

LAPPEENRANTA UNIVERSITY OF TECHNOLOGY

LUT School of Industrial Management

Department of Industrial Marketing and International Business

**EARNING LOGICS OF A PORTAL SOLUTION FOR A
MEDICAL DEVICE MANUFACTURER**

Master's Thesis

Examiner: Professor Asta Salmi

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ABSTRACT

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The need behind this thesis was in the development of a more modern earning logic for a pelvic floor muscle home training device to which a portal solution is going to be introduced as a part of new upgraded version of the device. The goal is to offer useful guidelines and recommendations for the medical device manufacturer to use in the process of creating the new business model around the new product version.

In the theoretical part of this thesis, the used theoretical frameworks for business model generation and pricing models are presented. The special characteristics of healthcare technology industry are also introduced as initial data for the empirical part. The empirical data is collected via interviews and meetings from both inside and outside of the company to gain a comprehensive picture of the issue at hand. The needed changes in the business model as well as possible pricing options are gone through in the empirical chapters with the main focus being on the incoming revenue streams and pricing.

As results of the thesis recommendations are presented for the changes that are needed in the business model after the introduction of the portal solution. The results of this thesis can be used for finishing the development process of the new version of the device and especially the earning logic of it.

TIIVISTELMÄ

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Tarve tämän diplomityön tekemiselle kumpusi uudenaikaisen ansaintamallin kehittämisestä lantiopohjanlihasten kotiharjoittelulaitteelle, johon tuotepäivityksen yhteydessä aiotaan integroida portaaliratkaisu. Työn tavoite on tarjota käyttökelpoisia ohjeita ja suosituksia lääkintälaittevalmistajalle uuden tuoteversion modernimman ansaintamallin suunnitteluprosessiin.

Työn teoriaosassa esitellään käytetyt teoreettiset viitekehykset liiketoimintamallin luomiseen sekä hinnoittelumalleihin. Terveysteknologian toimialan erityispiirteet ovat myös esitelty esitietona työn empiiriselle osalle. Empiirinen data on kerätty haastatteluin sekä tapaamisin sekä yrityksen sisällä että ulkopuolelta, tavoitteena saada kokonaisvaltainen kuva sekä toimialasta että käsiteltävästä tapauksesta. Tarpeelliset muutokset liiketoimintamalliin sekä hinnoitteluvaihtoehdot on käyty läpi työn empiirisissä kappaleissa, pääpainon ollessa tulovirroissa sekä hinnoittelussa.

Työn tuloksina esitellään suosituksia tehtävistä muutoksista sekä ansaintamalliin että hinnoitteluun uuden portaaliratkaisun luomisen jälkeen. Tämän työn tuloksia voidaan käyttää uuden laiteversion suunnitteluprosessin loppuunsaattamiseen, erityisesti sen ansaintamallin osalta

FOREWORD

A few years ago writing a Master's thesis seemed like a distant, almost unreachable task, and the older students looked so adult and wise in the corridors of the Lappeenranta University of Technology. Now, that I am finishing up my own thesis, I feel like those glory days of innocence were just yesterday and I am still the same guy, but even higher hopes of future. I should thank Professor Asta Salmi, my supervisor, for supporting and challenging me for this task, and the personnel of Mega Electronics for being supportive, helpful and patient with me during this project. I am looking forward to face the future with Mega staff in the future too and hope that I can start giving something back as well.

In terms of patience, the highest score goes to the ever supporting soon-to-be wife of mine, Jenni, and the rest of my family and closest friends. Without them this journey, from the freshman year to this date, would not have been as legendary as it has been.

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Eero Salminen

CONTENTS

1 INTRODUCTION	1
1.1 Background of the study	1
1.2 Research problems and objectives	2
1.3 Limitations of the thesis	3
1.4 Structure of the thesis	4
2 BUSINESS MODELS	6
2.1 The business model canvas	7
2.1.1 Customer segments	7
2.1.2 Value propositions	8
2.1.3 Channels	11
2.1.4 Customer relationships	11
2.1.5 Revenue streams	13
2.1.6 Key resources	14
2.1.7 Key activities	16
2.1.8 Key partnerships	17
2.1.9 Cost structure	18
2.2 Pricing	19
2.2.1 Traditional pricing approaches	20
2.2.2 Innovative pricing approaches	21
3 HEALTHCARE TECHNOLOGY AND MEDICAL DEVICE INDUSTRY ...	24
3.1 Finnish healthcare technology industry	25
3.2 Medical devices and medical device industry	25
3.3 Portals used in medical device industry	27
4 METHODOLOGY	29
4.1 Case study	29

4.2 Collecting the research data.....	30
5 MEGA ELECTRONICS LTD.....	33
5.1 Case: Femiscan	34
5.2 Current FemiScan business model.....	36
5.3 The portal solution.....	37
6 EARNING LOGICS OF A PORTAL SOLUTIONS IN MEDICAL DEVICE INDUSTRY	39
6.1 Value Proposition	39
6.2 Customer Segments	41
6.3 Customer Relationships.....	42
6.4 Channels	44
6.5 Revenue Streams	46
6.6 Key Partners.....	48
6.7 Key Resources	50
6.8 Key Activities	52
6.9 Cost Structure	54
6.10 Pricing.....	55
7 CONCLUSIONS	58
7.1 Main findings of the thesis	58
7.2 Future Recommendations	61
8 SUMMARY.....	63
BIBLIOGRAPHY	65

TABLE OF FIGURES

Figure 1 Channel types and Phases (Osterwalder & Pigneur, 2010 p. 27).....	11
Figure 2 Traditional and innovative revenue models (Bonnemeyer; Burianek; & Reichwald, 2010).....	19

LIST OF ATTACHMENTS

Attachment 1: Interview questions

Attachment 2: Business model canvas (Osterwalder & Pigneur, 2010)

Attachment 3: Business model canvas. Filled for the current FemiScan business model.

Attachment 4: Business model canvas. Filled for the new earning logic of FemiScan

1 INTRODUCTION

The medical device industry is a very demanding industry as it is strictly regulated by the authorities in order to assure safety of the products (Eatock, et al., 2009, p. 219) and innovativeness is expected from the manufacturers. The fragmented customer base in the industry is at the same time demanding new technologies and innovations to be developed, and resisting any changes in the procedures of their own, which makes it extremely difficult to launch new products successfully. Launching of new products can nonetheless be seen as one of the main ways to boost sales in the medical device industry (De La Lama, et al., 2010, p. 148). The requirements of the industry are not only challenging the manufacturer companies to develop excellent novel technologies but in synergy with modern information technology to come up with new, innovative business models. With a new-to-the-world business model, a company may be able to increase its own revenue simultaneously with the customer's. As the infrastructures in healthcare get more modern with the rest of the world, the devices evolve too and are integrated into the new systems. Due to this, the business models of medical device manufacturers must evolve at the same pace, because the old ways of operating may not work in a lucrative manner anymore.

1.1 Background of the study

As there can be diversification, innovativeness and conservatism seen in the healthcare industry, the customer base is extremely wide ranging from small private caregivers to massive university hospitals. If a company wants to create and sell a device that can be used by all of these widely spread customers, it must not only design the device carefully but also put in some thought on the business model, on the way the device is to be sold to the customers.

Mega Electronics Ltd (Mega) has been operating for over thirty years in the medical device industry, focusing mainly on electromyography, electroencephalography and electrocardiography products. Mega's products have

been mainly sold in traditional direct one time sales, where the customer buys the device and gains the full ownership of the product and can use it as much as they desire. In the modern world, where information technology is integrated into everything, the medical device manufacturers, including Mega, must also redesign their products as well as the earning logics behind the products. By developing more modern earning logics and business models, Mega could gain some more angles to their sales and marketing, widen and multiply their revenue streams and even gain access to completely new markets, for example B2C market perhaps.

Now that there is a new version being developed of Mega's pelvic floor muscle training device, FemiScan, it is a good time to think about the earning logics of this device too. As there are plans for introducing a portal solution into the device, there are possibilities in making the revenue streams of said product significantly steadier and wider, and boost the business in total also.

This thesis will provide information and recommendations for a medical device manufacturer, particularly Mega Electronics, on the needed changes in the business model of a traditional medical device when introducing a portal solution into the package. Different pricing possibilities will also be addressed as they can be in a critical role in creating revenue in the most effective way possible. The recommendations provided by the means of this thesis aim to make the product and the business model appealing and functional for all kinds of customers in the medical device industry.

1.2 Research problems and objectives

The main objective of this thesis is to find a business model for the portal solution that could work properly for the diversity of customers willing to utilize the FemiScan therapy in their daily practice, ranging from public hospitals in domestic market to private clinics in different foreign markets. The objective is to be reached by using theoretical frameworks of business model generation to identify needed changes in the business model of FemiScan devices. Main focus

will be on making the model work for FemiScan, but there might be some parts of the results to be generalized to other portal solutions too.

The research problem can be divided into two research questions:

- *What does introducing a portal solution require from the business model of a medical device manufacturer?*
- *What pricing options does a medical device manufacturer have when introducing a portal solution?*

The first question can be seen as the main research question and the second one digs a little deeper into the generation of revenue streams. By answering these questions, good foundation can be offered for Mega to launching the new version of FemiScan concept to the market.

1.3 Limitations of the thesis

The theoretical part of this thesis is limited to concern the tools in describing the business model and changes in it, that are applicable to Mega. A comprehensive comparison between different ways of describing business models is not supplied by this thesis, but only one theoretical framework is introduced and used in this case. The theory used is the Business Model Canvas introduced by Osterwalder and Pigneur (2010), which offers a rather comprehensive tool to describe the business model at hand, but is definitely not the only way or the only right way to do that. The comparison between different approaches is not needed for the purposes of this thesis, as the objective is to focus on the business model and changes in it, and not on the perfect illustration of said model.

The part focusing on the pricing of the solution is limited in the way that the actual numerical prices are not calculated within this thesis. The theoretical part concerning the pricing options is also covered quite generally, and the theory together with the conclusions made based to it, are solely focusing on this case. The actual prices cannot be calculated within the timeframe of this thesis also

because the technical as well as any other designing project is still ongoing and the manufacturing and other costs are not known yet. The same applies to the description of the technical side of the portal and the new version of the device itself, as it is also still under development. The discussion and recommendation in this thesis is thus solely concentrating to the business model and other aspects are examined from the perspective of the business model.

1.4 Structure of the thesis

This thesis consists of eight main chapters with a split of four chapters focusing on theoretical description of the research problem and methodology, and four chapters focusing on the empirical data and the conclusions made from it. The theory chapters are placed first as they describe the research problem and the basis to which the empirical data leans on. The chapters concerning the empirical part of the thesis are heavily supported by the theoretical part and thus come after the theory.

The first chapter of the thesis is the introduction, which describes the very basis of the whole research. In the introduction chapter the background of the study, the research problems and objectives as well as the research questions are introduced as the starting point to this study. Additionally the limitations of the study are gone through and this description of the structure of the thesis is presented.

The second main chapter is the theoretical part of the research. In the beginning of the theoretical chapter the idea and basis of business models are presented. The principal content of the chapter is the detailed description of the Business Model Canvas introduced by Osterwalder & Pigneur (2010), which is used as the ground theory for this thesis. The canvas is divided into nine parts and thus there are nine separate chapters introducing each critical part of the framework. After this, there is a more detailed theory focusing on pricing and classification of different pricing model options. These theoretical chapters are used as the foundation to the empirical part.

The third chapter describes the basic information and characteristics of healthcare technology industry. Medical device as a term and medical device industry, with their special features, are also explained in this chapter. The healthcare sector is examined from Finnish point of view and the medical device industry a little more internationally and generally. The methodology of the thesis is explained in the fourth chapter. This chapter introduces the ways of collecting data for this study and the means it was used. Fifth chapter introduces Mega Electronics as a company and as the orderer of this study. Also, the product, FemiScan, is described in this chapter, for which the portal solution and earning logics are being developed. The current business model and the general description of the portal solution can be found in this chapter as well.

The sixth chapter includes the empirical information of this thesis and acts as the main source for the conclusions to draw. It presents the characteristics and changes in the business model and pricing when the portal is introduced into the FemiScan product. This chapter, in coherence with the theoretical part, provides the necessary information for answering the set research questions: “*What does introducing a portal solution require from the business model of a medical device manufacturer?*” and “*What pricing options does a medical device manufacturer have when introducing a portal solution*”. This information is gone through part by part similarly to the theoretical chapter.

The seventh chapter draws the final conclusions and describes how the set goals were reached. This is also the chapter where the answers to the research questions are presented profoundly and explicitly. The findings of the empirical chapters and the theoretical part are turned into clear answers to the research questions. Also the recommendations for future are brought to light in the latter part of this chapter. The last chapter summarizes the results of this thesis.

2 BUSINESS MODELS

The concept of business model has gained a lot of attention in the literature in the last decade or so. A consensus for the definition of business model concept has not been acknowledged, but the most common approach is to describe a way in which organizations create value (Al-Debei, et al., 2008). According to Osterwalder and Pigneur (2010) business model is a blueprint, which is used to implement the firm's strategy through organizational structures, processes and systems. A business model articulates the rationale and provides data and other evidence of how the organization creates, delivers and captures value (Teece, 2010) (Osterwalder & Pigneur, 2010). A business model is a conceptual model of doing business, not financial, and every established firm, knowingly or not, employs a business model describing the logic of the value creation, delivery and capture mechanisms (Teece, 2010).

The development of computing and communicating technologies and the open global trading regimes have brought up a whole new level of interest into the business model concept (Teece, 2010; Al-Debei, et al., 2008). The traditional world of business was defined by stability and low level of competition, but the recent developments have made the business world more complex, dynamic and elevated the levels of uncertainty and competition (Al-Debei, et al., 2008). The customers have more choices to choose from and the supply alternatives are more transparent. For many actors in different sectors the supply side driven earning logic, which has been employed in the industrial era, is no longer viable (Teece, 2010). Thus, in order to keep the firm's business model viable and achieve sustained value creation, managers need to change the business model of their company continuously (Achtenhagen, et al., 2013; Teece, 2010). If successful companies keep employing the business model that used to be right for too long, they will face a risk to fail. They need to adapt their business model accordingly to the competitive situation. (Doz & Kosonen, 2010) What is needed to achieve this change is not clearly conceptualized in the literature yet further than

acknowledging that strategy is important and experimentation and learning are in key roles (Teece, 2010; McRgath, 2010).

2.1 The business model canvas

The business model canvas introduced by Osterwalder and Pigneur (2010, p.15) is a basic tool or shared language to describe, visualize, assess and change business models and it consist of nine basic building blocks. These building blocks illustrate the logic of how the company is trying to make money. The nine building blocks are customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships and cost structure. (Osterwalder & Pigneur, 2010, p. 15) These building blocks are explained in detail in the next chapters.

2.1.1 Customer segments

The customer segments building block describes the different groups of people or organizations the company is trying to sell their offerings to. Customer segments building block is crucial for any enterprise, because without profitable customers, it is not possible to survive in the long run. Customers can be seen as the heart of any business model. An enterprise can satisfy customers better if it divides them into distinct segments by common needs, common demographics or any other attributes. When building a business model, a company must make a strict decision of which segments it wants to serve and which to possibly ignore. The segments chosen to be served and their specific customer needs can be used as a basis for the rest of the business model. (Osterwalder & Pigneur, 2010, p. 20)

The customer basis can be divided into segments in numerous ways. The three basic levels of segmentation are mass market, niche market and segmented market. A business model with mass market focus does not distinguish between different segments but focuses its all actions towards one large group of customers who share similar needs. (Osterwalder & Pigneur, 2010, p. 21) Mass market approach is more common in consumer business than in B2B-field.

Business models focused on niche markets serve one specific segments that have really specific needs and problems. All other elements of the business model, like value proposition and distribution channels, are tailored to the specific needs of the niche market. (Osterwalder & Pigneur, 2010, p. 21)

A company can also distinguish between segments that have slightly different needs and serve a few of these distinguished segments with slightly different value propositions. It is also possible to serve two totally unrelated segments with very different needs and problems, but this diversification requires some special assets to be able to serve two totally different segments. (Osterwalder & Pigneur, 2010, p. 21)

2.1.2 Value propositions

The value propositions building block describes the specific set of products and services that satisfy targeted customer segments. The value proposition is the bundle of products and services that creates value for the customer and brings the customer to the company instead of a competitor. The purpose of a value proposition is to satisfy a customer need or solve a customer's problem, and this way make them turn to purchase from this company over another. (Osterwalder & Pigneur, 2010, p. 22) Value propositions must also be evaluated and possibly altered in order to keep the customers turning to your own company (Achtenhagen, et al., 2013). Each customer segment needs to be addressed by a specific value proposition which consists of a bundle of products and services that satisfy their needs. Each value proposition should offer the customer something that competitors cannot offer. (Osterwalder & Pigneur, 2010, p. 22)

Value can be created in many different ways and the key to satisfy a customer segment's needs is to find the right mix of elements to do just that. An enterprise can create value by its products and services both qualitatively and quantitatively. Qualitative values are for example design and customer experience or other

attributes that are not to be measured directly in money, percentages or other numeral manner. Quantitative values instead can be measured in numeric way. Quantitative values are for example price or speed of service. (Osterwalder & Pigneur, 2010, p. 23) The value proposition can contribute to customer value creation in numerous ways and the following non-comprehensive chapters describe some of them.

Newness, a value often related to technology, is a value that satisfies an entirely new set of customer needs that the customer did not even perceive before as there never was a similar offering on the market (Osterwalder & Pigneur, 2010, p. 23). But it does not naturally mean that if a company creates something new, it will sell. It is crucial to distinguish the customer need behind the value.

Performance improving is very common way of creating more value to the customer. By improving the performance of offered products and services the customer naturally gains more value and hopefully is ready to pay for them. Improving performance has its limits though. It will not be beneficial for anyone to improve the performance of a product or a service beyond the need of the end-user. (Osterwalder & Pigneur, 2010, p. 23)

Customization means that the value proposition is tailored into the specific needs of certain customer or certain customer segment. Tailoring products and services to specific needs of a customer creates extra-value as the customer gets exactly what they need and nothing more. The customer can even be included in the designing of products and services they are about to purchase. Co-creation and mass customization allow the enterprise to offer customized products and services but also gain the advantages of economies of scale. (Osterwalder & Pigneur, 2010, p. 23) Value can also be created simply by getting certain job done for the customer. This way the customer can focus on its own core competencies and pay for the supplier to help perform a certain job which is not in their own area of expertise. (Osterwalder & Pigneur, 2010, p. 24)

Two of the most obvious qualitative values, design and brand/status, are not easily measured. Design can be very important in certain industries, especially in consumer markets, and it can even be the only decisive attribute in customer's choosing process. Customers may also choose products or services simply by choosing a strong specific brand and use this brand as a status symbol to put themselves in a certain position in outsiders' minds. (Osterwalder & Pigneur, 2010, p. 24)

Having a lower price on similar perceived customer value is a widely used base of business models. If customer can satisfy same needs with less money or more money, they will most likely choose less money. Some customer segments are definitely more price-sensitive than others and this must be taken into account when making pricing decisions. (Osterwalder & Pigneur, 2010, p. 24) More detailed description on pricing can be found in its own chapter.

Cost reduction is also an obvious and important way to attract customers. The whole business model can be based on a value proposition that reduces the costs of the customer. (Osterwalder & Pigneur, 2010, p. 25) Cost reduction can also be paired with aforementioned "Getting the job done" –offering. Another thing to reduce for the customer is risk. If the risks incurred in purchasing products and services reduce, the customer will perceive more value. This can be done for example by guarantees of different types. (Osterwalder & Pigneur, 2010, p. 25)

Offering customers access to something they did not have access before is another way to create value. Making products and/or services available for customers can be achieved by new technology, by new kind of business model or by combining these two. Accessibility business model makes usually something prestigious and luxury accessible for customers who are not wealthy enough to purchase them themselves. (Osterwalder & Pigneur, 2010, p. 25)

Value can also be captured by making products easier to use or more convenient. It will attract customers to buy if something can be done quicker and with less

effort. Improving convenience and usability is also often technology-based. (Osterwalder & Pigneur, 2010, p. 25)

2.1.3 Channels

The channels building block describes the process of communicating with and reaching the customer in order to deliver the specific value proposition to the chosen customer segment. Channels include communication, distribution and sales channels which together form the interface with customer segments. This interface is very important in overall customer experience. Channels can be distinguished between direct and indirect channels, as well as between owned and partner channels. These channels cover the five functions of the channels building block. (Osterwalder & Pigneur, 2010, pp. 26 - 27) The channel types and functions are presented in Figure 1.

Channel Types		Channel Phases				
Own	Direct	1. Awareness How do we raise awareness about our company's products and services?	2. Evaluation How do we help customers evaluate our organization's Value Proposition?	3. Purchase How do we allow customers to purchase specific products and services?	4. Delivery How do we deliver a Value Proposition to customers?	5. After sales How do we provide post-purchase customer support?
	Web sales					
Own stores						
Partner	Indirect					
	Wholesaler					

Figure 1 Channel types and Phases (Osterwalder & Pigneur, 2010 p. 27)

2.1.4 Customer relationships

The customer relationships building block explains the types of relationships an organization keeps up with each specific customer segment. The type of relationship has huge influence on the overall customer experience. Relationships can range between fully automated and personal relationships and a company should have a clear idea of the type of relationship it wants to establish with each distinguished customer segment. The motivations behind different types of customer relationships are customer acquisition, customer retention and boosting sales. (Osterwalder & Pigneur, 2010, p. 28)

There are six types of relationships to be distinguished, but these can co-exist too with single customer segment. First type of relationship is personal assistance, which is based on human interaction between the customer and the company. The company communicates with the customer through a real representative to answer their questions and help during and after the sales process. The communication may happen by e-mail, phone calls, on-site at the point of the sale or through any other means suitable. (Osterwalder & Pigneur, 2010, p. 29)

The deepest and most intimate type of customer relationship is dedicated personal assistance. This usually develops over a long period of time and multiple sales processes. This type of relationship involves a dedicated customer representative solely to an individual client. Dedication of a customer representative or a key account manager to a single customer is usually used to maintain personal relationships only to the most important customers. (Osterwalder & Pigneur, 2010, p. 29)

Self-service is a type of relationship where an enterprise provides all means necessary for the customer to get what they need and help themselves. This way no direct relationship is maintained as there is no personal interaction between the company and the client. A more sophisticated version of customer self-service is to mix it with automated processes. These automated services can recognize individual customers and their characteristics in order to offer them customized services. This is possible for example by personal online profiles which are used to offer information regarding orders and transactions or to offer recommendations on next sale. The ultimate goal of automated services is to simulate a personal relationship. (Osterwalder & Pigneur, 2010, p. 29)

Increasingly, companies are moving beyond the traditional buyer-seller relationships by keeping up communities or by co-creating value with the customer. Utilizing user communities help firms become more involved with existing and possible customers. Maintaining online user communities allow users to share knowledge and even solve each other's problems. Communities can also

facilitate new connections between the company and prospects. Co-creation involves the customer to the value creation for their own good. Customers can be engaged to create content to the offering or to assist with the design of a new product or in many other ways. Both of these types of relationship help the company to understand their customer better and to deliver superior value to them. (Osterwalder & Pigneur, 2010, p. 29)

2.1.5 Revenue streams

The revenue streams building block illustrates the money the company can generate from each customer segment. The most important question of this block is: “For what value is each customer segment truly willing to pay?” When a company finds the answers to that question it can generate at least one revenue stream from the said customer segment. Even if there are more than one revenue streams from one customer segment they all can have different pricing mechanisms and be different in type of revenue streams. In a business model the revenue streams are distinguished to two different types: Transaction revenues resulting from one-time customer payments and Recurring revenues resulting from ongoing payments. Ongoing payments can either be from delivering the original value proposition or from providing post-sales customer support. (Osterwalder & Pigneur, 2010, p. 30) The pricing mechanisms are introduced better in chapter 2.2.

There are a few different ways to generate revenue streams from customer segments. The most common and widely used way is the asset sale. The logic is to sell the ownership rights to physical product to a customer. After the sales the new owner is allowed to do anything to the product. They can use it as much as they want to, resell it or even demolish it. Another way to create a revenue stream is to grant the customer the exclusive but temporal right to use an asset for fixed period of time and collect a fixed fee for that. This is called lending, renting or leasing. This creates a recurring stream for the lender. For the renter this creates expenses for only a limited time instead of all the costs from buying and owning the rented asset. (Osterwalder & Pigneur, 2010, p. 31)

When dealing with services rather than physical product, companies usually generate revenue stream by usage fees or subscription fees. Usage fee is collected for the usage time or times of a particular service. The more the customer uses the service the more it pays. Usage fee can be collected for example by the hour or by the times a service is used. Subscription fee, instead, grants the customer a continuous access to a service. The customer may use the service as much as needed in the fixed time. The subscription fees are used widely from medical device industry to computer gaming or gym memberships. (Osterwalder & Pigneur, 2010, p. 31)

Licensing revenue stream generates from collecting a licensing fee for the permission to use intellectual property of the licensee. The rights-holder does not have to manufacture a product or commercialize a service, but can still generate revenues from their property. Licensing is commonly used when dealing with copyrights or patents. (Osterwalder & Pigneur, 2010, p. 31)

The brokerage fee revenue stream results from taking a fee for intermediating two or more parties. The most obvious examples of intermediation service performers are credit card providers, brokers and real estate agents. They earn a commission or a percentage of every matched buyer and seller or of the monetary value of each sales transaction. (Osterwalder & Pigneur, 2010, p. 32)

Another way of generating revenues derives from advertising fees. The revenues generate from collecting a fee for time or space for the customer to advertise their own offerings. Advertising revenues are increasingly relied on as business is moving to internet. Traditional collectors of advertising revenues are media industry and event organizers. (Osterwalder & Pigneur, 2010, p. 32)

2.1.6 Key resources

The key resources mean the most crucial assets that are requirements for the whole business model to work and no business model can work without them.

These are the resources allowing the company to create and deliver value proposition, reach the customers, establish customer relationships and generate revenue. Key resources can be physical, intellectual, human or financial and different types of business models naturally require different key resources. They can also be owned by the company, leased by the company or even acquired from an outside organization. (Osterwalder & Pigneur, 2010, p. 34)

Physical resources include all the physical assets without which the business would not work. These are for example manufacturing facilities, buildings, vehicles, machines, distribution networks etc. Physical key resources are often quite capital-intensive. (Osterwalder & Pigneur, 2010, p. 35)

Intellectual resources include brands, proprietary knowledge, patents and copyrights, partnerships and customer databases. These are difficult to develop but can offer a lot of value if successfully created. Intellectual resources are becoming increasingly fundamental in business model creation. Business model can be built solely on one intellectual resource, for example collecting licensing fees from patents, or a company can use them to boost other parts of the business model. (Osterwalder & Pigneur, 2010, p. 35)

Human resources are a prerequisite for every organization. Some business models are still more dependent on human resources than others. For example a company relying heavily on research and development needs smart enough people to work on the R&D to be successful. In any creative or knowledge-based industry human resources are relatively more crucial. Skilled sales force can also be a crucial for the business model to work. (Osterwalder & Pigneur, 2010, p. 35)

Every enterprise needs some financial resources to stay in business. Some business models though require more specific ones. Resources like cash, lines of credit or stock option pool may be needed to attract and hire key employees. (Osterwalder & Pigneur, 2010, p. 35)

2.1.7 Key activities

The key activities building block describes the activities the key resources perform in order to keep the business running and operating successfully. Key activities are also something that every company has; they just need to be understood. Much like key resources, key activities are required allowing the company to create and deliver value proposition, reach the customers, establish customer relationships and generate revenue. And like key resources, they may vary between different business models. Some business model may require production related activities whereas another needs problem solving. (Osterwalder & Pigneur, 2010, p. 36)

Production related key activities are in a dominant role in manufacturing companies. Production activities ensure the designing, making and delivering the product in large enough quantities and/or of superior quality. (Osterwalder & Pigneur, 2010, p. 37)

Problem solving activities are needed especially in consulting business as they relate to figuring out a new solution for individual customer's specific problem. Also other service dominant business models, such as hospitals, rely heavily on these activities. Problem solving category also includes activities such as knowledge management and continuous training. (Osterwalder & Pigneur, 2010, p. 37)

Platform or network used as a key resource for a business model requires specific kind of activities. Platform/network activities are for example platform management, service provisioning and platform promotion. A platform as the cornerstone of the business model can be for example a network, a web site, a transaction platform or an interface between software and an operating system. (Osterwalder & Pigneur, 2010, p. 37)

2.1.8 Key partnerships

The key partnership building block illustrates the network of partners and suppliers that without the business would not be able to operate successfully. Partnership can be established for various reasons and networking is becoming increasingly important part of many business models. Organizations partner up with each other in order to optimize their business models, reduce risk or acquire additional resources. There are four types of partnerships to be recognized: Strategic alliance between non-competitors, coopetition/ strategic partnership with a competitor, joint venture to develop new business and buyer-supplier relationship to assure reliable supplies. (Osterwalder & Pigneur, 2010, p. 38)

Optimizing business model and economies of scale are usually the motivation behind a buyer-supplier relationship. It is not logical for a company to own all resources or perform all activities by itself. Thus, buyer-supplier relationship, designed to optimize the allocation of resources, allows the company to enjoy the benefits of economies of scale. These partnerships are most commonly formed in order to reduce costs which often mean outsourcing or sharing infrastructure. (Osterwalder & Pigneur, 2010, p. 39)

In competitive business environments characterized by uncertainty partnership are often formed to reduce risk for both parties. Organizations can form a strategic alliance in one area and compete in another. This can be useful for example when pursuing for a certain technological innovation to become an industry standard in order to compete with products utilizing said technology. This is coopetition. (Osterwalder & Pigneur, 2010, p. 39)

It is very rare that a company owns all necessary resources and performs all necessary activities described in their business model. Rather, they acquire knowledge, license or access to customers from other firms. The motivation behind such partnerships is in extending their own capabilities by relying on others and this way gaining access to certain resources or performing certain activities. Such acquisitions of particular resources could be for example

acquiring operating systems or sales force rather than develop them in-house. (Osterwalder & Pigneur, 2010, p. 39)

2.1.9 Cost structure

The cost structure building block includes all the costs incurred to operating the business model. The costs incurred from creating and delivering value, maintaining customer relationships and generating revenue can be calculated relatively easily after carefully defining key resources, key activities and key partnerships. Some businesses are naturally more cost-driven than others but every business model creates costs and every organization wants cut costs if possible. (Osterwalder & Pigneur, 2010, pp. 40 - 41)

Some business models are naturally keener about low cost structure than others and thus there has been a distinction between two broad classes of business model cost structures: cost-driven and value-driven. Many business models are somewhere in between the two extremes. Cost-driven business models are focusing on cutting costs wherever possible. The aim of these businesses is to create and maintain leanest possible cost structure in order to offer the value propositions at lowest possible price. This is usually done by using low price value propositions, maximum automation and wide-scale outsourcing. Value-driven businesses do not care as much about the costs of used business model, but instead focus on maximizing the delivered value to the customer. Value-driven business model are characterized by premium value propositions and highly personalized services. (Osterwalder & Pigneur, 2010, p. 41)

Costs can be simply divided into fixed and variable costs. Fixed costs remain the same regardless of the volume of produced goods and services. Manufacturing firms have usually higher proportions of fixed costs than some other companies. Fixed costs include for example salaries, rents and physical manufacturing facilities. Variable costs instead vary in scale with the volume of production. (Osterwalder & Pigneur, 2010, p. 41)

2.2 Pricing

Pricing is a significant part of the revenue streams building block of the business model canvas as price is the one element that creates revenue, not costs (Kotler & Keller, 2012). Bonnemeyer et al (2010) introduce a figure that is basically dividing pricing measures into two approaches: traditional approaches and innovative approaches. The traditional approaches are based on value proposition of conventional product or service supplied by the provider. In contrast, the innovative approaches are based on the actual input or output of the customer according to the service-dominant logic of marketing (Vargo & Lusch, 2004). This difference in focus changes the measurable performance parameters and shifts the allocation base for pricing from the supplier's costs to the value that is actually realized for the customer (Bonnemeyer, et al., 2010). In Figure 2 and the next chapters the different approaches are explained in more detail through performance parameters, supplier's value propositions and parameters for price setting.

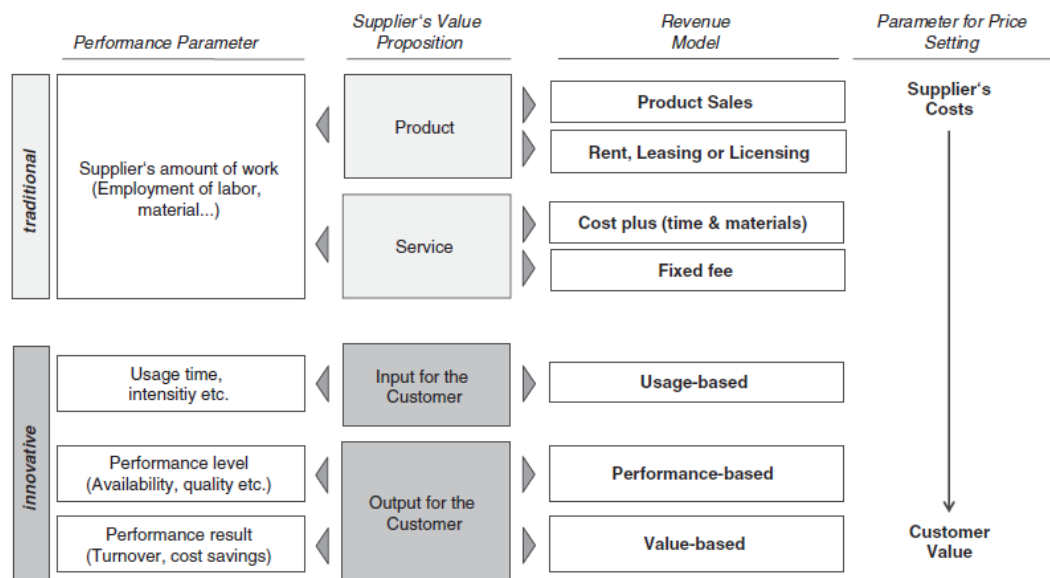


Figure 2 Traditional and innovative revenue models (Bonnemeyer; Buriánek; & Reichwald, 2010)

2.2.1 Traditional pricing approaches

The value proposition in the traditional revenue models is basically a product or service provided by the supplier. The measured performance that is the basis for the price setting is the amount of work and costs of the supplier. Basically there are three elements impacting the supplier's pricing decisions in traditional models: competition, customer's willingness to pay and costs. In the traditional revenue models the products and services are offered to the client as loose bundles and not as integrated solutions. The revenue model is called 'product sales' if the contract includes a property transfer for the product components of the offering. 'Product sales' is the most traditional revenue model. In case the ownership of the product does not change, but the supplier only transfers the possession rights to the client, the revenue model is called 'rent, leasing or licensing'. (Bonnemeyer, et al., 2010) In renting, leasing or licensing model the customer pays for the time the product is possessed by them.

Service components of the bundled offering being the value proposition, there are two different revenue models to be distinguished: 'Fixed fee' and 'Cost plus' (Kalnins & Mayer, 2004). In 'fixed fee models' both parties are given the possibility to agree upon a fixed amount of money to be paid for the service. The client will pay the fixed fee even if they do not actually utilize the service at all. As the purchase and the delivery of the service are separated, the service can be paid for even if it is never consumed. This kind of 'fixed fee model' could be used for example in IT support services as they can be purchased but not utilized if the purchased systems work all the time. The use of the 'fixed fee models' would work best for both the supplier and the customer if the service can be clearly specified before the contract is signed. The non-consumption of the service could affect greatly to the supplier's capacity and revenue as well as the costs of the client. The supplier would get paid for doing nothing, which would look good money-wise, but they would still have to keep up the capacity in case something happens and the service is needed. In order to avoid the non-consumption, the 'cost plus model' can be appropriate. 'Cost plus model' is a widely used approach to pricing. Under this approach, the supplier charges the amount of work and

material used to produce the offering and adds a certain markup in order to create a profit margin. In the service context this approach is sometimes called ‘time-and-materials model’. (Bonnemeyer, et al., 2010) In this model the client should negotiate a cost limit into the contract, because otherwise the supplier usually charges their complete effort to the client (Farr, 2001).

All of the traditional revenue models share the basis that the only measurable performance parameter is the supplier’s amount of work put into providing the value proposition to the customer. (Bonnemeyer, et al., 2010) Thus, according to Nagle and Hogan (2006) the supplier’s incurred expenses pose as the only parameter for price setting. The traditional revenue models are however often combined and mixed together in practice as they all have common point of origin (Bonnemeyer, et al., 2010).

2.2.2 Innovative pricing approaches

In innovative approaches the first two of the aforementioned elements affecting the pricing decisions (competition, customer’s willingness to pay and costs) remain crucial for the supplier. The role of the supplier’s costs changes greatly in innovative models. Instead of the production costs and other internal variables of the supplier, the parameters for price setting in the innovative models are related to the performance of the offering in the customer’s business environment. (Bonnemeyer, et al., 2010) In many cases where innovative models are used the supplier’s value proposition is not a single product or a service but an integrated and customized solution, which creates specific value added to the customer (Nagle & Hogan, 2006) (Hünerberg & Hüttmann, 2003). The innovative approaches can be divided into two according to the supplier’s value proposition: ‘input’ or ‘output’ for the customer.

When the supplier constitutes an ‘input’ from the client’s perspective with its value proposition, there is only one adequate revenue model: the ‘usage-based model’. In the ‘usage-based model’ a pre-negotiated price is paid by the customer to the supplier depending on how much the customer actually utilizes the service

or solution (Hünerberg & Hüttmann, 2003). The payments can be collective from a given period of time or the parties can negotiate a pay-per-use type of pricing.

If the supplier's value proposition constitutes an 'output' for the customer's production process, there are two more innovative revenue models to be distinguished: the 'performance-based model' and the 'value-based model' (Bonnemeyer, et al., 2010). The 'performance-based model' means that the provider guarantees a certain performance level to the client (Nagle & Hogan, 2006) and, if the level is reached by the provider the client pays a pre-negotiated price (Bonnemeyer, et al., 2010). If the promise of performance level is not kept, the provider may face penalties. Another output-dependent pricing approach is the 'value-based model'. In this model, the focus of the supplier is on the client's internal processes. The goal is to deliver optimization and/or productivity to the customer. Thus, the pricing cannot be based on aforementioned elements but is has to be based for example on cost savings generated to the customer by the supplier's value proposition (Sawhney, 2006). Thus, the provider benefits directly from the value generated to the client (Hinterhuber, 2004). In order to assess the value generated to the customer monetary figures like the amount of cost savings, increased turnover or improved profitability created by the offering are most suitable. Non-monetary figures like customer satisfaction can also be used but the quantification of them can be difficult. (Bonnemeyer, et al., 2010)

Altogether the supplier's costs are becoming less important for pricing decisions as the innovative approaches are focused on the perceived customer value, instead of the supplier's costs, as the main parameter for pricing. The costs are no longer the main parameter for price setting. Competition is as important as in traditional models considering price setting. In value-based model for example, the intensity of competition at least sets some constraints to the supplier concerning the price it can bill from its customer's gained benefits (cost savings, turnover increase etc). (Bonnemeyer, et al., 2010) In innovative approaches the provider's and the client's objectives become much more aligned, which has been shown to lead to significant cost efficiencies (Ng & Yip, 2009). In addition, the incentives and

risks become more aligned too between the vendor and the customer in innovative approaches (Kim, et al., 2007). Thus, Bonnemeyer et al (2010) argue that the customer's willingness to buy may increase in innovative pricing approaches, if the supplier keeps their advantages transparent enough to the customer.

Using innovative revenue models complicates the internal price setting process. A set of strict pricing objectives, accurate courses of action, an operational strategy, and a set of control and review procedure are required from the firm in order to utilize these models effectively. (Lancioni, 2005) Other barriers to utilize innovative pricing models are the difficulties to objectively measure the value generated to the customer and customer's resistance to accepting unfamiliar pricing approaches (Sawhney, 2006). Appropriate communication is also crucial in innovative approaches if the supplier wants to convince customers (Hünerberg & Hüttmann, 2003). Lacking such skills and resources might lead the provider to granting the created value straight to the customer. Without effective pricing the firm may not be able to gain the value for itself of the value created to the client (Dutta, et al., 2003). In order to have effective pricing processes, the provider needs to have routines to realize when the price is right compared to the value created to the client as well as routines to decide prices internally. (Bonnemeyer, et al., 2010) All in all, price is traditionally a major determinant of buyer's choice (Kotler & Keller, 2012).

3 HEALTHCARE TECHNOLOGY AND MEDICAL DEVICE INDUSTRY

The term healthcare technology is used for the drugs, devices and medical or surgical procedures used in healthcare and the organizational and supportive systems within which such care is provided (De La Lama, et al., 2010). The healthcare technology industry consists of very wide customer base as the customers are spread across the public and private organizations and even the individual end-users. Many medical products are often bought by a government, public institution or a private agency on behalf of the actual end-user, which makes it difficult for the manufacturing company to create strong relationships with the actual users of their products. These difficulties are highlighted especially in medical device markets. The industry is very B2B-oriented, but some companies are still present at the consumer markets and selling directly to the end-users. As the customers are widely spread in healthcare technology industry, so are the acting companies. Especially medical device sector is highly fragmented and a majority of the players in the field are small companies. (Eatock, et al., 2009) In addition to the diversity of the industry it is also very innovative as new products are brought to the market relatively often (Eatock, et al., 2009; Nass, et al., 2006). Introducing new products is one of the main ways to increase sales in healthcare industry (De La Lama, et al., 2010) and new to the world innovations are usually developed by small companies as larger companies rather just upgrade their products (Eatock, et al., 2009). This industry is characterized by rapidly changing environment, as it is very diverse and new requirements and regulations may come up very quickly, and by the companies' lack of direct contact to their end-users. These factors make the product development as well as the general operation in this field very difficult. (Eatock, et al., 2009; Nass, et al., 2006)

3.1 Finnish healthcare technology industry

Finland, as a relatively small country, has a lot of expertise and professionals in health technology. The health technology sector has probably attracted more FDI into Finland than any other sector. There are over 300 companies operating in healthcare technology industry in Finland and approximately 100 of those are offering manufacturing, design, clinical trial, regulatory and other services needed locally by large and small entities. Nonetheless, Finland makes no exception in the fact that majority of the production is accounted for few large companies, from which most have integrated into multinationals. (FiHTA, 2015)

Finnish healthtech exports have grown at an average rate of 9% for two decades and 2014 was the best trade year ever. Strong demand of Finnish health technology, mainly rooting from electromedical and diagnostic imaging sectors, led to a record exports of EUR 1.8 billion in 2014 (increase of 8.3%). Imports grew at slower rate, which led to another record: trade surplus of EUR 829 million. Healthtech is today the biggest segment of Finland's high-tech product exports, representing 47% of total high-tech exports. The medical equipment sector was the main reason for the growth as its exports rose by 10.3%, to EUR 1.3 billion. Overall exports of healthtech grew only slightly to Europe in 2014, but exports to USA rose 24% and exports to China increased 11%. Finland has achieved long-term growth in exports of health technology products with significant trade surpluses and these are actually understating the capabilities of Finnish healthtech. There are several multinational enterprises that run large R&D operations in Finland, but manufacturing of the products is located in other countries. (FiHTA, 2015)

3.2 Medical devices and medical device industry

Medical devices are a part of the health technology industry and, as said above, the medical device sector is highly fragmented and products are often bought on behalf of the end-user by a government or other "middle-man". The industry is

also highly regulated, because the devices are often sold for research or medical use. Sold devices must have at least the medical CE marking in European markets and FDA approval in US markets in order to assure that the devices are safe enough to use in such manner. (Eatock, et al., 2009)

A medical device, according to the European Commission (2015), means “any instrument, apparatus, appliance, software, material or other article, whether used alone or in combination, including the software intended by its manufacturer to be used specifically for diagnostic and/or therapeutic purposes and necessary for its proper application, intended by the manufacturer to be used for human beings for the purpose of:

- diagnosis, prevention, monitoring, treatment or alleviation of disease,
- diagnosis, monitoring, treatment, alleviation of or compensation for an injury or handicap,
- investigation, replacement or modification of the anatomy or of a physiological process,
- control of conception,

and which does not achieve its principal intended action in or on the human body by pharmacological, immunological or metabolic means, but which may be assisted in its function by such means.”

This definition includes many features that make the medical device industry a very unusual one and difficult to operate in. The range of products is extremely broad and the products are brought to market by almost as broad range of small companies. (Eatock, et al., 2009) Because of the wide range of products and the use that the products are acquired, the customers often base their purchasing decision on articles and other publications published about the products their acquiring. Therefore, there is sometimes a strong connection between the number of publications about a new product or method and the launching of said product or method into the market. The introduction of new products is a critical activity

in medical device industry and that is why it is useful to create a buzz around the technology being launched. The increased buzz can result indirectly in increased new sales opportunities for the company. The customers' interest in articles and other publications make the R&D investments and activities often the most important ones from the manufacturer's point of view. (De La Lama, et al., 2010) Here lies a risk of becoming too focused on the engineering side of the business and forgetting the sales and marketing activities for example needed to succeed. Smith (2007) states that usually the firms that are driven by their R&D capabilities can succeed if the industry is in embryonic or growth stage. If the industry is already in matured stage, the industry leaders are usually the ones with the strongest marketing capabilities. The medical device industry is peculiar one as it has reached the mature stage already but is still maturing all the time. (Smith, 2007) Hence, the R&D capabilities are not enough to remain competitive in this industry. Companies should also focus on their business models and marketing efforts, for example.

3.3 Portals used in medical device industry

Generally portals or similar solutions are not very widely used in medical device industry, but more and more are being launched continuously (Airaksinen, 2015). Increasingly they are used in cardiology and other fields, which require complex analyses of recorded measurements and involve severe health risks or even death if these analyses are not executed properly. These risks force the professional to use and pay for the portal as the manufacturer instructs.

If the risks are not as severe or acute the clinician or whoever is using the device through a portal may get tempted not to use or pay for the full service (Segal, 2015). They could only use the device as they should but not use the analyzing tools to get accurate analyses trusting their own objective opinion. This scenario may pose a significant risk for the manufacturer in terms of continuous revenue stream especially in fields like home training devices or care, especially now, that the market is shifting from acute care to early detection and prevention

(Airaksinen, 2015). Any device manufacturer about to launch a portal should thoroughly calculate the prices and the risks for their solution and also think carefully about the behavior of the end-user.

In conclusion, the theories presented in this theoretical part offer a basis for answering the research questions and come up with solutions to renewal of the business model of the case at hand. The business model canvas works as a tool for presenting the current and the new business model for the addressed product and the theory for the pricing models provide a starting point for making the decision for the pricing method of the new solution. The results presented in this thesis will also take into account the specific characteristics of the industry, introduced in this part.

4 METHODOLOGY

The nature of the research problem, as a particular problem for a certain case, resulted in making this thesis as qualitative research and more specifically as a case study. The aim of this study is to create outlines for Mega Electronics to a business model after introducing a portal solution to its' urinary incontinence treatment device, FemiScan. This can be seen as a single case maybe to be universalized for some parts to other cases. In this case the research data is collected from real life situations and the results are also guidelines for real life actions, which are typical for qualitative research (Hirsjärvi, et al., 2007, p. 160). The objective of qualitative research, and also this thesis, is to make a holistic research, profound understanding of the issue and applicable proposals for actions, rather than test different theories and hypotheses (Eskola & Suoranta, 2008).

4.1 Case study

This thesis is carried out as a case study, as the objective is to search for a solution to a single problem collecting data from multiple sources and depending on the knowledge of the author (Metsämuuronen, 2008, p. 16). The single case in this thesis is to describe the changes needed to be made for the business model and pricing model of the FemiScan devices when introducing a portal solution as part of the treatment plan. Metsämuuronen (2008, p. 17) states that in a case study, data is collected in various ways and from different sources to gather a comprehensive understanding of the issue. The data gathered for this thesis for making the conclusions has been gathered via interviews, meetings, from books and articles and from the internet for example. Also, different sources, such as management of Mega, outside practitioners and scientific community, have been used to gather data for the empirical part of this thesis.

In a case study the results are based on the experience and knowledge of the author (Metsämuuronen, 2008, p. 17), which applies for this case too, as the data

gathered in the interviews and from the literature are translated into guidelines by the author of this thesis. This offers a natural basis for universalizing of the results (Metsämuuronen, 2008, p. 17), but one must be careful if the results are to be generalized. The interpretations of the gathered data are strictly subjective and some other researcher could draw different conclusions from the same data, which is also typical for case studies like this (Hirsjärvi, et al., 2007, p. 160; Metsämuuronen, 2008, p. 17).

Some generalizations have been done in this thesis, for example considering the industry, customer behavior or future perspectives, to slightly simplify the making of the conclusions, and this is also typical for a case study like this (Metsämuuronen, 2008, p. 17). Considering the generalizations of the results of this study; some parts of the results may and some parts may not be applicable for generalizations. Some industry related outcomes can possibly be applied in other cases as well, but most of the results of this thesis are generally applicable only for the use of Mega.

4.2 Collecting the research data

In case study the data can be gathered in many different ways (Metsämuuronen, 2008, p. 16). The data is gathered in prior to making the actual conclusions and answering the research questions and the data can be gathered in any way necessary, ranging from interviews and business meetings to literature reviews and internet documents.

The theoretical data was gathered through literature review including books and articles as well as internet sources. In this thesis three interviews were made and two research meetings were held, and the interview questions can be seen in attachment 1. The interviews and meetings were conducted in order to gather the empirical, mostly qualitative, background data for making the actual conclusions and compare it to the theory. In the first business meeting the CEO of Mega Electronics introduced the product and the insights of the issue at hand to the

researcher and basic outlines of the study were determined. This meeting offered the fundamentals for making this thesis. In the three interviews very different status individuals were interviewed. The first interviewee was a senior physician and the head of the psychiatric department in the University Hospital of Kuopio (KUH), who has been utilizing the FemiScan therapy in the treatment of urinary incontinence for years and this interview was held face to face in the premises of KUH in April 2015. This interview offered very useful data for understanding the industry, customer and patient behavior as well as the general operational patterns of the Finnish health care system and future perspectives regarding this type of treatments.

The second interview, in May 2015, was held over the internet, via Skype, because the interviewee was based in the United States of America, in the Boston area. The interviewee was a medical doctor running three incontinence clinics in the Boston area and consulting two more practices in Florida. From this interview some very useful data was gathered, especially data concerning the American health care system, its' reimbursement policies, the industry itself and future perspectives for the incontinence treatment. The comparison between the answers from these two interviews created a quite comprehensive picture from the different types of FemiScan customers, as the first interviewee was operating in a Finnish public hospital and the second one was running a private business in the US. These interviews showed clearly the diversity of the FemiScan customer basis.

The third interview was held in the end of May 2015 in the Mega office and the interviewees were the R&D Manager and Sales Manager of Mega. This interview was held as the last of these three as the questions for this one were partly formed from the basis of the first two interviews. The main outcome from this third interview was the roughly filled business model canvas for the FemiScan, afterwards completed by the author. The questions for these interviews can be seen in the attachment 1.

The second business meeting was held in the Mega office when the theoretical and some of the empirical data had been already gathered and the contents of this meeting included presenting the theoretical grounds and empirical plans of the thesis to the Mega personnel and receiving their thought and comments regarding the matter. The meeting was held with the presence of the CEO, COO, R&D Manager, and two Sales Managers from Mega.

With these methods sufficient amount of data was gathered to start the process of composing the business model for the FemiScan products. The meeting with the Mega personnel, with the agenda of going through the theory and gathered data, was great in terms of the reliability of this thesis. In addition to these meetings and interviews the researcher has been in close communication with the representatives of the company.

5 MEGA ELECTRONICS LTD

Mega Electronics is a medical device manufacturer in Kuopio, Finland. It was founded in 1983 and ever since it has been developing, manufacturing and marketing medical devices and software for monitoring and analyzing human brain, heart and muscles. It specializes in bio signal monitoring and the devices can be used in several different applications like, neurology, cardiology, rehabilitation, sports science, occupational health, research and educational use and home healthcare. The devices manufactured by Mega Electronics can measure for example muscular strength, fatigue and recovery, stress levels of an employee, work ergonomics and human brain, for example in epilepsy monitoring.

Mega is a global company as its distributor network spreads out to over 30 countries and it has customers all over the world. Mega has a lot of experience on the multinational medical device market and it has become more and more international all the time since its foundation. Nowadays most of its sales is exporting all over the world. The largest customer segments for Mega are hospitals, universities, research institutes and other public institutes, but there are also many different kinds of companies and institutes as customers in the private sector.

As the public sector covers a lot of Mega's customer base, Mega faces a lot of bureaucracy when the customer tries to find funding for the purchase of Mega's products. This might take a lot of time which is why the sales may be spread very unequally on the fiscal year. Medical devices can also be very complex and designed for very specific use. Thus, most of the sales are one-time-deals as the customer purchases as many devices as they need and get funding for, and new orders from the same customer might come only after several years or not at all. This makes the customer relationships very different compared to each other in terms of continuance. Other reason for customers not to upgrade their devices more often is that the old technology is not replaced by new innovations as often as in some other markets. Launching new innovations take time in medical device

industry because the new products need all kinds of approvals and certificates especially if sold to the public sector. The devices sold to public hospitals or other institutes are usually required to be certified medical devices and getting that certificate might take time. Another thing requiring a lot of attention is the software-side of the devices. Software and services are the factors that distinguish devices from each other in current medical device market, which forces Mega among others to invest a lot of effort to software development and planning of services. Mega's department of research and development is very effective as it can come up with new innovations all the time. Many development projects get carried out also in cooperation with research institutes or universities for example to gain wider perspective and more resources. This way Mega can come up with new devices and solutions to offer for their wide customer base and continue leaving its footmark all over the globe.

5.1 Case: Femiscan

FemiScan is an interactive biofeedback device designed for training of the pelvic floor muscles in order to treat urinary incontinence. Urinary incontinence is defined as the complaint of any involuntary loss of urine (ICS, 2009) and it is more commonly faced by women. Urinary incontinence is also more common within elderly and overweight people. There are three different types of incontinence: stress incontinence, urge incontinence and mixed incontinence. Stress incontinence means small amount of urine loss due to increase of abdominal pressure caused for example by coughing, sneezing or heavy physical activity. It can be caused by weakness on pelvic floor muscles, damage in childbirth or changes in hormonal levels for example. Urge incontinence is an unavoidable loss of urine associated with a sudden strong urge to void. This can be caused for example by problems in central nervous system or local irritation to bladder due to infection, bladder stone or tumor. Mixed incontinence is a combination of pelvic floor weakness and uncontrollable bladder contraction.

FemiScan therapy is an effective and pain-free method for the treatment of urinary incontinence and pelvic floor rehabilitation. With FemiScan the patient can monitor and record muscle activity of each contraction of pelvic floor muscles by using EMG-signals. The method allows fast and accurate measuring of the activity in pelvic floor muscles and based on the measurement it gives direct feedback about the training guiding the user through the program.

The FemiScan product family at the moment includes FemiScan Home Trainer, FemiScan Stim and FemiScan Clinic Set. The Home Trainer is the main product of the series and it is an interactive biofeedback device for women. It consists of the FemiScan device, an electrode cover for single patient use and headphones for the verbal guidance and feedback. The Home Trainer monitors the activity of the pelvic floor muscles during every contraction saving the data from every training session. In the beginning of every session the device determines the contraction and relaxation target levels and the exercise target level, which are used as goals during the exercise. It is meant to be used by the patient in the privacy of their home and the data from the training session is analyzed by a professional afterwards. The FemiScan Stim is an electric muscle stimulator for both men and women and it is designed for the treatment of urge incontinence and persons who have difficulties identifying their pelvic floor muscles. The Clinic Set is meant for the professionals treating the incontinence patients and it enables the professionals to adjust the training programs for each patient independently. The Clinic Set is also used to upload the training data from the patient's device on to a computer, archive it and report it to the patient. It can additionally be used to perform on-line measurements at the clinic.

The FemiScan treatment procedure is usually an eight to twelve week program with regular visits at the clinic. When the patient comes to the physician and has incontinence issues the physician recommends the FemiScan treatment, which is cheaper and more effective in comparison with surgeries for example (Airaksinen, 2015). The patient receives a FemiScan device from the physician with an individual electrode cover. The physician introduces the patient to the treatment

and the device so that the patient can do the exercises at home. The patient follows the training program ordered by the physician and returns to the clinic after agreed time. The physician gets the training data from the Home Trainer on to a computer and analyzes the sessions. Based on the training data the physician prints a report concerning the training and the development on the patient's pelvic floor muscles. According to this report the physician makes changes into the exercises on the device and the patient can go home and start training again. This cycle is carried out usually for eight to twelve weeks in order to gain permanent results. It is also possible to use the FemiScan devices independently at home without consulting a physician, but then the patient cannot customize the training session according to his/her results and has to use basic programs stored in the device.

5.2 Current FemiScan business model

The sales of FemiScan products have mainly been carried out through Mega's distributor network which reaches all over the world (Kylliäinen & Pajunen, 2015). The purchases have usually been one-time-deals, meaning that the customer buys the products needed at once and re-purchases are very rare. As the client has bought the devices and the clinic set, they are able to use them as much as they can without any restraints or limits. This means no continuous revenue stream for Mega, excluding the individual electrode covers that are ordered every now and then. The earning logic in the current FemiScan business is simply product sales and the business model canvas for this is can be found in attachment 3.

At the moment there is an on-going research and development process concerning a new model of FemiScan, and thus the sales and marketing activities have been on pause for a while (Kylliäinen & Pajunen, 2015). The new version of the FemiScan will be the same from the principal functions, but overall quality will be improved. The device will not only get a new modern design, but the measurement will get more accurate especially when measuring the relaxation

levels of the pelvic floor muscle activity. The biggest improvement, concerning the business model of FemiScan, is the transition from simple PC-interface to a portal solution, through which the physician will use the analyzing software and print the reports. The portal will also guarantee Mega a continuous income from FemiScan, because the portal will be priced in some sort of usage or time based manner. This pricing will get Mega closer to the revenues coming from the treatment of incontinence patients and allow Mega to move from product sales closer to service business.

5.3 The portal solution

The portal will become as a channel between the professional and the patient as well as between the professional and Mega. It will be a PC/web-based solution offering different interfaces for the doctor, the patient and Mega. When the portal solution is introduced to the new Femiscan, it alters the treatment procedure quite significantly as the portal allows data transfer and communication between the patient and the physician. The patient comes to see the doctor the first time with urinary incontinence symptoms. The doctor then prescribes Femiscan treatment for the patient as before and introduces the patient to the procedure and the device. Additionally the patient must be taught to use the portal. The significant changes in this procedure is that the eight to twelve week training program can be mainly carried out without the patient visiting the clinic to get analyze report and further instructions. The portal allows the data to be transferred remotely. Some visit can be appointed if needed, but it is probably not necessary to actually see the doctor until the end of the treatment and returning of the devices, especially if the treatment works as it should and the patient does everything correctly and sticks to the protocol.

The Patient interface is mainly meant for downloading the training data from the device through the portal to the physician and possibly for simple data viewing. Also, the new training protocols made by the doctor can be uploaded from the portal into the device for the next training sessions. From the patient point of view

the portal saves a significant amount of time, effort and thus money from the patient and possibly her/his employer (Airaksinen, 2015), as the patient does not have to visit the clinic so often but can train at home at the most suitable time.

The professional will have a different interface for the portal as they have to send feedback and new training protocols for the patients, modify the protocols, analyze and report the training data and also order and pay the analyzing tools. So, the doctor will communicate in a way with the patient and Mega. The doctor will receive some kind of an alert or a message from the software when the patient has sent new training data for analysis, and analyze the data when possible but of course as soon as they can. In order to make the analysis, the doctor must have credit in the software. The credit could be acquired for example with a monthly fee or pay-per-analysis –type of deal, but this will be discussed in later chapters. When the data is analyzed and a report made from the analysis, the doctor makes possible changes for the training protocol of the patient and sends necessary data to the patient through the portal. The patient receives feedback from the previous training session and instructions for the next one with possible alterations to the training protocol. For the doctor, the portal solution will also save time and money as he/she can treat more patients in same time compared to the current model. Whether the clinic is a publicly funded hospital or a private clinic, the time saving either saves money (public) or generates more revenue (private) as more patients can be treated simultaneously.

6 EARNING LOGICS OF A PORTAL SOLUTIONS IN MEDICAL DEVICE INDUSTRY

The introduction of the portal solution to the Femiscan has direct or indirect effects on basically every building block of the business model canvas. Some building blocks change quite drastically and others have only minor changes in them.

The value proposition building block is not the one changing the most. The Basic elements of this block stay quite the same, but are improved in effectiveness with the portal and other updates. Channels change quite a lot especially within the communication channels as the portal creates a new direct communication channel between the doctor and Mega. This affect indirectly to the relationships block, as the new channel both automates the communication and brings the customer a little bit closer to Mega with a new direct channel. Key Resources and Key Activities are also affected by the portal solution as new ones need to be acquired. For example management and programmers must develop new skills for resources, and pricing and R&D are in key role in activities block. Revenue Streams -building block is one of the most changing blocks, as new, more continuous streams are created moving Mega a little bit closer to the clients revenue streams. New Key partners will probably also be acquired in form of new subcontractors, distributors and design partners. Cost Structure is also naturally affected as new products are being developed. Designing and launching the new device and portal requires a lot of capital for R&D, planning, manufacturing and partner searching for example. The completed business model canvas for the FemiScan can be seen in attachment 4.

6.1 Value Proposition

The value proposition building block does not change drastically when the portal is introduced. The different elements do get more effective with the portal as the solution is different and probably easier to deliver to the customers.

The most fundamental value proposition Femiscan offers for customers, is definitely the successful treatment of urinary incontinence. The effectiveness of FemiScan therapy has been both scientifically and clinically proven (Remes 2014; Segal 2015; Aukee 2012). The FemiScan therapy cures approximately 80% of the treated urinary incontinence patients and in almost every case the continence is at least increased significantly (Segal, 2015). Other significant part of FemiScan's value proposition is the fact that it is relatively risk free, compared to surgery or medication for example (Airaksinen, 2015). The FemiScan treatment is a natural and painless method for treatment of urinary incontinence and thus offers value for the patients by minimizing the risk of harmful side effects and improves the quality of life for the users.

The price of FemiScan is not seen as the most important value proposition, though it shall not be set too high to effect the sales negatively (Kylliäinen & Pajunen, 2015), but the cost savings from the customers creates great value for them. For example the most common surgical treatment for incontinence can cost up to 5000€ per surgery for a publicly funded hospital in Finland (Airaksinen, 2015) and surgeries never come without risks. This is significantly more compared to costs from FemiScan, of which the device can be used for multiple patients, so the main costs would be the individual plastic cover for the device, use of the portal and the time of the doctor or other professional. Additionally, as the main part of the treatment is carried out in the patient's home, there is a huge amount of time and money to be saved from the hospital, the patient, the society and possibly the patient's employer, as one day off work costs 500€ on average for the employer in Finland (Airaksinen, 2015). Some of these cost saving can also be seen as improved performance, if viewed from the hospitals/clinics point of view. The use of FemiScan home therapy reduces the amount of time used for each patient, and thus allows the doctor to treat more patients in the same time.

The value propositions of FemiScan are mostly quantitative rather than qualitative, meaning that they can be measured in numerical way. For example,

treatment rate or cost reduction for the customer can be easily calculated. This is partly because the industry is very scientific and regulated, requiring hard evidence not only to win customers, but to even get the devices out to the market and approved by the authorities.

6.2 Customer Segments

The possible target market for FemiScan is a niche market, with the strict constraints and requirements of the industry. The customers are fundamentally after the same thing; training pelvic floor muscles and this way treating urinary incontinence, and can be treated quite the same, but they operate with slightly different goals regarding business.

Customer segments building block is also one that does not change very much after the introduction of the portal solution. Similarly before and after the portal, the FemiScan is basically sold to anyone willing to treat urinary incontinence or otherwise train someone's pelvic floor muscles. The FemiScan customers of Mega can be segmented in various ways, like by usage of the device, geographically or to public and private institutions.

Using the usage of the device for segmentation would mean distinguishing between customers, who treat patients with the device, prevent urinary incontinence of occurring in the first place and those, who use it for research. This segmentation would not work as segmentation should, because all distinguished segments would get the same value proposition and same treatment from Mega, and thus they could be seen as one group of customers.

Geographical segmentation would have more use for FemiScan, because of the industry's specific features. As the medical device industry is highly regulated, the regulations and procedures in health care in general differ quite a lot between countries. Thus, the FemiScan customers cannot only be segmented into domestic and foreign customers, but each country could be seen as their own target market.

An excellent example for these differences can be seen between Finnish customers, who are mainly large hospitals with public funding, and private clinics from the United States trying to make fair revenue operating under predefined reimbursements (Airaksinen, 2015)(Segal, 2015). And for another example, Germany is somewhere in between these two as there is a similar reimbursement system as in the States, but the treatment is still in the reach of everyone, as everybody is insured by some instance. With these specifics the geographical segmentation can be seen as a natural and somewhat obligatory way, if the company in this industry wants to do business internationally.

The segmentation into private and public sector is also a quite natural way to distinguish between different kinds of customer groups. It is a rather common in many countries to have public and private health care sectors, which naturally operate in a slightly different manner. The public sector, including for example university hospitals, other hospitals and health centers, aim to treat as many people as possible with strictly made budgets. Thus efficiency of the systems used for treatment is in a key role for them. The private sector in addition to efforts of treating patients has to think of the business side of the operations quite differently compared to public hospitals. The private clinics are of course aiming to also make a good profit from treating people. For FemiScan this segmentation might not mean that different customers get to be served differently, but there could be some alterations in the product itself, especially considering the portal solution and the way the customers want to pay for it. More details from the payment and pricing aspects in the Pricing chapter later on. In the end, the most effective segmentation for FemiScan home therapy products is a mix of geographical segmentation and the distinction to private and public sectors.

6.3 Customer Relationships

Customer relationships building block is one that needs to change considering FemiScan products. Not necessarily because of the introduction of the portal solution, but in any case. Customer relationships have been something for

FemiScan products that have not had a lot of investment put into them lately (Kylliäinen & Pajunen, 2015). With the old version of FemiScan basically all relationship and sales activity has been on pause for a while and the sales people of FemiScan “acknowledge, that this (relationships) is something to be improved in the future” (Kylliäinen & Pajunen, 2015). Nowadays, the customer relationships are dealt with almost minimum effort, mostly through distributors. Some of the bigger long term customers and some Finnish have been in closer relationships with Mega, but most customers get contacted only by request and mainly through distributors. Training for use of the devices has of course been taken care of and necessary support and maintenance request have been answered, but that has been what is done in order to maintain relationships. In addition, as there has not been a strict protocol on how the relationships have been dealt with, customers might have gotten a little confused if some services are free sometimes and sometimes not.

The relationships, and activities connected to that, are one important sector that needs to be productized in the future. This means that not all of the services and educational contents are to come without a price tag for the customer. The customers in medical device industry often would like to have a lot of different kinds of services, ranging from basic maintenance to professional education and recap training from the manufacturer. Often nonetheless the need for such support may disappear if the manufacturer puts a price on it (Kylliäinen & Pajunen, 2015).

Customer relationships can easily be forgotten if the manufacturer is only focusing on making new sales and new relationships. This is why the Mega should focus on keeping the relationships alive with at least with the most important FemiScan customers, as it has been doing in the past too. The portal helps greatly on keeping up some level of relationship to all the customers using it, as the customers can reach Mega staff easily through the portal. This will not go as far as automated self-service relationships in any case, there will be always a real person answering the questions or contact requests coming through the portal, as the anticipated problems or questions may vary so much that automation is not

possible. With the new model of FemiScan, there should more of personal assistance type of relationships with customers, especially if the distributors in this matter are considered customers, as they are buying products from Mega. With the biggest, most valued customers, in Finland and abroad, there should be a real person answering personally the possible questions with his/her own name, because that way the customer will feel valued and feel that Mega cares about its customers. Any training or education beyond basic customer support and maintenance should be clearly priced, and clearly expressed to the customers in order to avoid misunderstandings and unnecessary support requests.

6.4 Channels

As mentioned in previous chapter the main channel to reaching end users has been through distributors and only the biggest, Finnish and some random customers have been dealt with direct contacts. The distributors have had, and should have in the future too, direct personal contacts to Mega's FemiScan team and they have received necessary support whether it has been technical or other sort (Kylliäinen & Pajunen, 2015).

The distributors in different countries should still remain the main sales channel to acquiring new customers and it should also be worthwhile to keep close and open channels to most valued customers, especially in domestic markets. The number of distributors and the number of countries where there are representation of FemiScan products is something that should be increased, when the new version of the device gets out. As the distributors are the main channel to acquire new sales and new clients, Mega should actively invest into search of new potential distributors. Searching for and starting new relationships with new distributors is not only for getting more channels to reach customers, but of course for getting more sales force out there and that way more revenue too.

Another channel to lure new users for FemiScan therapy, which has not received large investment either, is internet visibility. Mega in general has been more and

more active in the internet and in the social media lately and the FemiScan products should not be left out from those channels once the marketing for the products is started again. Internet visibility and its boosting needs a solid plan, kind of which has been done for Mega in general, but it would be fruitful to make separate plans for different product lines too in order to effectively reach the right customers.

Completely new channels created for FemiScan after the introduction of the portal solution, are the channels for money and information moving via the portal from users to Mega and for information vice versa too. The portal includes some sort of module by which the user can send messages to Mega and this can be considered as a new channel between Mega and their customers. The information moving through this channel can be basically anything from support requests and malfunction complaints to inquiries for additional sales or any other type of feedback. This channel would make it easier for the end user to reach Mega in basically any situation and tilts the relationship from personal assistance slightly towards automated support. The portal can and should also be used by Mega to reach FemiScan users in cases of urgent news, updates for the software or even launch of new FemiScan related products or services.

The portal could be also a totally new channel for money exchange between Mega and their customers, as the software would work by monthly fee or pay-per-use basis, more detail on these in the Pricing chapter later on. The monthly fee and the payment for analysis tool activation could be carried out directly via the portal, if there is a simple enough and secure enough money exchange service found to be integrated into the software. Such a service could be for example PayPal or other service to which a credit card can be registered. In case of working money transfer is not to be found the monthly fees must be paid like any other transaction and the use of the software would be cut by Mega if the fee is not paid in time. The usage based fee instead would have to be arranged by the customer buying credits for the software and one credit is charged for each analysis or report made in the software or each patient added to the software database. In this case, the portal

would not act as a money transfer channel, but it could at least offer a channel to order new credits in case the user runs out unexpectedly.

6.5 Revenue Streams

The revenue streams building block is probably the one that changes the most after the introduction of the portal solution for the FemiScan. As described in the value propositions chapter, the customers buy FemiScan products from Mega to treat their patients' urinary incontinence; some customers for the common good and some to make a profit for themselves too. At the moment and in the past the FemiScan has been sold as a "one-time-deal", where the customer buys the product and uses it as much as they want to, possibly not communicating with Mega ever again. In the modern world and market this is not necessarily the most lucrative way of doing things for either side. The industry is getting more service oriented and utilizing modern information technology both allows and demands some changes in the business models of the actors, such as Mega, in the healthcare industry.

The actual revenue streams of FemiScan products from the customers to Mega before the portal solution include basically only the purchasing prices/starting fees, cover sales and possible resales. Nothing else, like additional services, has been priced separately and has just been included in the initial price. This is one of the reasons to introduce the portal solution and renew the earning logics for the FemiScan; to move closer or even inside to the customers' revenue streams and thus make the streams more continuous and stable. The portal itself will also create a completely new revenue stream as the customer will be charged for using it. The prices for the devices and the usage of the portal must be planned carefully to be attractive for the customer to acquire and use the FemiScan therapy as a part of their business, but more on the pricing in the Pricing chapter below.

The revenue streams after the portal solution has been introduced include the initial purchase stream, the electrode cover sales, possible resales, usage based

charges for the portal as well as some maintenance and other service fees. As the product itself is quite complex with the device, covers and the portal, there will be quite a few separate revenue streams too. The stream coming from the initial purchase of each customer will be same by nature as before, but the breadth of that stream will most probably change as the pricing and the volume will change with the new version of the FemiScan. Additionally, as the market for urinary incontinence treatment is continuously growing, because of the demographics of elderly and overweight people is growing constantly too. The initial purchase price could be set a little lower than before to make starting the FemiScan therapy more attractive for the customers, and respectively the most of the revenue for Mega would be made from the use of the portal and sales of the individual electrode covers. The cover sales is in a crucial role in making the business more lucrative for Mega, as it is a continuous stream with the covers being personal for each patient for hygienic reasons for example. The manufacturing costs of the covers should be minimized, without compromising the quality of the cover, in order to make the profit margin bigger. Lowering the manufacturing costs for the cover requires some effort from the R&D team in terms of searching for the right solution for the materials and mechanics of the electrode cover. But with this development effort, significant amounts of revenue are achievable.

Also the resales to customers who are already using the FemiScan therapy as a part their treatment plans make their own revenue stream. These resales take place for example when a clinic starts using the FemiScan and after a while of use they see that they could use a larger amount of devices in their practice, so they acquire some more FemiScan trainers to treat more patients. Basically, when the market grows there is an opportunity for resales for FemiScan. In this stream we could also count sales that are done after the release of the new version to the customers using the old version and wanting to upgrade to the new version with the portal and upgraded device.

A completely new revenue stream compared to the current business model is the stream generating from the usage of the software through the portal. Whether the

use is charged on monthly, yearly or usage basis, the stream can be seen as a continuous one and should be the main source of revenue for this solution. After all, it is the analyzed and reported training data that the customers are willing to pay for. This stream is the one moving Mega closer to the customer's revenue stream, so the overall cost for the solution must be calculated for the customer and this portal fee cannot just be additional to the previous purchasing price. Introducing the usage based pricing for the portal would mean that the initial cost should be lower than before and lower than it would be with traditional device sales, otherwise the customer will not see the whole solution attractive.

Another new revenue stream would be the one reflecting the stream of maintenance and other additional services that should be productized for FemiScan. In the past they have not been productized and thus they have not been generating any revenue for Mega, but eating it. These additional after sales services, including for example extra warranty, maintenance or training, should be made profitable for the FemiScan products.

6.6 Key Partners

The Key Partners building block for the introduction of portal solution to FemiScan does not change its appearance in Business Model Canvas type of composition, but the amount and quality of mentioned partners should change. The most important partners regarding the product family are, in the past and with the upcoming new version, distributors, subcontractors and some design studios and research partners. Also logistics partners are worth mentioning.

In chronological order, the design and research partners come first as the new device itself must be designed. Research partners such as hospitals or similar have been in key role when acquiring information on end users and their behavior and needs. This kind of medical home treatment device with all the technicalities and use preferences cannot virtually be designed to match the end users' needs if their knowledge is not gathered beforehand. For this purpose it is crucial to have some

research partners with access to real life patients suffering from the very impediment the new device is being created to heal. The design partners, whether they are designing the looks or the mechanics of the device, are needed to make the actual device work properly and look appealing at the same time. They can be seen to be very important for the whole product, because the products must look “good enough” to be attractive and the mechanics have to work in a rather specific manner and certainty, as the medical device must be approved by certain authorities in order for it to be used in clinical purposes. These design partners are not necessarily the same for the previous and the new version of the FemiScan, but in the light of the business model canvas they are seen similarly and needed just as much in both.

Finding good quality subcontractors is naturally in a big part when manufacturing any kind of technical devices. For Mega, having good subcontractors in FemiScan products allow allocating own resources more effectively and also create the chance to enjoy the benefits of economies of scale, as bigger amounts of the products would be slow and expensive to manufacture by self. The finding and maintaining subcontractors have been executed quite effectively in Mega in the past and also within this project, so any bigger changes are not needed in this department.

The most effort required in the future, regarding the Key Partners building block, is for searching new, capable distributors for the FemiScan products. New distributors are definitely needed as the international sales is planned to be mostly made through the distributor network. It is easier and more effective that way as the distributors create more exposure for FemiScan products and also naturally increases the overall sales force all over the world. In the past, the search for new distributors have maybe not been effective enough and this is one sector to invest in to make the new version of FemiScan a world-wide success story. The distributors must be inspected thoroughly enough before making official distributorship agreements, because if the distributor is not competent, the amount of training and support may grow too big comparing to the achieved sales. The

distributors are seen in both filled canvases in the attachments, but the overall quantity and quality must be increased in the future for the FemiScan products.

6.7 Key Resources

The Key Resources, classified into physical, intellectual, human and financial resources, are principally the same for the current FemiScan and the new one, with slight alterations. The physical resources stay mainly the same even after the introduction of the portal solution, as the manufacturing and office facilities with everything necessary to deliver the new FemiScan products are already in Mega's possession. There is no need for new facilities in order to assemble and sell the FemiScan products. The biggest changes in physical resources take place if the distributor network is counted as a physical resource. The distributor network will be even more important in the future as it is planned to be grown significantly and most of the international sales is supposed to be conducted through the distributors.

The intellectual resources are becoming more and more important to many businesses as technology is developed in a fast pace and needs indeed intellectual resources to both developing and maintaining the achieved advantages to the company. For FemiScan the brand name has been discovered a long time ago, it will just need a little polishing in a form of a new start. The brand of FemiScan must be brought to the present by actively exposing it when the new version is published. The FemiScan therapy is protected by patents in all necessary aspects, in a way that the competition cannot simply copy the whole treatment and business model, which is very valuable in terms of gaining and sustaining competitive advantage over the competitors. Mega's existing customer databases and contacts, acquired while operating in the industry for several decades, are also an extremely valuable resource when the new product is being test-marketed and when the actual launch will take place. The existing contacts reduce the time of searching such customers significantly and thus save money and effort from the

sales personnel. In the same way, existing partnerships or contacts to possible new partners can be utilized for this project to save time and effort of searching.

The human resources needed for the new FemiScan, compared to present actions, include many different kinds of skills from the company. Research and Development staff is naturally in a big role when developing new products, as the mechanics, appearance, the portal and other features must be developed for the new device. Additionally, a significant amount of know-how is required from the programmers when designing, and up keeping, a technical device like the FemiScan and the portal around it. Management and marketing personnel are needed when preparing for the launch of the product and when actually launching new products as well as conducting the business model for the whole solution with the help of this thesis. These resources are needed to find both new distributors and new buying customers for the FemiSan products. The production and assembling department is naturally needed to test and put the sold devices together and also for maintenance and possible repairs of the new devices. The resources in assembling must thus learn new skills on the way. Mega must make sure in advance preferably that all of these human resources already in the company are competent to their respective tasks.

The Financial resources are naturally required to run any business, and especially when creating something new such as new version of FemiScan and the portal solution. The financial resources, which are limited for a company the size of Mega, for this kind of product upgrade must be allocated carefully for R&D, personnel's salaries, designing etc. in order to get the most out of the project as effectively as possible. The financial resources can be self-obtained and just directed to the right place or they can be gathered at least partly from outside of the company, for example from some development funds.

6.8 Key Activities

The key activities do not necessarily change that much considering the business model canvas for the introduction of the portal. Only the parts related to creating the portal itself, otherwise the elements in this section are primarily the same as in the current canvas; they just have to be done again. The key activities performed by the key resources for FemiScan include both production related and problem solving activities.

Research and development can be seen also as an activity and it is naturally performed by the research and development team of Mega. As mentioned in the previous chapter, new has to be developed for the device mechanics and appearance, the portal solution as well as the business model of the whole solution. The business model though is not developed by the R&D team, but it is constructed by the management with guidelines provided by this thesis.

Another key activity needed perhaps even before the beginning of the development process, is searching of partners. Especially, as the partners are needed for the design and mechanics development. Finding competent partners may not always be quick and easy, when operating in a strictly regulated industry such as medical device industry. The partners must also meet the standards set by the regulative authorities, in addition to Mega meeting them. Later on in the development process, the search for partners continues in the form of looking for distributors. As the distributors are being planned to take even larger responsibility of the sales of FemiScan products, the search for them must not be taken lightly. It is not only the quantity of the distributors and the width of the global sales network, but the distributors must be qualified to market and sell this kind of technology effectively and have contact to the right places in their respective market. It must not be enough, that the potential distributor has some experience in medical device industry, but they should be familiar with this specific kind of market, which is the incontinence treatment market. The search

for new distributors must also be started early enough, to have a running start for the products straight from the beginning.

The production, assembly and testing are the most obvious production related activities and their operation must be optimized to lower the unit cost of the device and also to assure a required level of quality in the produced devices. The production of the parts to the device has been, and is good to have in the future too, outsourced to some key partners of Mega. The final assembling has been performed in the premises of Mega and this is probably the most cost-effective way to keep it. This matter must be considered again thoroughly in case that the volume of sold FemiScan products gets unexpectedly high, unexpectedly fast. The testing of the final products is also smart to keep in the house, in order to make sure the quality is kept in a satisfactory level.

Key activities performed by the management are for example planning of the pricing, marketing and sales in the beginning of the new product's life span and also later on. The pricing has its own chapter below, where more precise suggestions are made for the pricing of this kind of complicated solution. The plans and guidelines for marketing may be in a key role for the FemiScan's success. The marketing actions must be planned and targeted carefully to reach the right people in the right time and with adequate material and exposure. In the planning of marketing and sales, Mega has to take into account both end users and distributors in a way that all of them understand the concept as meant and become convinced by it. The end users have to be convinced that they want to use this method to cure urinary incontinence and the distributors that they can and are able to sell this solution and collect some profit out of it. With the previous FemiScan product, at least in the near past, the marketing efforts have, partly knowingly, been quite minimal and maybe all of the potential of the product have not been taken advantage of. When the planning for sales and marketing are done carefully and the device itself designed to amaze, it is much easier for the FemiScan sales people to start their respective work. The sales straight to customers and to

distributors should be, of course, implemented according to made plans and kept track of regularly and systematically.

6.9 Cost Structure

Companies in the medical device industry, such as Mega, are somewhat forced to be more value-driven than cost-driven as the main aim in the industry is to treat people and cure illnesses. The noble cause for this kind of firms is to make people healthier more effectively than ever before, which cannot be achieved by focusing solely on cutting costs and selling cheap. Despite this noble cause, the industry being as restricted and regulated makes the firms acting in it indeed value-driven, because the certificates and approvals needed to operate in this industry are not granted if the quality and efficiency of the devices and the companies are not good enough. Naturally Mega as well as every other company will and should try to cut costs wherever possible, but this must be done in a way that it does not lower the quality of the products or make them less safe for the patient for example.

As most of the companies Mega is positioned somewhere in the middle of value- and cost-driven cost structures. The cost-driven mentality, considering the FemiScan products, is seen especially with the individual plastic cover, which is the part of the whole product that creates continuous revenue stream as the clinics using the FemiScan therapy for treatment should always have a new cover for every individual patient. Of course the manufacturing costs of each part of the device should be pressed as low as possible, without compromising the quality, to achieve more attractive initial cost for the customer, but if the cost of the electrode cover can be lowered significantly, there is huge potential for big profits for Mega.

The cost structure for the FemiScan does not experience any drastic changes when introducing the portal solution, as the principles behind the cost structure stay the same. The shifts in the revenue streams and possible growth in overall sales

highlight the cost-driven part of the cost structure, but do not change the fact that Mega will remain more value-driven in FemiScan's business model.

6.10 Pricing

The pricing for the FemiScan therapy will have to change with the new version, as there are many parts changing and new features introduced making the whole solution more modern and moving away from traditional product sales. The true prices are not calculated in this thesis, as the development of the product itself is still an ongoing project and thus all the expenses are not known yet. The overall price for using the FemiScan therapy will consist of multiple parts that will have to be assessed separately. There will be separate prices for purchasing the products, buying more electrode covers, using the software/portal and additional services such as extra warranty or maintenance. The pricing will have to be quite complex because there are so many aspects to the solution itself.

The cost for starting the use of the FemiScan therapy, meaning the price of the device itself, should be set quite low in order to make the product appealing for new customers. The customers are usually willing to pay a little bit more for the use of this type of solutions if the initial cost has been relatively low (Airaksinen, 2015). If only product sales is under the scope, the larger margin is to be made from the electrode covers, which are meant for individual use, and thus the clinic must buy them somewhat continuously. Taking the manufacturing costs as low as possible, without compromising the quality of course, there are huge sales to be made, because the patient specific covers are where the big volume are sold in this case.

There are multiple ways to put a price for a portal type solution, especially as the customer base is as versatile in size and character as in usually in the medical device industry. In this thesis two different options are presented for pricing the use of the portal/software, which both have some good qualities and some risks. The two options are a flat monthly or yearly license fee with unlimited use of the

portal and analysis tools, and a pay-per-analysis type of pricing, where the customer pays for each time they want to analyze the measurement data or make a report of the data. The fixed monthly/yearly license fee a little bit more stable and lower risk option as the customer would pay for the use even if they do not use the portal at all. This option would most probably lure customers such as large hospitals, which know that they will treat a large amount of patients in any case, thus the unlimited use coming with the time based price seems appealing for them. The actual price for the monthly or yearly fee must be calculated in a way, that there is a certain amount of patients treated per month/year that going over makes this option appealing. For small private clinics this pricing option could seem too expensive, especially if they know that they will only treat a single patient every now and then, and not have a steady stream of patients coming through the doors.

The usage based pay-per-analysis pricing has quite different selling points and it seems tempting for different customer groups than the flat time-based price. In this option, the customer pays a small fee for each analysis they make for one measurement data or each report they create for an individual patient. This is more appealing option for the small private clinics not knowing how many patients they will have in the future and when they will have them. Also, if the customer stream is steady, but the business is small in general, this might be a preferred pricing model. The small fee paid by the customer must be collected in the beginning of the analysis, or to activate the analysis tools in the software through the portal, because if the fee is collected after analysis just for creating a report for the data, some customers will abuse the system and not print the report, but just view and analyze the data. There lies also a small risk in the patients simply skipping doctor's appointment, in which case revenue is not generated neither for the clinic nor Mega. The simplest way to organize this payment method, is probably that the customer could buy the credits in large amounts and use them to activate the analysis tools in the software/portal.

Any additional services possibly created in the future for the FemiScan products should be priced accordingly to the value created for the customer through them, because currently they have been just taken care of by Mega without any compensation or they have been non-existent (Kylliäinen & Pajunen, 2015). These services could include for example extra maintenance or warranty, different types of extra training or education et cetera. Basically anything not included in the predetermined price could be charged for from the client.

The whole recommended pricing model for the FemiScan products and portal is a mix between traditional and innovative pricing models. The recommendation includes product sales (devices and covers), fixed fee (monthly/yearly fee for the bigger customers) and usage based pricing (pay-per-analysis and additional services). This recommendation is a shift towards the performance and value based pricing, but the product or the market are neither ready for a leap straight from product sales to value based pricing. The actual numerical prices are to be defined by the management of Mega Electronics when the product is ready enough for it.

7 CONCLUSIONS

The main goal of this thesis was to find recommendations for Mega Electronics, a Finnish medical device manufacturer, for the business model of one of their products after introducing a portal as a part of it. Mega's urinary incontinence treatment device, FemiScan, has been sold with a simple business model by one-time-deal product sales. Now, that there is a new version of the device in development and new features including a portal solution are introduced into it, Mega has a certain need to upgrade also the earning logics of said product. With a portal solution, which will be acting as a channel for communication between the patient, physician and Mega as well as for maintenance, support and monetary transactions, the old fashioned business model will not work efficiently anymore. The main goal for this thesis was to offer guidelines and valuable information for Mega on which parts of the FemiScan's business model need to change in order to make the new portal solution attractive for Mega and their customers and how they need to change. Additionally, general recommendations for the pricing of such solution are presented in this thesis. With the base knowledge acquired from literature and from internal and external interviews, a comprehensive picture was formed of the medical device industry and the different types of customers that need to be satisfied. With this base information and the tool of business model canvas, introduced by Osterwalder and Pigneur (2010), valuable recommendations were brought up for the knowledge Mega's management, that can use these recommendations for more detailed planning when launching the new FemiScan portal. The results that are generated subjectively for the use of Mega are not necessarily generalizable into other cases as such, but some aspects of the results may be used in planning of other similar business models.

7.1 Main findings of the thesis

The main findings of the thesis are simplest to present as direct answers to the research questions set in the beginning.

What does introducing a portal solution require from the business model of a medical device manufacturer?

The business model of FemiScan clearly needs some updating, when new information technology -based features are introduced into the product bundle. The new portal solution does not necessarily change every aspect of the business model canvas, but some change even quite drastically. The one building block that experiences the biggest change is definitely the Revenue Streams, as one goal behind this project is to widen these streams and acquire more of them. With the portal solution new streams are established in addition to the old ones, which are basically just product sales, electrode cover sales and some rare resales for old customers. The completely new revenue streams include the usage fee for the portal/software and additional maintenance/support fees, which have been absent in the past. Also, the starting fee, or the product sales price, should be taken as low as possible in order to lure the prospective customers to purchasing the FemiScan therapy solution. The biggest revenue, in addition to the portal usage fees, is to be collected from the electrode cover sales, as the covers are patient specific and every customer simply needs to buy them in order to keep practicing the FemiScan therapy as a part of their treatment. The different pricing options for realizing these revenue streams are presented below the second research question.

The Value propositions and Customer segments do not necessarily change after the portal is introduced, as the basic treatment goals stay the same and thus similar customers are targeted as before. The main distinction between customer segments is in public and private practices, as they have slightly different motives in treating of urinary incontinence. The portal and the new version of the product in general make the propositions more efficient and easier to deliver to the customer. The value gets easier to deliver, because the portal creates a whole new active channel between the customer and Mega, whatever is to be transferred through the portal. Whether it is money, information or update packages moved through the portal, the overall communication process gets simpler and faster. Indirectly, these new channels generate some changes also into the Customer

relationships building block. Some relationships may be perceived as closer and some more distant, if the personal communication disappears, but in total more attention need to be addressed to the relationships within Mega than before. New channels should also be acquired in form of new competent distributors, as they are in a critical role in international sales of FemiScan products, and Mega should invest in search of such distributors significantly.

Changes needed inside the company are mainly focused on key resources and activities, and more precisely on human resources such as R&D, management and programming. R&D department is naturally affected by new features, as the new features need to be designed. Their role is most critical in the beginning of the new product's life cycle. In addition, the IT/Programming staff possibly needs to acquire new skills when creating the portal solution. The management and marketing personnel instead are most needed in planning and implementing the business model, pricing, sales and launching of the new product and in searching of new partners. Some new activities will have to be learned in the production/assembly department too, as always when launching new products. Financial resources are also needed in different measure as before especially in the development phase of the new version. The cost structure of the business model is not changed drastically and is not in the main focus of the thesis.

What pricing options does a medical device manufacturer have when introducing a portal solution?

The pricing of the whole product/service bundle will be quite complex in any case, because the bundle itself is quite complex too. The starting cost should be pressed as low as possible and the main revenue generated from the cover sales and the portal usage fees. For the usage fees of the portal there can be two different pricing models distinguished; a pay-per-analysis based and monthly or yearly based fee.

In the usage based pay-per-analysis type of pricing the customer pays a small fee from each data analysis they make in the software. This pricing option would work the best for small private practices that either do not know how many patients they will treat in the near future or the amounts treated is relatively small. The more conservative time based pricing, whether it is collected monthly or yearly, would instead work ideally for large hospitals that treat significantly larger amounts than small private clinics. With this pricing the customer can use the analysis tools as much as they need and additionally it is easier to fit this treatment into the budget of the hospital.

It would be recommended, or at least something to be examined, to offer both pricing options for different customers at the same time. The different pricings could be offered as parallel options for some customers or just either one of them could be presented to the possible customer in the sales process. All in all, the price of the FemiScan would consist of the starting cost, the cover sales and the portal usage fees, which ever pricing is used. Additionally, extra maintenance and support should be priced separately and not be free of charge. With this kind of pricing model, Mega could attract customers with very different backgrounds, sizes and motives.

7.2 Future Recommendations

The recommendations presented in this thesis can be used in the process of finishing the plans and development of the new version of the FemiScan product and its new business model. Firstly and naturally, the technical development of the new product version and the portal need to be brought to the end. The information offered by this thesis can be used as the basis for the planning of the earning logics that will be utilized with the FemiScan products, including the pricing methods that the product will be offered for the customers. The pricing, including the actual monetary prices, the launching and the marketing strategies for the device must also be designed carefully; to whom will the product be principally offered and with what kind of pricing composition?

After evaluating and using the findings of this thesis and after the launch of the new product, there are many, even quite different, paths worth exploring ahead for FemiScan and Mega. Considering the pricing of the usage of the portal/software, it will now take the next step towards value based pricing methods and business model. There are many questions to be answered before reaching that, not only for Mega, but also the industry needs to change into more modern direction to be able to welcome totally different approaches from the device manufacturers. Another interesting path to explore for Mega, and possibly other manufacturers making homecare devices, is to make a shift towards the B2C markets. What if the device was to be acquired by the end-user, the patient, and they would just deliver the training results in one way or another to their doctor? In this scenario, and probably even before moving this far, some sort of mobile applications will most definitely become a part of the training procedure, whether they are just for moving the data forward or serious games or anything. These paths will require some additional investigations about the needs of the customers and patients, general requirements for such solutions et cetera. Additionally some differences will most definitely be ahead when investigating the willingness to use this type of mobile solutions in different countries. Especially the differences might arise between countries that are working with a reimbursement business and those not. All in all, whichever direction the FemiScan is taken, this new earning logic constructed from the basis of this thesis, will be step into the modern world and a great stepping stone for the future.

8 SUMMARY

The background of this thesis was in the urge of finding more modern earning logic to a certain medical device, a pelvic floor home training device, of Mega Electronics Ltd. when introducing a portal solution as a part of it. The goal was to offer recommendations for the changes in the business model of said device as well as offer guidelines on how such model could be priced. A comprehensive literature review on business models or pricing in general was not carried out, but only the theoretical frameworks used in the empirical part are introduced. The basic theory for this earning logic portraying was the Business model canvas by Osterwalder & Pigneur (2010). In order to gain more thorough picture of the medical device industry and the product itself, three interviews were conducted. One of these interviews was held inside the company and two interviewees were influential users of the device, one from Finland and one from the US. Two business meetings were also held within the company to dig a little deeper into the product at hand.

With the information gathered from the interviews and business meetings, the business model canvases were filled for the current and the recommended business model, and the changes to be made were described and explained thoroughly. Considering the pricing of the portal solution, some guidelines and categorization was offered for the company, but the numerical prices could not be calculated yet as the development process is still ongoing.

The basic building blocks of the business model for the pelvic floor therapy device do not need to change drastically. The value propositions and customer related blocks stay rather the same, with only some minor changes. In the beginning of the development and launching process of the device, new skills and resources naturally need to be obtained in the R&D department as well as in management and marketing, as new is to be created. The biggest changes are experienced in the revenue streams. Some completely new streams are established, partially on the expense of some old ones, with the aim of moving

closer to the customers revenue streams and boosting both businesses. The pricing model options for the device are presented as categorized guidelines with no calculations of the final price. The actual prices can be defined when the development process has been brought to its end. These recommendations can be used in the process of launching the new version of the pelvic floor therapy device, and maybe some parts can be used as guidelines for other medical device manufacturer's business model generation in the future too.

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Kylliäinen, Juha, R&D Manager & Pajunen, Antti, Product Manager. Mega Electronics. Face-to-face interview. 19.5.2015.

Segal, Shimon. 2015. Medical Doctor. Three clinics in USA. Skype interview. 7.5.2015.

Interview Questions

Airaksinen, Olavi. Interview questions

1. How are the operations funded at KUH regarding urinary incontinence treatment?
 - 1.1. What are the pros and cons in this system?
 - 1.2. Is this system working well?
 - 1.3. How do you see the whole concept?
 - 1.4. How much FemiScan treatments are done per year at KUH?
 - 1.5. What does the patient have to pay for the treatment?
2. What is the saved cost from the society through FemiScan treatment?
3. How do you see the future for this kind of portal solutions?
 - 3.1. How does the shift to more service intensive products affect the public sector and their funding/budgeting?
 - 3.2. What do you think about mobile applications for the patients?
 - 3.3. Are they to be applied for every patient, especially the elderly people?
4. As the new FemiScan will work through a portal, how would you prefer to pay for the use of it?
 - 4.1. What are the pros and cons of pay-per-analysis model?
 - 4.2. What are the pros and cons of yearly license model?
 - 4.3. What are the possibilities for a public organization to pay for such solutions?
5. What if the device was to be acquired by the patient or sold to the patient at hospitals?

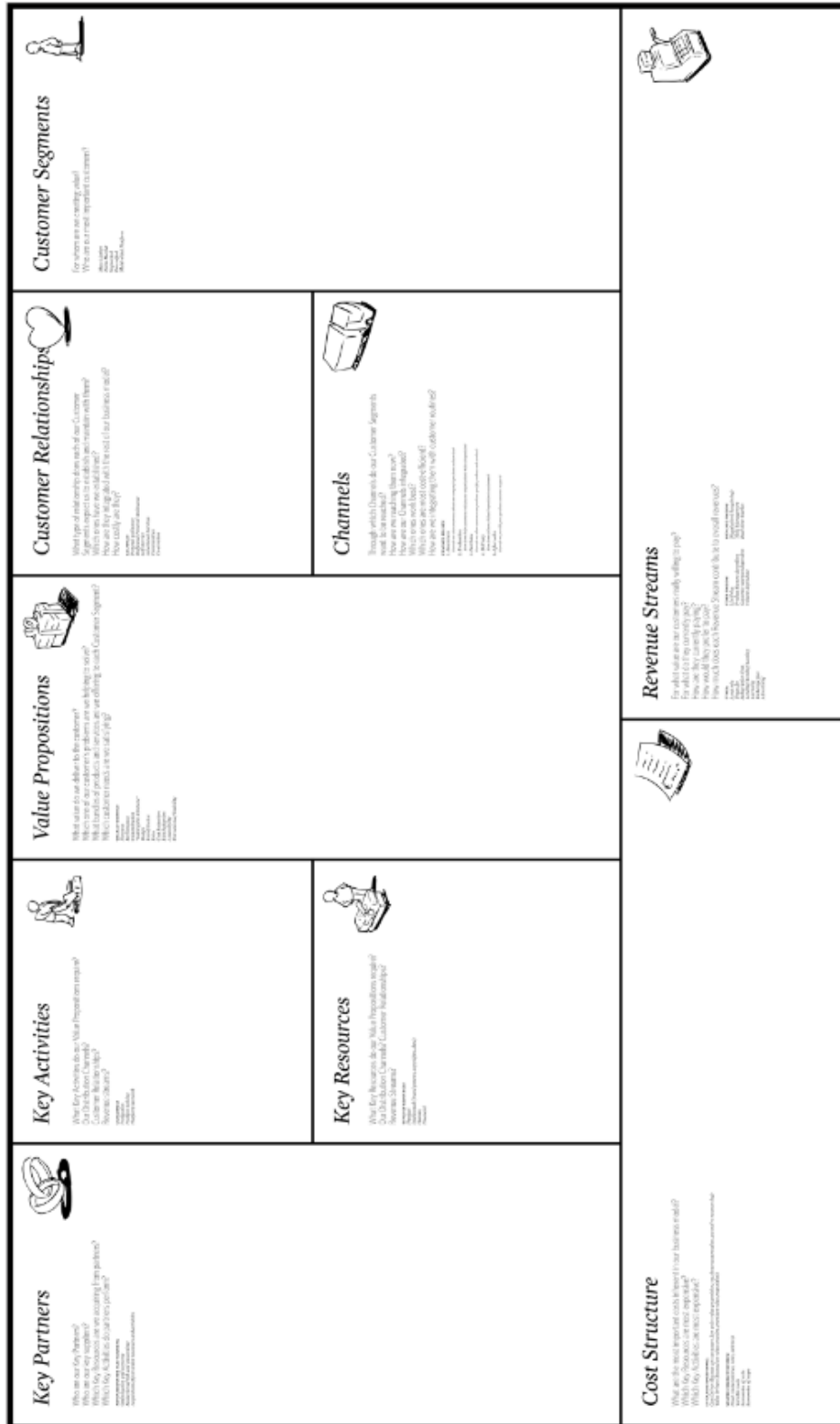
Segal, Shimon. Interview questions.

1. How does the FemiScan treatment work at your clinic currently?
 - 1.1. Do you think it works effectively?
 - 1.2. Who uploads the training data from the device to the PC at your clinic?
2. How does the reimbursement system work in the US?
 - 2.1. Are there any changes in sight to this system?
 - 2.2. What does the patient have to pay for incontinence treatment?
3. What kind of volumes are you treating in your clinics?
 - 3.1. What would be a maximum volume?
4. Are there any specific problems with the FemiScan therapy?
5. What would you think if the device was to stay with the patient in the end of the treatment?
6. What means do you have to get the patient to come back after the treatment period in terms of keeping up the results?
7. What do you think of portal solutions in general in healthcare?
 - 7.1. Do you have experiences of them?
8. Should the patient be able to view their own results at home?
9. What would you think about a mobile application for the patient?
10. Do you see that a doctor/clinic would be willing to pay for the usage of a portal with pay-per-analysis basis?
11. As the new FemiScan will work through a portal, how would you prefer to pay for the use of it?
12. Could you see that some other practitioners would think differently in the USA?

Kylliäinen, Juha & Pajunen, Antti. Guiding interview questions.

1. What do you think of the business model canvas in general as a tool for planning of FemiScan?
 - 1.1. Value propositions?
 - 1.2. Customer segments?
 - 1.3. Customer relationships?
 - 1.4. Channels?
 - 1.5. Revenue streams?
 - 1.6. Key activities?
 - 1.7. Key resources?
 - 1.8. Key partners?
 - 1.9. Cost structure?

Business model canvas (Osterwalder & Pigneur, 2010)



Business model canvas. Filled for the current FemiScan business model.

<p><u>Key Partners</u></p> <ul style="list-style-type: none"> - Part manufacturers - Design studios (when designing new) - Logistics partners - Research Partners 	<p><u>Key Activities</u></p> <ul style="list-style-type: none"> - Assembling - Searching distributors - Marketing - Planning 	<p><u>Value Propositions</u></p> <ul style="list-style-type: none"> - No incontinence - Risk free treatment - 80% cured - Natural method - Cost Reduction 	<p><u>Customer Relationships</u></p> <ul style="list-style-type: none"> - Every customer gets treated the same per se, but... - Biggest customers get better service 	<p><u>Customer Segments</u></p> <ul style="list-style-type: none"> - Public sector: University hospitals, hospitals, health centers etc. - Private sector: physiotherapists, gynecology and obstetrics clinics etc. - Sell to anyone who buys
<p><u>Key Resources</u></p> <ul style="list-style-type: none"> - Physical: office, distributor network, - Intellectual: brand, patents, - Human: R&D, management, marketing - Financial 	<p><u>Channels</u></p> <ul style="list-style-type: none"> - Sales through distributors and direct contacts - Information through direct contacts 	<p><u>Revenue Streams</u></p> <ul style="list-style-type: none"> - Customers pay to treat patients and make/save money on that - Starting fees - Resales - Cover sales 		
<p><u>Cost Structure</u></p> <ul style="list-style-type: none"> - Value driven, goal to treat people, regulated by authorities - Manufacturing costs down = more profit 		<p><u>Revenue Streams</u></p> <ul style="list-style-type: none"> - Customers pay to treat patients and make/save money on that - Starting fees - Resales - Cover sales 		

Business model canvas. Filled for the new earning logic of FemiScan.

<p><u>Key Partners</u></p> <ul style="list-style-type: none"> - Distributors - Subcontractors - Design studios (design, mechanics etc.) - Logistics partners - Research partners 	<p><u>Key Activities</u></p> <ul style="list-style-type: none"> - R&D - Searching distributors - Marketing - Planning 	<p><u>Value Propositions</u></p> <ul style="list-style-type: none"> - No incontinence - Risk free treatment - 80% cured - Natural method - Cost Reduction 	<p><u>Customer Relationships</u></p> <ul style="list-style-type: none"> - Every customer gets treated the same per se, but... - Biggest customers get better service - All relationships get tighter with portal - Personal Assistance 	<p><u>Customer Segments</u></p> <ul style="list-style-type: none"> - Public sector: University Hospitals, hospitals, health centers etc. - Private sector: physiotherapists, gynecology and obstetrics clinics etc. - Geographically by country - Sell to anyone who buys
<p><u>Key Resources</u></p> <ul style="list-style-type: none"> - Physical: office, distributor network, - Intellectual: brand, patents, - Human: R&D, management, marketing - Financial 	<p><u>Channels</u></p> <ul style="list-style-type: none"> - Sales through distributors and direct contacts - Information through portal, internet, SoMe ad direct contacts - More internet visibility 	<p><u>Revenue Streams</u></p> <ul style="list-style-type: none"> - Customers pay to treat patients and make/save money on that - Starting fees (smaller than before) <ul style="list-style-type: none"> - Resales - Cover sales - Portal usage fees (monthly, yearly or pay-per-use) - After sales services (all not free anymore) 		
<p><u>Cost Structure</u></p> <ul style="list-style-type: none"> - Value driven, goal to treat people, regulated by authorities - Manufacturing down = more profit 				