Director, Hilti Svenska AB

Based on interviews with customers and industry experts, it can be concluded that the Hilti brand is well known within the construction industry. The company has since the beginning kept a strong focus on the brand and it has always been considered as a driver for growth. According to customers Hilti is associated with trustworthiness and has a reputation of providing high quality and products alongside with services included in the price. This is a resource that provides

possibilities to be leveraged on and considered very important when developing new services within same or new areas.

Employees

As Hilti Svenska AB is a market organisation, where 70 percentage of the employees work with sales, the company have a well-established sales organisation. The organisation mainly consist of account managers (AMs) working with directs sales, though there are also key account managers (KAMs) and regional directors for each sales area. Hilti also employs what they call field engineers. This is considered a valuable resource, since the new service has to be exposed to customers through the sales organisation.

Industry Knowledge

Hilti has been operating within the construction industry since 1941 and has long experience from providing both products and services to its customers. This has resulted in significant knowledge about the industry and its characteristics, which enables Hilti to follow the industry development and spot new trends early.

Customer knowledge

Hilti has succeeded to build a very strong relationship with many customers, because of factors such as the brand, the long history within the industry together with the direct customer contact. This has resulted in an enormous customer database followed by solid customer knowledge. Though, according to Hilti employees, the relationship to a certain segment of customers is stronger than to others. This tight customer relationship can be a valuable resource when launching a new service.

Product development

Due to the direct contact with customers and the controlled supply chain, Hilti can identify customer needs quickly and develop solutions for this. The product development competence can be relevant for building service offers indirectly since services can be based on physical products.

The supply chain

The supply chain give the company total control over products and customer interactions which can be used to create fast and flexible customer solutions. Further it simplifies the launch of new products and services.

Core Capabilities

“We got the whole supply chain, the product, the technical competence, we are in place at the construction site and at all levels” – Field Engineer, Hilti Svenska AB

After focusing on key resources it is as described in the framework important to identify capabilities related to the scope, which are considered as core capabilities if they differentiate the company strategically (Leonard-Barton, 1992).

The capability to create customer adapted products and solutions through the combination of a range of different technologies and knowledge resources.

Hilti has extensive knowledge resources within areas such as product application and customer understanding. In combination with its technological resources, focusing on expertise regarding anchoring systems, hammer drills, fire stops and installation systems, they are able to create products of high quality that are well suited for practical application.

The capability to maintain a customer and service minded approach through extensive customer understanding and ability to build customer relations

Hilti's long history within the construction industry has enabled them to build a solid knowledge bank related to customer behaviour, purchasing patterns, history and preferences. Further, the focus on building customer relations through an extensive sales force and the great focus on creating a value larger than the product value alone creates the foundation for this capability.

The capability to attract motivated employees and creation of a good reputation within the industry by having strong competence and experience within brand management

Hilti's brand is well known within the industry, interviewed customers is well aware of it and associates it with top quality products. During the creation of this report Hilti was also awarded with first price in the category of best places to work in Sweden. This capability is considered important when developing a new service as a strong brand can help the company to gain trustworthiness on the market when launching a new solution.

The capability to create fast and flexible solutions and products based on customer feedback by controlling the whole supply chain

Today there is no competitor to Hilti in the market that has control of the entire supply chain, which makes this a differentiating capability. The decision not to sell Hilti products through any retailers also provides Hilti with the valuable direct

contact with customers. AMs that have everyday contact with customers report to their Region Manager who is on a strategic level of the company. The short way between the customer and the strategic level of the company is as well a reason and resource that enable this capability.

5.2.2 Summary step 1

This step in the process model has created a basic understanding of how Hilti creates value and an understanding of prevailing internal conditions. As the model is based on Barney's theories saying that the basis for a competitive advantage lies primarily in the bundling of resources, this step is considered as a precondition to be able to develop a service that actually can be implemented, are in line with corporate strategy and that actually can create a competitive advantage. The attitude towards service development within Hilti is positive – upper management support and employees see it as a necessity to stay competitive and differentiated. Cornerstones in the business model are that Hilti does not have any key partners as well as the importance of the employees and the brand. The capability to control the total supply chain is considered core as it differentiates Hilti strategically in the market. A basic understanding is now established and the next step is to narrow the scope further down and begin to map the external environment to identify value gaps where additional value could be created for customers by offering a new service.

5.3 Step 2 – external mapping, identification of value gaps/service opportunities

The aim with this step was to with the case company's resources and capabilities identified, begin to look outside the company and create an understanding of the customers and the construction industry. This to enable identification of value gaps - if there are areas where additional value could be created for customers, there could be a possibility for offering a new service. To do this in a structured way, The Service Opportunity Matrix was used. Three questions that assist when identifying new service opportunities are stated below and all three of them are based on the logic of activities derived from the matrix.

- *Is it possible to start charging for existing services in their current shape? (no effect on existing activities)*
- *Is it possible to modify or expand the existing services in order to start charging for them? (reconfiguring activities)*
- *Is it possible to create entirely new services that could be charged for, either stand-alone services or services based around existing products? (add new activities)*

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These questions were kept in mind when conducting the initial external mapping. The external mapping was executed by interviewing Hilti employees, industry experts and customers. The interviews consisted of open questions regarding overall processes, daily challenges and quality. To summarise the insights from the interviews, The Value Proposition Canvas was used to in a structured way illustrate customer “pains” not covered by Hilti’s current value proposition, see figure 15. For a more detailed presentation of the data collected in this step as well as the identified problem hypotheses, see appendix 4.

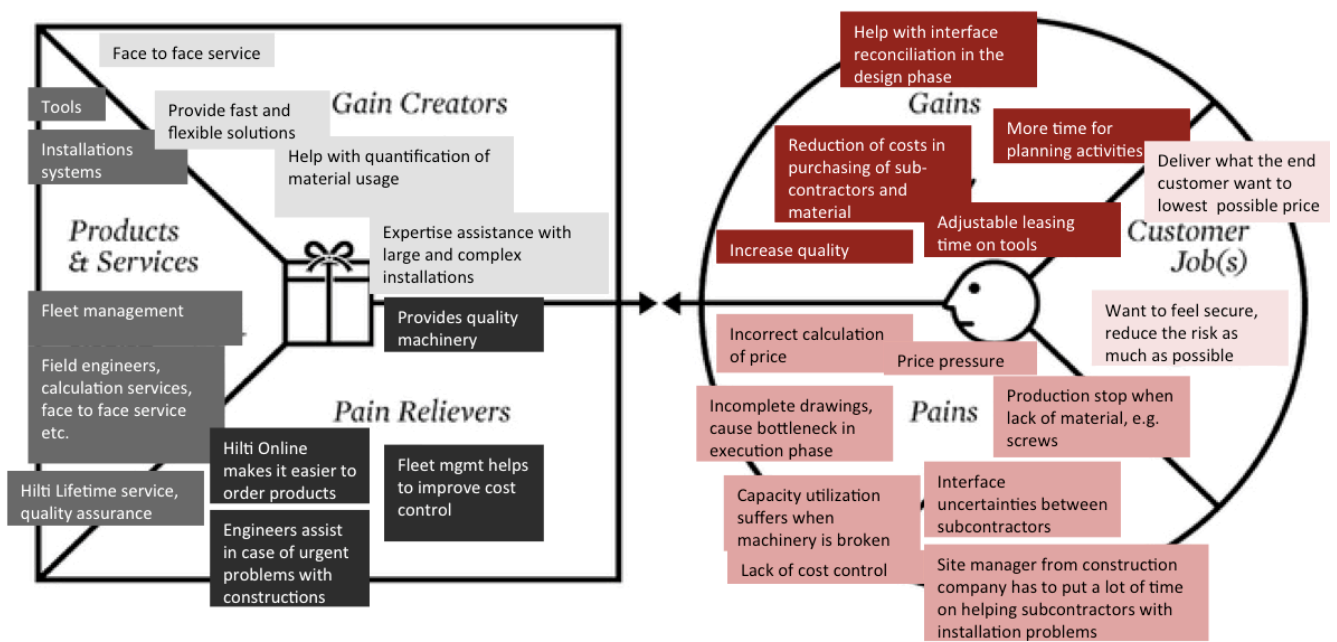


Figure 15 – The Value Proposition Canvas filled in by the authors

5.3.1 Summary step 2

Since the next step in the model begins with stating hypotheses regarding possible service opportunities, hypotheses were derived from the interviews performed in this step. The insights presented in The VPC is a summary and not all pain & gains identified are illustrated, only the ones considered most interesting for the scope of the study. The identified hypotheses has emerged as the authors experience that the customers have pains not being relieved by Hilti’s current product and services. Therefore the next step is to, in step 3, evaluate which one of the hypotheses that should be further investigated.

6 Step 3 - Testing & Verification

In this step the model aims to ensure that the customer insights are turned into an actual service offer. To remind the reader of the four phases the process is presented in figure 16. With the internal mapping and initial external mapping in mind, this section will present the process and results from performing each of the four phases. Blank's Model is mainly used as a framework and overall guideline in the process. This as the four phases is considered as general, not exactly describing how to practically execute each phase, especially the phases concerning how to test the problem and the solution. Therefore the authors has developed and tried own methodologies and strategies in these phases. The empirical data needed to make the reader get a basic understanding of the testing process is provided. Though continuously through the chapter the reader is referred to appendixes in case of further interest in some results.

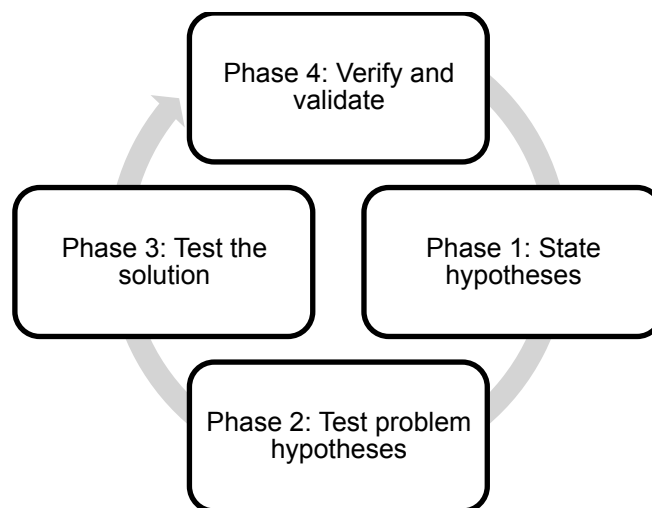


Figure 16 – The fours phases of the customer discovery step, illustration by Blank & Dorf

6.1 Phase 1 – state hypotheses

In this phase the purpose is to list all the hypotheses derived from performing the external mapping in step two. The value proposition hypotheses are influenced by the customer insights identified during the interviews and by the three “service opportunity questions” presented in the beginning of step 2.

The hypotheses states what the authors think are true about the customer when it comes to general problems in their activities and hypotheses regarding where a new or modified service could create customer value. The hypotheses are presented

below, a short description and motivation behind each hypothesis can be found in appendix 5.

Hypotheses related to modifying or expanding existing services in order to start charging for them

- *It would be possible to expand the current service offered by Field Engineers and start charging for it, e.g. in terms of taking a more active part in making detailed drawings*
- *There exist uncertainties among subcontractors in terms of how to install Hilti products and systems*
- *It would be possible to expand or modify the existing fleet management offer in any way to make it more customer adapted*

Hypotheses related to creating new stand-alone services

- *It would be possible for Hilti to offer a service that would make the distribution of consumables (screws etc.) more effective making customers willing to pay for it*
- *It would create value for customers with a service that gave them the opportunity to receive loaning tools*
- *Incomplete and incorrect drawings are generally a problem throughout the construction process*
- *Undefined interfaces between different contractors is a problem in construction processes in general, especially concerning interfaces between installation sub contractors and the construction company*

6.1.1 Summary phase 1

This phase was considered straightforward as it was easy to list the problem hypotheses due to the data collected in step 2. All hypotheses were listed and then described based on the collected data. This created an overview of the hypotheses and a basic understanding of each hypothesis. It was realised that it would be time consuming to investigate all of the listed hypotheses and therefore the number of hypotheses need to be narrowed down in the next phase.

6.2 Phase 2 – Test problem hypotheses

The purpose of the second phase is to turn the formulated hypotheses into facts or modify them in an iterative manner as new insights occur. This phase is performed stepwise and to make it easier for the reader to follow the work process, the performed activities with associated section number, are illustrated in figure 17.

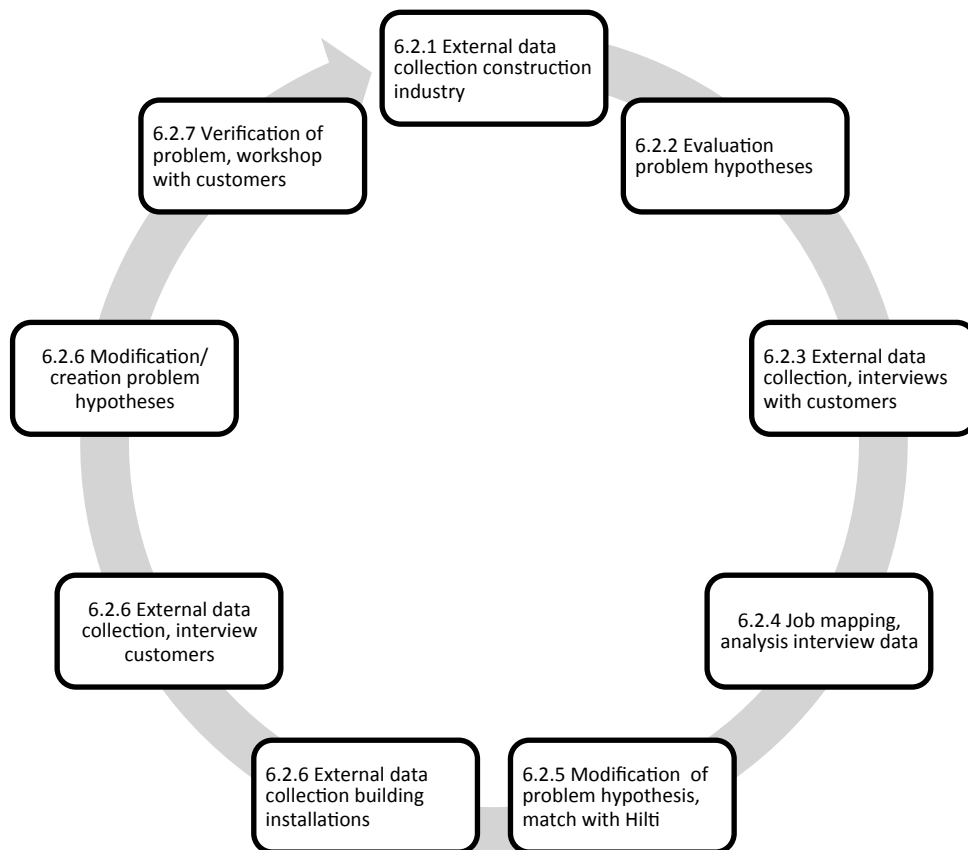


Figure 17 – Activities performed in phase 2, illustration by the authors

The entire phase begins with a description of construction industry as the authors discovered that all of the hypotheses couldn't be thoroughly investigated due to time limitations. To be able to evaluate and test the value proposition hypotheses related to the set scope this phase therefore starts with presenting findings related to the construction industry, the construction process and overall trends and challenges within the industry. The most interesting and relevant hypothesis will then be chosen and further tested in an iterative process that focus on looking past the data, test the hypothesis on the customer, understand the customer and gain insight of what they really want.

6.2.1 External data collection - The construction industry

It was considered necessary to understand the ecosystem where Hilti operates to be able to evaluate which of the hypotheses that would be most value adding for customers, and that could be turned into a real service. To provide the reader with a basic understanding, the most necessary information about the construction industry is presented below. A more extensive description of presented parts, as well as identified trends within the industry, can be found in appendix 6.

The two most common contract forms in a construction project

Design-bid-build contract form is when the client/purchaser is responsible for the design and function of the construction project, see figure 18. The contractor is responsible for the execution of the project, in this form the contractor therefore have limited flexibility.

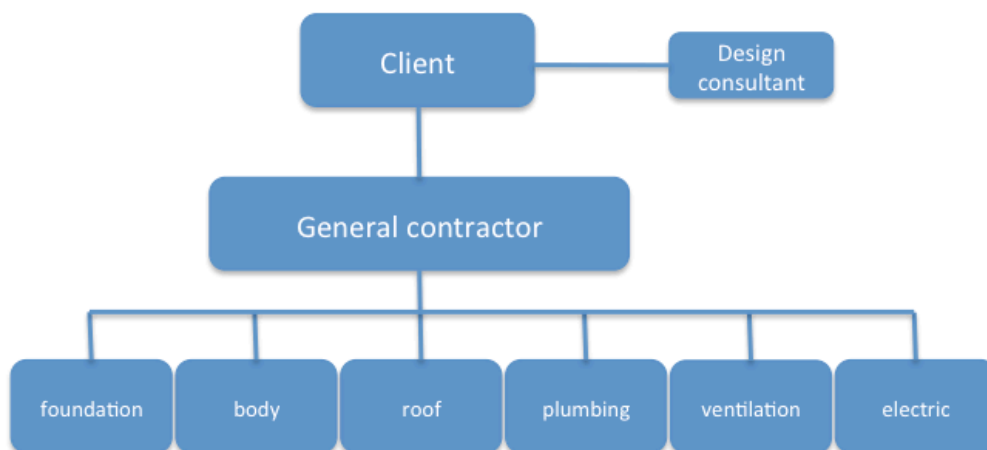


Figure 18 – Project organisation in a Design-bid-build project

In *The Design-build* form the client leave the responsibility for the total design to the construction company, and generally only provide them with guidelines in terms on functionalities, see figure 19. The construction company then hire their own design consultants and sub contractors. As the contractor is responsible for most of the design he has more flexibility than in the Design-bid-build form.

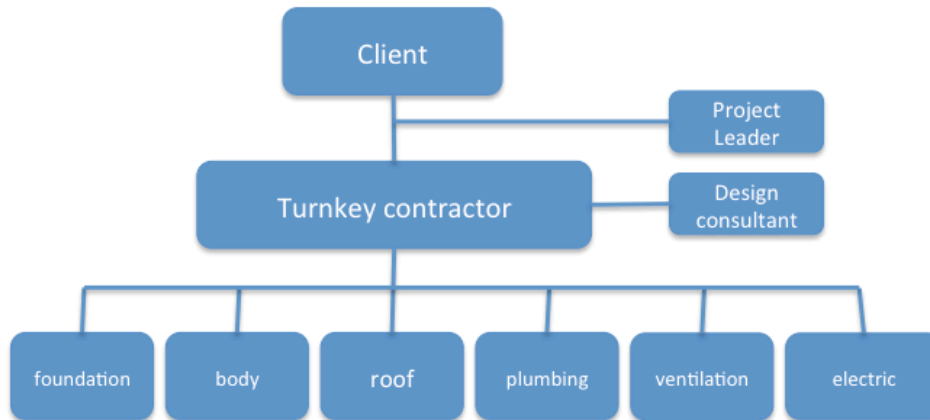


Figure 19 – Project organisation in a Design-build project

Identified industry characteristics

Temporary project organisations - the construction industry differs from other industries since all construction projects are temporary and have unique characteristics.

Complex project organisations with different contracting forms - a construction project can be organised in different ways and there exist several different contract forms on the market, though the two most common are the “design-bid-build” and the “design-build” contracts forms.

Many involved actors - another characteristic of the industry is that the construction projects usually have a great number of involved actors. The project organisations consist of different stages where each stage has actors specialised in a certain areas. The main actors are; the Client who orders the project, the Contractor that usually is a construction company, the Design consultant that is hired either buy the client or the contractor and finally the sub contractors who have different field of competences such as for example plumbing, ventilation or electricity and are hired by the Client or the Contractor.

The construction process

Beginning to create an understanding of the construction industry it was early understood that a construction project has many different phases, see figure 20.

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When the actual construction and execution starts the project usually have been planned for many years. Below an overview of the main phases in the construction process is visualized.

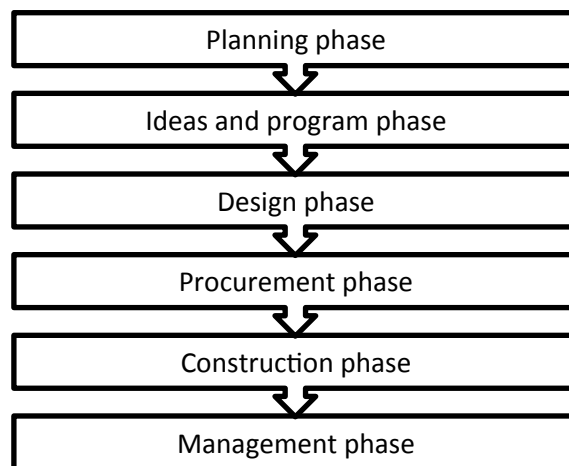


Figure 20 – the different phases of a construction project

6.2.2 Evaluation of hypotheses

As an internal mapping of Hilti and an initial external mapping of customers and the industry has been conducted, it was time to conduct further interviews with customers to be able to modify and reject some of the hypotheses. The areas that the authors wanted to discuss with the customers and Hilti employees were; working processes, bottlenecks, productivity and quality. After a few initial interviews had been carried out and the authors had gained basic understanding for the customer as well as the construction industry, further discussion regarding the hypotheses followed. This was performed with the purpose to identify the most interesting- and urgent problem, as well as identify hypotheses that should be modified or rejected. The results are presented below and the structure is that each of the listed hypotheses are discussed, and then rejected or considered as interesting to investigate further.

Hypotheses related to modifying or expanding existing services in order to start charging for them

- *It would be possible to expand the current service of field engineers and start charging for it, e.g. in terms of taking a more active part in making detailed drawings*

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This created the idea that Hilti field engineers could be consulted in an earlier stage of the design process and assist with detailed descriptions on the drawings, which would bring value to customers as it would make the mounting work easier. This was discussed with Hilti employees that explained that Hilti never draw anything in the construction drawings, they only give advices. They don't look at the attachments for an entire system, but only do point operations in case of problems. It would be too expensive for the construction- or installation companies to pay Hilti for doing detailed drawings, as this could be very time-consuming. According to both Hilti field engineers and people at the installation company, it is unnecessary to make detailed drawings as the fitters usually have great experience and there exist instructions and guidelines. When talking to the installation company it was verified that it sometimes is problematic and time consuming to solve difficulties on the spot due to incomplete drawings, since they don't have the financial resources to pay for more detailed drawings. The field engineers stated that occasionally it happens that Hilti makes detailed drawings, however in these cases the client has requested it and it usually concerns special and complex buildings such as hospitals. It is in Hilti's interest to get these kinds of jobs as they only draw and provide their own products and systems. Regarding this hypothesis there is a clear problem as it has a negative impact on the production efficiency when problems due to incomplete drawings occur. This along with the possibility for Hilti to earn money lead us to the insight that this is an interesting area that could be further investigated.

- *There exist uncertainties among subcontractors in terms of how to install Hilti products and systems*

One idea was that Hilti could create customer value by offering a mounting service together with the selling of products and solutions. Though when discussing this idea with Hilti employees they stated that this is not in line with Hilti's current resources and capabilities. Hilti would need to double the number of employees in the organisation to be able to offer mounting services. Therefore this hypothesis was rejected.

- *It would be possible to expand or modify the fleet management offer in any way to make it more customer adapted*

This hypothesis considered the possibility to modify the current fleet management offer and make it more flexible and adapted to each individual customer. The possibility was discussed with Hilti employees and they agreed that customers would appreciate it. However there would be a problem – Hilti would then begin to compete with their own customers in terms of the machinery and tool leasing firms. Currently there are leasing firms on the market, such as *Skanska Maskin* and *Ramirent* that is specialised in leasing tools to construction sites. Further they are big and important customers to Hilti as they lease out Hilti tools. If Hilti would modify their fleet management offer and reduce the leasing time, which currently is fixed to

two years, their offer would be similar to the leasing firms' and create a new competitive situation. This hypothesis is considered having a negative impact on Hilti's current business and customers, and was therefore rejected.

Hypotheses related to creating new stand-alone services

- *It would be possible for Hilti to offer a service that would make the distribution of consumables (screws etc) more effective which would make customers willing to pay for it*

This hypothesis was grounded in the thought of offering a service that would prevent carpenters from the actual need to drive to the store in person, when realising that they need new consumption materials. The idea was discussed with Hilti employees as well as customers. This showed that Hilti currently has an offer to big customers at large construction sites, where they place a "mini Hilti shop" at the site and also takes responsibility for the refill. When talking to smaller customers they didn't seem to consider this as a big problem since they purchase large batches continuously, based on the phase of the construction project. The authors realized that there probably is improvement and efficiency potential in this area based on a lean perspective. Though as other hypotheses were considered more interesting and to have greater value adding potential, this hypothesis was rejected.

- *It would create value for customers with a service that gave them the opportunity to receive loaning tools*

This hypothesis is based on a clear statement from the installation company where they distinctly stated that it would be value adding for their productivity to be able to loan tools in case of broken tools. Further the employees at the Hilti store mentioned that many customers arrive to the store and are stressed since they don't have any tools until they receive the broken ones from reparation. When discussing this problem with Hilti it was revealed that they had tried this some years ago, though it resulted in great amounts of additional administrative work. As this already was tried this hypothesis was rejected.

- *Incomplete and incorrect drawings are generally a problem throughout the construction process*

Almost all interviewed people highlight the problem with incomplete drawings. It is understood that it's a well-known problem, everybody is aware of it, though everybody states that it is just the way it is in the construction industry. The problem originates from time and cost pressure. Usually when a construction company receives a new job they have to begin the construction process immediately as the time frame is short. Therefore the construction work begins before the design phase is finished and thereby the drawings remain incomplete. The cost pressure results in,

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that nobody wants to or have the ability to pay for more detailed drawings. There is also an opinion among the installation and construction companies that it doesn't matter if you pay the design consultant for additional hours as the drawings still will be incorrect or incomplete. The design consultants are located in their offices and are not aware of the actual conditions and circumstances at the construction site, which lead to that many of the drawings don't correspond to reality, causing trouble at the site for the mounting workers. Hilti's core business is construction tools, though installation systems and technical advices within this area is a growing part of the business. As this is such a well-known problem it is clear that it would bring value to all involved actors within the construction process to offer a service that would improve the correctness of the drawings, leading us to the conclusion that this is an interesting area to investigate further.

- *Undefined interfaces between different contractors is a problem in construction processes in general, especially concerning interfaces between installation subcontractors and the construction company*

This hypothesis is linked to previous described problem, as this also are a problem of incorrect and incomplete drawings, though from another perspective. There is a great cost pressure on the construction company, created since there can be 8-10 construction companies providing tenders for the same job. This lead to that the construction company in turn has to focus on finding sub-contractors with the lowest price, to win the bidding process. Usually it is cheaper to buy each discipline from different actors, than to buy the same disciplines from one actor. When there are many sub-contractors involved, together with the time pressure, the interactions between the sub-contractors as well as the interaction with the construction company becomes affected. This is especially a problem between the installation-intensive areas such as electric, ventilation and plumbing. During the initial interview with a construction company the area manager mentioned that a problem is that they have a stationed site manager on each construction site and much of his time is consumed by assisting installation companies. This as the different installation firms discover on the spot that the drawings are incorrect and that there are undefined interfaces – then they turn to the construction company's site manager for help. The construction company mean that it isn't really their responsibility to help the installation companies as they pay them for taking the entire responsibility for their installation area. In this area there is a clear problem, the site manager is under time pressure and want the process to run effectively and therefore help the sub-contractors, as there are no one else who can do it. Since Hilti has a strong brand within the industry and has long experience and knowledge from construction projects, it is possible that they could do something to decrease this problem. This hypothesis should therefore be further investigated.

Summary evaluating hypotheses

After analysing the identified value proposition hypotheses based on the initial data collection – three of them were concluded to be interesting considering Hilti's resources and capabilities together with insights from the industry.

- *It would be possible to expand the current service of field engineers and start charging for it, e.g. in terms of taking a more active part in making detailed drawings*
- *Incomplete and incorrect drawings are generally a problem throughout the construction process*
- *Undefined interfaces between different contractors are a problem in construction processes in general, especially concerning interfaces between installation sub contractors and the construction company*

These hypotheses were considered to have common characteristics and based upon the same problem areas of drawings and the collaboration between involved actors. The collaboration between the construction company and sub-contractors was considered interesting as many of the identified problems originates from difficulties in coordinating the work and responsibilities between involved actors. The hypotheses related to drawings and incomplete interactions were therefore considered as most interesting, and the authors decided to continue this iterative phase by investigating the interaction between contractor and sub-contractor, with the aim to identify possible value creation gaps. The three hypotheses were merged into one:

- *The problematic interaction between contractor and sub contractors within installation lead to incorrect drawings and interfaces, reducing quality and the productivity within construction projects*

By looking at both sides individually and identify quality- and value gaps, the authors hoped to identify joint problems. The identified gaps could then be matched against Hilti's business model to develop a value adding service. Therefore the rest of this step will have an expanded focus on the relationship between construction companies and installation companies.

6.2.3 External data collection – interviews with construction and installation companies

To study the interaction between main contractor and installation companies, interviews were performed with construction - and installation companies. The construction firms that were interviewed were local actors with big market shares in

the south of Sweden. The purpose was to identify the fundamental needs of the customers as well as the jobs and outcomes they are trying to achieve, for a list of the interviewed firms and company info see appendix 7.

In this data collection phase the authors focused on asking open questions regarding the customer's different jobs and on the interaction with subcontractors, and vice versa. A summary of the main insights considered important to motivate the identified problem area is presented in appendix 8, divided into different categories.

6.2.4 Job mapping and analysis of collected interview data

When it comes to describing the problems in the construction process the construction side as well as the installations side had similar views on what is costly, time consuming and a barrier for good collaboration. While conducting the interviews, the main jobs each actor are putting great efforts on achieving were mapped, see summary in table 1.

Table 1 – Identified customer jobs

Construction company's jobs	Installation company's jobs
<ul style="list-style-type: none">• Purchasing of sub-contractors and tender evaluation• Project planning and coordination of sub-contractors• The actual construction of the building project• Discussions and meetings with clients to guarantee deliverable• Verification and control of completed project	<ul style="list-style-type: none">• Installation and mounting of solution/system• Preparation and calculation of offers• Discussions and meetings with main contractor to guarantee deliverable• Planning of activities related to their solution/system

The table show that both actors have similar jobs, though the construction company has greater focus on project planning and assurance of the project delivery. Both actors spend much time on preparing and evaluating offers as well as meetings and other coordination activities. When scanning the interview results it become clear that both actors' jobs are part of a larger process of assuring desired outcomes – outcomes that are same for both the construction and the installations company, see figure 21.

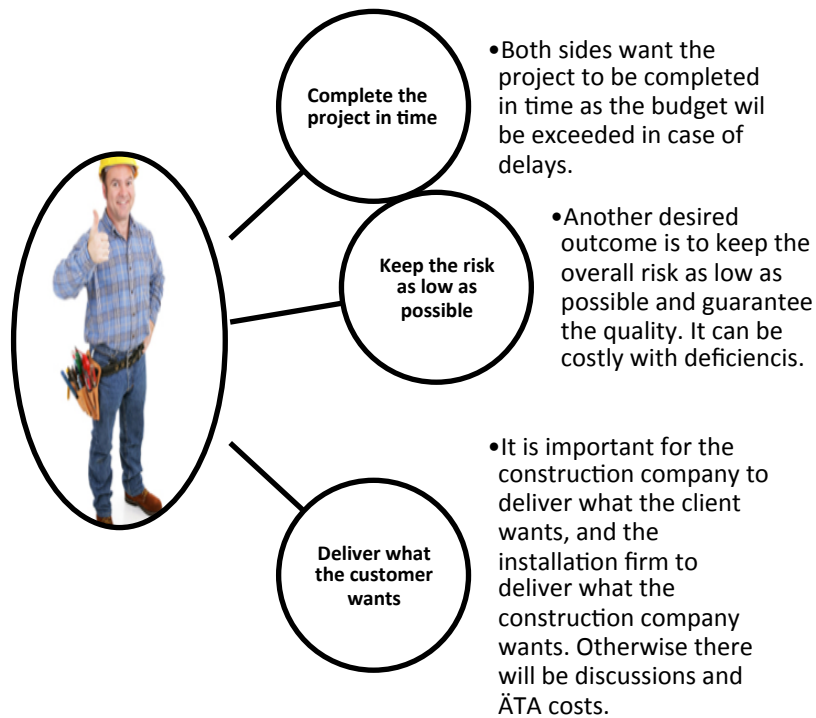


Figure 21– Desired outcomes of customers (construction & installation companies)

Further the process and jobs of the actors could be analysed from a lean and quality perspective by looking at where bottlenecks and quality deficiencies occur. The interview data clearly imply that bad planning and short time frames result in carelessness in the design phase causing collisions and additional work in terms of “ÄTA” costs later in the process. This is especially a problem within the area of installation coordination as it is here that most collisions occur. Another problem causing an inefficient process is the uncertainty among sub-contractors and main contractor regarding who has the responsibility for coordination of installations, leading to production stops and emergency solutions. A weighted analysis of the experienced problems, jobs, outcomes and quality deficiencies several, show that several factors point at installation coordination a problematic area, see summary of factors in figure 22.

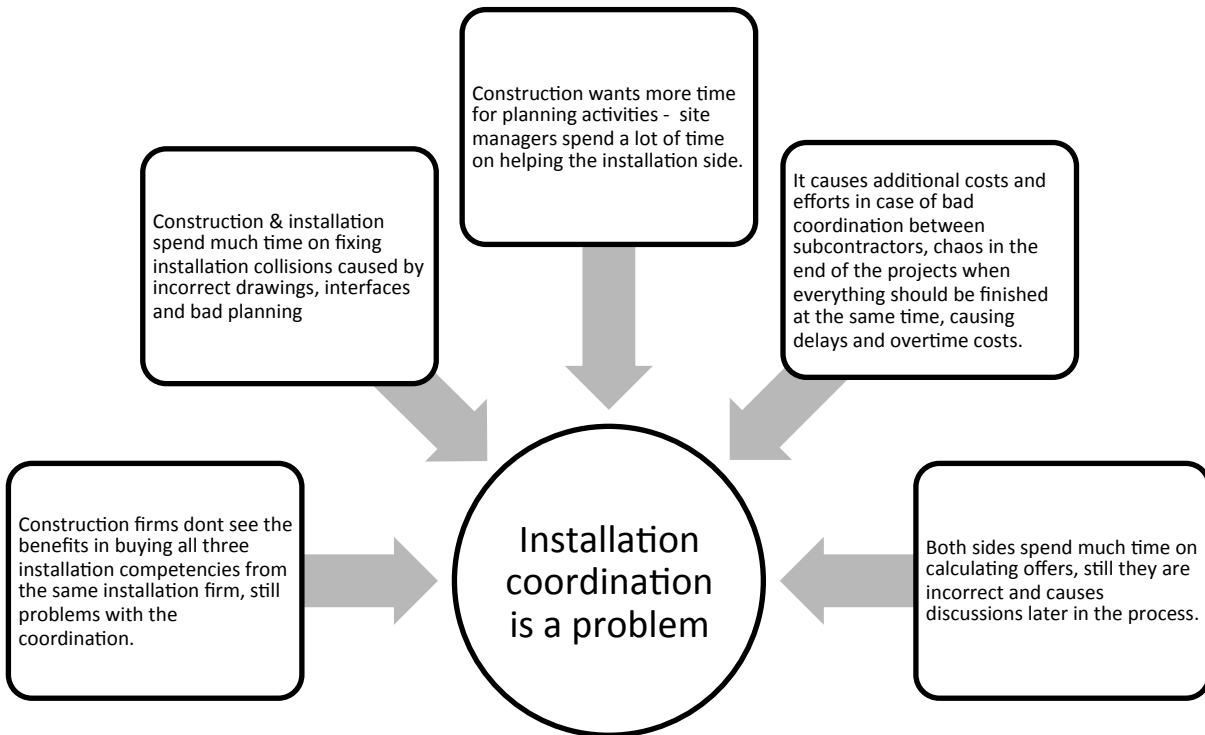


Figure 22– Factors implying installation coordination as a problematic area

6.2.5 Modification of problem hypothesis and suitability with Hilti's current business model

To summarise the insights received from the extensive data collection, the authors modified the previously stated problem hypothesis.

- *The problematic interaction between contractor and sub contractors could be improved by offering a service facilitating the coordination of installations*

One part of Hilti's product portfolio is fastening and installations systems and they have Field Engineers working with providing advices within this area. The authors considered this as an interesting area where Hilti could have the possibility to find a new service opportunity. Further resources that could be useful are their strong brand and customer knowledge, supporting their trustworthiness when launching a new service in the industry. To ensure that the hypothesis would be suitable and

interesting for Hilti, the authors checked with Hilti Account Managers, working with installation companies, if they thought that it would be reasonable for Hilti to take a more active role within installation coordination. As they were positive and started to brainstorm different possibilities the authors felt that this would be an interesting area to investigate further. Both Account Managers meant that one possibility could be that Hilti assisted installation companies with coordination of installation suspensions for entire installation systems. With this new hypothesis the authors decided to look further into the area of building installations, to gain deeper insights of the actual problem and how Hilti could design a value adding service within this area.

6.2.6 External data collection – Building installation systems

The authors conducted a second data collection within the industry, this time focused on the area of installations. Interviews were performed with the same actors as in the previous phase, though with new questions regarding their knowledge and processes regarding installations.

According to interviewed companies within the industry, there is a clear trend in that buildings are getting increasingly complex in terms of installation systems. It is derived from both the fact that the technology is becoming more advanced as well as the amount of installations increase. Previously the major part of a construction project consisted of the actual construction part where the construction company played the leading part, though this is changing. Today installations approximately stands for 50 % of the total turnover in a construction project, reducing the role of the construction companies in favour of the installation companies. To cope with this change the importance for contractors to have knowledge in the field of installations is growing. This is important to gain bargaining power and understand different bids received from sub contractors. Further it is important when choosing sub contractors, as they have to understand what they are buying.

Based on the interviews, the authors can see a clear demand after employees competent within the field of installation coordination. One of the interviewed construction firms was looking for to hire an installation coordinator, and they were not alone. When discovering that there was a position/role called installation coordinator on the market, the authors decided to investigate the meaning of this role. For a detailed description of the role of installation coordinators and the reason for hiring them, see appendix 9.

When summarising the definitions of an installation coordinator(IC) it is clear that it is a relatively new position on the market as the definitions differs and there are no fixed perception among actor in the industry, regarding responsibilities. There are different perceptions regarding where in the process the IC should be most active. Some is of the opinion that it mainly is in the design phase, while other emphasizes

activity during the execution. Though most definitions mean that the IC should work with examination of drawings in the design phase, to ensure the functionality of the overall solution. Further the majority agree on that the IC should work with coordination and decide work orders during execution. A general sense is that the IC should be present during the entire construction process and through exchange of expertise improve collaboration and quality. Further characteristics preferred in an installation coordinator is leader ability in the sense that he/she should be able to take quick decisions and make people follow the time schedule. An important factor, highlighted by many, is the importance of that the IC has solid experience from working with both electricity, plumbing and ventilation installations in buildings – it is important to have the overall understanding.

To conclude the role as IC is new on the market, and different actors have different perceptions of what the IC should be responsible for and contribute with during the project. The role is difficult in the sense that it demands cross-functional competence and the knowledge within each field need to be comprehensive, otherwise it is not very useful. Another important insight is that there seems to be an obvious gap in the market, as the companies need the competence of ICs, though they are scarce and hard to find on the market. Investigating the area of installation coordination lead to that the authors created a more specified problem hypotheses, presented in the next section.

6.2.7 Verification of problem description – workshop with construction and installation companies

After investigating the area of installation coordination, the authors decided to conduct a workshop with representatives from both the installation side and the construction side. The overall topic of the workshop was: *“How to improve the interaction between construction companies and installations companies with focus on coordination of installations?”*. The aim with the workshop was to verify drawn problem hypotheses regarding installation coordination. To verify these conclusions the authors wanted to create a forum where both sides could discuss and verify the problems together.

The hypotheses that the authors wanted to verify at the workshop are presented in table 2.

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Table 2 – problem hypotheses verified at workshop

Problem hypotheses workshop	
➤	The coordination of installations are a problem for both sides
➤	Problems with coordination of installations depends on collaboration difficulties between the different actors
➤	Problems with installations of coordination lead to poor flow efficiency within the construction process - employees from both sides has to spend time on the wrong things
➤	Boundary/interaction lists don't solve all problems related to coordination of installations
➤	A comprehensive installation coordination is not only required in complex construction projects
➤	Installation coordination will be facilitated if the construction company by plumbing, ventilation and electricity from the same sub-contractor

The findings and insights from discussing each hypothesis with participants at the workshop are presented in appendix 10.

Main insights from the workshop and summary of problem identification

The workshop had a positive outcome and all problem hypotheses were verified. It became clear that the problem is bad drawings and lack of coordination and planning of installation activities during execution. Following insights were considered as most important:

- Both sides were surprisingly consistent and had the same view of most experienced problems.
- Both sides lack a person that is responsible for the coordination of installations and is a part of the project during all phases.

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- It is a problem that the installations company does not have any fixed management on the construction site.
- Better coordination of installations would increase the quality.
- There is a need for more people working with installation coordination on the market.

6.2.8 Summary phase 2

The result of performing phase 2 was a well-substantiated problem identification that was thoroughly verified.

- *The problematic interaction between contractor and sub contractors could be improved by offering a service facilitating the coordination of installations*

The next challenge was to develop a service that Hilti could offer to reduce this problem. The first idea was that Hilti could take the role as installation coordinator, though there would be a problem, as Hilti currently not have any knowledge within the area of electricity. Hilti are mainly specialised on installation and fixings of pipes, and still many customers see them only as tool providers. However, one possibility could be to break down the identified problem into smaller parts, and maybe Hilti could offer a service relieving this problem.

Regarding the methodology of phase 2 it was an iterative process based on rejecting hypotheses and verifying the chosen problem hypothesis, see illustration of the activities performed in phase 2 in figure 23. This process was developed by the authors as it was discovered that the evaluation of hypotheses had to be done parallel with the collection and mapping of the external environment, making the phase time consuming and resulting in great amounts of empirical data. Further the phase was complemented with activities such as the workshop and further interviews to assure the verification of the problem hypotheses.

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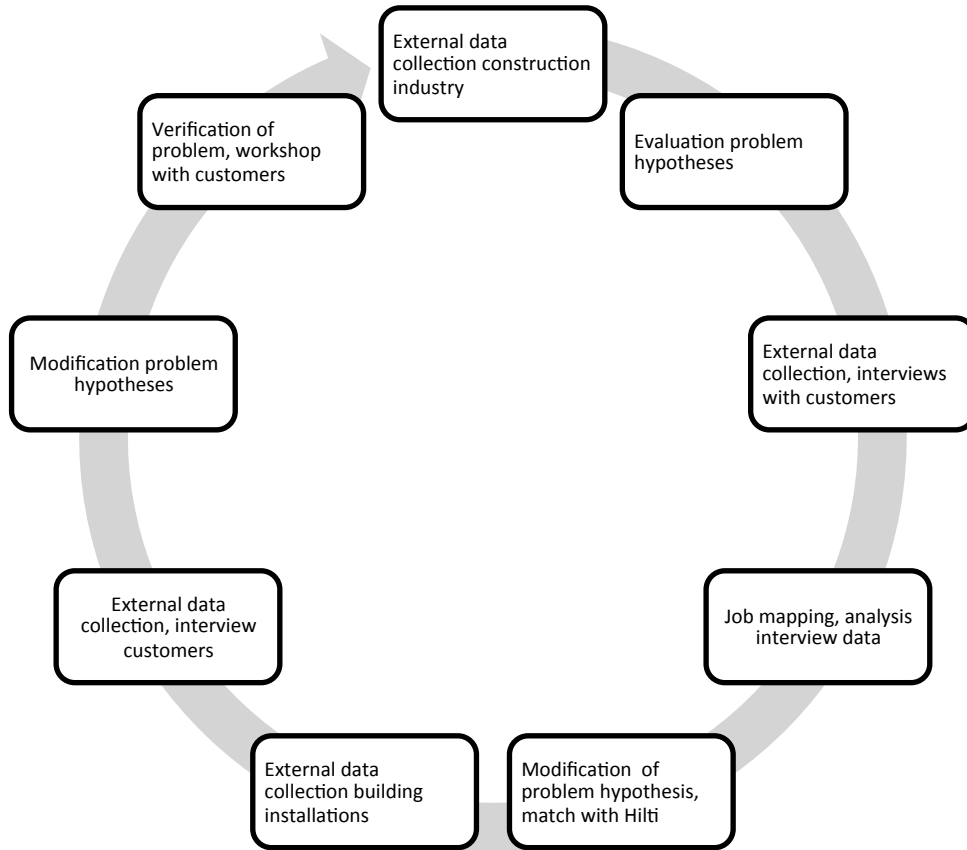


Figure 23 – Activities performed in phase 2

6.3 Phase 3 - Test the solution hypothesis

To verify and develop the service proposal the authors decided to arrange an additional workshop with Hilti employees. By presenting the identified problem, the goal was to confirm if it would be realistic for Hilti to offer a service regarding installation coordination, or to brainstorm and come up with a service facilitating a smaller part of the problem.

6.3.1 Test of the solution on Hilti - Workshop

The hypotheses that was presented during the workshop was:

- *The problematic interaction between contractor and sub contractors could be improved by offering a service facilitating the coordination of installations, Hilti could improve this by taking the role as installation coordinator*

This proposition was rejected due to the following reasons:

- Hilti have competence within plumbing and ventilation but not as much regarding electricity. From the interviews it was clear that the IC need genuine competence in all three fields.
- It was explained by Hilti employees that it would be too costly to invest in the knowledge needed and therefore it was considered unrealistic.

The next step in the workshop was to go through the different steps of the construction process and based on the perceived customer problems in each phase, brainstorm and create a service offering that could create value for customers.

Another solution then was worked out, though about a service not directly connected to coordination of installations. The service was connected to the problem identified among installations firms in the execution phase, concerning that their local site managers have no time for planning and other coordinating activities. Currently the site/team managers spend much time on:

- Unpacking delivered material
- Ordering material
- Distributing material on site

It could therefore be value adding to offer a service where Hilti assist with orders, comes to the construction site and unpack the material and further ensure that the material will be on the site when needed and on the right spot. This would reduce the time the managers and fitters have to spend on ordering, unpacking and search

for material on the construction site. For a further description of the proposed logistic service solution see appendix 11.

6.3.2 Test of the solution on customers – interviews

To test the solution and get input on how the service could be modified to create even more value for the customer, phone interviews were conducted with fitters and project leaders at installation companies.

Time consumption - unpacking and ordering of material

It was verified that the leading installers or sometimes the fitters, spend approximately:

- 1-3 hours per day on unpacking material
- ½ hour per day on activities related to ordering of material.
- To move around the material is also expressed at time consuming

“Today the situation at many construction sites is that when material delivery arrive to the construction site, I have to drop all my current work tasks. This means I have to run over the site just to sign a single paper and maybe it is just regarding a small package of bolts. I find this very frustrating.” - Leading installer, Lunds Rörmontering AB

According to the interviews this time preferably could be spent on more value adding activities such as planning and coordination. Further the respondents claimed that the leading installer get increasingly more tasks as installations are getting more complex, therefore their time is of great value.

Willingness to pay

There were mixed opinions regarding the will to pay for the service – some stated that it would be value adding for them and some stated that they rather do it on their own. What was general agreement among the asked actors was that if there were two actors with the same price and one offering the service they would have chosen the one providing the service as they see it as extra value. When the project is under time pressure the value of the service increase according to the installation firms as then each hour that the workers can perform work is highly valuable due to time limits. The time that is released from unpacking activities was in this case what was considered valuable. When asking installation companies for an estimation of what could be worth paying for the service the estimated amount was no more than 350 SEK per hour.

Hilti as service supplier – pros and cons

Arguments for Hilti as a service supplier was that Hilti has the allowance to enter the construction sites, which the delivering companies such as Schenker is lacking. Another argument was that fixing and installation suspensions are quite standardized products, making it easy to calculate and forecast the amount of material needed before the execution phase starts. This makes Hilti consumables well suited for this logistic service, since when ordering the customer order large amounts of each product, from a small product range. Ahlsell, another retailer of installation fittings and suspensions, would have difficulties in delivering this service since when ordering from them, the customer is offered a broader range of products and usually orders a fewer amount of each product. One clear opinion from the interviews is therefore that it should be a producer that offers this service and not a retailer.

Objection from some of the interviewed team leaders was that it would be an unnecessary service as the work on the construction site constantly is changing and moving –therefore it would be to time consuming to update the Hilti employee on where to put the deliveries. This was discussed during interviews and some stated that in many projects it is impossible to put the products in the “right place”, instead it would be more realistic that the supplier put it at one “collection point” centrally located at the construction site.

Benefits with the service

A clear benefit that a majority of the respondents agreed on was that all time that they can gain by someone else doing their work is of great value. Further the installation companies stated that it would be of great value to have a stock of material on the site so the production process can flow without interruption. Further the logistic service would be valuable since it would detect when the last piece of a certain component is taken from the inventory, avoiding interruptions in the process. Some expressed that the solution would work the best if the delivery was in containers to reduce numbers of components. Another insight was that the service mainly would be needed on bigger projects were the deliveries of material come daily and in large amounts.

6.3.3 Modification of solution based on insights from customers

The modification of the service that is proposed after performing the interviews is that the Hilti employee should unpack the material to a strategic spot at the site, instead of distributing it so specific locations. This as the construction sites are dynamic and the workers shift location randomly. During the interviews it was clear that the service would create greatest value in large projects.

6.3.4 Summary phase 3

From the testing of the solution it can be concluded that the service is realistic and possible with regards to the current business model of Hilti, based on insights from the workshop with Hilti. It is value adding for customers as it would reduce the time their team-leaders have to spend on transporting, unpacking and ordering of material. However there is an uncertainty in if the customers actually are willing to pay for the proposed service.

Noteworthy is that the first idea of Hilti taking the role as installation coordinator was rejected in the initial testing of the solution, highlighting the importance of performing this phase. It was realised that this service wouldn't suit Hilti's business model as they currently don't have the necessary resources and competence needed to take the role as IC. The idea was rejected, and the new idea of a service in terms of a logistic solution was developed together with Hilti employees. This service was considered in line with Hilti's current resources and there was an identified need among customers. Overall considerably time was spent on confirming the problem of installation coordination in phase 2, though phase 3 lead to the conclusion that Hilti couldn't offer a service directly connected to relieving this problem. However the problem verification can be of value for Hilti strategically, as it may lead to the insight that Hilti could relive the customer from a problem being a part of the greater problem of installation coordination.

The methodology of the phase was that the solution first was tested on Hilti and then on customers, this ensured that the solution was compatible with Hilti resources as well as enabled modifications based on customer insights.

6.4 Phase 4 - Verify or Pivot

In the final phase the purpose is to analyse the following questions:

- Is there a product/ market fit?
- Who are the customer and how do we reach them?
- Can we make money?

By answering these questions the qualitative data will be turned into facts, proving that the developed service will be sustainable and profitable on the market.

6.4.1 Product/market fit

By the thorough collection of empirical data, the authors became aware of the fact that many of the involved people in a construction project spend their time on the wrong things. The problem of installation coordination originates from lack of competence and lack of time – nobody has the time to examine drawings and identify problems in an early stage of a project. This in turn lead to that problems are discovered during the execution phase, and then team leaders from the installation side has to spend time on solving these problems. Further, this lead to that they can't spend as much time on planning activities leading to chaotic project organisations and delays in the process. Based on performed interviews, with both installation and construction companies, it can also be concluded that the overall production flow could be improved from a lean perspective. Fitters and team leaders spend time on looking for material and solving emergency problems, causing bottlenecks within the process. This problem emerges since several actors are involved in the construction project, leading to a large flow of incoming material to the construction site, ordered separately by the different actors. The fact that many of the interviewees experienced that they spend a lot of time on these activities and that the suppliers could improve their logistic solutions opens up for the possibility to deliver an innovative and modern logistic solution that is better adapted towards their needs and conditions. A logistic solution in terms of a service, ensuring the access to the needed material on the right time and on the right spot, are therefore needed on the market as it would lead to a more efficient production flow. It can be concluded that there is a need for this service on the market and it would be value adding for the customer.

There is however competitors on this market and there are other suppliers offering logistic solutions, though as mentioned earlier it depends on the suppliers range of products. This solution suits well with Hilti products as they are quite standardized and ordered in large volumes, which makes it very important to emphasize that this service is adapted for Hilti products.

6.4.2 Who are the customer and how are they reached

Hilti's existing customers and extensive sales organisation should be taken advantage of when promoting this new service. Using Hilti's existing sales channels such as Account Managers and Field Engineers to sell the logistic service at the same time as they are promoting and selling Hilti products will create synergies. The sales representatives will continue to work with the same customers segments. The customer segments that should be targeted are the installation and construction firms, depending on the project form and the responsibilities of the actors. Today when selling, the Hilti sales representatives are processing both on a higher level in terms of work management and project leaders, and on a lower level in terms of team leaders and fitters. To sell this service, it will however be increasingly important to influence and process on the higher level as is it this people who has the mandate to purchase it. The main arguments when selling the service should be that the customer will save time and costs for storage of materials.

There is one challenge with selling the service, if trying to sell it to the main contractor in a design-build project – it has to be clear that the sub contractors are on the track and are willing to use it. Therefore the Hilti sales representatives both have to market the service against construction companies and sub contractors in terms of installation companies. Further, the service will mainly be profitable in larger project with a certain amounts of ordered consumption material, the marketing activities therefore should be focused on larger projects.

6.4.3 Can we make money

As the focus of the study is on developing a model and not the result, the focus on the financial part is kept on an overall level. This section will estimate the financials generally and are based on assumptions, drawn from data received from Hilti Account Managers and interviewed customers;

- In a large construction project the installation company puts one material order a day
- In general this order takes 30 minutes
- The unpacking of material takes 1 hour a day
- The average time of a construction project is 1 year
- Generally a team leader from the construction side costs 400 SEK/hour

Time savings customer (1year): $1.5 \text{ hour} * 5 \text{ days} * 52 \text{ weeks} = 390 \text{ hours}$

Cost saving: $390 \text{ hours} * 400 = \mathbf{156\ 000 \text{ SEK}}$

Preliminary the logistic service will result in a cost saving of 156 000 SEK for the installation company due to time savings. Based on interviews the authors estimate that on average the customers are willing to pay half of this amount for the service, namely 75 000 SEK.

Thank you Services!

Regarding Hilti's part there will be some costs associated with the launch of the service, though considered as quite low since the service doesn't demand so many additional resources. The existing sales force consisting of Account Managers and Field Engineers, already present at the construction site, can do the marketing. Further there is a possibility, discussed later in step 4 that Hilti doesn't have to hire additional employees as they can use the people working at the Hilti Center for the unpacking activities. Considering these facts it is concluded that there are possibilities for Hilti to earn money, this since the customers is willing to pay an amount greater than the actual costs for Hilti.

6.4.4 Summary phase 4

This final phase was kept quite short and concise as some of these parts will be further evaluated in step 4 of the process model. However it was concluded that there is a market for the product, customers are willing to pay for it and there are possibilities for Hilti to earn money. The phase was easy to conduct as much of the needed data was received in the previous phases.

7 Step 4 - Assessment of identified service solution

This is the fourth and final step of the developed process model. The previous process steps have focused on Hilti's resources and capabilities together with an initial external mapping to discover customer value gaps. Further the hypotheses derived from this have been tested in an iterative process resulting in a developed service proposal. To finalise the entire process the last step intends to assess the potential for the proposed service offer to succeed related to the company's situation. This was performed by evaluating the service offer's potential to generate profits, effects and consequences for resources and capabilities, implications for current business and customers and lastly risks associated with extending the business model. For a detailed description of the assessment of each area, see appendix 12.

Based on the assessment of the service solution it can be concluded that the service has the possibility to be turned into a profitable service considering Hilti's current situation on the market. The service is protected by complementary assets in terms of the sales organisation and brand – ensuring that Hilti as innovator and not followers will profit from the innovation. Further the service leverages upon existing resources and capabilities, reducing the need for costly investments in new resources and the risk for taking the company outside their logical scope. The service is not considered to have a negative impact on existing customers and business, on the contrary it is believed to strengthen Hilti's relationships with customers and result in synergies and reduced cost for the sales organisation. The financial and market risk is considered as the highest risks connected to the launch, highlighting the need for a transparent value creation that easily could be showed to the customers.

8 Analysis

“The purpose of the study is to analyse and investigate how, a company that operates in an industrial context, can expand their service offering, and thereby increase competitiveness and profits at current and potential customers.”

The purpose of the study is repeated above, and this will be the guideline throughout the analysis. Because the main contribution of this report will be a process model and methodology to follow when developing services, the analysis will focus on evaluating the applicability of the model, and not the generated result in terms of an actual service. By testing the model on the case company and their customers, the authors got a clear perception of the applicability and user friendliness of each step of the model. The analysis below, will evaluate the different steps one by one, though with a greater focus on step 3 as this is considered as the most important step.

8.1 Step one – internal assessment

As RBV states that a sustained competitive advantage is achieved by exploiting internal rather than external factors, the first step in the developed process model used BMC as a tool for mapping the internal conditions. The BMC was found useful in order to fulfil this purpose as the collected company information easily could be fitted into the nine blocks of the canvas. Further in the work process, the BMC worked as a reference point when modifying and rejecting hypotheses. Some criticism to the usage of BMC in this model is that the different parts in the BMC were considered of different relevance. The mapping of the cost structure as well as revenue streams doesn't seem to be as important as the value proposition, when developing a new service, and therefore this information wasn't used later in the process.

The BMC is considered as a suitable tool for describing the firm's value creation. The left-hand side of the canvas is leveraged upon in order to identify new opportunities that are in line with the company's strategy. The structured approach helped us to get a perception of the internal capabilities at Hilti initially and thereby assess the possibilities and the constraints for the rest of the study. The internal assessment was essential in our study since we were able to discard a few of our initial ideas and gain a few additional ideas based on internal interviews and reading internal material. We argue that an understanding of the entire business model is a prerequisite for continuing the process and be able to state problem hypotheses regarding service opportunities. The main advantage with the BMC therefore is considered to be that it worked as a tool to identify key resources and core capabilities.

To fill in the BMC we had to perform internal interviews, observations and study internal documents. This was quite time consuming since we didn't have any knowledge of the company or the industry when beginning the application of the model. If the firm developing a service conducts this process, this will be a quick and non-complex process. For a large established company that wants to develop services within a certain scope, this step is easy to conduct and works as a prerequisite for the rest of the process as the internal assessment phase identifies constraints and possibilities.

8.2 Step two – initial external assessment

In the second step The Service Opportunity Matrix and VPC was useful as a structured way to think of service innovation and to identify value gaps/service opportunities. To fill in the VPC a number of interviews were performed. The VPC helped to systematically identify needs (pains) and wishes (gains) of the customer and discover what was missing in Hilti's current value proposition. The three aspects on how and where a service can emerge were helpful when performing the initial interviews. Further it helped us to structure the insights gained from the VPC, and create the first value proposition hypotheses. It was considered as a complement to the BMC as it focuses on the customer- and value proposition block. Therefore it can guide the company in which blocks to focus on and what data that is needed.

Overall this step was considered as simple to conduct. If a firm should conduct this step they should choose customers from different customer segments, ask questions based on the VPC and then develop hypotheses inspired by The Service Opportunity Matrix. To summarise step 2 worked well as it gave us a natural path over to step 3 and the most important contribution of this step was that it provided the authors with the data needed to create problem hypotheses in the next step.

8.3 Step three – hypothesis testing & verification

Step 1 and 2 were considered important and necessary to be able to conduct step 3, though it was early experienced that step 3 was the most important step as it was in this step the problem should be verified and tested. When designing this step we decided to use the first step of The Customer Development Model. The step consisting of four phases, which were considered to provide a good structure enabling the execution, see figure 24. Below the phases, especially phase 2 and 3 will be further analysed.

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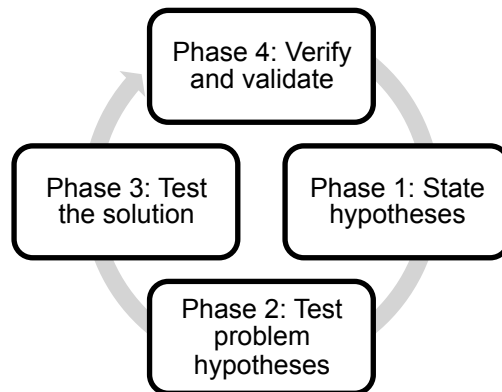


Figure 24 – The four phases of the customer discovery step, illustration by Blank & Dorf

8.3.1 Phase 2

The first phase was simple to conduct due to data collected in step 2 - here we only stated and further described the hypotheses derived from previous step. However when beginning to execute phase 2 where the problem hypotheses should be tested in an iterative manner, the authors experienced some challenges. It was realised that the number of problem hypotheses had to be reduced due to time limitations. Further there were challenges in knowing the amount of iterations that should be performed and how we should ensure the match between customer needs and current resources at Hilti. We therefore concluded that the four phases provide a good structure, though phase 2 had to be concretized with specific activities and a systematic methodology to be able to apply the model in a real business context, see illustration in figure 25.

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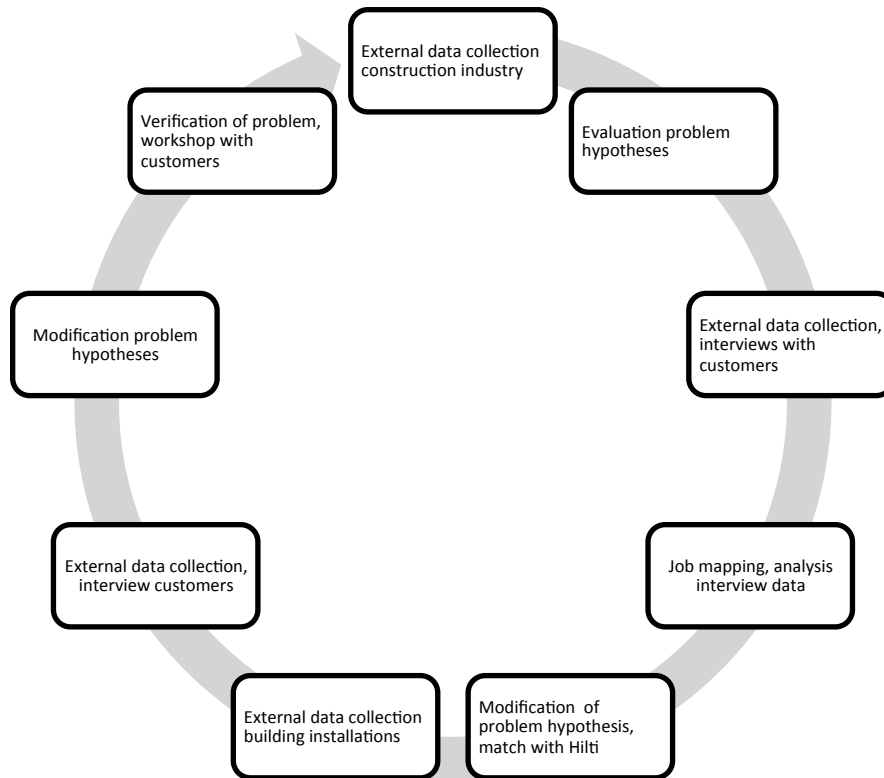


Figure 25 – Activities performed in phase 2 of step 3, illustration by the authors

First we realised that we had to narrow down and evaluate the problem hypotheses stated in phase 1. This was due to time limitations and to ensure that the most relevant hypotheses were chosen and the non relevant rejected. We therefore began the problem testing with a mapping of the construction industry, involved actors, the construction process and trends within the industry. This step was considered necessary, as we had to create an accurate understanding of the environment and the customer to be able to draw conclusions regarding which hypotheses that were relevant. Based on the insights from the first data collection, we could perform the first round of hypotheses evaluation and make well-motivated rejections and modifications of the hypotheses.

With a modified hypothesis as result we understood that we had to verify and investigate this hypothesis further by interviewing customers. We also realised that we needed a methodology to follow or a perspective to draw upon when interviewing customers and searching for service opportunities. Therefore this phase was complemented with the methodology job mapping and the LEAN perspective. The LEAN-perspective and the job mapping worked satisfactory as a base in the

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interviews, and facilitated the analysis of the collected data. The job mapping and the LEAN-perspective highlight the importance of focusing on the customer's processes to identify service opportunities. This led to a challenge in ensuring that the identified problem could be facilitated by a service based on Hilti's resources and capabilities. This was mainly a problem due to us being external parts with limited insights of Hilti and their resources. If a person that has extensive experience from the industry and the firm in question, would test the process model, this phase probably would have run quicker. The problem was handled by adding an activity where we had a brief discussion with relevant Hilti employees regarding the match with Hilti resources and capabilities, which led to a modified problem hypothesis.

After that a second data collection within the industry was performed, though with a new focus due to the modified hypothesis. Based on insights and answers from the first round of interviews, we did a second round of interviews inspired by the Delphi technique to ensure consensus. This technique worked well and fulfilled its purpose of verifying hypothesis along the way. It provided the authors with the security of knowing that what was experienced, as a problem was a general opinion in the industry.

To thoroughly verify that both interviewed customer segments agreed on the identified problem hypothesis, a workshop where both segments were participating was arranged. The structure of the workshop was that we presented our view of the current status in the construction industry, and after that we systematically presented each problem hypothesis and let the participants discuss it and give their individual opinions. The outcome of the workshop was considered satisfying as we were assured of the credibility of the problem identification, and that it was a problem for both installation and construction companies. By having both segments present at the workshop, the discussion was accelerated and more dynamic, providing new insights not received during the individual interviews.

When evaluating the execution of phase 2 it can be concluded that this step was extensive and large amounts of customer and industry data were needed. Though with the developed work methodology and added activities, the applicability increased and the model had the ability to generate correct data. We thoroughly documented and evaluated all collected data and insights, which were considered as beneficial since it made the work process more structured and important data wasn't lost. However, the time spent on the second phase could have been reduced by scheduling the workshop earlier in the process and reducing the number of individual interviews with customers. It was realized afterwards that it would have been enough with two or three interviews with each customer segment, instead of six. By conducting the workshop earlier consensus could have been reached quicker, providing more time for testing of the solution in phase 3.

8.3.2 Phase 3

The same challenge experienced in phase 2, in the phase being too general, was also experienced in phase 3. We therefore added two activities to this phase; a workshop with Hilti employees and several phone interviews with customers.

As we experienced a challenge in knowing if the developed service solution would be in line with Hilti resources and capabilities, we decided to arrange a workshop with relevant Hilti employees. Here we presented the identified and verified problem hypotheses as well as the proposed service. This activity was important as it was realised that the service offer had to be rejected due to it being unrealistic for Hilti to implement. However we were prepared for this possibility, and in the second part of the workshop we systematically investigated the different parts of the construction process to identify service opportunities related to the problem identification, though with a smaller scope. This had a positive outcome and a new service offer was developed together with the Hilti employees, and now we could be sure of alignment with Hilti's resources. Because the service was developed without direct involvement from customers, though considered to relieve a problem identified earlier in the process, we had to perform further customer interviews to verify the interest of the solution. This highlights the challenge in balancing customer insights with Hilti resources. At first we identified a problem and a service offer that couldn't be matched by Hilti. After that we developed a service based on Hilti resources and then we weren't sure of if the customers wanted it. In step 3 it is therefore of great importance to constantly switch between the company and the customer perspective.

Another challenge throughout step 3 was how to distribute the time between the four different phases. If we had performed the process again we would have spent less time on phase 2 and more on phase 3, this to enable a more extensive testing of the solution. The time spent in phase 1 and 4 should be minor, as the purpose mainly is to state hypothesis and assess the service. The testing of problem hypotheses as well as testing of the solution demanded extensive work and the main focus of the entire process model should be put on these phases. Further, The Customer Development Model was considered as a good tool for turning the problem hypotheses into an actual service, when complemented with proposed activities. It drives the service development forward in a logical way, considering both the customer and the external environment.

8.4 Step four – assessment of identified service opportunities

The aim with the final step of the model was to assess the service solution and ensure that it was in line with the overall strategy of the company and its current business. As the previous step was comprehensive, most of the data needed already was collected and this step could be executed in a quick and effective way. The value creation against customers was ensured since the value creation gap was identified

by close contact with customers along with the market fit. The financial aspects were considered in phase four of step three. Therefore some parts of this step could be considered as slightly redundant, though it was relevant to evaluate associated risks and consider the strategic sweet spot perspective. Especially the evaluation of competitors' offers felt important, as this isn't a part of the previous steps of the model. However it was indirectly concluded that there were no competitor's providing a solution to this problem as many customers expressed a need for it. The three categories of risks, was considered as a good method for evaluation throughout the model.

8.5 Overall reflections

During the application of the process model the authors experienced some difficulties with having RBV as base, while focusing on the customer and its processes to discover service opportunities. Some of the identified opportunities had to be rejected, as they were not in line with the current resources and capabilities at Hilti. However the job mapping was found as a useful and necessary tool to understand the underlying needs of the customers. Therefore the job-centric approach is a suitable tool to ensure that the customers experience a problem and would benefit from the developed service. However, the firm continually has to match the identified problem hypotheses against the internal condition to ensure that the developed service is in line with existing resources and capabilities. This to eliminate the risk of identifying a problem and developing a solution that is totally out of the scope related to internal conditions.

To conclude, our perception is that the process model helped us to identify a value creation gap and develop a service solution in a structured and efficient way at a large established company. The structured approach with predefined steps, made the process less complex and helped us to be more efficient in our work. Altogether the model generated large quantities of data, where the major part has been useful and applicable in the model.

8.6 Further improvements

Throughout the application of the process model, several service opportunities and problem hypotheses were generated. The generation of service opportunities is a proof of that the model works and that the right data was collected. The challenge in deciding which of the ideas and insights to proceed with, forced the authors to collect further data, making the process iterative. However, what can be improved in the model is a more structured method to follow when rejecting ideas, for example by using validating questions or checklists. In this master thesis the ideas are presented along they way but the model could be developed to do this in a more structured way.

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Competitive advantage as described by Barney (1991), is when a firm is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors and when these other firms are unable to duplicate the benefits of this strategy. With Barney's view in mind it would be useful to have a macro perspective on the value creation that Hilti provide in order to be able to tell if the new service is based on resources that will result in a competitive advantage. In the model this is first introduced in step four in hard facts. Although the authors indirectly gained insights regarding the competitive environment, when conducting interviews during the process.

9 Conclusions

This chapter will provide the reader with the authors' conclusions. The overall conclusion is that a firm can expand their service offering by following and applying the systematic process model developed and proposed in this study. This model will increase competitiveness and profits at customers, mainly as the model emphasis to put great effort on verifying the problem hypothesis and the value creation for customers. This results in that the firm applying the model can be confident in that the new service will create value for customers in their daily operations, and therefore increase competitiveness. The model is built on theory without any involvement of the case company. The authors therefore consider the model to be applicable on several companies. As this master thesis is a single case study validation of the generalizability has not been performed but is considered probable. This model will be further described in the section below, following the structure of the stated research questions.

How could a model for developing new service offerings be designed?

The authors recommend a service development model, taking the base in RBV and following a systematic structure consisting of 4 steps, see illustration in figure 26. The model is concluded to provide established companies with a systematic methodology to follow when developing services. RBV should be the base of the model since successful service innovation and competitive advantages is considered originating from company unique resources and capabilities. The model begins with 2 steps mapping internal conditions at the firm, as well as describing the firm's value creation. This is a prerequisite for step 3, where the problem hypothesis is verified and the solution tested. In this step the customer must be involved to assure that the developed service will create value for both parts. Following the structure of the Customer Development Model, a method providing great amounts of customer data and customer insights, ensures this. In this step it therefore is of great importance to create problem hypotheses and search for service opportunities in a structured and systematic way, which this study propose should be accomplished by systematic documentation, interviews and workshops. The interview questions should be based on the job-centric approach and the LEAN perspective, providing a structure for the data collection. The firm continually has to match the identified customer problem hypotheses against internal conditions to ensure that the developed service is in line with existing resources and capabilities. This is secured in the model by the iterative methodology in step 3, eliminating the risk of identifying a problem and developing a solution that is out of the scope in relation to internal conditions.

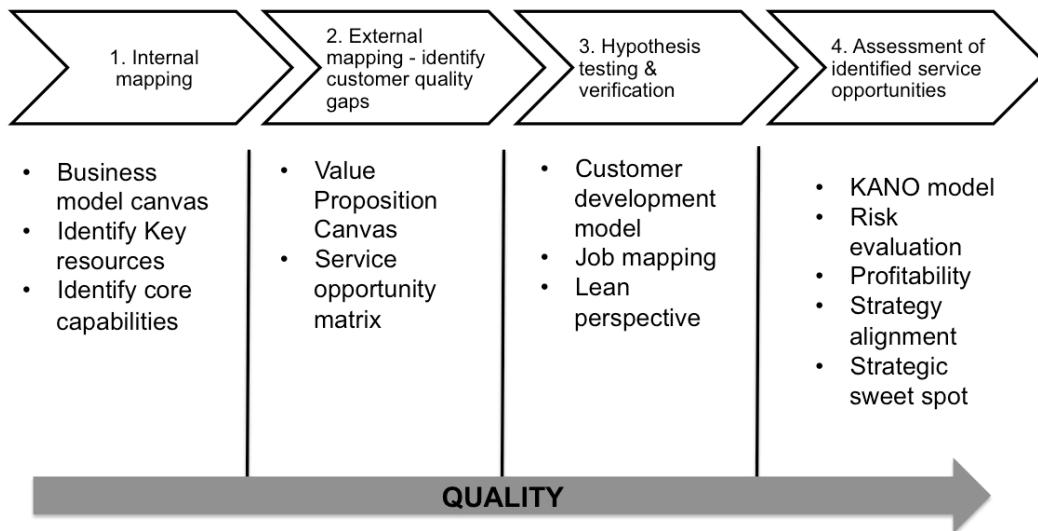


Figure 26 – the developed process model

What is the applicability of the developed process model when applied on an established manufacturing company?

The authors' perception is that the process model, mainly step 3, enabled the identification and verification of problem hypotheses, resulting in a new service offering. The iterative process of step 3, which were performed systematic and thoroughly documented, made the extensive process less complex and helped the authors to be efficient in the testing process. When constructing step 3 the authors decided to use the first step of The Customer Development Model, consisting of four phases. These phases provided a good structure, though it was realised that these phases had to be concretized with more specific activities to be able to apply the model in a real business context. It was discovered during the testing that especially phase 2 and 3 in step 3 was difficult to apply in a real business context, due to the lack of a systematic procedure to follow. The phases therefore were complemented with concrete activities, concluded to improve the applicability of the process model.

To conclude, the process model is considered to allow established firms to test and experiment cost efficiently with new service opportunities in a dynamic way, enabling the discard of less promising opportunities at an early point. There was a challenge in the application when having RBV as a base and at the same time keep

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focus on the customer. This problematic was handled by arranging workshop and having a clear dialogue with both customers and the company. The service generated by the model leverages on the existing capabilities of the firm, while it at the same time consider customer needs thanks to the customer discovery element and the job-centric approach. Finally the author's point of view is that the combination of elements within the model as well as how they are arranged in the model, makes it a valuable tool for established companies that wish to develop new services in a structured way.

10 Discussion

As an analysis is performed and conclusions drawn, this chapter will focus on discussing concerns within the application, the academic contribution, evaluation of results and credibility as well as give suggestions regarding further research.

10.1 Concernments within the application

Step 3 in the process model is based on The Customer Development model, however complemented with the job-centric approach influenced by the internal capabilities of the firm. The view of Bettencourt et al., (2013) emphasising the importance for firms to expand their focus beyond existing services and service capabilities and address the fundamental needs of their customers, is quite contradictory to the RBV view. Blank (2006) further pinpoint the importance of involving the customer when developing services. Therefore the authors early in the process made the decision to complement the RBV base, and integrate the aspects of customer involvement in the model. This was considered necessary to be able to create problem hypotheses and search for service opportunities in a structured way. The purpose with the job mapping is to gain understanding and create value with the customer rather than for the customer (Bettencourt et al., 2013). This philosophy is fundamentally a contradiction to RBV as the job-centric approach focus on external factors and RBV focus internally in the company. The two theories can either be considered necessary in the model as good complements or totally conflicting. Grant (1991) argues that there are risks in listening too much at the customer, as the global world we live in changes quickly. This speaks for RBV as a good base and insights about customers could be seen as a changing parameter that the firm shouldn't put too much effort on. On the other hand organisations need to understand what drivers create value for customers in order to build a competitive advantage (Lapierre, 2000).

During the application of the process model we experienced some difficulties with having RBV as base, while focusing on the customer and their processes when searching for service opportunities. Some of the identified opportunities had to be rejected, as they weren't in line with current resources and capabilities at Hilti. There was a concernment when we during the testing in step 3, realised that it could be difficult for Hilti to take the role as IC. The authors therefore realised that it would be beneficial to conduct a workshop with Hilti employees, to ensure alignment with existing resources and capabilities. The adding of this activity to the working process further assured that the new service offering would be in line with current business model. By doing this we improved the model by making it more concrete. During the workshop with the Hilti employees, they realized that they should change the strategy of approaching customers when selling, due to the presented problem identification. This shows that when applying the model there

can be outcomes besides service opportunities along the way, valuable for the company applying the model. This is another argument for the importance of performing systematic documentation during the application is important.

10.2 Academic contribution

The main contribution of this thesis is a process model that helps established companies to develop services in a structured and efficient way. The process model is mainly based on established theories and models, such as RBV, BMC, The Service Opportunity Matrix and The Customer Development Model. However the novelty and contribution lies in the combination, the use of RBV as a cornerstone of the model and further the development of a concrete methodology to follow when testing and developing services in a real business context. No other service development model, distinctly utilizing RBV as starting point has been found. Therefore it was considered interesting to develop a model and then analyse the result of applying it on a real company. Especially the working methodology used in step 3 of the process model is interesting, as there is a gap in the existing literature regarding how to actually test and develop service solutions in a real business context. Today there exist general models regarding service development, though they are generic and mainly highlighting that the service should be developed based on customer insights. None of the models offers a systematic methodology to follow in a real business environment or clearly state that RBV should be the strategic view when looking for new service solutions. Therefore it can be concluded that the developed process model plays an important role in the existing service development research.

Further the study offers an empirical contribution in terms of the analysis of the data collected during the application of the model. This has lead to a well-motivated and verified problem hypothesis regarding the area of installation coordination within the construction industry. The service generated by the process model is a contribution in terms of a real service. Both these achievements are considered valuable to the case company. The verified problem of installation coordination could be considered when developing new services in the future as well as when modifying the company strategy. The developed service offering could be further developed and investigated, and later launched on the market.

10.3 Credibility & evaluation of results

The credibility of this study is considered high mainly due to three factors; the deductive approach, the extensive collection of empirical data and the systematic working method. The process model was developed uninfluenced by the conditions at the case company, which facilitated the authors' ability to evaluate and analyse new information, strengthening the credibility and the academic contribution.

As mentioned in the methodology chapter, the collection of empirical data has been extensive, consisting of several interviews, workshops and observations. This together with the use of the Delphi technique has made the authors completely confident of the correctness of the identified problem hypotheses, as well as the results from applying the model in step 3. The authors have focused on working in a systematic way and clearly follow the structure of the model. This entire process has been thoroughly documented which is considered to increase the trustworthiness of the study.

The high credibility of the study makes the results considered as very interesting. As the process model is developed not considering the conditions at the case company, the results of the application can be evaluated in a way not being possible if the company had developed the model on their own, influenced by the company environment and characteristics.

10.4 Further research

During the development and application of the process model some interesting research areas has been identified, though not in the scope of the author's timeframe.

- Given that this study is a case study on a manufacturing company, it would be further interesting to test the model on established companies operating within other industries. This to be able to further discuss the generalization potential of the process model.
- As it now is concluded that the process model is applicable and that the overall methodology works, it would be interesting to further develop an even more specific methodology for step 3. This to be able to conduct a more in depth analysis of how to find the balance between having a RBV base and at the same time identify services considered to be new thinking innovations. This would be interesting since the authors experienced it as difficult to match the identified service opportunities based on customer insights with the Hilti business model, restraining the innovation potential. The authors solved this problem by working iterative and continuously match the problem hypothesis against Hilti resources, though it is possible that a more effective method for this could be developed.
- When applying the model on another company it would be of great value to move quickly through the testing of the problem phase with the help of the proposed methods in this master thesis and put greater emphasis on the testing of the solution phase. This since we are of the opinion that the methodology in the testing of the solution phase could have been further

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developed, unfortunately we didn't had the time to do this due to the great effort in testing and verifying the problem.

- Regarding the empirical contribution of this study, where one major part is the identification of installation coordination as a problematic area within the construction industry, further research is suggested within the area of how to solve this problem. However, this is not entirely connected to service development research, as it is not sure that it is a service that will solve this problem. As there are several stakeholders and actors involved and affected by the problem, it is possible that there are other solutions than services to this problem. Although the actor that will develop a service that solves problems within this field will have large opportunities for profitability, which is why future research is proposed.

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Appendix 1 – Interview sample

External interview sample

Construction Firms		
Position	Geographical position	Employer
Area Manager	Arlöv	Byggmästaren Skåne
Purchasing Manager	Kristianstad	Thage Andersson
Area Manager	Munka Ljungby	MVB
Calculation & Purchasing employee	Munka-Ljungby	MVB
Purchasing Manager	Malmö	Otto Magnusson
Site Manager	Malmö	Otto Magnusson
Site Manager	Lund	ByggCompagniet
Project Leader	Lund	ByggCompagniet
Carpenter/ team leader	Lund	ByggCompagniet

Installation Firms		
Position	Geographical position	Employer
Project leader	Malmö	Bravida
Fitter/team leader	Malmö	Bravida
Project Leader	Lund	Imtech
Project Leader	Lund/ Max IV	Imtech
Project Leader	Lund/ Max IV	Imtech
Department Manager	Malmö	Stjernfeldts/Climat 80
Project Leader	Malmö	Stjernfeldts/Climat 80
Project Leader	Malmö	Stjernfeldts/ Climat 80
Owner/CEO	Malmö	AB Rörläggaren
Vice VD	Malmö	AB Rörläggaren
Project Leader	Lund	Caverion

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Industry experts		
Position	Geographical position	Employer
Project leader research & development	Malmö	Sveriges Byggindustrier
Head of department, researcher of construction management	Malmö	Malmö University
Docent within construction management	Lund	Lund University
Professor within construction management	Lund	Lund University
Docent within construction management	Lund	Lund University

Clients		
Position	Geographical position	Employer
Manager Construction Department	Lund	LKF
Purchasing Manager	Lund	Akademiska Hus
Project Leader	Lund	Akademisk Hus

Participants Workshop Customers		
Position	Geographical position	Employer
Purchasing Manager	Malmö	Otto Magnusson
Site Manager	Malmö	Otto Magnusson
Owner, electrician	Malmö	Elfast
Project Leader	Malmö	Stjernfeldts/Climat 80
Head of Marketing	Malmö	Climat 80
Installation Coordinator	Malmö	Climat 80
Project Leader	Malmö	Climat 80

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Internal interview sample

Hilti employees	
Position	Number of interviews
Strategic Director	2
Hilti Center employee	2
Customer service employee	2
Account Manager Construction	1
Account Manager Industry	1
Key Account Manager	1
Regional Sales Manager	1
Field Engineer Construction	1
Field Engineer Industry and Installation	3

Participants Hilti Workshop	
Position	Geographical Position
Account Manager Industry	Arlöv
Account Manager Industry	Arlöv
Regional Sales Manager	Arlöv
Field Engineer Industry and Installation	Arlöv

Appendix 2 – Interview guides

Internally Hilti employees

- Kan du beskriva vad din roll innebär?
- Vad är du involverad i för projekt just nu?
- Det finns många definitioner av service. Vad innebär service för dig?
- Vad menar du med service i relation till Hilti?
- Har du märkt att industrin/branschen går mot en förändrad attityd vad gäller service?
- Vad ser du för utmaningar i att gå mot att vara ett mer service orienterat företag?
- Vad tycker du personligen om utvecklingen att gå mer mot service?
- Vad tror du krävs internt för att kunna börja ta betalt för service som Hilti erbjuder?
- Vad finns det för för och nackdelar med att ta betalt för service?
- Vad är de största fördelarna med att gå mer och mer mot att vara en "service provider" från ditt perspektiv?
- Vad skulle du säga är Hiltis unika resurser?
- Vad skulle du säga är Hiltis unika kompetenser?
- Hur har Hiltis erbjudande till kund förändrats över tid?
- Hur ser Hiltis relation till sina kunder ut?

Construction firms

Allmänna frågor/ Intro

- Vad inbegriper i din roll? (ansvarsområden)
- Vad är dem största utmaningarna för er i byggbranschen idag?
- Vilka är era fokusområden när det gäller utveckling av effektivitet och processer?
- Hur ser era typiska projekt ut, vad har ni för policy gällande TE och UE?
- Ungefär hur stor del av er verksamhet består av totalentreprenader, där ni är totalentreprenör?
- Vad är ni bäst på, vart ligger er kärnkompetens? (Typ av byggnad/byggnation?)

Allmänt Totalentreprenader

- Vad är ert övergripande mål vid en totalentreprenad?
- Hur arbetar ni med kvalitet, dvs säkerställer att ni levererar det som kunden vill ha?
- Enligt branschexperter så är en av utmaningarna i byggbranschen idag samordning i projekterings-fasen (koordinera styrande dokument/underlag och ritningar från alla UE (om dem har konstruktionsansvar) eller projektörer - hur arbetar ni med detta? Upplever ni ett problem här?
- Brukar det uppstå konflikter mellan de olika aktörerna? (konstruktör/projektör, UE, tot entrp)
- Det finns en tydlig trend mot att man använder fler och fler olika UE i samma projekt, gäller detta även er?

Om processen

- Vad måste vara definierat och planerat innan ni bestämmer UE?
- Vad är det viktigaste parametrarna för er när ni väljer UE? (pris, kvalitet, förtroende)

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- Vad har ni för övergripande krav på era UE inom ex VVS?
 - Hur säkerställer ni att dessa krav uppfylls/hur ser processen ut under projektets gång när ni arbetar med detta?
 - Ex... samordningsmöten i projekteringsfasen?
- Hur resonerar ni när ni handlar upp en UE - ex vi handlar det minst kostsamma och lämnar över ritningar till VVS firman och säger "lös det", eller mer specificerat?
- Hur detaljerat beskriver ni saker, ex hur långt går ni/projektör i att föreskriva upphängningar och infästningar mot UE?
- Vad ser ni som dem största riskerna vid upphandling av en UE?
 - Om riskerna varierar, hur jobbar ni med riskhanteringen?

Genomförande

- Kontrollerar ni arbetet som utförs av UE (ex VVS) löpande under projektets gång? Hur ser processen ut?
- Upplever ni något problem/risk kring huruvida UE kommer lösa det vid ofullständiga ritningar?
- Vad är era erfarenheter av att installatörerna löser mycket av monteringen på plats. ("löses på plats"- tänket), då antingen ritningen är fel eller om det inte står med alls i ritningen?
- Tror ni att det ibland uppstår kvalitetsbrister på grund "löses på plats"-tänket?
- Era projektledare på plats, vad är det som tar upp deras tid?

Efter genomförande

- Vad måste övervakas/kontrolleras och verifieras efter att UE gjort sitt jobb för att försäkra sig om att jobbet är gjort på rätt sätt?
- Vad måste modifieras eller justeras efter genomförd uppgift?
- Vad är det oftast för krav som inte uppfylls? Vad gör UE oftast för misstag? (ex VVS)

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- Vad tycker ni oftast är för dyrt? (något tar mycket tid, kostar mycket, kräver stora ansträngningar) - vad är oftast tillkommande jobb?
- I vilken del av processen uppstår det oftast stopp/avbrott?

Övergripande om samarbetet mellan TE och UE

- Beskriv din roll och ansvarsområden i processen att handla upp UE och säkerställa att det levererar enligt kravspec?
- Upplever ni att det uppstår glapp mellan olika UE (vart är oftast gränssnitten inte väldefinierade, något speciellt område, vissa aktörer)
- Hur tycker ni processen fungerar? (säkerställandet av att krav uppfylls)
- Svårigheter och utmaningar?
- I vilken del av processen (före, under eller efter) säkerställa krav mot UE - tror du att ni skulle behöva stöd som skulle göra ditt jobb lättare? (för att försäkra er om att ni levererar det ni ska)
 - Vad gör ni ofta för misstag i denna process?
- Vad tycker ni är jobbigt? (frustrationer, saker som tar upp din tid och irriterar dig?)
- Vad för besparingar av (tid, pengar, resurser) skulle göra er glad?
- Om du fick 100 tusen kronor att lägga på utbildning av anställda, eller utveckling och effektivisering av processer, vad skulle du göra då?

Test av nya lösningar

- Vad är den vanligaste orsaken/barriären till att testa nya lösningar hos er? (stora initiala kostnader, för svårt att lära sig, motvilja till förändring?)
- Vad skulle öka sannolikheten för att ni börjar använda en ny typ av lösning? Vad ska denna lösning bidra med i er verksamhet?
Ex...
 - Ökad kvalitet
 - Större förtroende mot UE
 - mindre stopp/färre avbrott
 - färre kvalitetsfel
 - lägre risk
 - lägre kostnader

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- färre investeringar

Övrigt

- Jobbar ni på något sätt med erfarenhetsutväxling/diskutera problem för att ta fram lösningar på problem? Exempelvis har ni någon form av forum där ni diskuterar hur processen kan effektiviseras tillsammans med UE?

Installation firms

Allmänt

- Vad inbegriper din roll?
- Vad är dem största utmaningarna i er verksamhet som ni arbetar mot idag?
- Vilka är era fokusområden när det gäller utveckling av effektivitet och processer?
- Hur ser era typiska projekt ut, vad har ni för roller?(hur ofta är ni UE vs TE) (policy gällande TE och UE)
- Vad är ni bäst på, vart ligger er kärnkompetens? (typ av VVS område, typ av byggnation)

Allmänt er roll i totalentreprenader

- Enligt branschexperter så är en av utmaningarna i byggbranschen idag samordning i projekterings-fasen (koordinera styrande dokument/underlag och ritningar från alla UE (om dem har konstruktionsansvar) eller projektörer - hur arbetar ni med detta? Upplever ni ett problem här?
 - Koordinering kan vara om allt blir utfört, dvs. det inte finns gränssnitt som inte ligger långt ifrån varandra)
- Brukar det uppstå konflikter, schismer mellan er och de olika aktörerna? (konstruktör, projektör, UE, tot entrp)

Arbetskartläggning - processen

- När ni får ett projekt (ex vid en TE) hur ser processen ut i stora drag från att ni får ritningen till att ni börjar montera och tills det är klart (ex VVS) om man ser till hela installationssamordningen?

Före exekvering

- Om man ser till installationssamordning - vad måste vara definierat och planerat innan montören börjar montera?

Exekvering

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- Hur väljer ni hur ni ska göra vid ex en upphängning och det inte är beskrivit i detalj i ritningen hur det ska göras?
- Om montören inte vet hur han ska göra hur ser er lösning ut?
- Hur jobbar ni med/samarbetet med platschef från TE under byggprocessen?
- Vad brukar dem behöva hjälpa er med?
- Hur fungerar samordningen av installationer?
- Hur gör ni/hur ser processen ut om ni får en felaktig handling/ritning som ni upptäcker ute på bygget? (skickar man tillbaka den eller löser man det själv?)
- Hur hanterar ni problematiken kring ofullständiga ritningar?
→ Era erfarenheter av att mycket av monteringen "löses på plats", då antingen ritningen är fel eller om det inte står med alls i ritningen?
- Hur hanterat ni problematiken kring krockar i installationer?

Efter exekvering

- Vad är det oftast för krav som inte uppfylls? Vad gör ni oftast för misstag, vart uppstår det kvalitetsbrister? (ex VVS)
- Om man ser till installationssamordning i vilken del av processen uppstår det oftast stopp/avbrott – vad finns det för flaskhalsar?

Strategi ni som har alla funktioner inhouse

- Upplever du det som en konkurrensfördel när ni marknadsför er mot kund att ni har alla funktioner in house? (el, vent, vs)
- Hur ser det ut vid en anbudsförfrågan, ger ni ett pris per funktion eller ger ni ett sammanlagt pris? Räknar ni på synergi effekter?
- Hur ser samarbetet ut mellan de olika funktionerna i ett projekt?
- Använder ni er av installationssamordnare?
- Upplever du att ni hade kunnat utnyttja just att ni har alla funktionerna själva på ett bättre sätt?

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- Känner ni att ni hade behövt stöd för att göra detta?
- Om ni hade behövt stöd, eller köpt in denna tjänsten, vad skulle den personen hjälpt er med?

Mer detaljerat för att se om det finns en problematik i processen

- Upplever ni att det ofta uppstår glapp mellan olika installations UE? (odefinierade gränssnitt som ingen rikt har ansvar för)
- I vilken del av processen(före, under eller efter) säkerställa krav mot TE - tror du att ni skulle behöva stöd som skulle göra ditt jobb lättare? (för att försäkra er om att ni levererar det ni ska)
 - Vad gör ni ofta för misstag i denna processen?
- Vad tycker ni oftast är för dyrt? (något tar mkt tid, kostar mkt, kräver stora ansträngningar)
- Vad tycker ni är jobbigt? (frustrationer, saker som tar upp din tid och irriterar dig?)
- Vad för besparingar av(tid, pengar, resurser) skulle göra er glada?
- Om du fick 100 tusen kronor att lägga på utbildning eller utveckling och effektivisering av processer, vad skulle du göra då?

Hur ser du på framtiden för er del?

Test av potentiell lösning

- Vad är den vanligaste orsaken/barriären till att testa nya lösningar hos er? (stora initiala kostnader, för svårt att lära sig, motvilja till förändring?)

Övrigt

- Jobbar ni på något sätt med erfarenhetsutväxling/diskutera problem för att ta fram lösningar på problem? Exempelvis har ni någon form av forum där ni diskuterar hur processen kan effektiviseras tillsammans med TE?

Appendix 3 – Step 1 Insights internal mapping

Internal mapping - general attitudes towards service development

“Globally Hilti is setting the stage to charge for services” (Hilti AB, 2013)

After performing interviews with people at different roles at Hilti it is clear that currently there is a focus on service development within the company. This is grounded at top management level and for the first time services is seen as a key driver for continued growth this year, alongside with the traditional drivers such as products and the brand.

Since this is a new focus area the first step within the company is to optimize the output of the services already offered today. The next step will be to look one step further for totally new service offerings, and the vision is that Hilti will have three legs that will generate money in 2020; services, software and products. (Hilti AB, 2013)

According to Hilti management, insights that has lead to this development is the fact that since Hilti has a premium price compared to competitors in the industry many services has been included in the price. This has during a long time given the customer a great amount of services included when choosing Hilti as supplier. Since the services have been included this has lead to difficulties in getting the customer fully aware of the value created by Hilti. During the interviews there were several employees at Hilti mentioning that the company is too generous in their business model.

“I don’t understand why we shouldn't charge for services, if the customers don't receive it from us they would buy it somewhere else.”- Area Sales Manager, Hilti Svenska AB

It was also mentioned that there would be great challenges associated with a service transition at Hilti. One perspective lifted in the interviews where how to decide where to draw the line - which services should be included and which should be charged for. Further there were opinions from Account Managers (AM) and Field Engineers regarding that as they use the included services as sales arguments for the expensive Hilti products, it will have a negative impact on the sales rate if beginning to charge for these services. During the interviews it also became clear that many is of the opinion that it will be easier to offer new services and begin to charge for existing ones to the key account customers. This since Hilti currently has a strong relationship to the large customers such as Skanska and NCC, where many of them see Hilti more as a partner than just a supplier. The majority of the smaller customers and the mid market segment don’t have this relationship with Hilti and

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therefore it will be a greater challenge to convince them of the value that Hilti services can offer. To manage this Hilti has within recent years re-structured the way to segment the customers. Earlier each AM was responsible for all customers within a geographical area, today the aim is that an AM instead should be responsible for a certain kind of customers with similar characteristics. The new set was rearranged to improve the relationship building with each customer and create more customized offerings.

Some of the salespeople were however convinced that since Hilti has a strong brand and many loyal customers, it would be possible to offer new services as long as Hilti can prove that the service will create value for the customer. Some of the AMs regarded services as a necessity to survive in the market;

“It is with services you can compete, this since it is harder to differentiate as company only with products - the need has increased during the last years and this request service development” – Account Manager, Hilti Svenska AB

Further opinions regarding service development were that it is important to charge for services since if customers have to pay money for it, the associated value becomes more obvious. Service development will also make customers see Hilti as a service provider and not only a supplier of tools. This could lead to that Hilti will be consulted earlier within the construction process. Another advantage with offering service is that this could lead to upselling, if the customer first buy the service a further action could be to buy Hilti's products.

To summarise the attitude towards service development within Hilti is in general positive, has support from top management and many of the employees see it as a necessity to stay competitive. However there is a great challenge in beginning to charge for existing services, as this earlier has been included in the price, which can cause difficulties for the AMs when selling. Therefore some of the AMs are sceptical towards the strategy of beginning to charge for existing service, though positive to the possibility of offer totally new services.

The Business Model Canvas

As presented in the theory chapter, The Business Model Canvas is a structured method to describe the different parts of a company's business model and in an easy way illustrate how a company creates value. In the illustration below, figure 28, you will see the filled Canvas based on what the authors consider as the most important elements of the Hilti business model. These insights are grounded in information and insights received from interviews with Hilti employees, industry experts and customers along with study of internal documents. Below the most relevant insights related to the scope of the study will be presented for each of the nine building blocks.

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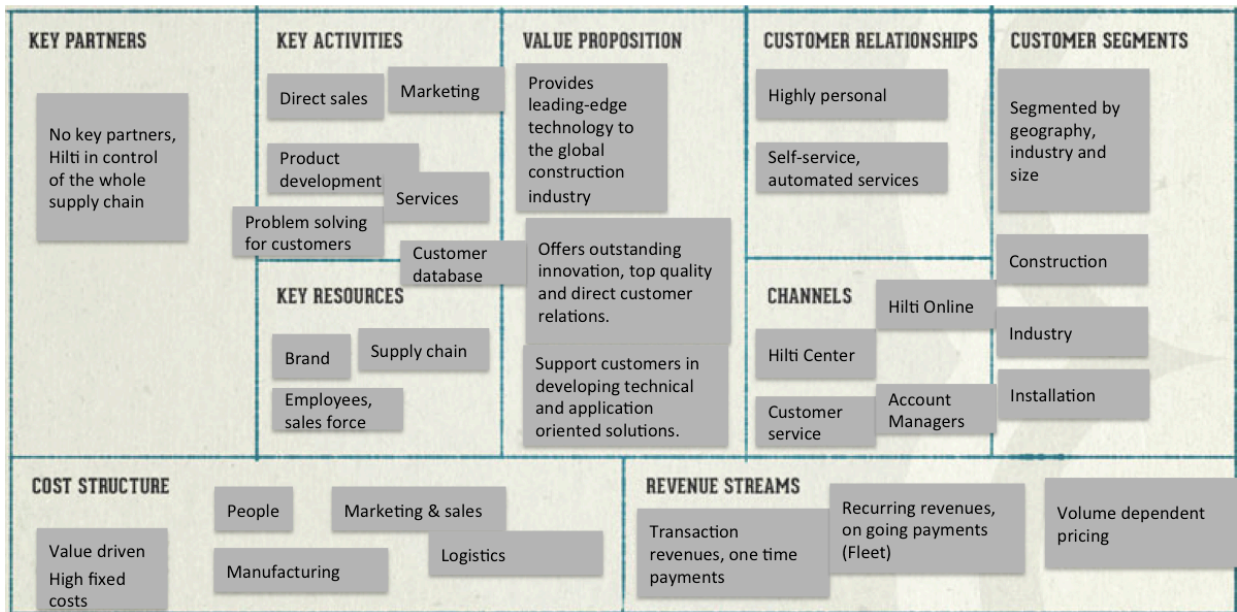


Figure 28 – The Business Model Canvas based on Hilti facts

Key partners

Hilti is in charge of their entire supply chain – from product development until the sales channel, which significantly differentiate them on the market. Hilti only uses their own sales channels as they want to be in charge of the contact with the end customer and be able to quickly respond to changes in demand. (Hilti AB, 2014) Therefore they don't have any key partners and don't have to rely on other actors within their supply chain.

Key resources

The unique brand characteristics such as the Hilti toolbox, Hilti salesperson and "Hilti red" have strong recognition. The brand is so strong that it has become a metonymy for the rotary drill that means that customer asks for "the Hilti" instead of a rotary drill.

Hilti put great effort on finding the right employees that share the same values as the company. The values of the company are integrity, courage, teamwork and commitment. Hilti has a target of reaching a level where 90% of all leadership positions are filled with internal candidates. (Hilti AB, 2014) The strong values and focus on employee development has been fruitful and in 2014 Hilti Svenska AB was ranked as the number one best place to work in Sweden based on employee satisfaction (Great Place to Work Institute, 2014). This announcement is important employee branding as well as marketing.

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To assure a close relationship to the customer the sales representatives, constituting of two thirds of the employees, work directly with the customer and engage with customers on a daily basis. The contact with the customer contains of sales persons as well as field engineers that are present at their customer's sites solving technical problems. (Hilti Svenska AB, 2013)

Since the organisation have two thirds of their employees within sales and after each sales visit the personnel save all the information provided about their customers, Hilti holds a lot of data about their customers. Even in the customer service all information are stored in the database when the customers call about problems or orders. This generates better customer service as the sales personnel always can be updated even if it was a colleague in another sales channel that had the last contact with the customer.

Another important resource is as just mentioned, that Hilti doesn't use any retailers and is in charge of their entire supply chain, enabling a quick response in the communication from the customer to a strategic level.

Key activities

The sales force performs direct sales on the site of the customer as well as in the Hilti stores. The direct sales make every customer contact transparent as well as provide Hilti with control over the customer experience.

Hilti has a portfolio of services traditionally included when using Hilti as supplier; such as Lifetime Services, maintenance of tools, customer trainings, project support, drawing services and advice on the job site. Hilti also have developed a leasing concept called Fleet Management, meaning that Hilti take full responsibility of the customer's tool fleet against a monthly fee. (Hilti AB, 2014)

Further, the company provide expertise in form of field engineers that help with design, calculations and solve problems when buying and installing Hilti products and systems.

"As the construction industry is becoming increasingly more regulated more installation companies requires paperwork on the job performed. This is as well an area where Hilti can help with their services and provide the customer with the required paperwork." - Field Engineer, Hilti Svenska AB

Hilti has during the last six years been awarded more than 80 different design rewards worldwide (Hilti Svenska AB, 2013). The product development and production function all report directly to corporate level. The corporate strategy is based on three components: product leadership, market scope and operational excellence. (Hilti AB, 2014)

Cost structure

Hilti has a position on the market as an expensive premium brand, where the pricing strategy is value based. The business model has a cost structure consisting of great fixed costs, due to the extensive sales force, marketing and qualitative logistics. The first production plant was located in Liechtenstein and today they are as well manufactured in various locations around Europe and in China. (Hilti AB, 2014)

Value proposition

The value proposition offered toward customers is leading-edge technology to the global construction industry. Hilti also offer innovative tools as well as expertise services through direct sales channels, personal relationships with the customers and support and problem solving when required.

Customer Relations

"Today great focus is put on moving customer's purchasing activities towards Hilti Online, the e-commerce platform, but the organisation still emphasis highly personal relationships with the customer."- Strategic Director, Hilti Svenska AB

Channels

Hilti has four sales channels in Sweden; Sales force, Customer Service, Hilti Online and Hilti Centers, illustrated in figure 29. (Hilti AB, 2014) What differentiates Hilti from competitors is that they have control of the whole supply chain and has chosen to only sell products and services to customers through their own sales force, meaning that they don't use any retailers. As Hilti has control of their own supply chain it facilitate their ability to keep track of their products. It also makes it possible to give fast responds to the customer. (Hilti AB, 2014)

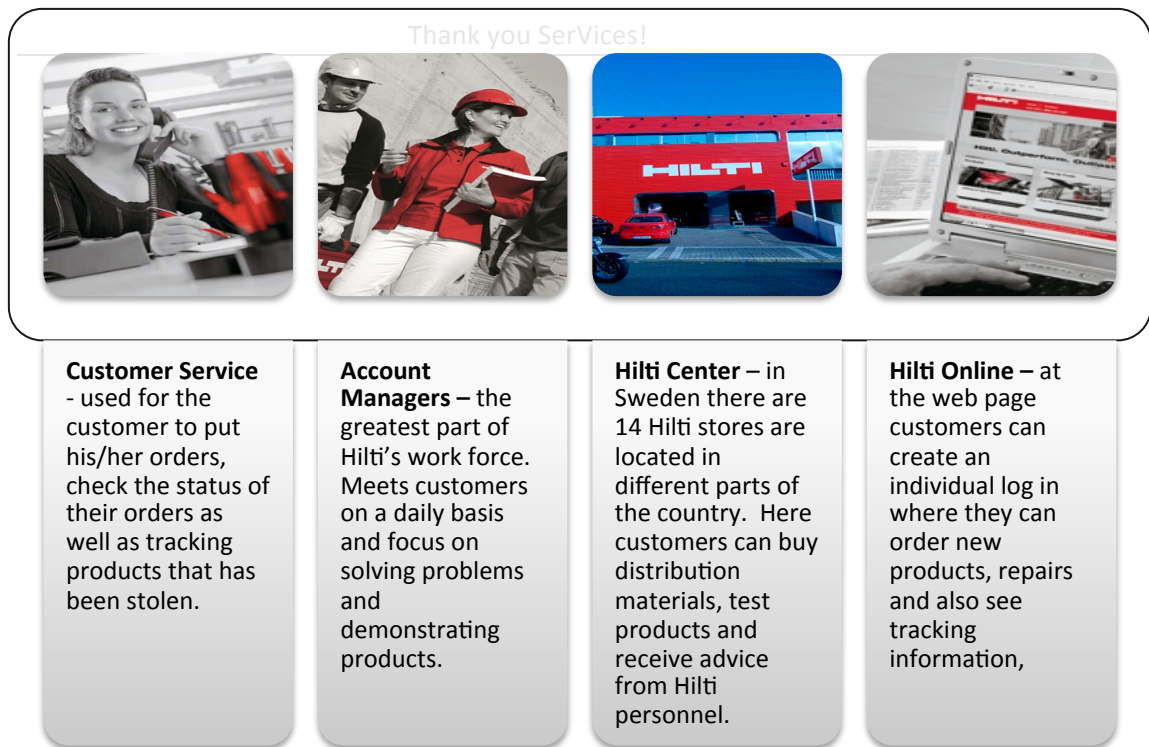


Figure 29– Hilti’s four sales channels

Customer Segmentation

Hilti’s customers is segmented by geographic location, industry and by size, were size is ranked according to the potential buying power of the customer. (Nordendahl, 2014) The customer is divided into three different industry segments; construction, installation and manufacturing industries. Further the customers in each industry segment are divided into groups based on their size; key account customers, mid market customers and smaller customers. Key account customers are big companies such as Skanska, PEAB and NCC and have long-term agreements. (Landin, 2013) The segmentation of customer is visualized in the figure 30 below.

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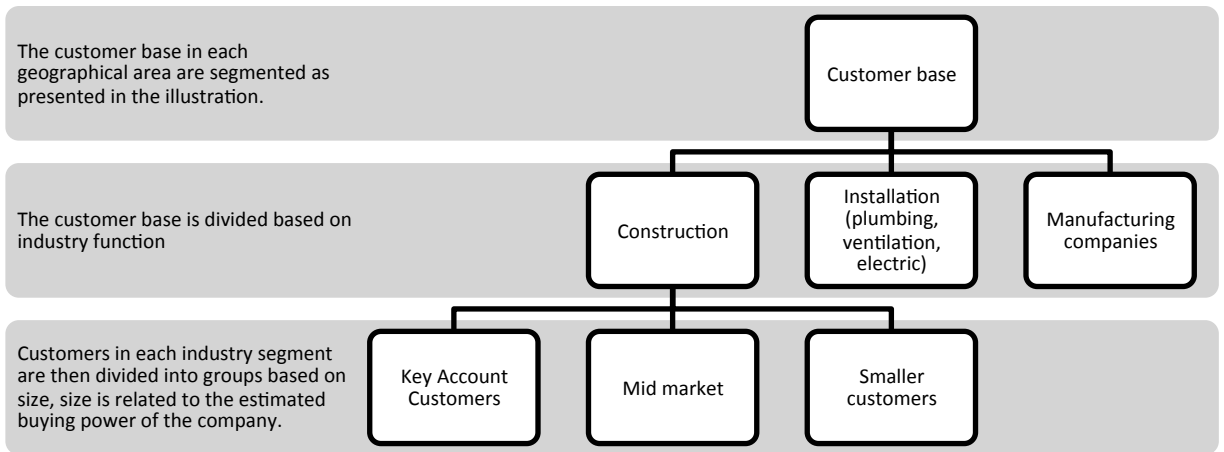


Figure 30 – Hilti’s customer segmentation

Revenue Streams

Hilti has two main types of revenue streams; on-going payments from the fleet management customers and one-time payments from the store, website and other channels. With Fleet Management the customer pay a fee on a monthly basis for the service. Hilti works with volume dependent pricing, mostly towards their key account customers, which receives prices based on estimated purchasing volumes. (Hilti AB, 2014)

Appendix 4 – Step 2 insights regarding service opportunities

As the next step in the model begins with stating hypotheses regarding where there could be service opportunities, each section below will end with the hypotheses derived from these interviews.

Hilti employees

When mapping the internal conditions at Hilti, questions regarding their perception of customer's "pains" and "gains" were also asked. The AMs meant that they experience that a general problem for their customers are incomplete drawings at the construction site, which usually causes bottlenecks and long production stops. Further, a field engineer stated that sometimes they receive questions regarding how to mount and install Hilti's installation solutions, as the customer are not used to these installations and need assistance. Though they can't help customers with this since physical mounting not is a part of their customer offering. The general opinion of how Hilti creates value for customers was especially that they offer personal assistance, the customer can call their Hilti AM and then he/her visit the customer in person. For instance, if a customer has a complex tube suspension they usually call Hilti for technical advices and help with drawings, which Hilti offer for free when buying their products. When talking to an employee working in the Hilti store it was also mentioned that the most frequent sold products in the store are consumables such as cartridges for captive bolt, and that it could be beneficial for customer to receive this products directly to the working place instead of driving to the Hilti store. One additional customer pain experienced was that customers come to the Hilti store when their machinery breaks down, then they have to wait a couple of days for the machine to be repaired. Since Hilti does not offer any loan tools, this can create production stops for the customer.

- *It would be possible to expand the current service of field engineers and start charging for it, eg in terms of taking a more active part in making detailed drawings*
- *There exist uncertainties among subcontractors in terms of how to install Hilti products and systems*
- *It would be possible for Hilti to offer a service that would make the distribution of consumables (screws etc) more effective which would make customers willing to pay for it*

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- *It would create value for customers with a service that gave them the opportunity to receive loaning tools*

Industry experts

During interviews with industry experts they confirmed the problem with incomplete drawings at construction sites. The problem of distribution of consumables was also lifted, when for example a carpenter realise that the bolts are finished he often has to drive to the store and buy new ones which can be time consuming - in this process there could be possibilities for improvements. The industry experts also mentioned that overall trends within the industry is that the turnkey contract form is becoming more common and that the number of subcontractors in each construction project has increased which leads to challenges within coordination of all actors.

- *Incomplete drawings are large problems during the entire construction process in general*
- *It would be possible for Hilti to offer a service that would make the distribution of consumables (screws etc) more effective which would make customers willing to pay for it*

Customers

To gain an initial picture of the customers' processes and challenges pilot interviews with one construction company and one installation company was performed. As Hilti serves both industry branches it was decided to interview one from each branch to receive an as diverse picture as possible.

Installation company

The installation company wished that Hilti's fleet management offer should be more customer adapted and flexible, this since today there is a fixed leasing time on two years and this can't be changed even if you don't use the tool as frequently. They thought that project planning was difficult and caused problems during the process, especially in the end when everything has to be done at the same time. Further they experienced that the most common process disruptions concerns problems with incomplete drawings and unclear interfaces between subcontractors. The problem with incomplete drawings is that the construction can't be applied in reality and this causes downtime. Further unclear interfaces create collisions between the different installations disciplines during the execution phase, which takes time, and efforts to fix. It can also create quality deficiencies, as problems have to be solved on the spot by the individual. A project leader from the installation side explained that they sometimes consult Hilti's field engineers:

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"If Hilti wouldn't have helped us with calculations and material decisions when it comes to advanced installations of heavy and tempered pipes and ventilation, we would have been forced to buy this service from someone else. This is not anything we have knowledge of how to do in-house." -Project Leader, Imtech

The project leader experienced that incorrect calculations are a great business risk that sometimes happens when the solution is more expensive than calculated. It was mentioned that the customer appreciate that Hilti offers a service in terms of free educations regarding how to use certain tools, which is used frequently. They also expressed a wish regarding that Hilti should offer loan-tools;

"The dream would have been that when we inform Hilti of a broken tool, at the same time we would receive a loan tool". -Project Leader, Imtech

- *Unclear interfaces between different contractors are a problem in construction process in general*
- *It would be possible to expand or modify the fleet management offer in some way to make it more customer adapted*
- *It would create value for customers with a service that gave them the opportunity to receive loaning tools*
- *Incomplete drawings are a large problems in the whole construction process in general*
- *It would be possible to expand the current service of field engineers and start charging for it, e.g. in terms of taking a more active part in making detailed drawings*

Construction company

The area manager meant that it is really important for them to focus on effectiveness when it comes to purchasing and the procurement of subcontractors:

"80 % of our activities is to do business and 80 % of our turnover consist of purchasing of material and sub-contractors, if we can earn some money here it have a great impact on our overall result" - Area Manager, Byggmästar'n i Skåne

The manager mentioned that what usually creates unnecessary costs are when things take more time than expected during the process, this could for example be coordination of the different installation systems. The problem of incomplete drawings were mentioned again, as he meant that this create problems on the work site that the site manager has to handle, which can be very time consuming.

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- *Unclear interfaces between different contractors are a problem in construction process in general*
- *Incomplete drawings are large problems during the entire construction process in general*

Appendix 5 – Phase 1, Step 3 Problem hypotheses

Hypotheses related to modifying or expanding existing services in order to start charging for them

- *It would be possible to expand the current service offered by Field Engineers and start charging for it, e.g. in terms of taking a more active part in making detailed drawings*

It was realized that Hilti's Field Engineers offer value to customers in terms of solving "emergency problems" regarding advanced constructions and suspensions. When a fitter receives a drawing from the design consultant it's common that it is not described in detail how to mount the pipe. Usually the fitter can solve this based on experience, though in rare and advanced constructions they have to ask Hilti for support. This created the idea that Hilti Field Engineers could be consulted in an earlier stage of the process and assist with more detailed descriptions on the drawings.

- *There exist uncertainties among subcontractors in terms of how to install Hilti products and systems*

During the interviews with Field Engineers it was mentioned that they often receive questions regarding mounting and installation of Hilti's installation systems. Therefore one idea was that offering a mounting service, together with the selling of products and solutions, could create customer value.

- *It would be possible to expand or modify the existing fleet management offer in any way to make it more customer adapted*

Today Hilti offer the fleet management concept towards all customers, though the leasing time for each tool is fixed on two years, and after that it is replaced. This is experienced as inflexible by customers and Hilti employees as the demand for tools vary during a construction process and some tools are used more frequently than others. One possibility could therefore be to modify the current fleet management offer and make it more flexible and adapted to each individual customer.

Hypotheses related to creating new stand-alone services

- *It would be possible for Hilti to offer a service that would make the distribution of consumables (screws etc.) more effective which would make customers willing to pay for it*

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As the time frame usually is short in construction projects, all time-savings are valuable. Since the employees in the Hilti store said that most sold products are consumption materials, this awoke the thought of offering a service that would prevent the carpenters from the actual need to drive to the store in person.

- *It would create value for customers with a service that gave them the opportunity to receive loaning tools*

This hypothesis is based on a clear statement from the installation company where they distinctly said that it would be value adding for their productivity to be able to loan tools in case of broken tools. Further the employees at the Hilti store mentioned that many customers comes to the store and are stressed since they don't have any tools, during the reparation time.

- *Incomplete and incorrect drawings are generally a problem throughout the construction process*

Almost all interviewed people highlighted the problem of incomplete drawings. The problem is that it is costly to let a design consultancy firm spend time on making drawings on a detailed level, therefore some things are left to solve for the fitter on the actual spot. The construction firm meant that there is no point in drawing to many details on the drawing as it wont work in reality. However, this can have a negative impact on quality as the fitter mount it in the way he considers as best. Therefore a service that reduces the occurrence of incomplete drawings and increase the correctness of the drawings should improve the efficiency of the construction process.

- *Undefined interfaces between different contractors are a problem in construction processes in general, especially concerning interfaces between installation sub contractors and the construction company*

This hypothesis is linked to the previous described problem of incomplete drawings. It is usual to hire many different sub contractors responsible for different functions in a project, where each actor is responsible for their design and drawings. These drawings have to be coordinated between all actors, though this usually fails which causes incorrect drawings and undefined interfaces. It can also cause collisions between the different installations system that has to be solved on the spot and causes time delays. Services that enable an easier coordination between the actors are therefore believed to create value for all involved stakeholders. In order to investigate opportunities related to this issue a hypothesis was formulated.

Appendix 6- External data collection – The construction industry

When beginning to map the construction industry following characteristics was identified:

- **Temporary project organisations.** The construction industry differs from other industries since all construction projects are temporary and have their unique characteristics. The uniqueness of each project is often used as an argument from actors in the industry in an attempt to explain why it is difficult to make improvements in construction processes. This also explains why they do not work with knowledge transfers - they suggest that as each project only occur once it is unnecessary to work with improvements.
- **Complex project organisations with different contracting forms.** A construction project can be organised in different ways and there exist many different contract forms on the market, though the two most common are the “design-bid-build” and the “design-build” contracts forms. There are many other contracting forms though the two most common will be presented here. The main difference between the contracting forms is which actor that performs and is responsible for the design phase in the project. A brief description of the two different forms will be presented below;

Design-bid-build

In this type of contract form it is the client/purchaser who has the responsibility for designing and the functions of the object, while the contractor is responsible for the embodiment. The client hires a contractor who is responsible for the total implementation. The contractor in his turn can have contracts with one or several sub contractors. This contract form create more work for the client as he/she has to produce the drawings – usually the client doesn’t have this knowledge in the organisation and therefore it is common to hire a design consultant who do the design. Compared to the design-build form, the main contractor, who almost always are a construction company, has less freedom and flexibility as they receive complete drawings and only should execute based on these.

Design-build

This contract form has become more common during recent years, and is the contract form most preferred among the interviewed construction companies. Design-build contracts means that the entrepreneur is solely or partly responsible for the function of the object. The contractor is generally responsible for much of the design. He can then easily affect end product properties and performance and thus also take functional responsibility. In

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this form the client leave the responsibility for the total design to the construction company, and generally only provide them with guidelines in terms on functionalities. The construction company then hire their own design consultants and sub contractors.

Many involved actors. Another characteristic of the industry is that the construction projects usually have a great number of involved actors. The project organisations consist of different stages where each stage has actors specialised in a certain areas. An example of the actors usually involved in a construction project is presented in figure 31.

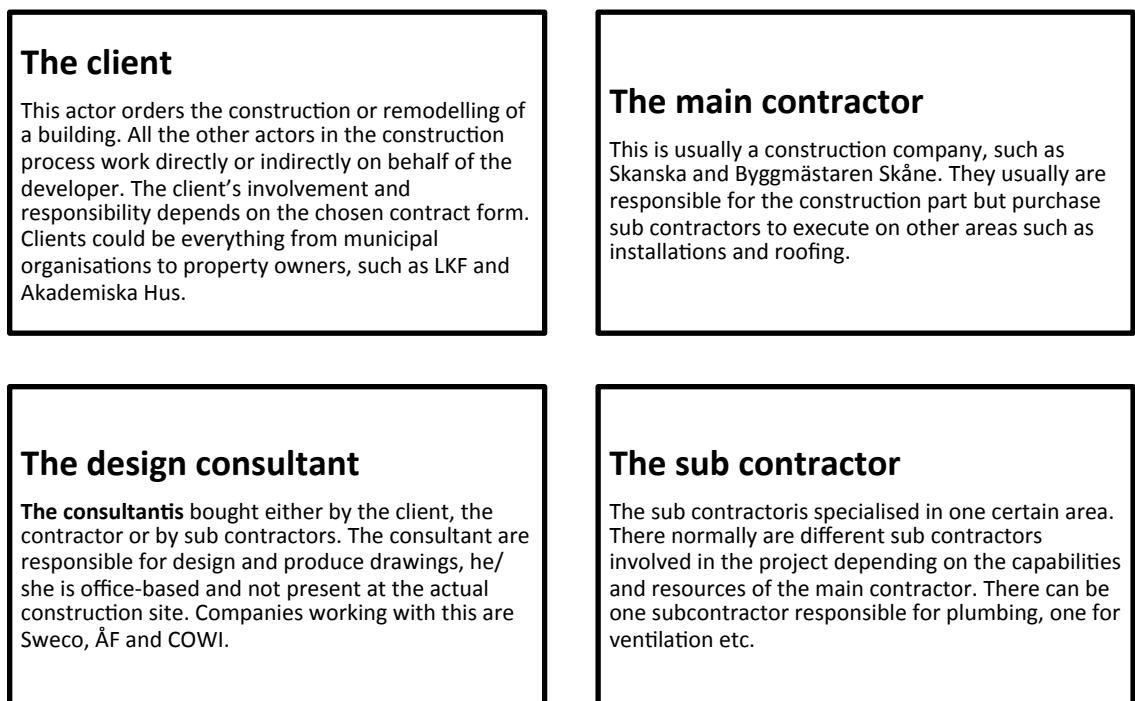


Figure 31 – actors involved in a construction project

The construction process

Beginning to create an understanding of the construction industry it was early understood that a construction project has many different phases, see figure 31, - when the actual construction and execution starts the project usually have been planned for many years. Below the most important activities in the different phases will be described.

Planning & Idea Phase

The first stage in the construction process is the plan stage, here it is the municipalities that have the overall responsibility for determining how land and water areas in the long term will be used and developed. Municipalities must for that purpose establish so-called comprehensive plans, under the Planning and Building Act (PBL). Based on the comprehensive plan, the municipality then make detailed plans for each area where new buildings or where major renovations are planned. Anyone looking to build a new house or doing major renovations, must apply for a building permit at the municipal building. The work in the following idea and program phase is lead by the client's project leader. In this stage the client makes a need analysis and when this is ready, questions like where the building should be located and functionalities should be decided. Further the architect makes the first sketches of the building and the best solution is chosen.

Design phase

In this stage the architect sketches should be turned into specific documents that describe in detail how the building should be constructed and what the end result should be. Except from the architect a variety of consultants become involved in this stage – geotechnical engineers, constructors for plumbing, electricity, interior design etc. The architects and consultant's work determines how the building should be constructed and these descriptions are called system documents, consisting of technical descriptions and drawings. The next step is the detailed design, describing how the building should look like in every detail, e.g. location of particular windows and doors. This result in the finished construction documents that will ensure that all actors involved in the construction process are aware of how the finished building should look like. As mentioned previously a problem in the construction industry is unfinished and incomplete drawings, this is a result of that it is expensive to pay a consultant to make the detailed drawings, as this is very time consuming. Therefore many construction companies and installation companies hire the consultants for less hours and hope that the fitters and carpenters can solve the details on the spot. In the end of this phase a governance system of the whole complex project should be created, this to ensure that budgets is kept and that quality and environmental objectives are met. This system usually consists of several information channels such as information folders, a clear meeting structure etc.

Procurement phase

Now it is time to choose which companies that will build and perform the different installations. The first step is that the client finalizes the contract documents, which are based on the construction documents that the design stage landed in. In the specifications it should be described what each contractor should perform. The specifications contain two different parts; a technical part and an administrative part. The technical part consists of drawings and descriptions of how the building should be designed. The administrative section describes how the contract and the upcoming project should be conducted, as well as the rules that will apply between

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client and contractor. Based on the specifications, the sub-contractors calculate prices and then make an offer to the purchaser. The client then considers the various bids and chooses the contractors who gave the best price or best proposal. For private clients there are no special rules of how to examine the offers and choose entrepreneurs, though public sector clients and public sector clients, is required to comply to special rules for public procurement. According to almost all interviewed construction companies this phase is very time consuming, as many sub-contractors should be bought, and it takes time to evaluate all offers. They all state that the most important criteria is cost, though the trend is that they are increasingly putting emphasis on quality, environment and previous experiences.

“80 percentage of our business is to do business, this is what we are best at. 80 percentage of our sales are purchases of materials and sub-contractors. Can we earn a few percentage here in any way it affects our performance greatly.” - Area Manager, Byggmästar’n i Skåne

Construction phase

When the choice of contract form and contractors are done, it is time to begin the actual construction of the building. There are usually many different companies and professions involved. There is a project manager for the entire building, usually employed by the general contractor. There are land and construction workers, and eventually different types of installers. Job descriptions are defined in the so-called AMA documents, have CAD models of the planned building been used during design and procurement, this model can now be used to provide all players with concrete images of what should be done.

During production following moments should be executed:

- Ground and foundation work
- Frame construction
- Roof, doors and windows
- Gradually placement of the different installations (plumbing, wiring, electricity etc)
- Wallpapering and painting

When the house is ready it is time for handover and a number of inspections, checks and tests should be done to ensure that the prescribed objectives have been achieved and that the building has the right quality in all aspects.

Management phase

In the final stage the building is put into operation, and the occupants move into it. Activities included in the operation of a property is primarily to ensure that the building is equipped with functioning heating and cooling, ventilation, water and sanitation, electricity, telecommunications and data communications and waste management.

Summarising the entire construction process it consist of different stages, involving different actors. In the illustration and in theory the process is presented as stepwise, though interviewed actors all state the different stages usually are overlapping. For example it is very common that the design phase isn't finished when beginning the construction stage, this as most construction processes are under great time pressure.

Trends and challenges within the industry

During the initial interviews some distinct trends/characteristics within the industry were mentioned repeatedly and considered important to be aware of when developing a new service.

Conservative industry – many people refers to the industry as conservative compared to other industries. This since much of the work still is regarded as craftsmanship where the strategies such as lean and JIT is difficult to apply. Another argument is that the temporary projects make it unnecessary to work with improvements and experience exchanges. Though, the mind-set begin to change as younger people enter the industry - the requirement to deliver materials and components just- in-time to the site has increased, including to avoid material left lying for a long time, in all weathers, or to avoid having to wait for delayed deliveries

Technical development – despite the conservative views the construction industry has had a technological development in Building Information Modeling (BIM). Using BIM, you can create a digital model of a building that contains all the relevant information in a construction project. The three-dimensional model allows you to visualize the design and functionality, predict costs, avoid collisions and analyse climate and performance.

Complex buildings and more installations – buildings become increasingly complex which requires more advanced installation and installation systems.

“Today 47 percentage of the turnover in a construction project consist of installations, 10 years ago it was approximately 20 percentage.” – Vice President, AB Rörläggaren

Construction companies becoming project leaders – this is connected to the above trend, as installations become more complex the actual construction part has decreased. As another trend is that many construction companies sell out specialised functions and only keep the actual construction part in-house and then purchase all different functions in each project, they have become more like project leaders in the construction projects, mainly responsible for coordinating involved actors.

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Prefabrication and modules – It is increasingly common with prefabricated parts and modules, this is based on the strategy that some of the work on the construction site can preferably be done in factories instead of on the site.

Rules and regulatory requirements – generally the requirements on the clients has increased, this could be everything from environmental to safety aspects. They have to guarantee that they live up to certain standards, which in turn put greater requirements on the contractors and sub-contractors.

Environment and energy efficiency – this trend is the same as in many other industries, regulations and the increased awareness among citizens has lead to a greater focus on energy efficiency in newly built buildings.

Foreign labour – there is a significant cost pressure within the industry which has lead to that construction companies increasingly purchase construction labour from other European companies as they demand lower wages.

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Appendix 7 – Company information interviewed companies

Company name	Operational area	Nbr of employees	Turnover (MSEK)	Core competence
Byggmästaren Skåne	Construction	190	708	Apartments, libraries and schools
Otto Magnusson	Construction	203	604	Construction service, renovations and new projects
Thage Andersson	Construction	416	778	Schools, industries and offices
NE Bygg (Subsidiary to Thage Andersson)	Construction	130	264	Apartments
MVB	Construction	191	483	Schools, arenas, offices and renovations
Byggcompangiet	Construction	115	232	Housing, Offices and industry
Bravida	Installation	4 149	6378	Plumbing, ventilation and electricity
Caverion	Installation	4718	4990	Plumbing, ventilation and electricity
Climat80	Installation	208	289	Plumbing, ventilation and electricity
Imtech VS teknik AB	Installation	1835	2404	Plumbing (ventilation and electricity in the group)
Rörläggaren	Installation	168	258	Plumbing
LKF	Client	204	840	Housing and apartments
Akademiska hus AB (Sweden)	Client	403	5511	Schools, offices and conference

Appendix 8 – insights from interviews with construction and installation firms

A summary of the main insights considered important to motivate the identified problem area is presented below, divided into different categories. The information that follows is an aggregated summary of the different actors' views on the different categories, where the repeated and relevant answers are presented.

Challenges within the industry

Construction – A main challenge in the industry is to build quality houses at a low price. There is a great demand of building cheap residences. Lack of time to plan during each building projects is as well exclaimed among construction firms. Construction firms have turned it into a sales pitch to be able to build quickly and be adaptable with short time periods. The on going problem with undeclared labour is as well an exclaimed challenge in the industry.

Installation – Tight time schedules and to get all parts of the installation in the right place in time is a challenge. In every new project there is a business risk as the industry has great price pressure. Overall it is a constant struggle for installation firms to reach good profitability. Further a challenge is to calculate the right prices when creating offers, the time pressure and unclear interfaces usually create shortcomings. The firms that supply all three professions, plumbing, ventilation and electricity, have expressed a difficulty in the management and harmonisation of all three parts of the organisation.

Client - As buildings get more complex there is a greater need for coordination of installations. Further there is a challenge in reaching energy efficiency goals and demands.

Focus areas in terms of process efficiency

Construction – BIM is an upcoming technology that constructor's hope will facilitate installation coordination. Another focus area is the consolidation of purchasing departments to achieve a more efficient supply chain. Prefabrication is another trend mentioned by several, a method that improve productivity.

Installation – 3D models that makes it easier for the installers to understand the drawings is a focus area. Prefabrication is time reducing and execute the work in a comfortable environment. An obstacle that installation firms experience in the development of prefabrication is when the building starts before the drawings are complete. Modules can't be put in as it becomes hard to plan how the installations will fit together. To have an overview over all installations in a construction project is considered as a factor that would increase efficiency. Further one focus area is cost control, a more controlled and accurate cost control will enable the identification of costly processes.

Client – The final inspection can obtain many faults and in order to minimize these the focus is on performing routine controls continuously during the process.

Time consuming activities (man-hours)

Construction - Wants more time for planning activities, the site managers spend a lot of time on helping people from the installation side though this isn't their actual responsibility. One problem that takes time is to fix collisions between different installations, firstly recognised at the spot. The site manger spends much time on solving problems and collisions that was not solved or discovered in the design phase, usually due to time pressure. Another time consuming activity is purchasing and evaluation of subcontractors.

Installation - Spends a lot of time on fixing collisions caused by incorrect drawings, interfaces and bad planning. "ÄTA"(costs for additional work) costs, modifications and supplementary work create a lot of extra administrative work as well as it is time consuming.

Client – Experience that the more work that is performed in early phases the quicker process later on. If everyone does what is said in the instruction it works the best. Another time consuming activity is meetings, when managed incorrectly and when problems that isn't their responsibility and interest are discussed.

Selection of subcontractors

Construction - When main contractors purchase subcontractors the prime factor is the price. One contractor stated that 95% of the assessment is based on the price when choosing which sub contractor to work with. Since price is so important, it is not of great importance if the subcontractor can offer "all three legs", (plumbing, ventilation and electricity), if they not offer the most beneficial price. Other important criteria's are earlier experiences, reputation and financial status.

"It is not as great benefits as one hoped for with companies providing all three competences." – Purchasing Manager, Thage Andersson Byggnads AB

Installation – Has the same strategy as contractors when choosing sub contractors. The interviewed installation firms, having all three competences in-house, experience this as a competitive advantage as the coordination of installations can be improved. When several separate firms are included there are more uncertainties regarding responsibilities.

Client – Also value price as the most important factor when evaluating suppliers. However as they have an interest in the quality and operation of the building they emphasis other factors such as reputation and quality more than the other actors when choosing contractors. They also stated that factors such as if the contractor offer an installation coordinator or come up with own ideas regarding improvements – this is considered as an advantage. In case of a design-build project, the client

leaves all the responsibility to turnkey contractor and has minimal contact with the subcontractors.

Collaboration

Construction - Do not see it as an advantage from collaboration and coordination perspective to buy the same disciplines from one contractor, as they are still organised as separate companies. A threat to good collaboration is that design engineer consultants are going through a generation shift. This means that the accumulated knowledge is disappearing and that most consultants are newly examined from school with little experience, resulting in incorrect drawings. The collaboration with the client is usually time consuming as much time is spent on arguing and negotiating additional work with the client. The client is usually not versed within construction, leading to long decision times and uncertain answers. This in turn affects the collaboration with the construction company's sub contractor, as they also are dependent on the answers from the client. Due to the short time frame the interaction lists between different sub-contractor are incorrect causing collaboration difficulties, as no one knows who is responsible for each task. Making a common time schedule together with the sub contractor has given the best results when it comes to collaboration.

Installation - The bigger companies, who have the three disciplines in-house, mean that it would improve the collaboration between all parts if buying the total installation solution from them. Today collaboration difficulties emerge between sub contractors due to carelessness in the design phase, and they discover on the construction site that the drawing doesn't work in reality. Then the different actors have to spend time and efforts on arguing about who should fix it and who should pay for it.

Client – The client experience it as a success factor to create a time plan together with all involved actors. Consider a good collaboration with the main contractor in case of design build project, when they are relieved from answering questions from sub-contractors, since this is the contractor's responsibility.

Quality

Installation - Due to bad planning and lack of time the execution face sometimes start before all calculations and drawings are completed, resulting in rapid on the spot solutions. Bad planning also lead to chaos in the end of the project when everything should be completed at the same time, leading to quality deficiencies. Further bad project management lead to difficulties in how to prioritize what jobs to do first.

“99% of quality issues has its base in bad planning.” – Construction Manager, MVB

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Installation – The price pressure in the industry is a threat to quality since actors only get the job if they offer a low price and not the best and most effective solutions. Solutions that would be more sustainable and efficient in the long term are not developed as no one wants to pay for it.

Client – As the client has a lot of regulation requirements, the quality is highly prioritized, especially when it is their responsibility to operate the house afterwards.

Activities and processes where the actors need support

Construction – When calculating the price of a job, construction companies see benefits in having more competence within the installation field in order to estimate correct prices and identify deficiencies in the overall solution. This shows as many of the interviewed companies want to hire personnel with comprehensive installation knowledge. Therefore it is clear that there exists a desire to increase efficiency in the purchase phase. Another field where support is needed is logistics at the construction site. This field could be improved as workers spend much time on searching for things at the construction site. Several of the companies also mentioned that they would need external guidance in how to become better at planning.

Installation - An external project leader, not working on the behalf of any involved actor, would be helpful in terms of planning and coordination of installations. This would make the leader impartial and improve the process flow. Leadership within the installation area could be improved to reduce time spent on wondering what to do next among the installers.

Client – Clients hire expertise consultants to ensure that the subcontractors live up to their standards.

Factors causing additional costs

Constructor – The major factor causing additional costs is when things take more time than planned. This could be a production stop due to incorrect drawings or discussions regarding unclear interfaces. Further solutions that have to be developed on the spot usually are time consuming.

Installation – Factors such as disruptions in the process, bad coordination of installations as well as bad management that stop the workflow, are all considered as costly.

Client – The more specified product specification that they provide from the customer the less expensive it tends to get. When the architect has drawn freely it usually becomes expensive for the client.

Desired improvements in the organisation

To speed up our search after finding a service and to gain inspiration, the interviewed person was asked to think freely about what they would improve in a

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dream scenario if receiving 100 00 SEK. The responses are presented below in figure 32.



**Plumbing
company**

- “Education to employees regarding collaboration and teamwork activities with aim to create a better team spirit.”
- “I would allocate more time on examination of drawings before production starts, we need to get better at examining drawings and read them together.”
- “Education of a colleague working with purchasing, in installation technology. He has a background within construction and would benefit from gaining knowledge regarding installation in order to create better bargaining power, the better we are at what we do the better agreements we get. I would also develop better support documents and checklists concerning installation coordination.”
- “I would buy an education in planning – it is crucial to get everybody to realize the importance of planning.”



**Construction
company**

- “A kick-off for the involved parties in a new project where the overall planning is created jointly, this would improve collaboration and make the construction process run smoother. “
- “Computer course to be able to use all software programs”
- “Increased prefabrication to reduce work time on the construction site”
- “Better usage of our installation coordinators, when we are hired the customer should be able to focus on their work and know that the installations will work.”

Figure 32 – Insights from interviews with customers

Appendix 9 – the role of installation coordinators

The role of installation coordinators

“As installation coordinator, you have overall responsibility for coordinating installations in Ikano’s housing projects. You are engaged in the design, installation procurement, scheduling, production and inspections. The role also includes lead responsibility in commissioning and testing of the project.” – Employment ad, Ikano 2014

To gain an understanding of what an installation coordinator (IC) really is the authors read job ads, talked to the construction and installation companies as well as interviewed a person working as installation coordinator. The insights are presented in table 3.

Table 3 – Insights regarding the role of installation coordinators

What is the definition of an installation coordinator (IC)?			
Installation company	Construction company	Job ads on the market	Installation leader NCC
<ul style="list-style-type: none"> ○ One company was of the opinion that the responsibility of the IC could be divided into two main parts; planning and preparation in design phase, and coordination in execution phase. The IC should be most active in the design phase, if the job is thoroughly done here there is no need for much work during execution. ○ The task in the design phase should mainly be to compare and examine drawings to ensure the correctness and functionalities of drawings 	<ul style="list-style-type: none"> ○ Its important to understand all installation systems and know how they are interlinked. ○ Should further be able to suggest technical solutions. ○ Should be a part of design and execution phase, responsibility to assist when evaluating suppliers and examine drawings and interaction lists. 	<ul style="list-style-type: none"> ○ Work descriptions usually involve responsibilities regarding ensuring fulfilments of installations requirements. ○ Important to have experience from the different installation fields ○ The person should be involved during the entire construction process. 	<ul style="list-style-type: none"> ○ Distinguished between two roles in this field; installation coordinator and installation leader. ○ The IC mainly work during execution and the responsibility is to plan the time on the site and decide work order for subcontractors such as ventilation, electricity and plumbing. ○ Installation leader is referred to as a person who contributes in the design phase and during calculations. The purpose of this role is to reduce number of “ÄTA” costs and reduce number of remarks in the end product.

Reasons for hire an Installation Coordinator

Currently on the market it can be the construction firm, the client or the installation firm, who hire an IC. It was clear that many installation firms had good experience with projects where the installation coordinator was hired by the client. This was considered as positive since the IC doesn't work on the behalf of the installation firm or the construction firm, facilitating the collaboration.

“Installation coordinators improve the process flow since someone works actively with coordination of installations instead of each actor working on solutions in separate corners. They work as a moderator, as collisions are always occurring you have to find a middle way. It is easier if an external part do this.” (Larsson, 2014)

As many of the interviewed installation firms had all installation disciplines in-house they also have employed ICs, utilized when providing overall installation solutions. A minority of interviewed construction firms had an IC employed in-house, though some of them use to hire an external when necessary, usually in the construction of more complex buildings.

Another insight is that there seems to be different perceptions regarding when an IC is needed. Several firms stated that installation coordination, as a profession, only is necessary when it comes to large and complex buildings such as hospitals and industry buildings. However, some installations firm claim that installation coordination is relevant even when doing simple buildings for example in apartment complexes where the same thing is repeated a lot of times. If it is done correctly and effective the first time, it will save you a lot of money later in the repeated process.

Appendix 10 – summary of insights from workshop with customers

The main findings and insights from discussing each hypothesis with the people participating in the workshop, is presented below.

The coordination of installations is a problem for both sides

Both sides agreed on that this definitely is a problem. A representative from the construction firm meant that it is a problem, though it is highly dependent on the person acting as installation coordinator. The installation side meant that it is a problem, though as many of the representatives were working at the same installation company that has all disciplines in-house, they meant that it is a smaller problem when buying entire installation solutions from the same firm. This since it is easier for them to coordinate installations as they have all functions within the same company. The installation side also highlighted that based on their experiences the installation coordination always is easier handled when the construction company let all involved installation companies have a joint start-up meeting together with the client. Further the coordination is facilitated when they partner up more tightly with another installation firm and create solutions together.

√ Verified by both sides

Problems with coordination of installations depends on collaboration difficulties between the different actors

This statement led to an interesting discussion confirming that this is a real problem, perceived by both sides. Both actors generally had the same view of the problem – cost pressure led to that the construction company has to purchase the sub-contractors offering lowest bids. This results in separate sub-contractors on each function and thereby collaboration difficulties. This result in frustration at the installation company as they can spend a lot of time on calculating and designing synchronized solutions for the project, however the construction company still choose the cheapest solution. However the representatives from the installation company stated that they understand the construction company since if they don't choose the cheapest contractors they wouldn't get the job from the client, due to fierce competition.

A representative from the installation company mentioned that he had visited a plumbing firm, operating at another geographical location. They had allied with a construction firm and together they did most projects together, resulting in good financial results. They had the same people working together on each project, which facilitated the collaboration and reduced interaction problems. The construction company then meant that this wouldn't be possible for them today, if they had allied with a sub-contractor they would not receive bids from other firms, resulting in

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higher prices. The installation company agreed by meant that this would be desirable from an effectiveness perspective, as both sides could earn money on this. The construction company saves time, as they don't have to perform a competitive tendering on each project. At the same time it is easier for the installation company to plan and provide an overall solution. The installation company stated that based on experience, in successful construction projects, the different actors has met in an early phase and focused on working together.

√ Verified by both sides

Problems with installations of coordination lead to poor flow efficiency within the construction process - employees from both sides has to spend time on the wrong things

"This week I have spent 60 % of my time on doing the wrong things, but it still has to be done" – Project Leader, StjernfeldtsVVS

Regarding this statement, both sides experience that they spend much time on ÄTA-handling, which is administration of costs related to additional work not calculated in the original agreement. The installation representative stated that he spends a lot of time on this due to incorrect drawings, as the drawings are not examined together. The construction representative agreed on this, at the same time the construction company doesn't have the time or competence to examine all the sub-contractors' drawings.

The previously mentioned problem of the construction company's site managers forced to spend time on helping installation people, were also verified and discussed. The construction representative meant that this problem would be solved if the installation company would have a fixed work management on the site, though the installation side meant that they don't have the financial resources to this. The cost would be so high that they wouldn't receive any job. However, they agreed on the problem, as their project leaders have 2-3 projects running at the same time they cant be 100 % informed on each project.

√ Verified by both sides

Boundary lists don't solve all problems related to coordination of installations

According to the construction representatives it doesn't solve all problems since there are no lists that are complete and therefore they spend much time on investigating "who is really responsible for that area?". The installation side meant that lists could be good, though it is still important that all actors meet before the contract is written, and talk about the integration of installations. This as there is a great amount of technical parts today that not is a part of the drawings. They also

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pointed out that the reason to many errors is the short time frame, when they get a job there is no time for tendering and calculation of prices.

The construction company meant that preferably they should send the interaction list with the purchasing specifications, though the short time frame lead to that this never is the case.

“Usually we should begin the construction before the actual contract is received.” – Purchasing Manager, Otto Magnusson

✓ Verified by both sides

Comprehensive installation coordination is mainly required in complex construction projects

Both sides agreed on this and pointed out that the bigger the construction project is, the more important it is to work with coordination of installations. The same applies for the complexity of the building. Though, both stated that it would have been beneficial to work with coordination of installations on medium sized construction projects as well, especially in the design phase. However this is usually down prioritised due to lack of financial resources.

✓ Verified by both sides – though also needed in medium sized projects.

Installation coordination will be facilitated if the construction company by plumbing, ventilation and electricity from the same sub-contractor

Not surprisingly, as the participants from the installation side were working at a firm like this, they meant that it would be beneficial for the construction company to purchase the entire installation solution from them. This as they collaborate within the company and design overall solutions, this will lead to less problems and time consuming conflicts at the work site. The construction side didn't have any experience from working with one firm responsible for all installations, though meant that it seemed like an advantage to purchase everything from one actor.

✓ Verified by both sides

What could a solution to the identified problems look like?

After this part of the workshop it was quite clear that both sides had a consensus regarding what the problem really is; bad drawings and lack of coordination and planning of installation activities. Therefore the participants were asked what they would need to solve this problem.

Both parts agreed on that they want a person who is a part of the construction process the whole way – from design until the construction is completed. This would promote solving of problems in the beginning instead of in the execution phase. This

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since today there are no one that has the responsibility all the way, everything is passed on further to the next actor in the process. In case of problems this person would be able to solve it immediately, instead of as today, solving the problem two months later. The main responsibilities of the installation coordinator should be to examine the drawings in the design phase and coordinate the installations during the execution phase. The installation company had experience from working with an external coordinator that was involved during the entire project and meant that this was a success and resulted in win-win for all involved actors.

Both actors further wished that this person should be externally hired as this would make him neutral and facilitate that everything done, is done since it is best for the project. One possibility would therefore be that this person, the installation coordinator, is hired directly by the client – as he/she has the intentions that are for the best of the entire construction project.

There is an uncertainty regarding who should pay for the installation coordinator. The construction company representative meant that the installation company that has all functions in-house should afford to have this position in the work force. Though, the installation company agreed and said that they have been thinking about hiring an installation coordinator, though if they hire someone for this there has to be someone who hires their firm and is ready to pay for it. Both sides further agreed on that there is a great need for experienced and talented installation coordinators on the market, as they are lacking it today. Though, there is a great problem in deciding who should pay for it, everybody agree on the necessity but nobody wants to pay for it. The installation- and construction company meant that it is on the large construction projects it is easy to see the positive return, though on the medium projects it isn't as obvious and nobody can't afford it. It disappears in the competition and together with it parts of the overall quality.

Appendix 11 – description of the developed service offer

The situation today is that Schenker delivers the material to the construction site from point A to point B, see figure 32. After that someone from the installation side, usually the team manager, unpack the material and put it on a shelf or on the right spot on the construction site. Sometimes the Hilti Account Managers assist with the unpacking of materials, consuming much of their time. The service would therefore mean that Hilti arrives at the construction site after Schenker has delivered the material, unpack it on the right place and relieve the customer from the transport from point B to point C, see illustration in figure 33. The idea could be compared to suppliers delivering goods to a supermarket, where usually the suppliers self enter the store and unpack the goods on the shelves. The service would guarantee that the Hilti consumables arrive to the construction site in an efficient and easy way, at the lowest price as possible, making more time available for the installation side.

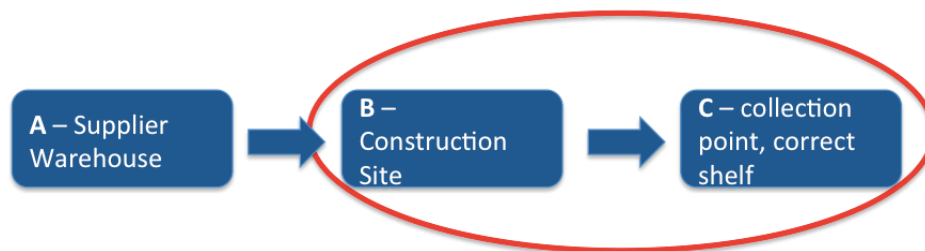


Figure 33 – The logistic service

However, the Hilti employee working with the unpacking not need to be an Account Manager, as their expertise and competence could be spent on more value adding activities. Instead this could be a new role at Hilti, employed by people that don't need to be as experienced and expensive as an Account Manager.

The participants at the workshop considered that this service offer would be in line with Hilti's current resources and capabilities, and that it would be a natural extension of current products and services.

"This service would release time from the sales force at Hilti that can be put on more value adding activities." –Key Account Manager (Installation firms), Hilti Svenska AB

Further, it would lead to an increased presence at the construction site and a closer relationship with customers. As it now was concluded that the service would be in

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line with Hilti's current business model, the next step in testing the solution was to test if the solution was interesting enough in order for the customer to buy it and whether the company has discovered a problem with a large enough market where customers are eager to get this problem solved.

Appendix 12 – Step 4 assessment of the service opportunity

Potential to profit from the new service

The potential to profit from the new service solution was assessed in an initial profitability assessment, carried out in chapter 6. An important aspect that has to be considered is that the proposed service is not yet launched and therefore the profitability aspects are not fully known. Except the financial calculations, elements that are considered relevant when assessing a firm's ability to profit from innovation will be evaluated in this section.

One of the elements are complementary assets, which are assets other than the actual sold service that will give Hilti an advantage in capturing value. The new service has to be marketed to customers within the construction industry, requiring sales personnel with knowledge about construction and the entire construction process. Therefore it is perceived to be important to have access to Account Managers with extensive knowledge and experience of selling to customers in this industry, competence that already exists within Hilti. Several of the employees working as sales representatives have long experience from the industry and have established relationships with many of the existing customers. Altogether, there is a need for a sales department with a large sales network that has experienced key Account Managers, construction marketing knowledge and technical knowledge. Therefore the sales organization within Hilti is considered to be a specialized complementary asset. Further Hilti's strong brand is considered as a complementary asset. The majority of customers within the construction industry are well aware of Hilti and associate the brand with high quality products, which are considered as an advantage when marketing the new service.

The logistic service is a service based on current Hilti products, which are protected in terms of design and patents, though the actual service don't have any legal protection to lean against. Looking closer to the activities carried out to perform the service, it contains a setup of many activities and resources. It is made out of a combination of products, human resources and Hilti specific resources. This together with the fact that the service is developed to match the characteristics of Hilti consumable products, the nature of the service is perceived to be hard for competitors to fully imitate.

Consequences for resources and capabilities

The new service solution is concluded to be in line with the overall strategic intent of Hilti Services. Insights from interviews combined with the study of internal

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documents made it clear that Hilti's current strategy is to focus on the development of services to make the customers regard them more as a partner than just a supplier. This service will leverage upon existing products and capabilities, and take them one step further. By doing this Hilti broaden their product and service portfolio and show the customer that they has a solution for the entire product chain. It is easy to deliver a tool, though with this service Hilti analyse the entire supply chain and optimise the logistic solution for each customer, providing the customer with a better and more value-adding offer.

The proposed service solution requires some resources not currently available within the company. A sales organization exists that can market and sell the service, though what is needed are employees working with the physical unpacking of material at the customer's site. This is needed since it would be time consuming and expensive to let the Account Managers or Field Engineers perform this task. The people working with the unpacking and distribution of consumables don't need to be as expensive and experienced as the current sales representatives. Further the logistic solution will require it-skills in terms of software development to be able to further develop the existing EDI solution. This knowledge is on the other hand perceived as to be quite generic and already existing within the company, and not believed to limit the firm's ability to carry out the business model in a qualitative manner.

There are several existing resources that can be leveraged upon when delivering the new service, mainly sales and possibly the employees in the Hilti store. However, the Hilti sales force today is quite product focused and there will be a challenge in adapting to promoting and selling chargeable services. Depending on how adaptable the sales force is, it can be considered to be a resource that can be leveraged on, or not. As just mentioned the new service require employees responsible for the physical unpacking, though there is a possibility that this could be handled by the employees in the Hilti Stores. Today there are Hilti Stores that are manned with at least two employees during the entire day, though something that could be further investigated is the utilization of the employees. Usually in stores there are some hours during the day when there are several customers and some hours when it is basically nothing to do. One possibility could therefore be that the Hilti Center employees can be leveraged upon and spend around 25 % of the day working with unpacking and distribution during some hours per day when the customer number is low. This is however something that needs to be further investigated.

Further, the service aim to leverage upon the existing brand, with its high quality and good reputation within the construction industry. Another resource that can be leveraged upon is customer knowledge as Hilti has built strong relationships to many customers resulting in a large customer database. This could be used when developing the logistical solution and adapting it to different customers. The tight customer relationship is considered as a valuable resource when launching this new

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service. Furthermore, the capabilities identified in step one of the model, especially the ones regarding the capability to create customer-adapted products and the service minded approach, are considered as useful when launching a new service that should fit with the customer environment.

Another aspect of launching this service is that it would release time for Hilti's Account Managers, as they don't have to spend time on unpacking activities. Instead they can spend the released time on selling and marketing activities, which is more value creating with regard to their skills and experience. This service will therefore also lead to a higher utilization and usage rate of Hilti's existing resources.

The perception is that the need for additional resources and capabilities are low, as the service is based on existing ones that can be leveraged upon. The existing sales organisation is an important resource that will enable the selling and marketing of the service. Further, the resources needed are not perceived to be vital resources and therefore identified not to affect the performance of the service to a large extent. A stronger argument is however that there are potential synergies from existing capabilities and resources. Existing customer relations and service mindedness presents a great base for trust towards the customers. This is perceived as beneficial since the outcome of the service is tacit where trust and reputation strengthen the firm's offer. Finally the service is perceived to be in line with the company strategy, resulting in that the service is identified to be well suited both in terms of strategy, resources and capabilities.

Implications for current business and customers

Hilti is considered as a premium player within the construction industry market through its high quality products and included services. As an effect, the brand represents an important asset towards customers. Therefore new services introduced, related to the Hilti brand, needs to maintain a high standard. At first the service's impact on existing customers and business will be evaluated, to ensure that it won't have negative impact, resulting in loss of customers and business opportunities.

The service proposal is not considered to involve any great risk of influencing the customer base in a negative way – instead it is perceived to strengthen existing customer relations through increasing the quality and efficiency of the customer's processes as well satisfy what the Kano model refers to as "attractive needs". This as the customers don't expect or require the attribute performance that this service offers in terms of unpacking and distribution of consumables at the work site. According to performed interviews the logistic service is considered to satisfy customers' emotional needs as they don't expect this product attributes, and not become dissatisfied when the performance of this product attribute is low.

For the existing business new routines, the implementation of the new service, might lead to less time spent on marketing and selling products. By offering both service and products through the sales organization there is a potential for synergies and reduced costs for the sales organization. However, as more is sold by the sales force less time might be available for the products and customers might perceive that sales meeting takes too much time and thereby affect the product sales negatively. On the other hand, by spending more time with customers Hilti can gain a stronger brand recognition associated with a larger extent of knowledge within construction related processes.

Summarizing it can be concluded that the service will fill an identified strategic sweet spot, as Hilti will meet customers' need in a way that rivals not are able to in the given context. The logistical solution is adapted to Hilti's products and therefore difficult for competitors to imitate. Further the service is aligned with Hilti's capabilities, providing them with unique characteristics enabling the launch of the service.

Associated risks

Summarising the final assessment of the developed service, identified risks will be presented along with a discussion regarding mitigations of risks.

Capability risk: This risk is considered as very low as the expansion into this service area not will take Hilti outside the logical scope of their capabilities and organizational culture. The service will leverage upon existing resources and capabilities, resulting in a low demand for entire new resources.

Market risk: There is a risk in that customers may not adopt the service as they consider it as too expensive. During the interviews there were mixed opinions regarding customers' will to pay for it. However, this will be handled by a thorough presentation and motivation by the Account Managers on what value the service will offer to the customers in terms of process efficiency and time savings. As expressed during interviews in projects where the time is scarce the service is even more relevant. During the interviews with construction workers as well as installation firms they all experience a limited time frame.

Financial risk: There is a risk, considered low, in that the service offer attractive revenues but not profits. Some general financial estimation has been completed, though there is a risk in that the time to develop and launch the service will be greater than expected.