



LAUREA
UNIVERSITY OF APPLIED SCIENCES
Together we are stronger

Providing customer voice for R&D - A case study in the manufacturing industry Hiiri, Beada

2018 Laurea





LAUREA
UNIVERSITY OF APPLIED SCIENCES
Together we are stronger

Laurea University of Applied Sciences

Providing the customer voice for R&D
- A case study in the manufacturing industry

Beda Hiiri
Degree Programme SID
Master's Thesis
December, 2018

Beada Hiiri

Providing customer voice for R&D - A case study in manufacturing industry

Year	2018	Pages	51
------	------	-------	----

Manufacturing companies need to stay competitive in the business and it requires innovation and improvements to existing products or services, to keep current customers but also gain new market share. There is a long history mentioning customer involvement, and how to create products that serve the customer needs. The starting point for the thesis is how to give the customer voice to those parts in the company that are responsible for innovating the products and services for the consumers.

The purpose of the thesis was to look for ways to provide the customer voice of the manufacturing area of the case company's research and development (R&D) department and to employ design thinking (DT) and innovation. The theoretical part concentrated on defining the role of R&D and the customer in product development. The customer role in R&D was evaluated through new product development (NPD), design thinking and the quality requirement Six Sigma processes. The empirical part concentrated on the case company's R&D personnel and their actual needs, and on how to integrate the voice of the customer in the daily work. The empirical part of the thesis utilized service design process and methods.

The theoretical and practical parts proved that a customer voice is needed in R&D work and it requires effective communication between R&D and marketing departments. Collecting and presenting the customer voice so that it is usable requires their own efforts that are not a part of current processes. The study did also show that the marketing organization has more information in use than the R&D department, and that this could be corrected with an R&D personalized way to present the same information.

Uncertainty in product development created another pain point and it was in the beginning of the process where initial definitions for the product should have been agreed. Based on theoretical findings, this is the part where customer needs should be involved, and it should be the starting point for the development. R&D sees definitions as more important in the beginning where marketing would like to keep the options open. Definitions will affect the speed of the process, and the quality of the product, especially if definitions change later in the project.

Future research should follow up with the implementation part of the proposed methods and evaluate if they have any effect on the work of the co-creation between departments, in the speed of the new product development process, on the success and quality of the new products and on the increased amounts of ideas and innovations.

Keywords: R&D, Voice of Customer, NPD, Six Sigma, Service Design, Design Thinking

Table of Contents

1	Introduction.....	6
1.1	Background.....	6
1.2	Thesis objective and delimitations.....	7
1.3	Thesis structure.....	9
2	Theoretical grounding for the need of customer voice in R&D.....	9
2.1	Role of Research and Development (R&D).....	9
2.1.1	R&D history.....	9
2.2	Definition of innovation.....	10
2.3	New product development (NPD).....	11
2.3.1	Fuzzy front end (FFE).....	13
2.4	Six Sigma and Voice of the customer (VOC).....	13
2.4.1	Sources for customer data.....	15
2.5	Design Thinking in NPD.....	15
2.6	Customer insight.....	17
2.6.1	Research for customer insight.....	18
2.6.2	Levels of insight.....	19
3	Service design.....	20
3.1	Thesis service design process approach.....	21
4	Execution of empirical part.....	23
4.1	Company background.....	23
4.2	Starting point in the case company.....	23
4.3	Background insight through questionnaire.....	25
4.4	Understanding the company R&D process.....	26
4.5	Evaluating information need and tools.....	28
4.6	Innovating new ways for collecting customer feedback.....	31
4.7	Customer helpline observation.....	34
4.8	Experimenting with the helpline monthly questionnaire.....	35
4.9	Testing the R&D dashboard prototype.....	35
4.10	Evaluating new ideas with the customer voice included.....	38
4.11	Testing the presumption canvas.....	40
4.12	Promoted next steps.....	42
4.12.1	R&D dashboard.....	42
4.12.2	Collecting customer feedback.....	43
4.12.3	Presumption canvas.....	43
5	Conclusion.....	44
5.1	Discussion of main findings on theoretical part.....	44
5.2	Practical contribution and process evaluation.....	44

5.3 Findings on practical contribution.....	45
5.4 Future research.....	46
References.....	47
Figures.....	50
Tables.....	51

1 Introduction

According to Theodore Levitt (1960, 24), people do not buy goods or products as they seek solutions or experiences. He says that American railroads failed because they were product-orientated not customer-orientated. A firm must make itself successful in business, and that requires knowledge. One obstacle against a successful business is mass-production.

He stated this in the 60's but this is a valid comment even today. Current trends show (Trend One 2017) that people are asking for more tailored products, as one solution does not fit all. Customers' needs vary and those needs must be heard.

1.1 Background

According to Lusch & Vargo goods-dominant (G-D) logic is goods and firm centric. Goods are seen as the end product, when a customer acquires them, the value comes out of owning the product. In service-dominant (S-D) logic, goods are transmitters, and the customer's influence creates the value. (Lusch & Vargo 2014, 101-102)

It is important to understand S-D logic in companies that produce traditional goods and how to implement S-D logic in these types of companies. The question is how they understand customer roles and customer needs in value creation, and how they could implement customers as co-creators in their processes and interact with the customers. Grönroos (2011, 289) sees companies more like facilitators of customer value creation processes. Therefore, manufacturing companies must implement something to the process so that they can ensure the value for the customer.

Table 1: Customer and goods role in G-D vs. S-D

	G-D logic	S-D logic
<i>Goods</i>	End product	Value transmitter
<i>Value creation</i>	By owning	In use
<i>Customer role</i>	Target	Resource

Customer-dominant (C-D) logic approach states that value is created over time and it is subjective and depends on customer context. It can be also a passive process (Voima, Heinonen & Strandvik 2010, 5-6). C-D logic argues that providers must gain insight and understand customers' patterns and different logics therefore C-D logic does not concentrate on specific contact points (Heinonen, & Strandvik 2015, 7). Adopting C-D business logic implies that cus-

tomer issues drive at all levels in company including design, production and the managerial thinking (Heinonen et al. 2015, 18).

Shifting from G-D logic with the product as a value, to S-D logic where the customer is a value co-creator, to C-D logic, which concentrates on understanding customer life, gives argument for case company to include the customer voice to the research and development (R&D) departments' development process. The manufactured product itself does not have value before it is used and evaluated in long-term usage. Selecting the product itself is affected by the customers own experience and reasoning. The customer could be a part of the new product development (NPD) process even when they are not in direct contact co-creating the product.

The Meier, Roy & Seliger (2010, 608) method of applying S-D in manufacturing companies are part of the Industrial Product Service System (IPSS) which is solely targeted to business to business (B-to-B) firms. According to Kowalkowski (2010, 285-292) service-dominant logic and value-in-use means new requirements for manufactured products. Companies need to consider lifecycle cost, maintainability, reliability and supportability. In IPSS customer needs are in an important role already in the beginning of the development process and both parties, engineering and marketing, should be taking a part in the decision process. For communicating customer needs for development, companies should have an organized system for collecting the needs. Kowalkowski (2010, 285-292) sees that the transition from G-D to S-D logic can be easier for business-to-business (B-to-B) companies than business-to-customer (B-to-C).

The case company delivers similar products also for B-to-B companies and they could view customer roles in similar way in both offering areas. Customers are a part of the co-innovation process and they can actively and passively co-create behavioural patterns (Kowalkowski 2010, 285-292).

1.2 Thesis objective and delimitations

In the light of insight presented in the introduction, it is important to bring the customer voice to the design process. The purpose of this thesis is to find a way to turn customer insight for the research and development (R&D) process, and to provide the customer voice in different steps of designing a new product or developing innovation for business-to-customer (B-to-C) use. The aim is to support the design thinking (DT) process in the case company. The thesis is tailored for the case company processes and to their research and development (R&D) department located in Finland. The key target is to find a way to implement the customer voice to the existing product innovation and development process and trigger possible innovations. The process to evaluate the R&D needs and create solutions is based on service design (SD) approach. The thesis is separated into two parts. The theoretical part concen-

trates on the research what is the R&D role in a manufacturing company, the customer role in the R&D process and how the customer voice is collected.

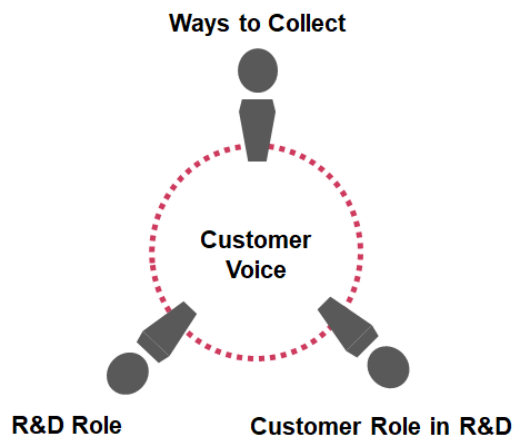


Figure 1: Research framework for the customer voice

Research questions to define the theoretical part of the thesis topic about customer voice:

- Why the customer voice is needed in research and development?
- What is customer insight?

Research question for the service design part of the thesis is to provide customer voice for R&D:

- What information is missing from the case company's R&D new product development process?
- How the information is related to the customer voice?
- How to collect the customer voice?
- How the information could be presented in everyday use for R&D?
- How to involve the customer voice in the new product development process?

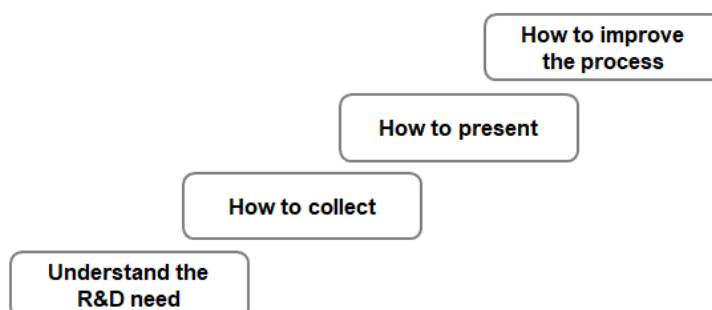


Figure 2: Research questions in the thesis empirical part

The thesis is concentrating on methods showing the customer voice in a B-to-C product development process and it will not redesign the case company's existing customer personas or processes used on the marketing side. Implementing new methods to the existing process could also need a wide study, and an employment of change management but that is not part of this thesis.

1.3 Thesis structure

The thesis is divided into five parts. In chapter 1, I went through some of the business background for customer voice in the manufacturing industry and defined the research questions. Chapter 2 deals with the role of research and development (R&D) in the company and how the role has evolved during the past decades. Chapter 2 explains innovation definition and the methodology used in the manufacturing industry that also considers the customer voice. In chapter 3, service design as well as some of the key principles and methods used during this process will be discussed. Chapter 3 will also clarify the steps of the thesis process while maintaining a service design approach. Chapter 4 concentrates on explaining the empirical part of this thesis and seeks answers to the empirical research questions - what was created during the study in the case company, and what the findings were at each phase. Chapter 4 includes proposals for future deployment of the customer voice for everyday R&D work. The fifth chapter reflects on the findings and concentrates on evaluating them and the entire process.

2 Theoretical grounding for the need of customer voice in R&D

In this chapter, I will go through the R&D process in traditional manufacturing companies and the need for customer insight. I am focusing on what the customer role is in the innovation process and why the R&D process could benefit from customer insight and co-creation.

2.1 Role of Research and Development (R&D)

According to Chiesa (2001, 6, 12) the primary function of R&D is to develop new products or new ways of producing them to gain market share. This is done by research, development, design and testing. This process has more risk factors and it carries uncertainty. This process phase and R&D is not in direct responsibility to get immediate profit. R&D plays a major role in the company's innovation process. He states that success comes out of combining marketing and R&D forces.

2.1.1 R&D history

Wang & Kleiner (2005, 88 - 95) Nobelius (2004, 369-375) and Barbieri & Alvares (2016, 116-127) define five steps of R&D and innovation evolution.

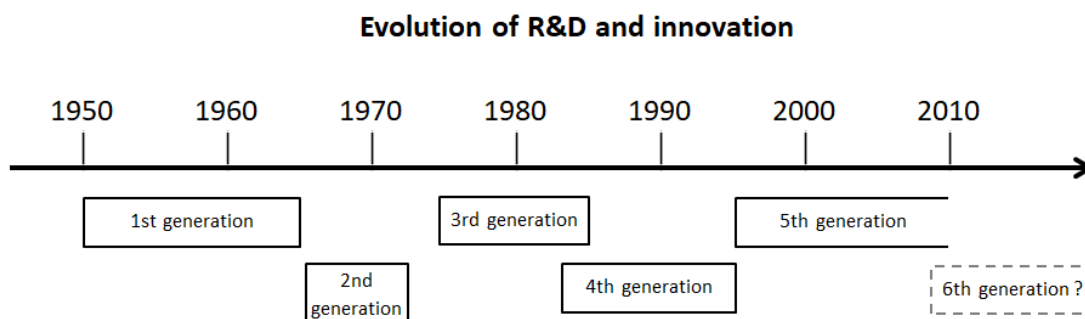


Figure 3: The five generation of R&D and innovation evolution

The first generation was from 1950s to mid-1960s. Then R&D was seen as an isolated part in the organization and the primary function was to produce scientific breakthroughs. Second generation started from mid-1960s and ended in early 1970s. R&D was a part of business and market functionalities. The company strategy and internal customers did guide the R&D work. Third generation was from mid-1970's to mid-1980s. During that period R&D portfolios were part of the business and corporate strategy decisions. Cost reductions played a role in R&D decisions. The fourth generation started in early 1980s and lasted until the mid-1990s. During the fourth generation, the R&D process became integrative. The process concentrated more on customers. R&D tried to learn from customers and with them, and R&D evolved from a product-driven process into a concept-driven one. The fifth generation started in the mid-1990s. At that time, R&D started collaborating with a network of different experts involving competitors, suppliers, distributors and other parties. According to Wang & Kleiner (2005, 91-92) the sixth generation of R&D will have a stronger focus on the actual research as more actors have to be taken into consideration in the development process.

2.2 Definition of innovation

Innovations are mostly defined in two categories; incremental and radical innovation. Radical innovations target the positioning of the company in a different way in markets they operate in or plan to operate in the future. Incremental innovations relate to the operational efficiency example cost reductions, faster order fulfilment, elimination of defect sources, and minor changes in the product to make it more suitable for use. (Barbier et al. 2016, 116-127.)

Davila, Epstein & Shelton (2012, 48-50) divide innovations to radical, semi-radical and incremental, and the deviation is based on a degree of novelty from a technological point of view and the business model.

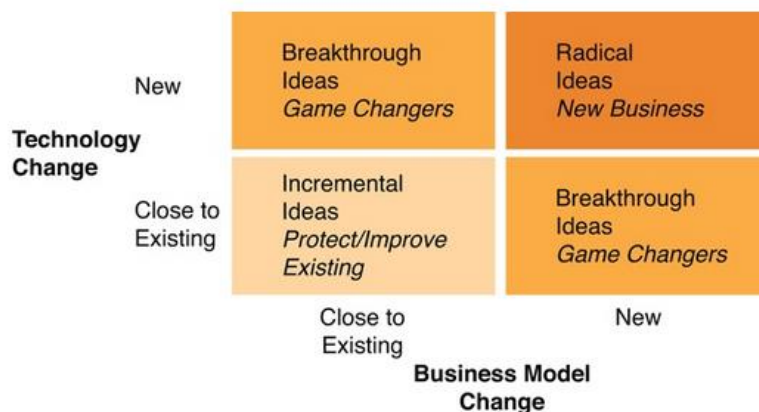


Figure 4: Davila et al. (2012, 22) Innovation matrix

Six levers of innovation by Davila et al. (2012, 64-66) are divided into business model and technology innovations. Business model innovation refers to how a company creates, sells, and delivers value to customers. Technology innovations concentrate on new technologies. Ideas are the origin of innovation. Ideas about product processes and business can come from inside and outside the organization, for example from the customer. Developing those ideas are a part of R&D work. (Davila et al. 2012, 64-66.)

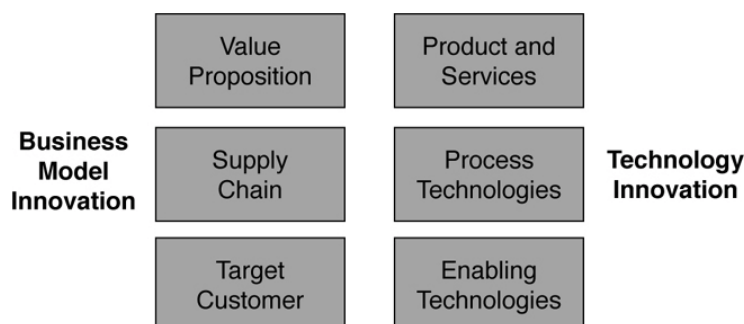


Figure 5: Davila et al. (2012, 62) six levers of innovation

2.3 New product development (NPD)

New product development (NPD) should be a process where the whole organization could have an opportunity to affect. Developing new products should transform business opportunities to actual products. Marketing, economics, production management, R&D and design engineering all affect to the development process. (Trott 2017, 482-483.)

Krishnan & Ulrich (2001, 1-21) divides product development to four categories. These are concept development, supply-chain design, product design and production ramp-up including launch. Concept development concentrates on defining the value attributes, the concept it-

self, variants, the architecture and physical form of the product. Attributes support the customers' needs and concentrates on making the product more desirable.

Based on the questionnaire conducted in the case company, these four parts can be seen as a journey for product development. It is important to notice that these four steps point out roles that are executed in different parts of the organization. For example, a design in R&D and a launch in marketing, support the need for co-creation in new product development.

Annacchino (2011, 4-6) defines different versions for product development outcomes, and he evaluates those by the revenue and economy growths they can bring to the company. New non-existing products are created to support growth of the economy and to generate revenue for the company. A new product line is way to enter new markets and that creates incremental revenue by increasing the manufacturer familiarity. It can also replace old product lines. Another way is the support for an existing product line with new amendments. That effects to the revenue similarly than the new product lines. Improvement of existing products focuses on keeping the market share and generally does not create new revenue. Repositioning act targets to change the consumer perception towards the company offering. This can be seen more of a marketing act, and it does not support real economic growth. Cost reduction can create revenue in the short term but it does not create growth.

Table 2: Types of product development programs (Annacchino 2011, 6)

Type of development	Time to introduce	Potential revenue contribution to economy	Revenue contribution to company	Company positioning strategy	Potential margin impact
New to the world	Longest	Highest potential	Highest potential	Market development	Highest
New product lines	Long	High potential	High potential	Market development	High
Add to existing	Medium	Medium potential	Medium potential	Line complete	Medium
Improve or revise	Short	Little potential	Medium potential	Market share	Medium
Repositioning	Shortest	Little potential	Medium potential	Market share	Medium
Cost reductions	Shorter	Little potential	Medium potential	Raise margin	Medium

Annacchino (2011, 101-106) and Trott (2017, 501) define the customer role in NPD as a resource for ideation, co-creator for design, as a tester of the product in the development phase and as a user for the product support phase. According to Annacchino (2011, 101-106) direct sources for customer data are customer surveys, focus groups, feedback and complaints. Indirect sources are benchmark and sales representatives.

2.3.1 Fuzzy front end (FFE)

“Fuzzy front end” (FFE) describes the starting phase of the new product development process which might feel messy and unclear. This contains the part of the process that has research opportunities in the business; studying customer needs and creating concepts. This state ends when the organization has decided to continue with certain concept. After this part, the cost of the NPD process will rise significantly. Therefore, this phase should be considered as critical part of NPD. Customer involvement should be a part of the early stages of the process but it can be difficult. One big reason might be that customers and producers are far away from each other. (Trott 2017, 498-500.)

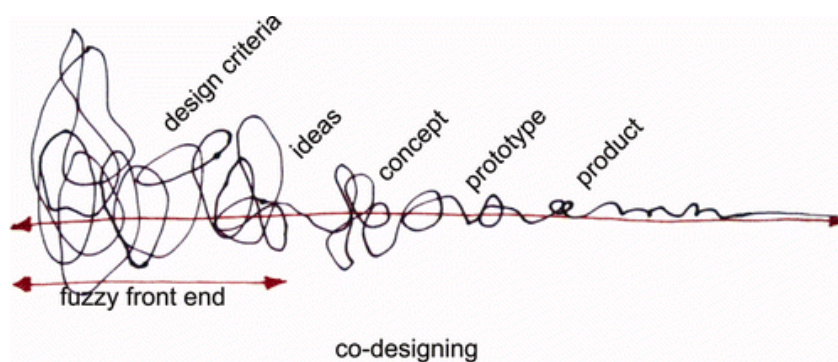


Figure 6: Fuzzy front end by Sanders & Stappers (2008, 7)

Celabretta (2015, 41-42) describes three key challenges in FFE; problem definition, information and stakeholder management. Methods used by design professionals can be helpful for dealing with those challenges. It is important to understand the problem properly and address the correct needs. Problem statement can stay too high level and then it might lead to solutions that do not address user or company needs. Distribution of information can be too overwhelming and therefore it should be planned so that it would clear the uncertainty and not create more of it. Different stakeholders might have different goals, instructions and interests and this might lead to poor innovation processes where people do not engage with the development project. (Celabretta 2015, 41-42.)

2.4 Six Sigma and Voice of the customer (VOC)

In manufacturing companies, there are needs for specified requirements for the products. These can either be based on legal or quality requirements set by the company itself or requirements indicating what the product should be. In many companies, there is a need for systematic quality checking and defining correct requirements for testing.

Six Sigma means a measure of quality that strives for near perfection. Six Sigma is a disciplined, data-driven approach and methodology for eliminating defects. A quality approach for

products, process and services. It focuses on customer requirements by understanding customer needs. The goal is improved customer satisfaction. (Desai 2010, 2-7.)

According to Taylor (2008, 35) the fundamental basic for Six Sigma is the voice of the customer (VOC). The VOC is defined with products that meet customer needs, customer attitude towards the company products or service, and customer perception towards the information about the company and organizing it (Taylor 2008, 36).

According to international Six Sigma Institute (2018) methods to capture the customer voice are surveys, interviews, focus groups, suggestions and observations. Customer feedback must be interpreting the customer needs and defining needs to product properties or attributes, together with the business and market requirements. Need is a desire or an expectation about a product or service. Some of the needs can be vaguer and can be stated as “wants”. “Wants” can affect slightly positively or negatively against the product or service but if these needs are not met, the customer will be unsatisfied and can choose another product or not buy the product at all. Requirements are attributes for a product or service, which fulfils the customer need. (International Six Sigma Institute 2018.)

Six Sigma uses KANO model to prioritize customer requirements (International Six Sigma Institute 2018). Matzlera & Hinterhuberb (1998, 25-38) summarize the requirements in different categories. Must-be requirements is something that must be achieved. If the requirements are not achieved, the customer is very unsatisfied. If they are fully achieved, the customers are neutral towards them as they expect these requirements to be achieved without mentioning them specifically. With one-dimensional requirements, the customer feels satisfaction when requirements are achieved and dissatisfaction if they are not achieved. The customer usually specifies these requirements unlike the must-be requirements. Attractive requirements surprise and excite the customer when fully achieved and gives no thoughts if they are not achieved. The customer does not usually express these requirements. International Six Sigma Institute (2018) describes two more categories for requirements. Indifferent requirements do not make a difference for the customer whether they are achieved or not. Reverse requirements should not be achieved as achieving these may lead to customer dissatisfaction.

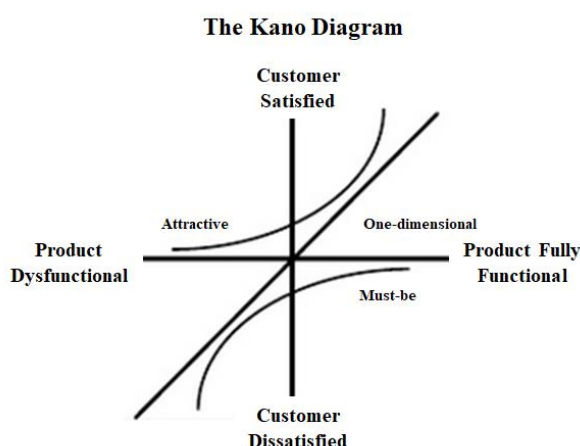


Figure 7: Kano's model of customer satisfaction (Walden 1993, 4.)

Voice of customer in Six Sigma gives another approach to the need of the customer voice and the principle for innovation development.

2.4.1 Sources for customer data

According to I Six Sigma (2012) methods for gathering customer insight is divided into two categories proactive and reactive. Reactive data examples are complaints, product returns, sales figures, warranty claims and surveys. These are mostly given without asking, like complains and sales figures. These are easy to obtain and they are directly related to a customer's experience but come after a negative effect. Proactive methods require special effort to collect, for example focus groups, surveys, market analysis and benchmarking. They can be used in planning new products and services, and they can drive for better user experiences, but can be more expensive to conduct. Both data types are important and can improve customer satisfaction. (i Six Sigma 2012.) Annacchino (2011, 4-6) mentions that direct sources are customer surveys, focus groups, feedback and complaints.

2.5 Design Thinking in NPD

Curedale (2013,13) describes design thinking as a way to look for solutions to problems and it can be used as collaborative toolkit with anyone to develop products, services, experiences and strategy. Curedale (2013, 73) summarizes that different views have mentioned focus on human values and later described as empathy for users. This is a starting point for design ideas. Brown & Katz (2009, 43-44) states that you should not directly ask people what they want, as they cannot state something that does not exist, but to concentrate on insight, observation and empathy. Brown et al. (2009, 50) says, "The mission of design thinking is to translate observations into insights and insights into products and services that will improve lives."

Brown et al. (2009, 24) explain that successful ideas have three different criteria: feasibility evaluates whether something can be done, viability ensures that an idea is part of a successful business model, desirability looks at the idea from people's point of view and evaluates whether the idea is needed or wanted.

The thesis scope is also to provide the customer voice to support the design thinking process. The case company is a manufacturing company, so they need to understand consumers, to solve their problems and innovate products that can be manufactured. Creating systematic approaches for getting customer insight is important.

Ideation part in design thinking might seem like a none-organized approach. Brown (2009, 67-68) explains the divergent and convergent thinking processes, where convergent thinking is a good way to select the best choice, but divergent thinking is needed to open the possibilities and think the future.

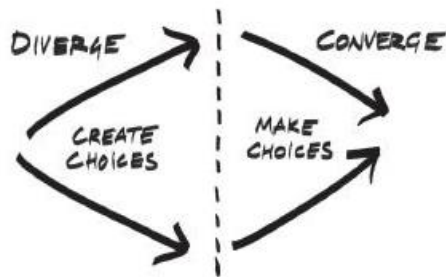


Figure 8: Brown et al. (2009, 68) divergent and convergent thinking.

Brown et al. (2009, 72) says that the best design approach contains room for experimenting, participation from whole organization and tolerance for risks during idea harvesting. The design thinking role is to produce better results, as it looks for customer needs and promotes early prototyping to search best results. This method can support the “fuzzy front end” in the NPD process and it can be used in the beginning of the process, which then continues with normal process methods used in the company (Luchs 2015, 22).

There are several design thinking frameworks but there is consistency between them (Luchs 2015, 23). I selected to present Luchs model as it is integrated to new product development process and it is considering the same elements that the scope of this thesis.

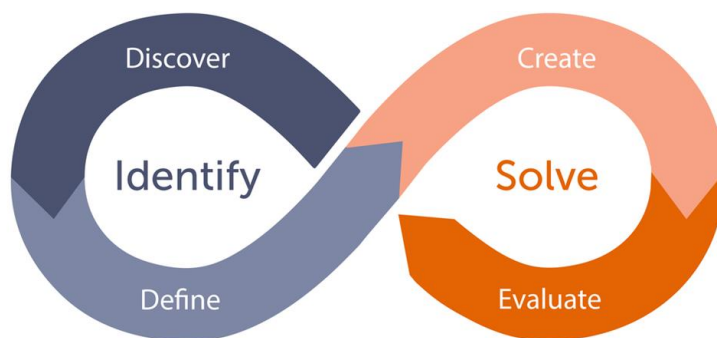


Figure 9: DT framework by Luchs (2015, 24)

In Luchs model (2015, 24-27) there are four phases. The discover-phase focuses on new customer insight referred to as latent needs. It is important to see the insight and break through the product specifications, which are related to an existing product. The define-phase consists of a developed understanding of the customer to create the challenge. In the creating-phase, the goal is to make a concept that can be tested with target market customers and iterate the concept based on the feedback. Testing is in the key role of the evaluate-phase and it is not the final step of the process.

The case company scope is to get the information for R&D to form the insight. Insight is used in discover-phase and goal is the customer understanding and the definition-phase.

2.6 Customer insight

Customer insight seems to be understood in many ways but Lopetcharat, Hanson & Paredes (2012, 54-55) state that insight is not same as research finding, and insight must answer the question “why”. Good insight is qualitative, allows forming connections in research findings and builds hypothesis for future use.

Schieffer mentions that (2005, vii) customer insight importance comes out of understanding customer needs. Especially in companies that have long processes for product development, it is important that the company seek the future needs of the customer. Schieffer (2005, xv) describes his view with a customer insight pyramid (Figure 9) which builds the path to new product success’. Each part of the pyramid must be understood before going to the next step on the pyramid.

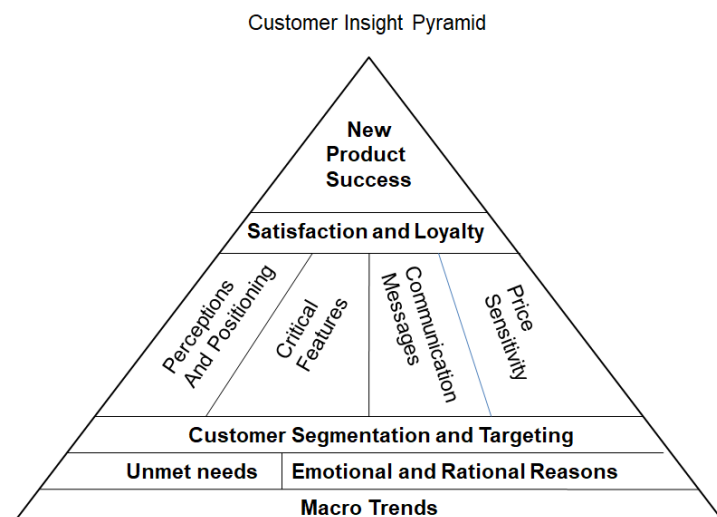


Figure 10: Customer insight pyramid by Schieffer (2005, xv)

When compared NPD, Six Sigma and design thinking approaches for customer insight, they all give similar roles for the customer and methods to collect the customer voice. Each of them aims for the customer to be part of the process and R&D needs the data from customers to make better products.

Table 3: Customer role and source for data in compared frameworks

	NPD & FFE	Six sigma & VoC	Design Thinking
Customer role	resource	source for needs	starting point
Used for	ideation co-creation testing user	attribute creation	empathy ideation co-creation testing
Source for customer data	<ul style="list-style-type: none"> • customer surveys • focus groups • feedback • complains • benchmarking • sales representative 	<ul style="list-style-type: none"> • surveys • interviews • focus group • suggestions • observations • market analysis • benchmarking • complaints • product returns • sales figures • warranty claims 	<ul style="list-style-type: none"> • quantitative • qualitative

2.6.1 Research for customer insight

Research is for understanding people and the goal is to get away from assumptions to knowing real data. Research can be quantitative answering more to “what” and qualitative answering more to “why”. Research can be conducted in several phases of the process not only to get the insight, but also to test the ideas to ensure correct direction. Research is a structured process to give insight and it utilizes ethnographic research methods. Research should be

planned to ensure that you get what you are looking for and to ask the correct questions from the right people. Findings should be combined with business constraints and data from marketing research to get full insight. (Stickdorn, Hormess, Lawrence & Schneider 2018, 97-102.)

Portigal (2013, 7-9) presents the Steve Mulder way of arranging different research methods. He states that the correct method for research should be determined based on the initial need for research.

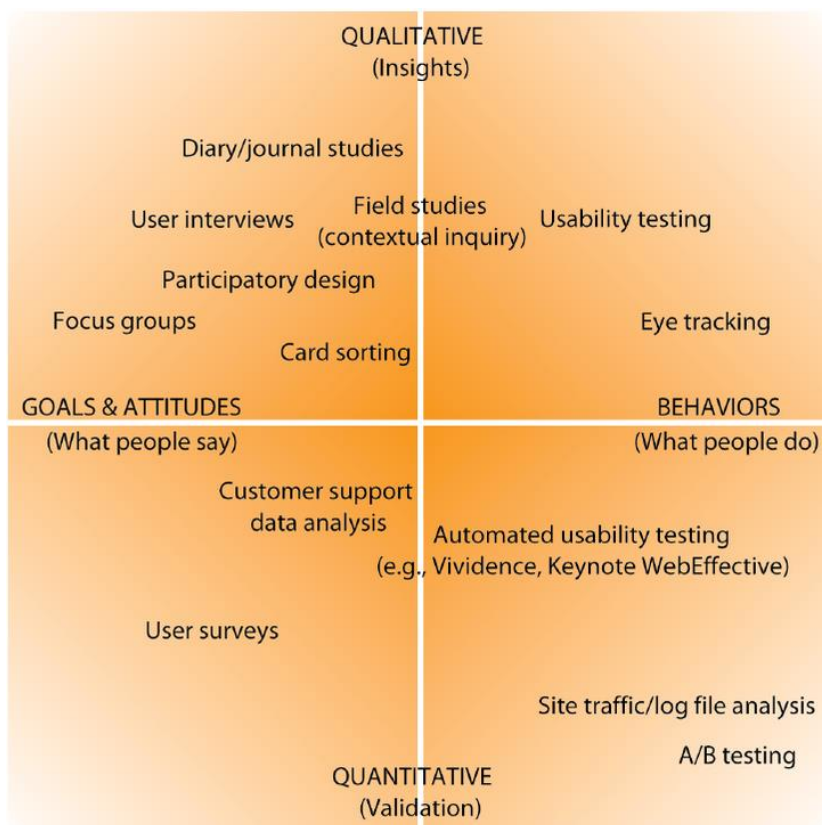


Figure 11: Steve Mulder way of organizing research methods Portigal (2013, 24).

The sample selection refers to the group size and the other selection dimensions about the people you target with your research methods. It can be conducted by quantitative research methods that has more people involved or qualitative research methods that concentrate on a certain target group and focus more on rich data. (Stickdorn et al. 2018, 103-105.)

2.6.2 Levels of insight

Polaine, Lovlie & Reason (2013, 48-49) define different levels of insight you can gather from users or customers. Low-level insight concentrates on four or five people and a short interview that gives insight about what they say. This is a less expensive method if it can be done locally or by phone. Medium-level gathers insight with approximately 10 people and gives

more insight about how we see the user or consumer insight. The method can be a co-creation workshop with the customer. High-level insight gives a deeper understanding combined with business effect. This needs deeper involvement with customers and use of different methods.

3 Service design

” Service design is an interdisciplinary approach that uses different methods and tools from various disciplines and it is hard to give a single definition for service design.” (Schneider & Stickdorn 2010, 29). Miettinen (2013, 6) states that service design can be seen both as an academic discourse and a practice.

Stickdorn et al. (2018, 21-22) describes that it can be seen through different views. The mind-set of a group of people in an organization whom thinks about the user, promote research and prototype testing and want to see an implemented solution that gives new insight for the next ideas. Service design connects the user, the technology and the business. Process approach gives effort to iterate an idea through short cycles, especially in the beginning with actual user feedback. Service design gives tools and methods that can be used in workshops and are understandable. Considering it as toolbox is one part, but without the mind-set and process aspect, it might not give any useful results. Seeing it as a cross-disciplinary approach, it gives the opportunity to bring different people around a common subject to work with simple tools and through that find common language and understanding. Using service design as a management approach, it can give opportunity to have both incremental and radical innovations. (Stickdorn et al. 2018, 21-22.)

According to Reason, Løvlie, & Flu (2015, 12) service design can be used to tackle organizational challenges. Service design starts from the customer and combines it with business ambitions and an organization’s capabilities. This outside-in approach can support common understanding inside the organization. (Reason et al. 2015, 12.)

Stickdorn et al. (2018, 26-27) has redefined the Service design principals. He has defined them in to six different principals: human centred, collaborative, iterative, sequential, real and holistic. What is tried to be achieved by using service design according to the principals is to understand the stakeholders as persons, designing together, experiment, iterate through the process, and validate those with tangible evidence to support the business needs (Stickdorn et al. 2018, 27).

Reason et al. (2015, 15-17) key concepts states that the design approach, that emphasizes on a human centred, creative approach is thinking by doing. It is based on qualitative research

that creates insight and understands the human behaviour. The goal is to design with people, not for them.

In this thesis, I consider R&D personnel as the customer or user who needs an internal service and tool to help them to do their work. The actual outcome of the company is seen mostly as a product, but also includes related services. The R&D personnel are designing mostly new products or improving existing products.

In the thesis scope service design tools and methods have been used as a mind-set, putting user and consumer first. Following process and toolset viewpoints to understand the need of R&D person, and ideate solutions for getting the customer insight, and how it could be presented. The solution has been tested with prototypes. The goal, to provide the customer voice for R&D, is to get ideas and innovations so therefore, some management approach would be needed, but generally it is not in the scope of this thesis.

3.1 Thesis service design process approach

Methods used in this thesis are familiar from design thinking and service design. This chapter explains the theory behind the selected methods and process steps. Next chapters describe more on how they were implemented in the empirical part of the thesis.

The thesis target is to understand the current state of the customer insight in the R&D department and how the customer voice can be visible in everyday use for the R&D department.

Like in design thinking, in service design there are several process descriptions. For example, UK Design council has created double diamond model for developing services: Discover, Define, Develop and Deliver (Design Council 2015). Moritz (2005, 123) categorises the service design process as a set of tasks that have been grouped into six categories: SD understanding, SD thinking, SD generating, SD filtering, SD explaining and SD realizing.

I have chosen to use the Stickdorn et al. (2018, 92-93) service design process as it resonates well with a manufacturing company and not just by service creation. Design processes can vary based on the subjects, but you always need to work iteratively, and it is necessary to understand user needs. An important part is to understand the correct problem first and this often means that the process starts from planned research. (Stickdorn et al. 2018, 87-88).

The thesis process is described with four key areas: research, ideation, prototyping and implementation, mentioned by Stickdorn et al. (2018, 92-93.) Figure (12) shows a detailed approach and selected methods in each part.

Thesis process

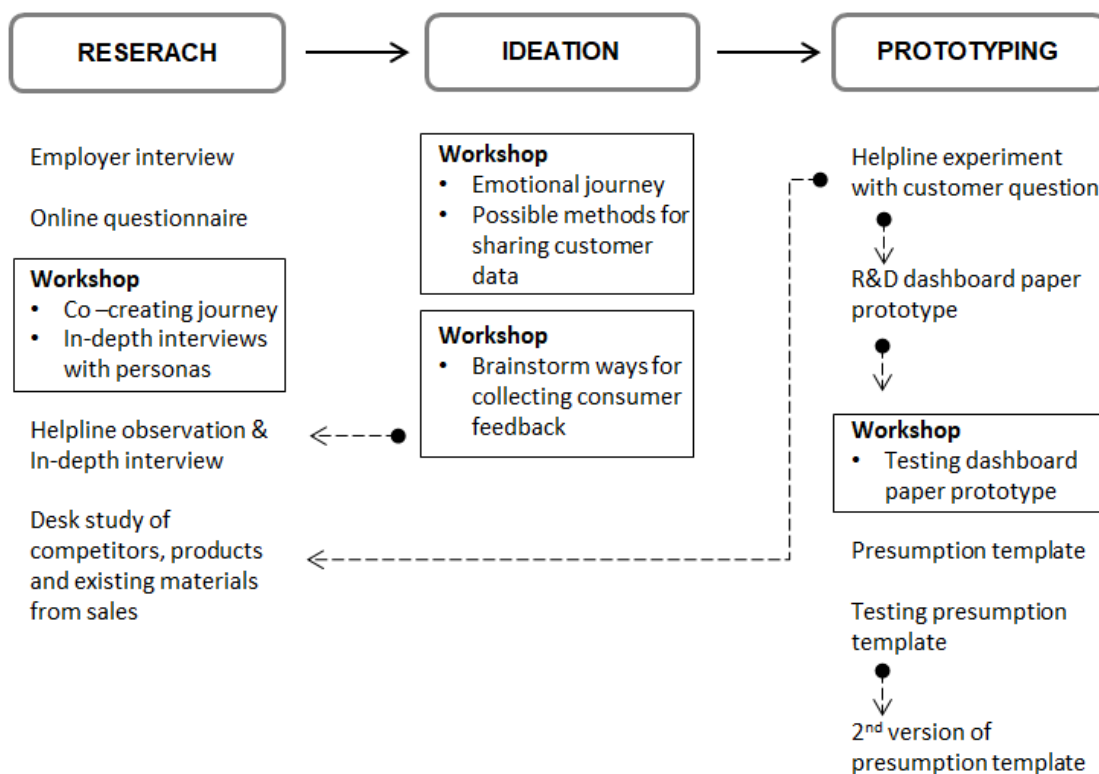


Figure 12: Illustration of thesis process and selected methods

Research aim is to understand people's motivations, subjects and empathize with people. Usually it is done as a first exercise in the service design project but can be also conducted during the process when more information is needed. (Stickdorn et al. 2018, 97.)

The thesis user is a person working in the case company's R&D department. The research part aim to understand how R&D sees this subject and what their needs are. R&D collaborates with different departments therefore research was expanded to related departments and their view of the same subject.

Ideas are a critical part of problem solving and belong to the service design process. Ideation contains idea generation, idea selection by clustering, voting and ranking. This happens after the previous output from the research part can give a starting point and scope for the ideation process. Ideas need to be groomed to get mutual understanding between the idea session participants and to create understandable concept for others to evaluate. (Stickdorn et al. 2018, 156-169.)

The goal of the prototyping is to give a tool or model, which can be evaluated and understood with users or stakeholders. The prototype method should be selected by the solution idea and what you want to validate. (Stickdorn et al. 2018, 231).

According to Stickdorn et al. (2018, 92) implementation can contain architecture design, product management, software development and change management. It is aimed for production after testing as the main goal is in everyday business rollout. This part can be very expensive, needs more stakeholders, new skills, and employs to execute the solutions. (Stickdorn et al. 2018, 271-271).

Possible implementation of idea solutions is not in the scope of this thesis. This thesis includes proposals for next steps based on the findings during the project. Implementation might need change management aspects, which are not part of the thesis.

The process was not linear what is normal in iterative service design process. During phases, you learned something that requires more research before going to the next phase.

4 Execution of empirical part

In this chapter, I will go through the executed process starting with the company background through desk research and an initial interview with a person requesting this thesis for the case company and proposing the thesis subject. Chapter will follow the thesis process and describes findings from each step. I will also describe the reason to select certain methods mentioned in chapter 3.1 and how they were utilized in this project.

4.1 Company background

The case company is a Nordic company, which offers products and services for consumers and professionals. They have a long history of manufacturing and they have production facilities in different countries. Products are available in more than 40 countries. The product offering includes several different product categories and related services. According to them, consumers and professionals are the end users of their products and services. Consumers (B-to-C) and professionals (B-to-B) are primarily served through different stores.

4.2 Starting point in the case company

In-depth interview is a qualitative research method for relevant stakeholders and conducted in a semi-structured way. The aim is to understand and learn more from the process and concerns. (Stickdorn et al. 2018, 122.)

The case company innovation specialist requested this thesis and I conducted an interview with innovation specialist and innovation director face to face. The interview was structured by using guiding questionnaires and recorded with field notes. This chapter refers to their statements of the starting point.

They state that they are good at the technical development but are missing insight from consumers and a proper way to ask from them. The current set up might be too product oriented and it is seen as risky to innovate new things. In the future, it would be good to also have new services together with the products. They do have customers involved in developing professional products and they conduct testing with them. This is not a normal method on the consumer side, and they would like to have more customer and market insight for the research and development process.

For new ideas, they do have an internal idea management system, where ideas are evaluated, and the evaluation process can take up to 60 days. To develop and launch new project can take from one month to two years. Launch time depends on the solution, as it can be product improvement to an existing product or a new product.

On the industrial side they iterate with some agile methods, and they have co-developed 1-2 cases with customers. For professional consumers they have a training facilities what is optimal for testing products. They also have the possibility to conduct surveys for professionals.

The R&D teams are cross-functional, and new products must be fitted for different countries because of cultural differences. They have several R&D teams located in Europe.

The company has started to implement design thinking method, to decrease the market risk for new products. DT approach is also part of the company culture change -process. During one exercise in Finland, they conducted interviews in local stores with consumers and R&D people. The feedback stated that it gave insight, but it was not natural for all R&D people to have interviews directly with the consumers. Therefore, there is always the question of who is responsible for interviewing consumers. The DT experiment revealed that similar types of exercises have been done already in the 90's. During that time, R&D personnel answered the company help and support line, and they had direct contact with the end users. Nowadays R&D is a more isolated department. During product development, they work together with marketing.

The company has existing consumer personas and their customer and consuming journeys are described by marketing. I used those personas in my workshop. During the process, I learned that marketing has more customer insight than what could be utilized by the R&D department.

The thesis was done for the R&D team located in Finland. During the process, there were R&D and product-marketing personnel involved, as new product development is a co-created process.

4.3 Background insight through questionnaire

The aim was to understand more about the company's R&D process from different parties who either belong to R&D or works closely with them, on the process of new product development. I selected the method to be an online questionnaire. An anonymous questionnaire was a good method for getting comments from individuals with statements that are more honest. I wanted to understand how the employees see the process from the perspective of their work. Do they think that they have easy access to customer feedback, and how are those used in the process, and how they see the customer voice being as a part of the innovation process?

Pre-questions:

- Job description
- Describe the basic product development process: Where it starts, how it goes on and where does it end?
- Do you have easy access to customer feedback and ideas? What is the method?
- Is customer feedback used in the R&D process? If yes, how it is used?
- Are customer comments used for making innovations?
- What inspires you to innovate?
- Are customers involved in some (case company name) processes, if yes in what phase?
- Do you see benefits of customer insight in your work?
- Anything else you would like to add on this subject?

Answers were given by ten persons from research, product development and product management areas. Access to customer feedback is seen quite differently and there are conflicting views. Half stated that customer feedback is available through different methods and half thought that they do not have the feedback or there is no systematic method for collecting it. Mentioned sources for this type of data are sales, customer enquiries and colleagues. Identical view is that many products have been improved, based on the feedback from customers.

They also feel that customer feedbacks are not necessarily used in the innovation phase, when it concerns consumer side products. Time and freedom in work is mentioned many times to be the important part of the innovation process. Developing ideas needs time and current workload might prevent someone to do innovation. What inspires to innovate is changing world and if they see problems. All stated that customer insight is the most important part of this work as products are made for customers. Currently customer involvement in new product development process happens mostly during testing and validation phases. Process starts from the need of the customer or the company or from new product idea. This can be seen as a product oriented process. In next chapter, I go thru the design process steps in more detailed level. There is a hope that processes would be companywide, and that there would be more customer visibility.

4.4 Understanding the company R&D process

Based on the interviews it was clear that R&D sees customer voice as an important source for them. Next step is to understand what type of information R&D needs. I wanted to create a journey map for differentiating steps in the idea development process and to see the information need in different steps. Later this same journey is used for defining the most important steps and information related to these steps. The main actor in the journey is the R&D personnel who are developing new products from a new idea to actual product in the portfolio.

Journey maps can be created with a co-creation workshop method in the research phase. The journey can vary from high-level maps to a detailed part of the journey and the timeline can vary. It can be considered as a research visualization method. (Stickdorn et al. 2018, 126-127.) According to Stickdorn et al. (2018, 44-47) the journey map is a tool to help outline someone's experiences step by step and to illustrate the overall experience of the customer in different steps. It can contain both customer and employee experiences and experiences by external stakeholders. It can be used for zooming out from an organization perspective and looking at the service/product from different perspective. The journey helps to understand the problem you are trying to solve and it tries to understand the customer reasoning. It helps to identify the opportunities and it is good way to co-create new solutions. Method can be applied for creating future state journey map. It is good method for ideate solutions, communicate & test with others. Journey can bring teams and organizations together with common focus.

The first workshop was about the new product journey from idea to market. Participant was persons from research, product development and product management areas. The journey is made from an R&D perspective. Steps are phases that new idea goes through before it can be

sold as a product and steps what happens after production. Figure 13 shows the co-created journey map with different phases and steps. Before-phase named as *pre work* holds the steps for innovation. This phase describes how idea will go thru different evaluation steps to see if it viable for product development and is it desirable for customers and does it meet customer needs. Ideas can come from anybody, but still pre-evaluation of ideas are a part of R&D work. During-phase named as *product development* describes process steps where idea is developed to a product and to phase when it can be mass manufactured. Steps contain feasibility study with different methods. This part is mostly an R&D process but also involves product marketing. After-phase named as *sales* follows what happens after mass production and continues with quality supervision and to sales procedures. Sales phase is not part of the R&D process but data that can be collected in these steps affects to the beginning of the process. Participants did not want to use direct brake lines between before, during and after and stated that the border is not that clear. Cost increases in the process towards the end.

Product development/product journey (R&D perspective)

Phase	Pre work €						Product development €€						Sales €€€		
	Observation	Describing the idea	First investigation	Internal evaluation	Business evaluation	Production evaluation	Product definition	Implementation design	Pilot (laboratory)	Testings	Finalising	Technical review	Marketing status review	Massproduction	Follow-up
Action and information need	<ul style="list-style-type: none"> -Diag -Mitä -Mitä kaikkien tarpeet -Mitä osien tuotteiden -Mitä osien tuotteiden 	<ul style="list-style-type: none"> -Onko idea hyvä -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla 	<ul style="list-style-type: none"> -Kattavampi -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla 	<ul style="list-style-type: none"> -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla 	<ul style="list-style-type: none"> -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla 	<ul style="list-style-type: none"> -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla 	<ul style="list-style-type: none"> -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla 	<ul style="list-style-type: none"> -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla 	<ul style="list-style-type: none"> -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla 	<ul style="list-style-type: none"> -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla 	<ul style="list-style-type: none"> -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla 	<ul style="list-style-type: none"> -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla 	<ul style="list-style-type: none"> -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla 	<ul style="list-style-type: none"> -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla 	<ul style="list-style-type: none"> -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla -Mitä kokeilla

Figure 13: Product development journey in R&D

Another goal for workshop was to get insight how familiar R&D is with the persona descriptions and can they empathise with these personas.

The persona is a group of people and it is archetype not stereotype. It can be created from research results and it can be considered as research visualization. The persona can contain several perspectives and the goal is to focus on the persona's wants and needs instead of demographics. (Schneider et al. 2010, 178).

Case company's four existing personas contain information about:

- Persona descriptions with numerical data of the persona attributes
- Where they live
- What they value and follow
- Where they use the products
- Media usage

- Persona journey starting from understanding the need through different steps to enjoying the end result
- Each journey step, needs, activities, barriers and triggers

Workshop participants were divided to small groups. Based on given information about the personas, each team had to think:

- What would stress the persona in this type of work?
- What personas observe when purchasing products?
- What personas observe during the usage?
- What delights the persona?
- What is the final thing the persona tries to achieve?

By observing this task and free talk after the session, it became clear that, some of the participants were more familiar about the personas than others. The task outcome followed mostly the information given about the personas, and participants did not argue about persona descriptions. They felt that the personas are relevant but think that some persona groups are too small to make special product just for them, as mostly they must design products that are for everyone.

4.5 Evaluating information need and tools

When the new product journey with R&D person perspective was finalized, it was tested in second workshop. Participant from R&D and marketing could tell how they felt during the journey and what their main pain points were. This gave a heat map to certain process steps that might need improvement.

I used an emotional journey to see how they felt about each step, and if they felt that lack of information was giving them stress. Another goal was to understand what information or action they rated as most important and which of those is related to customer voice.

The emotional journey presents main actor satisfaction levels during each step between -2 to +2 (Stickdorn et al. 2018, 46.) It visualizes people's emotional experience when they are interacting with the organization (Curedale, R. 2016, 109.)

Product development/product journey (R&D perspective)

Phase	Pre work €						Product development €€						Sales €€€			
Step	Observation	Describing the idea	First investigation	Internal evaluation	Business evaluation	Production evaluation	Product definition	Implementation design	Pilot (laboratory)	Testings	Finalising	Technical review	Marketing status review	Mass production	Follow-up	
Action and information need	<ul style="list-style-type: none"> -Dialogi -Aikaa -Asiakkaan olevien tuotteiden pakutteet 	<ul style="list-style-type: none"> -Onko idea hyvä -Näkemykset eri segmenteistä 	<ul style="list-style-type: none"> -kattavampi markkinatieto kilpailijoista ja hinnoista (vertailu) -idea toteutuuden arviot: onko tuote tarpeellinen, laadullinen ja otettavissa -Onko asiakkaan mieltä -Kiinnostus eri ominaisuuksista -Mikä on tuote todella vai ei -Onko tuotteen hinta alan kalli -markkinolla -kultin tuotetta käytetään: universaalit tuotteet 	<ul style="list-style-type: none"> -tiskintokkyky -kaha -vähäpöytä: 6 vuotta eteenpäin 	<ul style="list-style-type: none"> -ohohderyhman laajuuden määrittäminen: markkinan koko? 	<ul style="list-style-type: none"> -Asiakkaan kanta 	<ul style="list-style-type: none"> -tuottajan mielipide, mitä tuotteessa arvostaa esim. kestävyys, jämäkkyys -Asiakkaan mielipide ominaisuuksista -kuka on asiakas? -realistinen myyntiarvio -tietysti kumpunkin -kukaan ei todellinen ehdoton -minimivaatimus -katsausvaihto: pidetään sovittua kiinni -tuotteen lain vaatimukset -sääntökäytöt -tuotevaatimukset -kaksi tuotevaatimukset ajoissa 	<ul style="list-style-type: none"> -"sisäinen" tarve, tuotevaatimukset ja paullutiden / toimintatien kerääminen -Tuotteen edut ja hyödyt -Tuoteominaisuuksien priorisointi -Pakkaukset -Olkoon nimeltä materiaalin suunnittelu -Tuotteen tekniset ominaisuudet 	<ul style="list-style-type: none"> -Palute -"tekninen data" markkinoille 	<ul style="list-style-type: none"> -Asiakaspalute 	<ul style="list-style-type: none"> -Palute, onko parannettava 				<ul style="list-style-type: none"> -Todellinen kysyntä 	<ul style="list-style-type: none"> -Jatkuvaa palute sisältä ja ulkoa -Asiakas palute -Positiivinen ja negatiivinen palute -KPI:t -Myyntiin toteutuma -Kampanjan onnistuminen -onko ajan seuranta
Emotion journey																
+2							●●	●●	●●		●●	●●●				
+1	●●		●		●●●	●●	●●●	●●●●	●●●●	●	●●	●●●	●	●●●	●	
0	●	●●●●	●●	●●●●	●●●●	●●	●	●●●	●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	
-1	●●●●	●●●●	●●●●	●●●●	●●●	●●●	●●●●		●	●	●●			●	●	
-2	●●●●		●●●●	●●		●●●●	●●	●●					●●		●●●●	

Figure 14: Emotional journey

The test showed that the most critical steps in the journey are:

- Observation (pre-work)
- First investigation (pre-work)
- Production evaluation (pre-work)
- Product definition (product development)
- After monitoring (sales)

Table 4: Information needs in journey steps

Information or action missing in different phases		
Pre work	Product development	Sales
<ul style="list-style-type: none"> • Dialog • Time • Customer needs • Feedback for existing products • Encompassing competition analyses: market area and price • Product usability evaluation from the customer side: Would they use it and pay for it • Customer interviews • Clear definition of target customer • Interest of different attributes • Is the product really wanted or not? • Is the product price too 	<ul style="list-style-type: none"> • Customer opinion about what they value most • Customer opinion of attributes • Who is the customer • Realistic sales estimates • Co-operation partners • Minimum need for quality • A time schedule that is kept • Product safety & law requirements • Clear definition of attributes • All needed attributes listed on time 	<ul style="list-style-type: none"> • Constant feedback from inside and outside • Customer feedback • Positive and negative feedback • KPI's • Sales actualization • Success of campaigns • Long term follow-up

<p>high for the target market?</p> <ul style="list-style-type: none"> • Exactly for what is the product used versus universal products • Customer opinions 		
--	--	--

Participants could also write more details for each step especially if they gave negative emotions in that step. The test gave indication that when the product is in mass production and sold, sales should give an information loop back to the observation step to ignite new ideas. In many steps there is also a hope for clear insight on what the target customer really needs, so that product attributes can be agreed in the beginning of the process. This enables the product to be designed and developed with the given attributes, and that the attributes won't change during the process. Many times the process is quite long, and legal requirements vary between the attributes, therefore it is important to know all the attributes early in the process. The gathered data should also be analysed and be presented in format that would be easy to utilize by R&D personnel.

Main categories of needed data in the process:

- Clear definition of target customer & customer needs
- Customer interest for different attributes & clear definition of attributes
- Minimum need for quality
- Product usability evaluation from the customer side
- Feedback for existing products and sales figures
- Competitor benchmarking

Most of these did have some relation to the customer voice, as they can be seen as a source for customer voice. Minimum need for quality can be only company own requirement but if it is connected to the customer needs as in Six Sigma then it is also part of the customer voice.

Another test target for the workshop was to define the preferred tool for R&D personnel, which would be used in the everyday work to get this information from products and consumers. The workshop participants had different options and they could vote on the preferred solutions and write comments about them.

As can be seen in the Figure 15 the favourite top tools based on votes are R&D's own dashboard (17 votes), each person's own dashboard (11 votes) and email summary (8 votes). Future users did favour the dashboard, as it would give easy and fast way to see the overall status. Fear in personalised dashboard is that if they have to create it by themselves. Email is seen normal way for distribution but it is admitted that it can be lost between other emails. Negative feedback to different methods and tools contains the lack of time. That if some new

method would be offered for delivering the customer data, people do not find the time to read the data or collaborate.











	Method	Votes	Comments
	Real time innovation tool to look for customer data and collaborate with others	3	"Might create sense of community but again another new tool."
	Webinars in intranet pages	7	"Good, I could look it when I have time."
	Common chat view different subjects	4	" I don't have time to be on call here."
	Shared R&D Dashboard with consumer related data	17	"Easy and fast to see overall status."
	Personal dashboard	11	"Is this hard to do yourself? "
	Excel chart	5	"Easy to filter and analyse the data."
	PowerPoint presentation	5	"Visual but laborious to create."
	Email summary	10	"Normal way to do this but might be lost in the junk mail."
	Info TV	1	"I will not follow these."
	Weekly live info meetings. Option to join online and have a discussions.	8	"It is good if I can comment but usually I do not have time for these."

Figure 15: Tool preferences for customer insight sharing

I selected to make a proto from the R&D's own dashboard that would contain the hoped insight and information. The dashboard would have some insight that they are missing for customers and their interests, the market situation and competition benchmarking.

4.6 Innovating new ways for collecting customer feedback

The third workshop target was to ideate new ways of collecting customer feedback and insight. The workshop was done together with an innovation and marketing representative, as they would be the responsible party to collect this in the future. Participants had previous experiences and knowledge of previously used methods for collecting data.

There is always the option to buy customer studies from professional companies, but that is a more expensive way and therefore it is not done often. Constant insight from customers is then not available. The target was to innovate new ways which could be done rapidly and with reasonable cost.

An obvious method could be designing the product together with the consumer in a workshop. However, in the case company, the R&D designs mostly products not services. In addition, the product itself is not something that has user interface or it cannot be prototyped or tested in

seconds. Products are developed based on needs of the users, legal requirements combined with the technology and manufacturing restrictions.

In business-to-business area the case company has training sessions with the professional customers who can test the new products and give feedback. This could be a useful method to implement also in B-to-C side.

A method in design thinking is to interview customers, and employees from R&D could do it personally. That has been tested in previous trainings around design thinking, but not all R&D employees feel comfortable having interviews on the streets or in stores. These types of customer interviews could then be a part of the marketing organisation tasks or a bought service.

The ideation workshop process had four steps:

1. Agree scope
2. Brainstorming: silence / clustering / voting
3. Prioritising ideas
4. Idea specification: pros & cons / details

The brainstorming started with silent ideating and clustering similar ideas. Then each participant could vote for the idea they saw as most interesting. Ideas that got most votes were evaluated based on their impact and effort level.

Impact levels indicate how effective selected methods could be in getting the customer insight versus how much effort or cost there would be to implement these ideas. When ideas have been placed to the matrix, it should help in selecting the most usable ideas. If idea has high impact in selected subject and it requires low effort in implementing phase, it is most likely the best idea. Ideas with the high impact and effort and low impact and effort will need more evaluation. If idea has low impact and same time it requires high effort, it should be avoided. (Gamestorming 2018). As can be seen on Figure 16 the top ideas were seen relatively effortless to implement but those could bring high value for the process.

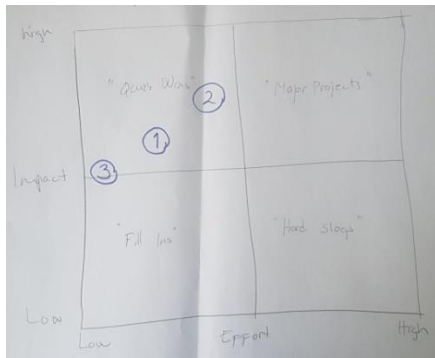


Figure 16: Impact / Effort matrix

Tree selected ideas:

1. Helpline monthly questionnaire
2. Case company interviews product sellers in stores
3. Form for visitors to fill in lobby

1. Helpline monthly questionnaire pros are that it is inexpensive, easy and it gives direct response from consumers. Cons are that it's extra work for the helpline, it requires changes in the helpline process, and objectivity might not stay during that process. However, the helpline is an existing system for conducting these types of questionnaires and there could be a competition to select the question of the month. This competition could engage and motivate the helpline personnel as conducting these types of questionnaires requires extra work. The questionnaire could be conducted quarterly.
2. Case company interviews product sellers in stores example store region managers by phone or in person about their insight from the consumers. This could be done yearly with 20 interviews. Pros for this type method are that it is relatively inexpensive and easy. These people do have insight from both customers and competitor products and related tools. Cons are that this requires some travelling and it is new way of working and for professional side customers (e.g. store region managers) it might feel disturbing.

Interview questions could be:

- Do people follow certain trends?
- Do they specifically ask for the case company products or generally certain brands?
- Do consumers complain about something?
- Who will make final decision?

These types of questions might validate current assumptions in the case company or give new ideas.

3. Form for visitors could be done with a computer in the lobby or proto version just with paper. Paper version requires more manual work but is easy and fast to produce for test use. This would be continuous process, so it could give constant feedback from outside and possibly some ideas. Pros are that this is relatively easy to test with paper proto and it might give ideas. Cons are that it might not lead to anything and correct target group might be challenging to define as visitors are from so many different consumer groups.

All the top three methods would require collecting the feedback in a readable format, analysing, and reporting it. This type of work is seen as a new way of working and a new task for the responsible people's workload.

4.7 Customer helpline observation

The case company has helplines and a chat for customers. They are used both by professionals and consumers, but also product sellers. The helpline has different numbers for different subjects. The helpline is an existing method where customers contact the case company instead of the case company reaching out to them. This is a relatively easy access to customer feedback and their problems. Finnish customer helpline gets approx. 6000 chats per year, 10 000 e-mails and 70 000 phone calls. These contacts come from consumers and professionals and they utilize same help lines.

I did observe these calls and a person who answers to the helpline, as they have first-hand insight about the customers. After the observation, there was face-to-face interview session with the helpline people.

Observation method gives option to see what people do, versus what they say. Usually in this method the researcher, does not interact with the situation or the people. (Stickdorn et al. 2018, 123.)

During the observation in most of the cases, the caller was a person selling the product. Professionals ask help in specific subjects. The consumers call for different reasons than professionals. People do call, as it is a faster method than e-mail. E-mail is usually slower as the creator might not fill it in properly and the helpline personnel must ask more details to solve the problem. On the phone, asking details is faster, and many times, it is an urgent situation at the caller's end.

Currently there are no records of the calls or statistics about how often certain things are asked. If this type of reporting would be needed, it would mean manual labour to write the data in to systems or to a paper. Helpline personnel have very cluttered screens as they have several application windows open when they try to solve the questions at hand. They do have some insight and a feeling what the consumer problems are, but it is not officially distributed so messages do not necessarily reach the R&D side of the business, and because there are no recorded statistics it would be considered as assumption.

The helpline personnel were positive to the idea of asking one specific extra question and writing down the answer. The question would be asked at the end of the call and usually calls are quite short. This would require writing down details about caller status (consumer or professional) and then the answer to the question. It was agreed to test this method for a short period.

4.8 Experimenting with the helpline monthly questionnaire

The testing was done for 1 week and the personnel were asked to fill in the data manually on a paper or in digital format to Excel form. They asked a question from every caller, which meant both professionals and consumers. The callers were divided into four categories. The question was related to consumers' pain points in the subject. After this test round all feedback was collected and used later for an R&D dashboard prototype testing. The general assumption might have been that the answer to this question is something that everyone already knows. That assumption was mentioned often, but there were also two other popular subjects. This is a good example for evaluating if the case company should develop solutions for generally known assumption or for something else that the customers mentions often.

4.9 Testing the R&D dashboard prototype

Prototyping fidelity in the early stages can be as simple as a paper prototype of a digital user interface. Content elements with actual data can make a difference in the testing phase. (Stickdorn et al. 2018, 172-173.) According to Bakusevych (2016), a good dashboard should show information that is important for the user and easy to read and navigate. It should be designed for the correct purpose of what defines the right way to present the data. As the content should be relevant to the user, personalization is more important than customization. Personalization is done in advance for the user, where the customization needs the users own effort. (UX Planet, 2016)

The dashboard information came from R&D needs. I decided to test this with a paper proto to get feedback of its usability as a dashboard. This was part of fourth workshop. In a bigger role of this test was, would content be interesting to the R&D personnel, and could it trigger some innovations or ideas. On an idea level connecting the insight and dashboard is usable, but it needs to be verified with testing and iterate design against the needed data. During the design phase of the dashboard I uncovered that most of the information does exist at some level and is available at the marketing side daily. Unfortunately, this is not available for the R&D side or they are not informed that it could be available. Selling volumes and people's interests on the case company's website and social media accounts are currently collected. The competition field is not that studied, and not as far reached, as in the fake prototype data.

Elements in the R&D dashboard proto contained three different categories. The aim was to answer previously stated needs for the insight.

Sales:

- New product launch sales
- Product reclamations and TOP 5 errors
- Mostly sold TOP 5 in current month (seasonal change)
- Mostly sold during the year in three categories (yearly change) and mostly promising products

Customer insight and trends:

- Monthly question results
- Top 5 of sold groups in last quarter
- Top 5 growing customer trends
- Most popular product pages last 7 days
- Most popular YouTube videos last 30 days

Competition field:

- The competition is based on different attributes against the certain category between competitors' products that are available in the Finnish market area.

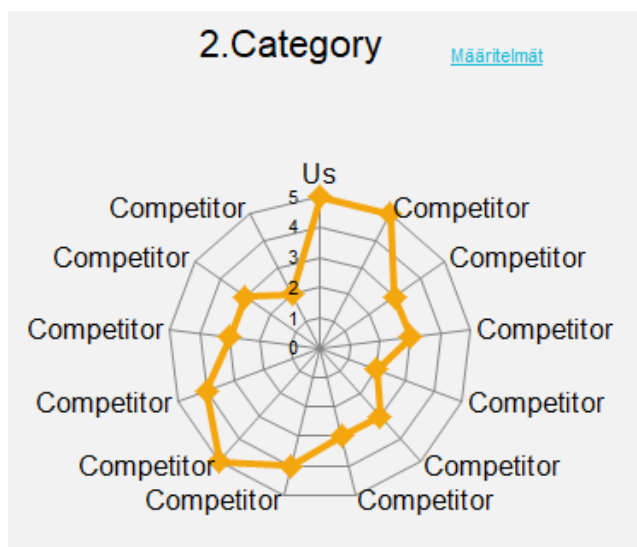


Figure 17: Example of graph style for competition field

Six people tested the prototype and they could give feedback on each part of the dashboard.

Sales:

In the sales section of dashboard wireframe, the sales figures were seen the most interesting part together with sales numbers in new product launches. Reason might be that R&D indicated this as a part of missing information. When looking in to the theory how customer voice is collected, it can be seen that sales figures is one source. This might help R&D to see the possible product fails in new product launches or drop in sales for current product. There was request for customization so that person could select the attributes that are more interesting to their own work. They would like to see attributes more detailed level about those products that they have been part of in the development process. They would like to see reasons for reclamations, and success stories, which could be seen as a guiding element for their own work and prioritizing their tasks .Dashboard could be personalized easily visible for R&D, without having to search for the same data from the company's internal systems. Reclamations could also be a source to improve products, but not seen as source for innovation.

Customer insight and trends:

Social media channels were seen as an interesting part. Most interesting in this area was the test result of the experiment in the helpline. Generally, they would like to get this type of information even though changes in this area are not fast. This type of customer information might trigger some improvements but was not mentioned as big source for innovation.

Competition field:

This was seen as very useful data, although it should be clearly agreed what the selected method and way of presenting is for benchmarking. The request was to get more specific

evaluation criteria's. The selected way to present the competitor field could be used. It was mentioned that customers evaluate the product in a different way than R&D, and therefore an external company could give better results. Benchmarking is seen important part of the process, but it might not trigger ideas or innovations.

4.10 Evaluating new ideas with the customer voice included

Another pain point revealed during the process was the information of the product attributes. This is an important thing for R&D process as development, the production site and method selection, as well as legal tests and qualifications, are designed and made against the defined attributes. If these are not clear in beginning or are changed during the process or near the mass production phase, it might lead back to the beginning of the product development process. This is related to the customer needs and what they try to do with the product. In Six Sigma this is a part of the quality process. As described in more details in chapter 2. Six Sigma contains a part which is called the customer voice.

A presumption canvas is made to test the first idea against the known data or assumptions. The case company has an evaluation form for new product ideas, and they do a pre-study before the product brief. These forms contain an evaluation of the production method, legal requirements, some marketing and sales targets and competition in the market. The pre-study is targeted for evaluating if the product fits to the company production. It does not contain a part that would mention the consumer personas or attributes, needed for that persona's point of view.

A presumption canvas should be used in the first state of a new idea journey, before more production evaluation is involved. It should be filled together with marketing, sales and R&D to get insight from different steps of the process, as well as the customer point of view.

Filling order of the canvas:

1. The user: Explanation of the user based on the existing consumer personas; where they would use the product and why.
2. What type of attributes and features the user is looking for: These attributes are divided to Must have / Makes difference / Nice to have / Try to avoid
3. Google search: What competitor products are found, or a user discussion about this subject
4. Test it: Write down all the main assumptions there are about this product and how they could be validated, success criteria for those, and what were the key findings after testing.
5. MVP: To select 1-5 main attributes for a minimum viable product, nickname for the product and assumed price level

Evaluating presumptions for new idea with Voice of Customer

Filling date:
 Participants:

1. The user

Who is the main user for this product? (Persona)

Where user is using this product?

Why user is using the product?

3. Google search

Competitor products

User discussions

5. MVP

Selected attributes (1-5) for the new product:

Nick name:

Price:

2. What type of attributes and features user is looking for?

Must have

Makes difference

Nice to have

Try to avoid

4. Test it

Main presumption	How to validate	Success criteria	Key findings

Figure 18: New idea evaluation canvas

Combining these five different parts in to one canvas could give more insight of the customer and competition.

Part two is designed for starting to think about the attributes that are based on the selected consumer needs. Selecting correct attributes as early as possible, and sticking to them, might speed up or keep the process on track. This is partly based on the Kano model, which is described in chapter 2. On the canvas, this is a simpler version to make it easier for first evaluation, to list what is needed for the target consumer, and if there exists competition which would favour the decision for this product. The idea is also to evaluate which are more like marketing gimmicks, nice things, and if they have affect against preferred attributes for the product, and whether those should or should not be added. Therefore, this chart also contains a part that makes it clear if some attributes should be avoided for this target consumer e.g. if they are cost conscious you shouldn't add too many attributes that would make the product too costly.

Part four tests the assumptions, for example about the problems or the competition. During the thesis process, it was revealed that there were assumptions that were just said in the company and referred to, which everyone knows. There are no facts or numbers for them, even when they are the right assumptions. These assumptions must be validated before going

to part five. The test it -part is based on Lean service creation Experimenting -canvas. In this phase of a new idea journey, there might be several assumptions that are based on educated guesses, but they have to be investigated. If some assumptions are wrong, the whole idea might fail, and that is why these assumptions are seen as critical. For this reason, acceptance of the criteria must be written before the testing, preventing a bias attitude after the investigation (Lean Service Creation 2017.)

Part five targets to agreeing together with R&D and product marketing side where to start with the product attributes, as next task in the existing process is to start the production evaluation based on agreed attributes.

4.11 Testing the presumption canvas

For future use, there are instructions how to fill in the canvas and one canvas filled with examples.

Instructions for filling:

Why is this done?

- The reason is to think about the actual user and involve the customer voice. This can be the base for future requirement specifications, which is then agreed together with R&D, marketing and sales.
- This should test the new idea before heavy technical testing and searching for manufacturing methods.
- Note that not all ideas have to be final products, and that the goal is to test the idea, and also to find if there are things that need improvement. After realizing what customers really want, there is an opportunity to tweak idea to better fit the target users and markets or find a new user and new market.
- Even if a product is mentioned here, the new idea can also be a service.
- The reason to have at least three people, who have a different scope, is to collect as many aspects you can think of.

How should this be done?

- Collect a group of people from R&D, product management and marketing.
- Fill in each part in order, starting from the number 1. "The user".
- Examples on what to fill can be seen in the pre-filled canvas.
- Try not to spend more than 60 minutes per idea or canvas.

What then?

- Test your assumptions. See the results and make the decisions on if you should redesign the original idea, reconsider later timing or forget the idea.
- If this goes ahead, then it is time for more evaluation in form of an innovation to product brief.

- When a product or service is in the evaluation process, come back to this canvas when defining requirement specifications, testing and evaluating quality needs, and defining the main characters for the product, in order to fulfil the user hopes and needs. The goal is to define the right product for the right user, and not everything for everybody.

Feedback from the product managers' side was not so welcoming, or the canvas functions were not understood. Usually customer needs are talked about together with the R&D research person, but they are not written down as clearly. For product manager, it also felt a bit narrow to make products just from one consumer persona point of view, as many consumers will use them. According to them, competitors are also studied, but it is not written in the current product brief. Product manager mentioned that attributes and requirements are already listed in the current product brief, but it is missing a "try to avoid" -part. The testing assumption part was seen as a good and systematic way of testing and reporting, as this way it would be visible to others. Currently there is some testing done, but it is not systematically written down. It is seen as important to show where the idea came from, is it internal or is it based on customer feedback, for example from the helpline.

Feedback from the R&D person was more positive. The testing also provided comments on how to improve the canvas. The R&D person stated that the current form could be replaced with this canvas. He felt that the current one is a bit old and outdated to be used in the early state, and that it could be used either before or together when filling in the pre-study. The response on using the consumer persona as starting point was positive, as it is seen as a path to defining attributes early enough for the pre-study. Currently used product briefs contain these attributes, but the briefs are done much later, so it does not really support the need to understand the correct attributes for the product in the early stages. The assumption was seen as a good part to actually test, before any expensive investigations. This was seen as a guide to help to evaluate the new idea and if it is worth investing resources in.

Naming was a bit confusing. "Test it" in the case company environment could mean a laboratory test, and MVP is not commonly known terminology. The proposal was an example to replace "Test it" with "Test assumptions and "MVP" could be "Minimum attributes or features of the product"

One improvement idea was to add a part that could be a reminder about the possible risks. When selecting a certain solution, unsolved environmental issues could make a project even a year longer.

Based on the feedback I created a second version of the assumption form. Names were changed according to the proposals and point six was created with a title of “Possible risks”. This would be filled after step 4 assumptions are tested and selection of minimum amount of attributes is done. The reason for risk evaluation to be added to the end is that canvas would be used before the pre-study. The pre-study should be the next step along with a check of the risk factors.

Evaluating presumptions for new idea with Voice of Customer

Filling date:
Participants:

1. The user

Who is the main user for this product? (Persona)

Where user is using this product?

Why user is using the product?

3. Google search

Competitor products

User discussions

5. Minimum attributes for the product

Selected attributes (1-5) for the new product:

Nick name:
Price:

2. What type of attributes and features user is looking for?

Must have

Makes difference

Nice to have

Try to avoid

4. Test assumptions

Main presumption	How to validate	Success criteria	Key findings

6. Possible risks

Figure 19: Iterated presumption canvas

4.12 Promoted next steps

This part will contain some proposals on how tested concepts could be used in future. The dashboard is a concept to present missing information from the R&D side about sales, competitors and customer interest areas. Collecting customer feedback in different ways is a concept for constantly collecting it and giving insight back to the process. The presumption canvas is made for starting with the customer voice and selecting attributes based on the consumer. This could support the R&D process to concentrate on correct attributes in the evaluation phase and to keep the R&D process shorter.

4.12.1 R&D dashboard

Based on the feedback from the R&D side I would promote giving more, already available data for R&D. The ultimate solution would be a personalized dashboard that gives the option to show data based on the user's interest and need. However, creating this type of dashboard needs design and implementation and creates cost. The first short term step would be to give current existing data available for R&D According to Stickdorn et al. (2018, 102) a good base for research and customer insight is the existing data. R&D's main responsibility is not to search for marketing data, even when it might be available, as it requires an internal search, which is out of the daily scope. Current data could be presented for R&D in the same way that product marketing shows the data but with R&D focus. This daily information is one way to keep the R&D constantly close to the consumer's interest.

4.12.2 Collecting customer feedback

Three selected methods don't require much investment and are quite feasible to implement. I would promote to test all of them and proceed gradually to approach which is more systematic. The helpline monthly questionnaire answers were seen as interesting part. This could then be tested frequently in the future, and carefully select the questions, so that it's targeted to a subject that needs more investigation.

Interviewing product sellers in stores by phone or in person is easy for a person who considers it to be a part of their daily work. An important part is the interview summary that has to be given for R&D. This type of constant feedback from the customer side must be regular to give the customer insight and tie the insight data closely to the R&D daily work.

A form for visitors to fill in in the lobby is easy, and simple to implement. However, it requires a responsible person for creating a monthly summary.

All methods for collecting customer feedback try to keep the consumer closer to R&D, and therefore they cannot be presentations which are given once a year or hidden from the daily work behind internal channels or databases.

4.12.3 Presumption canvas

The assumption form is seen differently from product marketing than from R&D. This sounds the same as the original problem, which is that the R&D side wants to see the attributes much earlier, and if there is a long time between the pre-study and product brief, the brief might not support the product manufacturing anymore, as the brief can have different attributes than originally thought. The improved form could be used for certain selected products and measure if it solves any information loss during the project phases, and if it supports a faster NPD process. According to Schneider et al. (2010, 64) a successful service design pro-

cess needs all stakeholders' participation in the early stage of product development, to get better buy-in and more proactive solutions.

5 Conclusion

The aim of this thesis was to provide the customer voice for R&D. This chapter evaluates the success of thesis process, methods, findings and outcomes and conclusion of the needs in the NPD process with research, customer insight and internal co-creation.

5.1 Discussion of main findings on theoretical part

When evaluating the R&D role in the company success and the customer role in the R&D process, both are seen as important parts of a successful new product development.

Ways to collect the customer voice can be seen as passive, where customer actions give the behavioural pattern mentioned by Kowakowski (2010, 285-292) and as active ways, where customers collaborate with the company.

When evaluating the role of R&D in the light of different methods used in R&D work, the customer voice is mentioned as a source for the development. The customer role is seen as a co-creating partner and in light of these findings; it is beneficial to study ways to get the customer voice for R&D use. Theoretical findings support the original hypothesis.

5.2 Practical contribution and process evaluation

The thesis process followed the rules of a nonlinear and iterative method, which is known in service design. Methods used in service design can be used with different subjects, and they give flexibility to adapt and design them, for different cases. However, conducting these types of processes, when you are not a part of the case company employees it is more difficult to get inside of process in an effective way. The R&D process in manufacturing needs knowledge of that area. Designing service or product, is not the exactly same process. There is similarity but there is a significant difference in production timelines, methods, rules and regulations.

Measuring the success of the project is challenging when last part of the service design process -implementation is missing. To evaluate any of the proposed solutions, it would require a long testing period.

What should be measured:

- Does the process benefit from direct customer insight?
- Does it create new ideas or innovations?

Measuring and proofing that the new idea comes from increased customer insight is difficult as it is a subjective matter and cannot have solid validation.

5.3 Findings on practical contribution

Understanding the R&D need of information related to the customer voice was the first part of the practical process. Answering to the question, what information the R&D new product development process is missing, was given through the co-created journey map and it validated that the voice of customer is missing.

According to Sanders & Stappers (2008, 5) over the past six decades, designers have been moving closer to the user and co-design has been increasing. Referring to chapters 1 and 2, the need for research and customer insight in R&D is an important part of the process. The thesis research showed that personnel in the case company's R&D felt the same way, therefore it would require new methods to the process, and to ensure future competition, it is seen as a strongly important subject.

The ways to collect the customer voice during this study did not create new or innovative ways for collecting customer insight; however, the selected methods were usable in the defined scope. The research showed that in new product development process, there is also other pain point for the R&D than the method of collecting customer data and that is an internal co-creation in the definition phase.

The ways to present the voice in everyday use is seen as a critical part. There were many options to show data, but users themselves selected the dashboard to be the easiest method for them. The current process does not support distribution of the same data for R&D and marketing. Even if the data is available, it cannot be assumed that a person will actively seek it, if it is not a part of their daily work, and as the test showed the data should be both personalized and customized. I see the paper proto testing as a good and easy way to check if the original assumption was correct, before creating expensive tools for R&D users.

The thesis did not take a strong approach on how to improve the product development process with the voice of customer. A proposed solution to give a new step for idea evaluation is a simple and easy way to test it, but it cannot be forced into the process. When R&D and Product manager side sees the canvas' value differently, it gives one good aspect for the future research about co-creation between marketing, sales and R&D.

5.4 Future research

Future research could concentrate on process aspects in quality, co-creation and speed. The company could find a way that would add the customer voice to the beginning of the product development. From a technical point of view, it could be evaluated if the quality process Six Sigma and the voice of customer would support this approach.

According to Song, Neeley & Zhao (1996, 546) successful integration between R&D and marketing could increase the success of the new product and innovation, and it needs effective communication between the departments to reduce the environmental uncertainty. In the thesis case company especially the effective communication around attributes that should reflect customer needs, is important to the process speed.

If the NPD process is long, suppliers should forecast what the customer would value. Fast development of a successful product requires heavy understanding of customer values in the market segments for both current and new. There should be effort to create deep customer understanding and apply it to the “fuzzy front end” of the NPD process. Improving other parts of the NPD process without customer feedback of the value in the beginning, it will not speed up a successful product process. (Flint 2002, 306-307.)

The R&D personnel also stated that time is the key for innovation and ideation, so this part of the process should have more flexibility to iterate and test the ideas. When compared to cost of the whole development journey, beginning is stated to be the low-cost part of the process. There could be an organizational change to dedicate responsibility to combine customer related research data to create insight and provide the continuous voice of customer flow for R&D use.

References

- Annacchino, M. 2011. *The Pursuit of New Product Development: The Business Development Process*. Oxford: Elsevier Science & Technology.
- Barbier, J. & Alvares, A. 2016. Sixth generation innovation model: description of a success model. *RAI Revista de Administração e Inovação*. 13, 2, 116-127.
- Brown, T. & Katz, B. 2009. *Change by design: How design thinking can transform organizations and inspire innovation*. New York: HarperCollins Publishers.
- Celabretta, G. 2015. Interaction design into the Fuzzy Front End of the Innovation Process in Griffin, A., Noble, C., Durmusoglu, S., Luchs, M. & Swan, S. (eds.) *Design Thinking: New Product Development Essentials from the PDMA*. Hoboken: John Wiley & Sons, Incorporated.
- Chiesa, V. 2014. *R and D Strategy and Organisation: Managing Technical Change in Dynamic Contexts*. Singapore: Imperial College Press.
- Curedale, R. 2013. *Design thinking: Process and methods manual*. Topanga CA: Design Community College inc.
- Curedale, R. 2016. *Journey maps: The tool for design innovation : comprehensive step-by-step guide*. Topanga: Design Community College inc.
- Davila, T., Epstein, M. & Shelton, R. 2012. *Making innovation work: How to manage it, measure it and profit from it*. New Jersey: Pearson Education Inc.
- Desai, D. 2010. *Six Sigma*. Mumbai: Himalaya Publishing House.
- Flint, D. 2002. Compressing new product success-to-success cycle time: Deep customer value understanding and idea generation. *Industrial Marketing Management*, 31, 4, 305-315.
- Grönroos, C. 2011. Value co-creation in service logic: A critical analysis. *Marketing Theory*, 11, 3, 279-301.
- Heinonen, K. & Strandvik, T. 2015. Customer-dominant logic foundations and implications. *Journal of Services Marketing*, 29, 6/7, 472-484.
- Kowalkowski, C. 2010. What does a service-dominant logic really mean for manufacturing firms? *CIRP Journal of Manufacturing Science and Technology*, 3, 4, 285-292.
- Krishnan, V. & Ulrich, K. 2001. Product Development Decisions: A Review of the Literature. *Management Science*, 47, 1, 1-21.
- Lewit, T. 1960. Marketing Myopia. *Harvard Business Review*, 38, 7-8, 24-47.
- Lopetcharat, K., Hanson, J. & Paredas, D. 2012. What You Must Look For: Finding High Potential Insights. In Beckley, J., Lopetcharat, K. & Paredas, M. (eds). *Product Innovation Toolbox: A Field Guide to Consumer Understanding and Research*. Hoboken: John Wiley & Sons.
- Luchs, M. 2015. A Brief Introduction to Design Thinking in Griffin, A., Noble, C., Durmusoglu, S., Luchs, M., & Swan, S. 2015. *Design Thinking: New Product Development Essentials from the PDMA*. Hoboken: John Wiley & Sons, Incorporated.
- Lusch, R. & Vargo, S. 2014. *Service-dominant logic: Premises, perspectives, possibilities*. Cambridge: Cambridge University Press.

- Matzlera, K. & Hinterhuberb, H. 1998. How to make product development projects more successful by integrating Kano's model of customer satisfaction into quality function deployment. *Technovation*, 18, 1, 25-38.
- Meier, H., Roy, R. & Seliger, G. 2010. Industrial Product-Service Systems—IPS 2. *CIRP Annals - Manufacturing Technology*, 59, 2, 607-627.
- Miettinen, S. 2012. Discussions on Change, Value and Methods. In Miettinen, S. & Valtonen, A. (eds). *Service Design with Theory. Discussion on Change, Value and Methods*. Vantaa: Lapland University Press.
- Moritz, S. 2005. *Service Design: Practical Access to an Evolving Field*. Köln: Koln International School of Design.
- Nobelius, D. 2004. Towards the sixth generation of R&D management. *International Journal of Project Management*, 22, 5, 369-375.
- Polaine, A., Lovlie, L. & Reason, B. 2013. *Service design: From insight to implementation*. Brooklyn, NY: Rosenfeld Media.
- Portigal S. 2013. *Interviewing Users. How to Uncover Compelling Insights*. New York: Rosenfeld Media.
- Reason, B., Løvlie, L. & Brand, M. 2016. *Service design for business: A practical guide to optimizing the customer experience*. Hoboken, New York: John Wiley & Sons, Inc.
- Said, E., Macdonald, E., Wilson, H. & Marcos, J. 2015. How organisations generate and use customer insight. *Journal of Marketing Management*, 31, 9-10, 1-22.
- Sanders, E. & Stappers, P. 2008. Co-creation and the new landscapes of design. *Co-Design*, 4, 1, 5-18.
- Schieffer, R. 2005. *Ten key customer insights: Unlocking the mind of the market*. Mason, OH: Thomson.
- Schneider, J. & Stickdorn, M. 2010. *This is service design thinking: Basics - tools - cases*. Amsterdam: BIS Publishers.
- Song, X., Neeley, S. & Zhao, Y. 1996. Managing R&D-marketing integration in the new product development process. *Industrial Marketing Management*, 25, 6, 545-553.
- Stickdorn, M., Hormess, M., Lawrence, A. & Scheider, J. 2018. *This is service design doing: Applying service design thinking in the real world: a practitioner's handbook*. Sebastopol, CA: O'Reilly Media, Inc.
- Taylor, G. 2008. *Lean Six Sigma Service Excellence H/C: A Guide to Green Belt Certification and Bottom Line Improvement*. Fort Lauderdale: J. Ross Publishing Inc.
- Trott, P. 2017. *Innovation management and new product development*. Sixth edition. New York: Pearson.
- Voima, P., Heinonen, K. & Strandvik, T. 2010. *Exploring Customer Value Formation: A Customer Dominant Logic Perspective*. Helsinki: Hanken School of Economics Working Papers
- Walden, D. & 1993. Kano's methods for understanding customer-defined quality. *Center for Quality Management Journal*, 2, 4, 3-35.
- Wang, J. & Kleiner, B. 2005. The evolution of R&D management. *Management Research*, 28, 11/12, 88 - 95.

Electronic sources

Bakusevych, T. 2016. 10 rules for better dashboard design - UX Planet. Accessed 17.03.2018.
<https://uxplanet.org/10-rules-for-better-dashboard-design-ef68189d734c>

Design Council 2015. Design methods for developing services. Accessed 01.07.2018.
<https://www.designcouncil.org.uk/resources/guide/design-methods-developing-services>

Gamestorming 2015. Impact & Effort Matrix - Gamestorming. 08.11.2018.
<https://gamestorming.com/impact-effort-matrix-2/>

I Six Sigma 2012. VOC: Comparing Reactive Data and Proactive Data. Accessed 07.08.2018.
<https://www.isixsigma.com/methodology/voc-customer-focus/voc-comparing-reactive-data-and-proactive-data/>

Lean Service Creation 2017. LSC Handbook 1.82.pdf. Accessed 03.02.2018.
<https://leanservicecreation.com/material/LSC%20Handbook%201.82.pdf>

Six Sigma Institue 2018. Six Sigma DMAIC Process - Define Phase - Capturing Voice of Customer (VOC) - International Six Sigma Institute. Accessed 07.08.2018.
https://www.sixsigmainstitute.org/Six_Sigma_DMAIC_Process_Define_Phase_Capturing_Voice_Of_Customer_VOC.php

TRENDONE - Innovation Consulting - Trends & Innovation 2018. Mega-Trend: Individualisation. Accessed 08.11.2018.
<https://www.trendone.com/en/trend-universe/mega-trends/mega-trend-detail/individualisation.html>

Figures

Figure 1: Research framework for the customer voice	8
Figure 2: Research questions in the thesis empirical part	8
Figure 3: The five generation of R&D and innovation evolution	10
Figure 4: Davila et al. (2012, 22) Innovation matrix	11
Figure 5: Davila et al. (2012, 62) six levers of innovation	11
Figure 6: Fuzzy front end by Sanders & Stappers (2008, 7)	13
Figure 7: Kano's model of customer satisfaction (Walden 1993, 4.)	15
Figure 8: Brown et al. (2009, 68) divergent and convergent thinking.....	16
Figure 9: DT framework by Luchs (2015, 24)	17
Figure 10: Customer insight pyramid by Schieffer (2005, xv)	18
Figure 11: Steve Mulder way of organizing research methods Portigal (2013, 24).	19
Figure 12: Illustration of thesis process and selected methods	22
Figure 13: Product development journey in R&D	27
Figure 14: Emotional journey	29
Figure 15: Tool preferences for customer insight sharing.....	31
Figure 16: Impact / Effort matrix	33
Figure 17: Example of graph style for competition field	37
Figure 18: New idea evaluation canvas	39
Figure 19: Iterated presumption canvas	42

Tables

Table 1: Customer and goods role in G-D vs. S-D.....	6
Table 2: Types of product development programs (Annacchino 2011, 6)	12
Table 3: Customer role and source for data in compared frameworks	18
Table 4: Information needs in journey steps	29