



**LUT School of Business and Management**

Bachelor's Thesis

International Business

**Patent Strategies of Small and Medium Sized (SME)  
Health Technology Firms**

2.9.2018

Author: Peppiina Räisänen

Supervisor: Elina Karttunen

## ABSTRACT

**Author:** Peppiina Räisänen  
**Title:** Patent Strategies of Small and Medium Sized Health Technology Firms  
**School:** School of Business and Management  
**Degree programme:** International Business  
**Supervisor:** Elina Karttunen  
**Keywords:** patents, IPR, strategy, SMEs, health technology

The aim of this research is to take a look into how SMEs (small and medium sized enterprises) can use patents especially in the health technology industry. Furthermore, the aim is to provide insight and information for management of these firms. The research method for collecting and analyzing data is qualitative. Scientific publications were used to gather theory about the topic and material for content analysis was gathered in the form of theme interviews. The main research question was “How can small and medium sized firms take advantage of patents?”. Overall, it was found that even though high costs and risks are involved, SMEs do seem to benefit from patents if they are able to use them in a smart way. As a result of this study, it can be said that there are multiple ways to use them: using patent protection for entering new markets, searching for external funding, buying time to enter markets and collaborating with other firms. The second research question was “What kinds of patent strategies do health technology firms have?”. Findings of this research show that using the market power patents offer to take over new markets, licensing-in for acquiring technologies and knowledge, licensing-out for creating cashflow and using patents to get funding are viable patent strategies for SMEs in healthtech. A finding of a previous study, implying that attracting external financing is significantly more important for SMEs than it is for large firms is backed up by the findings of this research; it does seem like resources are a key issue in patent strategy for SMEs. Overall, the results of this research show that managers of SMEs should consider available resources and act based on that without forgetting to be aware of other firms’ patents as well.

## TIIVISTELMÄ

<b>Tekijä:</b>	Peppiina Räisänen
<b>Tutkielman nimi:</b>	Pienten ja keskisuurten terveysteknologiayritysten patenttistrategiat
<b>Akateeminen yksikkö:</b>	School of Business and Management
<b>Koulutusohjelma:</b>	Kauppätieteet / kansainvälinen liiketoiminta
<b>Ohjaaja:</b>	Elina Karttunen
<b>Avainsanat:</b>	patentit, IPR, strategia, pk-yritykset, terveysteknologia

Tämän tutkimuksen tavoite on selvittää, miten terveysteknologia-alan pk-yritykset pystyvät hyödyntää patenteja, minkä lisäksi tavoitteena on tuottaa hyödyllistä tietoa näiden yritysten johdolle. Tutkimusmetodi datan keräämiselle ja analysoinnille on kvalitatiivinen. Tieteellisiä julkaisuja käytettiin teorian rakentamiseksi aiheeseen liittyen ja aineistoa sisällönanalyysiä varten kerättiin teemahaastattelujen muodossa. Tutkimuksen pääkysymys on ”Miten pienet ja keskisuuret yritykset voivat hyödyntää patenteja?”. Tutkimuksessa selvisi, että vaikka patentointiin liittyvät kustannukset ovat korkeita ja siihen liittyy riskejä, pk-yritykset voivat silti hyötyä patenteista, jos ne osaavat käyttää niitä viisaasti. Tutkimuksen tuloksena voidaan todeta, että tapoja käyttää patenteja on monia. Patenttien tarjoaman suojan käyttäminen ja sitä kautta uusille markkinoille laajentuminen, ulkoisen rahoituksen etsiminen, lisäajan hankkiminen markkinoille menoon ja yhteistyökuviot muiden yritysten kanssa ovat pk-yrityksille toimivia strategioita. Toinen tutkimuskysymys on ”Millaisia patenttistrategioita terveysteknologiayrityksillä on?”. Patenttien antaman markkinavoiman hyödyntäminen uusien markkinoiden valtaamisessa, lisensointi uuden teknologian ja tiedon saamiseksi yrityksen ulkopuolelta tai rahavirran luomiseksi sekä patenttien hyödyntäminen rahoituksen saamiseksi vaikuttaisivat olevan pk-yrityksille toimivia strategioita terveysteknologia-alalla. Aiemmassa tutkimuksessa ulkoisen rahoituksen on todettu olevan pk-yrityksille huomattavasti tärkeämpää kuin suurille yrityksille ja tämä tutkimus tukee tuota löytöä; resurssit ovat avainasemassa pk-yritysten patenttistrategioissa. Patenttistrategiassa pk-yrityksen tulisikin ottaa huomioon resurssit ja toimia sen mukaan. Tärkeäksi asiaksi tutkimuksessa nousi myös tietoisuus muiden yritysten patenteista ja muiden patentoinnin riittävän aktiivinen seuraaminen patenttiloukkausten ja oikeudenkäynnin välttämiseksi.

## CONTENTS

<b>1 INTRODUCTION</b> .....	<b>1</b>
1.1 Scope of Research.....	2
1.2 Theoretical Background .....	3
1.3 Definitions of Key Concepts.....	4
1.4 Methods and Data Collection.....	6
<b>2 SMEs AND PATENTS IN HEALTHTECH</b> .....	<b>8</b>
2.1 Opportunities .....	9
2.2 Threats.....	9
<b>3 PATENT STRATEGY OPTIONS</b> .....	<b>10</b>
3.1 Using Market Power .....	11
3.2 Selling or Buying.....	11
3.3 Collaboration .....	12
3.3.1 Open Innovation .....	12
3.3.2 Licensing.....	13
3.3.3 Cross-Licensing.....	14
3.3.4 User Innovation.....	15
3.4 Other Options .....	16
<b>4 ANALYSIS</b> .....	<b>17</b>
4.1 Patents in Health Technology .....	17
4.2 Internal and External Aspects .....	18
4.3 Decision-making.....	21
4.4 Strategy .....	21
4.4.1 Past and Future .....	23
4.5 Open Innovation .....	25
<b>5 DISCUSSION AND CONCLUSIONS</b> .....	<b>25</b>

5.1 Findings .....	25
5.1 Conclusions .....	27
5.3 Managerial Implications .....	28
5.4 Limitations and Future Research .....	29
<b>REFERENCES.....</b>	<b>30</b>

# 1 INTRODUCTION

The purpose of this research is to take a look into different ways how a firm's own patents can be utilized from small and medium sized enterprises' (SMEs') point of view in the health technology industry. The idea behind this research and interest towards different patent strategies came from Tesla's innovative approach to IPR strategy; opening up the firm's patents in 2014 seemed to be quite a smart move from the electric car company that is trying to get a foothold in a market controlled by massive car manufacturers. This shows that there is more to IPR and patent strategies than simply the original idea of patents: protecting innovations. Thus, this research aims to find different ways to utilize patents and create a set of strategy alternatives for small and medium sized firms operating especially in the health technology industry.

Intellectual property strategy plays an important role in the competitiveness of businesses these days. Furthermore, a firm's ability to do business without being excluded by IPR of other firms is affected by the IP strategy of the firm itself as well as IP strategies of other firms. (Holgersson, Granstrand & Bogers 2017, 2) According to Innanen and Jäske (2014, 188) intellectual property is valuable property that – when protected and used correctly – can guarantee an exclusive position on a market and increase revenue. A significant part of a business' profit can be purely based on IPR and intellectual capital and utilizing these in different contractual agreements. That is why it is important for firms to be able to use IP in a smart way and find strategies that fit them best. The reason why this research focuses on patents is that in health technology, patents may be the most significant intellectual property rights especially for small firms.

Health technology was chosen to be the target industry of this research due to the fact that it is a fast-growing industry and market where numerous new companies are founded each year. Health technology is one of the fastest growing high technology export industries in Finland. An evaluation from 2017 reported a growth rate forecast of 5,1 percent for the health technology world market. In Finland, product export of health technology was 2,3 billion euros and growth compared to the previous year was 5,3 percent. Imports of health technology increased by 5,5 percent to 1,16 billion euros. (Healthtech Finland 2018, 3,6; Lehesranta 2017) However, all that growth also increases competition, which can be seen

for example in the increasing number of patent filings; medical technologies have been the leading category in patent applications to the European Patent Office for the past 20 years and in 2017 it was the strongest sector for European patent filings, beating substantial categories such as digital communication and computer technology (EPO 2018 a & b).

Due to the fast growth of the field, there is a vast number of small and medium sized players in health technology and firms that size usually do not have endless resources both personnel and money-wise and may not have much experience in patents – unlike potentially larger and more powerful competitors. That is why it is useful to gather this kind of information for management of SMEs to help them understand and find ways to use patents more efficiently and hopefully in more innovative ways to gain competitive advantage in the increasingly competitive market.

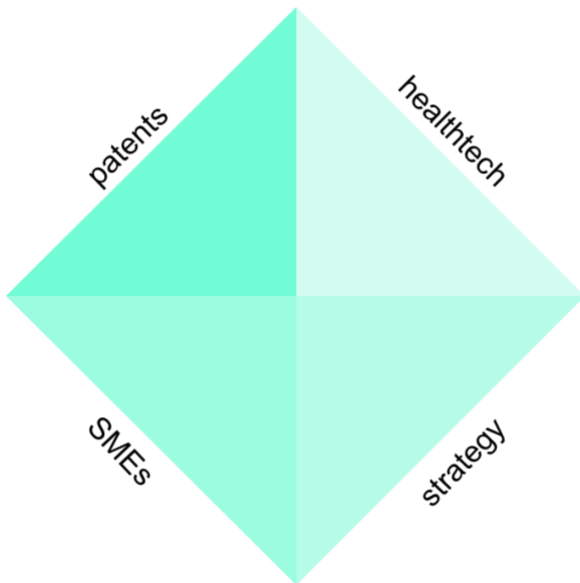
## **1.1 Scope of Research**

The scope of this research consists of four components: patents, health technology, SMEs and strategy (Figure 1). The definitions of these terms can be found in chapter 1.3. The research questions are:

*How can small and medium sized firms take advantage of patents?*

*What kinds of patent strategies do health technology firms have?*

The first and main research question aims to explain what kinds of strategies there are for small and medium sized enterprises by finding different ways for these companies to utilize patents. The second question dives deeper into the subject of patent strategies by looking at which strategies are the most useful and viable for SMEs and explains how those strategies fit health technology companies.



**Figure 1.** Scope of research.

Theoretically, the aim of this research is to get an understanding of how patents can be used to benefit small and medium sized health technology firms and what kind of patent strategies these kinds of firms could or should have. Moreover, the aim is to provide useful information for managers of SMEs especially in the health technology industry to help these companies stay competitive against larger players that have more resources and personnel to invest in their IPR strategies. This research is limited to only profit-making firms and thus non-profits are not included in the scope. Intellectual property rights in this research are limited to patents and consequently other intellectual property rights are left out of the scope of this research.

## **1.2 Theoretical Background**

The subject of patent strategies has been approached from other angles before for example by Koskisto (2015) who studied patent strategies and patent valuation for startups. Agostini, Filippini and Nosella (2016) investigated the influence of patents and trademarks on SMEs' financial and economic performance. Somaya (2012), in turn, explored patent strategies and management from a more general and generic perspective, whereas Xuefeng and Minguang (2011), for example, did a more specific research by studying new energy technology patent strategies in China. Indeed, it is quite clear that patent strategies have been researched a lot in a more general manner and in specific areas, however, not quite from the perspective this research represents.



Moreover, Belingheri & Leone (2017), for example, researched IP licensing strategies of startups, while Holgersson, Granstrand and Bogers (2017) studied the evolution of intellectual property strategy in innovation ecosystems, illustrating the need for including both collaborators and competitors, for example, in the analysis and management of innovation ecosystems. They presented a sequence of IP management's stages, implying an extension to traditional IP management, which has mainly revolved around issues related to patent protection, prosecution, infringement, monitoring and clearance, to also involve litigation, licensing and acquisitions. Holgersson and Granstrand (2017, 1267-1268) have also recently studied motives for patenting, technology strategies, and open innovation, investigating the role of patents in open innovation. They have identified for example licensing, protection, collaborations, open innovation in general, technology purchasing and technology sales as strategy options in a general sense. However, Holgersson and Granstrand did not specifically focus on any specific firm size or industry, but they acknowledge a need to understand the motives impacting the decision to patent. All in all, research around the topic of patent strategies seems to be quite scattered; there is research about motives and patent strategies in general, but not something that combines all this information into one package. Thus, this research attempts to combine some of this information to create current and useful patent strategy guidance for SMEs – especially those operating in the health technology industry.

### 1.3 Definitions of Key Concepts

**IPR** stands for intellectual property rights. IPRs have the goal of ensuring and fostering investments in innovation (Brem, Nylund & Hitchen 2017, 1286). IPRs include the following intellectual assets: trademark, patent, trade dress, utility model, copyright and related rights that allow the inventor to benefit from their own work or investment in a creation (Innanen & Jäske 2014, 18; WIPO 2018, 2-3). In this research, patents are the core of the study and other intellectual property rights are excluded.

According to the Finnish Patent and Registration Office's definition, a **patent** gives an exclusive right to using an invention (PRH 2018) – which can a product or process – or rather, the right to prevent or prohibit others from professionally or commercially exploiting the invention. This kind of use includes manufacturing, selling, distributing, importing and using the invention without the patent owner's consent. A patent can be granted to an

invention that is new, innovative and offers a technical solution to a problem. Patents are valid for a limited period of 20 years and as territorial rights, they generally are exclusive rights only applicable in the region or country where the patent has been filed and granted. They are very strategic rights that are often used for competition and negotiations between businesses. Patent owners can use their patents like any other property; patents or limited rights to use them can be sold, for example. (Innanen & Jäske 2014, 18, 171, 188; WIPO 2018, 5-7)

Holgersson and Granstrand (2017, 1267) have identified the following patenting motives: protection, bargaining, improving corporate image, attracting financing and internal motives. Their study of motives for patenting showed that patenting in order to protect technology is a traditional motive that still dominates. Patents can be valuable assets to a company. While patent portfolios are often seen as offensive tools that enable firms to thwart competition in similar technology fields, they also have defensive uses. (Harroch and Chatterjee 2017) **IPR strategy** is affected by available resources, the size and industry of the firm and the market in which the firm operates. It is always an important part of business strategy and should be updated when the business plan changes, which is why it is important to understand what is important to the company. IPR strategy can be different in different geographical regions based on specific regional characteristics. It should include mapping the IP the firm owns, formulating innovation processes and the use of new innovations, naming a person who is responsible for the strategy in the firm, creating an internal strategy and informing the use of IPR and the meaning of IP inside the firm. Moreover, the strategy should include monitoring IPR, utilizing the IP portfolio or creating new IP and being future-oriented. (Innanen & Jäske 2014, 240-246) Like stated earlier, in this research, the focus will be on patents, thus taking the focus out of other IPR strategies.

Small and medium sized enterprises (**SMEs**) represent the vast majority of all businesses. According to the European Commission (2016, 11-16), an SME is “any entity engaged in an economic activity, irrespective of its legal form” that employs not more than 250 people, has either an annual turnover equal to or under 50 million euros or an annual balance sheet total equal to or under 43 million euros and is autonomous, meaning that it completely independent or holds less than 25 percent capital or voting rights in one or more enterprises and/or external parties hold less than 25 percent of its capital or voting rights. Within SMEs, small enterprises are those that employ less than 50 people and their annual turnover or

annual balance sheet total does not exceed 10 million euros. Micro enterprises have less than 10 employees and their annual turnover or annual balance sheet total does not exceed 2 million euros.

According to WHO (2018), **health technology** is "the application of organized knowledge and skills in the form of devices, medicines, vaccines, procedures and systems developed to solve a health problem and improve quality of lives." It does not only stand for medical devices and information technological applications but also a wide area that includes diagnostic and care-taking systems, pharmaceutical products, rehabilitation and preventive procedures as well as organizations and support systems. Moreover, digitalization and IoT (Internet of things) have made portable applications for self-care and health tracking possible along with remote doctors and even remote surgery. Artjoki (2016, 2-3) and Viik (2016, 6), in turn, describe health technology as equipment, tools and technical systems used in healthcare technology and equipment, tools and technical systems used by people and/or organizations for voluntary and preventive maintaining and/or restoration of health.

#### **1.4 Methods and Data Collection**

In this research, the research method for collecting and analyzing data is qualitative. Answers to the research questions will be presented by using scientific publications and part of the data for analysis was gathered by conducting in-depth interviews. First, theory about patent strategies and usage of patents will be examined to get an understanding of what kinds of patent strategies there are in general and how patents can be used to a firm's advantage in – hopefully – a clever way. This theory will be looked at in terms of SMEs and health technology.

Theory mostly consists of scientific papers and articles about the topic of this study. After enough theory and information had been gathered, interviews with small and medium sized Finnish health technology firms that own patents were arranged. Data from the interviews was used to collect information about the current state of patent strategies for small and medium sized firms to find out how these firms have been using their patents and to see how the answers correspond to the current theory about patent strategies and usage of patents. Finally, theory and data from interviews was compared and analyzed to make conclusions about the most feasible patent strategies for small and medium sized health

technology firms. Based on these findings, suggestions for management will be made at the end of this research paper.

This study was done in the form of a theme interview, also known as a semi-structured interview. The most important thing in interviews in general is to get as much information as possible about a certain topic. In theme interviews, the interview is structured around chosen themes and questions related to those themes. The advantage of this type of interview is that questions can be specified and deepened based on the answers of the interviewee. Methodologically, theme interviews emphasize the meanings and interpretations people give to different matters (Tuomi & Sarajärvi 2018, 87-88). Choosing theme interviews as the method for collecting information about this topic made it possible to get deeper information about patent strategies from health technology SMEs' point of view.

The themes for the interviews of this study revolved around patents and patent strategies. More specifically, the questions aimed to generate a view of the importance of patents in healthtech and the strengths and weaknesses SMEs have in patenting as well as the importance of having a patent strategy as a SME in healthtech. This way it is easier to make conclusions about the most suitable patent strategies for these kinds of firms. Furthermore, the questions were generated to find out the motives the interviewed companies had for patenting, whether or not their initial strategy has changed over time and if they recognize any needs for change in their patent strategies. This way it is possible to learn what kinds of strategic improvements might be useful for these firms and possibly for other firms as well if the findings can be generalized. The goal also was to find out not only how these firms see their patent strategies and get an idea of how this area is organized in the companies, but also how content they are with their current patent strategies to further learn about how successful the patent strategies of these firms are to understand what might work for other SMEs as well. The questions moved from one theme to another and were rather open-ended to leave the interviewees some freedom to tell about the topics, which made the interviews semi-structured rather than structured.

The style of doing this research is content analysis, in which analysis of a document can be done systematically and objectively. Content analysis is analysis of text, which in this case will be done in a deductive manner, meaning that the analysis is formed based on theory. The document can be almost anything that can be turned into written form, such as

interviews – which is what will be used in this paper. (Tuomi & Sarajärvi 2018, 117) In the interviews, three people from three Finnish SMEs operating in the health technology field were asked questions about the patent strategies of their companies.

Data was collected by individually meeting the interviewees either in person or via Skype during July and August 2018. Firm A was represented by its CEO, a Master of Science in Technology in technical physics, who has been the company's CEO since the formation of the company in 2013. In the beginning, this person's duties in the firm revolved more around the product, research and development and clinical development, but the responsibilities also included thinking about what can be protected and patented. Recently the responsibilities have moved more over to marketing and sales as well as building a distribution network. Firm B, a nearly 30-year old business, was also represented by its CEO. This person is a high school graduate who has worked in this company for a total of 23 years and 20 years as CEO with the responsibility of coming up with ideas of what the firm should do next. Firm C was represented by its founder and Vice COB (vice chairman of the board), with the educational background of a physicist, who has been in the company since day one: the first 7 years as CEO and vice-chairman of the board for approximately the past three years while also being responsible for products, partly R&D, IPR and strategic issues, among others. Due to the sensitivity of the subject, neither the names nor further information about these companies and interviewees will not be shared in this research to guarantee their anonymity.

## **2 SMEs AND PATENTS IN HEALTHTECH**

In this chapter, the possibilities and threats SMEs can face in the health technology field will be examined shortly to gain a better understanding of the industry and the environment in which these firms operate. Based on this background information, it will be easier to make strategic suggestions and thus this theory will work as a basis for the analysis of viable patent strategies for SMEs in the health technology field.

## **2.1 Opportunities**

Health technology is an IP-intensive industry, which is why it is important for a company to make sure its core technology is properly protected in order to make business blossom, but more importantly, firms should be aware of IP owned by others (Lehesranta 2017). Unfortunately, SMEs often neglect using patents even though they are the most common used statutory IPR and startups, for example, do not always pay attention to IPR until they are compelled to. Even so, research does suggest that in terms of commercialization success, protecting intellectual property through patents is positively linked to performance and that both large firms and SMEs can use patents to increase turnover. (Brem et al 2017, 1288; Lehesranta 2017) Moreover, responding to competition and convincing investors becomes easier when a company has a clear IP strategy as well as long-term strategy in which both IP of one's own and IP of others is considered (Lehesranta 2017).

## **2.2 Threats**

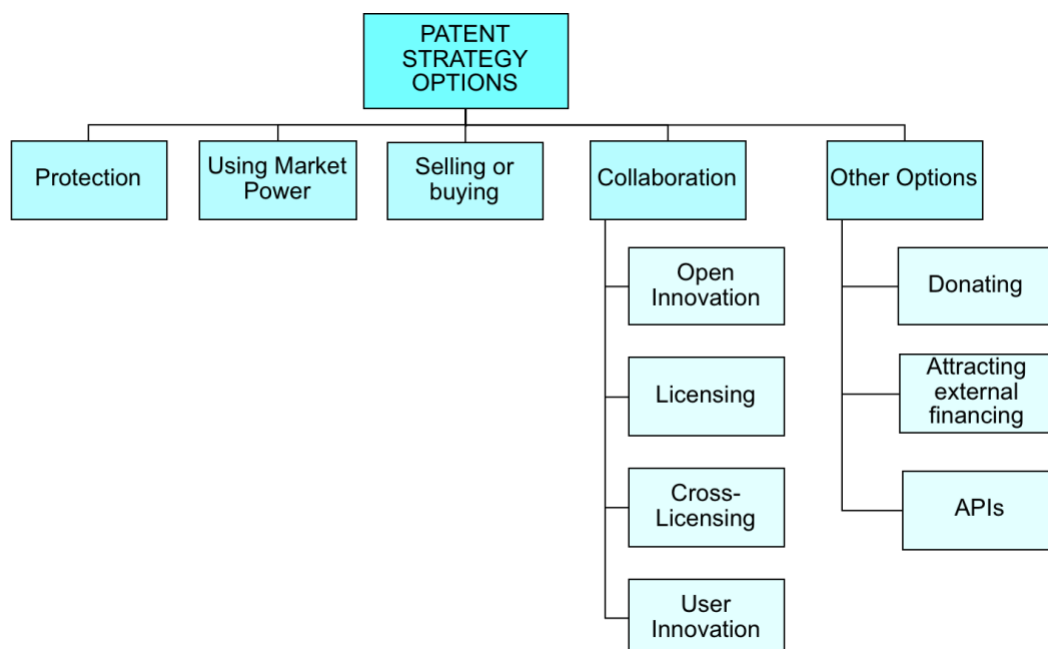
SMEs drive innovation and growth in economies and compared to the early years of globalization, they are becoming increasingly involved in global markets and competition. Consequently, there is a higher threat of competitors and substitutes that can even be worldwide for these companies, which, in turn, leads to an increased need for protection. (Brem et al 2017, 1285-1286) Furthermore, the rapid growth of the health technology field means there is an increasing number of firms and IP registrations in this industry, causing serious competition. This, in turn, calls for ability to convince investors and users of one's uniqueness; showing them the firm is offering something different from other products on the market. (Lehesranta 2017)

One of the most prominent challenges for SMEs might be lack of resources; SMEs are often disadvantaged in applying for and using IPRs because they are costly to acquire and enforce (Agostini et al 2016, 96). Brem et al (2017, 1287) also acknowledge the fact that not only is using and enforcing IPRs especially challenging to SMEs due to the lack of financial resources, these companies also often lack enforcement abilities. SMEs are different from large companies in patenting in the way that they tend to only patent innovations likely to succeed; whereas large firms have plentiful resources to patent all innovations, SMEs have organizational and financial barriers as well as lack of IP management practices that make systematic patenting difficult (Brem et al 2017, 1825, 1288). Moreover, when it comes to

legal battles, SMEs can be disadvantaged compared to larger firms with more resources to fight these costly and often long battles. Defensive costs fall on especially on innovative firms because being sued for patent infringement is more likely for R&D (research and development) heavy firms (Bessen 2014).

### 3 PATENT STRATEGY OPTIONS

This chapter presents strategy alternatives (listed in Figure 3) and explores the positive and negative sides of them in the context of this study, thus aiming to come to a conclusion about which strategies should best fit SMEs in the health technology industry. As mentioned earlier, protecting technology is a traditional patenting motive that still dominates (Holgersson and Granstrand 2017, 1267). While protection can be seen as a strategy of sorts, it will not be discussed in this chapter. Instead, this chapter examines strategies that patent protection allows firms to use: using market power, selling or buying, strategies based on collaboration – including open innovation, licensing, cross-licensing and user innovation – and a few other options, which include donating, attracting external funding and APIs.



**Figure 3.** Patent strategy options.

### **3.1 Using Market Power**

When a firm or group of firms has market power it or they can increase and retain prices above the level that would prevail under competition (OECD 2018a). In Holgersson and Granstrand's study (2017, 1279), blocking competitors from certain technology areas and creating retaliatory power were among the group of dominant patent protection motives. When bringing a new product to the market, many device developers also like having some issued patents and some pending patent applications to make legal rights enforceable right away if a low-priced copycat product shows up. Such a strategy also guarantees that legal rights remain flexible. Pending patent claims can be modified and thus the borders around the intellectual property can get shifted. (Kennedy 2015, 13) SMEs can benefit from the exclusive right to using an innovation patents give as they may otherwise be disadvantaged especially compared to larger competing firms and because the competition in health technology is high, utilizing such benefits can help SMEs take control of markets.

### **3.2 Selling or Buying**

Some of the ideas generated in R&D are useful for a firm while others are not. The ideas useless to its line of business can be patented and sold. Being able to sell patents offers an incentive to do R&D and firms that fail to create innovations can buy them, allowing both parties to grow business (Ackigit, Celik and Greenwood 2016, 981). Thus, selling patents could be one strategic goal for SMEs that do a lot R&D and come up with good ideas they do not find useful for themselves, which could offer them at least some financial profit for the ideas they do not plan to use themselves. This does, however, eliminate the possibility of future profits, thus making licensing a better option. One could also assume innovations that have not been on the market for a longer period of time and do not have proof of generating profit for the owner are not as valuable in the eyes of a potential buyer, thus decreasing the selling price.

Ackigit, Celik and Greenwood (2016, 946) identify two concerns in selling patents. First, ideas can be transferred by other means too – or licensing, to be more specific. This would mean, based on these researchers' theory of the usefulness and uselessness of ideas, that the firm that owns the patent finds it useful for itself and does want to have the right to use it as well. Also, licensing will create future profits – unlike selling. Second, some patents may be bought and sold for reasons related to litigation, having little to do with increasing



productivity or transfer of knowledge. For example, a firm might buy a patent intrinsically worthless it merely to avoid potential litigation. There are also patent trolls that try to earn money by threatening litigation. These are companies that do not make useful products of their own and assert patents against other firms to make money. (Bessen 2014)

Selling patents naturally also works the other way around; just like ideas useless to a firm can be patented and sold, firms that do see a need for such an invention can buy these patented inventions from others. It should be noted, though, that this option might be too expensive for SMEs unless they have enough resources to buy patents. Thus, this option may not be very feasible for small firms as they generally have limited resources. The positive side of buying patents from others could, however, be the time and money saved in terms of R&D efforts.

### **3.3 Collaboration**

It has been stated that cooperation with outside firms is connected to for example innovation performance especially for SMEs as cooperation may enable them to overcome barriers that their size causes. (Brem et al 2017, 1287) This chapter examines patent strategy options that take advantage of different cooperative models.

#### **3.3.1 Open Innovation**

Open innovation (OI) is a company-centric paradigm the primary concern of which is taking advantage of a firm's external knowledge to enhance its internal innovation and economic performance (Chesbrough et al. 2014, 29). The original concept of OI identified two knowledge flows: inbound (inside-out) and outbound (outside-in) open innovation. In inbound OI, firms attempt to find external innovations and select and acquire those that are useful for them and then integrate those innovations into their R&D efforts and bring them to market (West & Bogers, 2014). Outbound OI, in turn, can be describes as sharing knowledge and ideas with other organizations (Deichmann, Rozentale & Barnhoorn 2017) or deliberately commercializing and capturing internally developed ideas in the organization's external environment" (Naqshbandi & Kamel 2017; Chesbrough et al. 2014).

Today, the question is not whether or not open innovation is important but rather to what extent (Brem et al 2017, 1825). Firms are increasingly considering using OI in the modern

competitive environment in order to bring novel products and services to market. In this model of innovation, IP ensures appropriability and provides access to partners, valuable knowledge and markets. In recent literature, it has been shown by a few authors that SMEs normally have different OI habits compared to their larger equivalents. (Belingeri & Leone 2017, 1209) Because of their small size, they seem to be the best candidates to implement boundary-spanning practices (Chesbrough et al. 2014) and are less inclined toward formal protection mechanisms (Belingeri & Leone 2017, 1209). SMEs are also catching up to multinational companies that have explored open innovation extensively. Moreover, the role of SMEs in open innovation is increasing and a positive trend towards open innovation has been observed among SMEs. (Brem et al 2017, 1287)

In fact, there seems to be a positive relationship between IPR and open innovation. Furthermore, even though it has been found in some studies that SMEs do not use patenting as much as in larger companies, patenting does have a positive effect on financial performance and innovation when used in SMEs, which in turn indicates that large firms and SMEs need different patenting strategies, particularly in the area of open innovation. (Brem et al 2017, 1825, 1288) However, due to their smallness and in some cases newness, SMEs can face some problems in terms of exchange and appropriability of OI practices (Belingeri & Leone 2017, 1210). Moreover, Brem et al (2017, 1299) found contradicting results to these claims in their research stating that there is “a negative impact of patenting on the turnover for medium-sized firms that engage in open innovation”, contradicting earlier studies that have found a positive connection between firm performance and patenting in SMEs.

### **3.3.2 Licensing**

Licensing is one of the most frequently used mechanisms for IP management and is seen as a mechanism for managing inbound and outbound knowledge flows in collaborative agreements (Belingeri & Leone 2017, 1210; Chesbrough et al. 2014). Licensing means giving legal permission to do something. The license confers the person or firm a right they did not previously have. Licenses are legal agreements that may include limitations regarding the use of the license. While some licenses are granted for free, most are not. In the case of patents, the patent owner grants authority in the form of a license to another party to sell, buy, use or produce the item in question. Usually, the patent owner gets a fixed payment and a royalty rate in return. (OECD 2018b)

Due to lack of abilities and contacts in the market, smaller firms can face more challenges in commercializing their technology. However, they can compensate these deficiencies with an approach focused on learning; using patents can help them gain access to partners and to “ensure appropriability of the collaboration outcome” (Belingeri & Leone 2017, 1211; Parnell et al. 2015). Thus, licensing can help SMEs establish a foothold in the market they operate in, which is harder to do without granted patents.

Licensing-out technology allows firms to recover their R&D costs and increase economic profits, but it can also be used strategically (Zhao 2017), while licensing-in can work as an addition to resources, providing a way of acquiring knowledge while leaving space for adapting their technologies and seeking competitive advantage (Belingeri & Leone 2017, 1211). Indeed, licensing-in can benefit SMEs by accelerating the creation of a patent portfolio, giving them real and defensible patent positions earlier. However, because of contractual negotiations, fees and royalties as well as in terms of the potential buyers’ cost of integrating external technologies, licensing can turn out to be expensive (Belingeri & Leone 2017, 1218). Teece (2018) also sees licensing as a challenging business model to implement from the perspective of capturing value. Thus, even though licensing could be lucrative, SMEs should be cautious and careful if they wish to implement it in their IP strategies. While licensing-in could serve as a useful source of knowledge, it may be too costly for small firms and thus licensing-out might be a more suitable strategy for SMEs. If lack of resources is not an issue, licensing-in could be a smart way to bring knowledge into the company.

### **3.3.3 Cross-Licensing**

A common way of collaborating with IP is cross-licensing, which is a wide practice to obtain valuable IP. Cross-licensing can be defined a contract between at least two parties, granting mutual rights to both parties’ intellectual property (Jalfin 2017). According to Harroch and Chatterjee (2017), a defensive patent portfolio can work as a bargaining chip if a competitor threatens a small company with patent infringement, which can lead to somewhat favorable outcomes, such as an opportunity to cross-license. Zhao (2017, 390, 402) explains that compared to unilateral licensing, cross-licensing tends to be more likely in industries where market concentration is relatively high, meaning that “the more obvious the characteristics of oligopoly in an industry, the higher the likelihood of cross licensing among firms operating in the industry”. This means that competing on price is less common than competing on

output (market share). By cross-licensing technology, firms can avoid spending resources on lawsuits for patent infringement. Other benefits include developing a superior product by bundling complementary technologies, access to new markets, lower product development costs and utilizing the manufacturing and/or marketing competences of the other parties to shorten market entry time. However, there is a risk of becoming dependent on the other party, royalties add expenses to the product and the other party could become a competitor. Moreover, to prevent unfair reduction of competition or undermining reasons for innovating, especially patent pools consisting of substitute (directly competing) products are subject to regulatory scrutiny. (Jalfin 2017)

### **3.3.4 User Innovation**

External sources of knowledge can be used to improve the innovation process. In the literature of sustainable innovation, the involving the end-user is a neglected issue while innovation led by producers is the backbone of empirical research and theoretical development. Nonetheless, there are ways how users can innovate. (Nielsen, Reisch & Thøgersen 2016, 2) User innovation allows individuals to address their own needs by using innovation; companies can collaborate with consumers to let them innovate in ways that improve the firms' offerings, thus giving commercial value to companies and social value for the users. Users tend to often reveal their innovative ideas, inventions and knowledge sometimes even without request and without expecting compensation. (Chesbrough et al. 2014, 29-32)

These innovators tolerate initial low product performance levels and uncertainty and "insulate novel ideas and prototypes against the dominant socio-technical regime" (Nielsen et al. 2016, 2). Especially in fast-paced markets, so called lead users can have special needs ahead of the rest of the market (Chesbrough et al. 2014, 29-32). SMEs could benefit from user innovation because they usually do have scarce resources, which is why receiving "help" from outside the firm could be a positive situation, especially when it is free of charge. This way, they might get new ideas for product improvements, for example, spurring R&D and potentially backing up future patenting actions, thus safeguarding continuity of business. Consequently, user innovation could serve as a tool for sustaining competitive advantage and keeping patented inventions up-to-date.

### 3.4 Other Options

It is possible to give away some parts of intellectual property while retaining other, possibly complementary parts of IP; alongside the increasing trend of open innovation and commercializing patents, a recent phenomenon where firms donate their patents has also emerged. Firms generally engage in open source activities for economic, technological and social reasons. First, firms can achieve economic benefits from donating patents, especially in the United States where firms can get tax benefits and cost reductions. Second, from a technological point of view, firms can benefit from the technology side of the open source community through ideas, comments, and further developments by opening up their innovation processes. Third, some firms also feel the need to conform to the social norms of the open source community and may even feel morally obliged to donate patents. There has also been a rising public interest and attention to open innovation and companies have realized that participating in the movement can enhance corporate reputation. (Ziegler, Gassmann & Friesike 2013)

The least important group of motives for patenting Holgersson & Granstrand (2017) identified was related to attracting external financing. However, this motive is significantly more important for SMEs than it is for large firms. Due to their small size, SMEs often lack resources and in order to grow business, they may need external funding. The options for SMEs to get funding are more limited than for larger firms because the option of foreign financial institutions and bond markets is practically possible only for large firms (Kauppalehti 2016). Globally, over half of SMEs suffer from funding problems in international commerce (Kauppakamari 2015). Indeed, getting funding is crucial for SMEs in order to expand and because investors need protection for their investments in the form of patents, firms seeking funding need to have them.

The valuations of firms successfully incorporating APIs (application program interfaces) in their strategies are skyrocketing (Iyer & Subramaniam, 2015a), making APIs another collaboration option to consider. APIs are software-to-software interfaces: “programming routines or protocols that allow software applications to share data”, making it possible for software programs to interact with one another and, ultimately, serving the end customer by improving functionality and the user experience (Iyer & Subramaniam 2015; Huckman & Uppaluru 2015). This sharing of services with external firms is enabling companies to grow at remarkable rates and furthermore, allows them to expand into markets they may not have

thought of before. (Iyer & Subramaniam 2015b) In terms of health technology, APIs can offer possibilities in expanding business. For example, data from wearable technology devices are gathered in applications and creating insightful ways of presenting data and sharing it in the form of APIs for health data integrations, for example, can generate revenue for firms and value for customers.

APIs may be seen merely as a technical concept, but they also have a growing strategic significance. In fact, the influence of APIs is growing well beyond technology firms especially now that the internet of things (IoT) is bringing digitization to all kinds of products and services. (Iyer & Subramaniam 2015b) Furthermore, the increase in cloud computing and open APIs has changed the game by allowing small businesses to use data in completely new ways (Beatty 2017). Having a dominant user interface (UI) is the front end of a powerful information gathering API, enabling a platform to grow stronger through network effects. Such UIs and the network effects they cause enable platforms to uphold advantage as they help retain users and consequent information sources. However, sustaining the dominance of a UI can pose a challenge. (Iyer & Subramaniam, 2015a)

## **4 ANALYSIS**

This chapter presents the information gathered from the interviews. First, the general opinions of the interviewees regarding patents in the health technology field will be discussed. Second, analysis of the opportunities and threats in health technology will be discussed from the interviewees' point of view and the strengths, after which the strengths and weaknesses SMEs have in healthtech are discussed. Third, the decision-making regarding patent strategies of these firms will be presented, followed by discussion about their patent strategies and advantages they seek from patents. Finally, the last sub-chapter is dedicated to opinions about open innovation from SMEs' point of view to see whether or not open innovation could be a viable strategy option for SMEs.

### **4.1 Patents in Health Technology**

When asked about the importance of patents in the healthtech field, all three interviewees had somewhat differing opinions. The CEO of Firm A views them as very relevant but not

necessary. He points out that a startup may not have IP on day one, but many investors require patents, which basically makes them mandatory and thus firms need to apply for them and have them to safeguard their technology and own investment.

The CEO of Firm B, on the other hand, believes patents are important in health technology but not as important as they might be in some other industry because “big things” of the industry have been invented a long time ago and healthtech is a slowly developing industry because it has so many regulative matters such as difficult standards, an example of which is the MDR (the new EU regulation for medical devices), making it challenging to fulfill all requirements. The regulative burden of making medical devices in the healthtech industry as well as validation and getting approval are long and sizeable processes that take years, thus creating a high threshold to enter the industry. However, the CEO of Firm B does also point out the fact that due to the time consuming clinical validations and regulative issues, the lifecycles of healthtech products are long, unlike in consumer electronics, for example, where lifecycles can be very short, and thus patents can indeed offer protection and it is good to have IPR and patent protection.

The Vice COB of Firm C sees the issue as a two-sided question; On the one hand, patents that protect the firm’s technology well, they give a strong position and freedom to operate independently on the market and make licensing a possibility, thus making it possible to build business. On the other hand, firms need to be able to defend patents, which is challenging to small businesses especially when put against larger firms with plentiful resources to battle over patent issues, which means that SMEs need strong enough finances to go through legal battles and if a firm does have that, patents are very valuable. Overall, it can be concluded that patents are important in health technology, but firms also need to be able to defend them.

## **4.2 Internal and External Aspects**

The internal advantages SMEs have in patents due to their small size generated somewhat contradictory views among the interviewees. Firm A and B’s CEOs thought that SMEs do not exactly have any strengths, but the CEO of Firm B does think that SMEs can be agile in developing innovations and they may also be able to operate under the radar. The Vice COB of Firm C had the most positive view, explaining that the strength of SMEs is their high ability

to flexibly create innovations, make patent applications and utilize them, emphasizing flexibility, speed and reactivity, because even though larger firms have many patent applications, the way they operate is much more bureaucratic and difficult. Thus, the general advantage of being small may be speed and flexibility that larger firms may not be able to achieve as easily. However, this may not be an aspect all SMEs have, but rather, they should aim to take advantage of their smaller size in such way to be able to compete against larger rivals.

The internal problems of SMEs when it comes to patents seemed to be easier to think of. The CEO of Firm A thinks that the smaller the firm, the more difficult it is because patents require heavy investments of time and resources and SMEs tend to not have time and resources to focus on all markets or all the technologies they would like to protect. The CEO of Firm B has a similar opinion; SMEs have many challenges when patent protection should cover all geographical areas and sometimes commercializing takes a long time while at the same time patents create expenses at a very early stage and application stages are hard and expensive, and there may not be cash flow because regulative issues slow down bringing products to market. Consequently, SMEs face various challenges especially in the health technology industry. The Vice COB of Firm C is also concerned about the highly costly and time-consuming nature of patents in the global world and also recognizes potential unknown risks in patent processes that require considerable amounts work; while a patent application is rather simple to create and takes an investment of few thousand euros and possibly a few weeks of work at the lightest, there is no guarantee for anything else except for a preliminary privilege to that innovation. However, at worst, the process can be extremely laborious and time and money consuming, which often seems to be the case, and SME's may simply not have enough resources for such processes. Overall, the common view seems to be that lack of resources is the root cause of SMEs' problems in terms of patents.

The views of opportunities healthtech SMEs get from patents were quite similar among the CEOs from Firms A and B. Firm A's CEO believes that patents can allow SMEs to protect some area for their own use and may also allow them to operate on an area where they normally would not have a chance to do business. Especially in healthtech, where entering the market takes time and effort while SMEs usually do not have much money, patents can help firms buy time to enter markets, keep others out of the game and take control of the



market. The CEO of Firm B has the same main idea; if a firm gets a product on the market and it creates demand and solves some problem well, the advantage of patents namely is the 20 years of patent protection – a lengthy period of protection that SMEs need. Moreover, in health technology, because everything has to be clinically proven, it takes a long time to get products to market and customers and buyers are very pragmatic and slowly warm up to and adopt new ideas. Indeed, without patent protection, large firms with resources, wide spread and good sales channels could steal innovations easier than for example in consumer electronics. Thus, the CEO of Firm B believes patents bring protection in the long run before products create cashflow. The Vice Vice COB of Firm C also seems to be on the same page with the other two interviewees. Anyhow, this person also believes that firms also have to be able to defend the exclusive right patents offer; if a larger competitor knowingly infringes the patent of an SME, threats of juridical acts may only activate a very expensive juridical operation where the small firm may not stand a chance unless they have some partners to back them up. This would mean that the patent would not actually offer any benefit. If the firm is, however, able to defend the patent, the best-case scenario, in the opinion of the Vice COB of Firm C, would be that the situation turns into a business negotiation and the firms ends up being able to license the invention and get immaterial benefit from the other party. Selling the patent to a larger operator is also seen as an opportunity to get very substantial financial benefit. Moreover, The Vice COB of Firm C views having an IPR portfolio as a requisite for growth and funding.

The disadvantages or threats healthtech SMEs may experience from patents formed somewhat similar opinions from all firms, the main message being that patents can eat up a lot of money, as the CEO of Firm A put it, and sometimes it is all for nothing. The CEO of Firm B explains that in health technology, products are typically improvements to former products when there is a threat that even if some product has actually not been invented before, there may be patents that prevent bringing even some improved product to market. This can happen because the problems these products are solving have existed for a long time and there are solutions that have been patented and can be barriers to bringing good, new and even differing innovations to market because the application texts of those older patents have been made with large amounts of money and can often be very challenging. This firm also has many experiences from attempting to patent some innovations and improvements but having the patent official of some country not accept it because they do not see a substantial enough improvement and thus they have not been granted a patent

even though they have spent even a hundred thousand euros on the application and spent ten years trying. The Vice COB of Firm C sees a risk in having been granted a patent and then losing it because of a competing patent, innovation or publication found afterwards, thus losing the competitive advantage and all the investments and resources allocated to that patent.

### **4.3 Decision-making**

In Firm A, the CEO and another founder are responsible for the patent strategy of the company together. In Firm B, in turn, the CEO is the only person who has been in charge of patent strategy for the past 20 years. In Firm C, however, the case is slightly different; in normal business and routine patent decisions the Vice COB is in charge but as the business grows to be more global and additional costs increase, strategic decisions regarding patents move higher and higher up the organizational ladder and all the way up to the board of directors if necessary. Thus, when the question is about whether or not the company should seriously invest in something, it becomes a budget level decision. Similarly, if the company has to defend its patents and juridical actions need to be taken, the process can easily result in millions of euros of investment and risks related to loss and profit. Decisions like this are in the hands of the board of directors but routine business is the Vice COB's responsibility. In conclusion, even though this is a considerably small sampling, it seems like SMEs tend to not have a specific person responsible for taking care of their patent strategy, but instead this task falls under management's responsibility, for instance. This does not come as a surprise, though, as small firms often may not have the resources to for example hire specific people to handle patents and patent strategy.

### **4.4 Strategy**

The importance of a small or medium sized healthtech company to have a patent strategy depends on which sector of healthtech a firm operates in, says the CEO of Firm A, explaining that for example patenting of implantable products is crucial, but making improvements to existing technologies is an area where patenting is not as important. The CEO of Firm B believes that good inventions should be protected and IPR should be developed; for example, creating a solution to a clear problem is worth patenting because such products have a chance of generating revenue. The Vice COB of Firm C views having a patent strategy as an absolute prerequisite for securing and growing business through exclusivity

but also points out that it is important to know that one's own firm is not infringing anyone else's patents because that is a risk for business. Thus, it can be concluded that having a patent strategy does seem to be important in health technology, which would of course make sense as patents were already found important and, naturally, it would make sense that if a company has patents, it should also have an idea of how it plans to use them. Even if a firm does not own patents, it should be noted that being aware of other firms' patents is important in order to avoid infringing them.

When asked about why they applied for patents, Firm A's CEO names applying for funding as one reason because investors want protection for their investments and because if a firm does not have patents, anyone can copy the idea and the investment is not worth anything. They also try to get competitive advantage and market power from patents. They do have some patents they do not use yet and they are not sure if they ever will, but the CEO is quite sure they will use them as well. The patent strategy of Firm A has included licensing-in from other parties when they have recognized a need for a piece of technology they need and someone else has had it, but they have not yet actively searched for a buyer or licensee for their own products. Another important issue is going to new markets – a situation where it is useful to have something to use against competitors and having a patent strategy can offer market force. However, for this firm, the main reason for having a patent strategy is getting investors and funding and for such a young and small firm, that does make sense.

The CEO of Firm B believes that patents are part of the reason why the company is as old as it is, has been able to develop technology in piece and has been able to generate business. The firm seeks advantages from patents by making their innovations publicly known. That way they can make sure that someone else does not patent the same innovation because there is always a risk that someone hears about an improvement to some innovation and starts to patent it under their own name. Sometimes someone who works around the same issues may even patent something and thus unknowingly prevent the other party working on the same issue using the idea. Making the innovation public by applying for a patent guarantees that no one else can get a patent for that idea. Patents have created a foundation for long-term operations, building international markets and taking the company's products to global markets; especially Japan and the United States tend to be markets where having IPR is necessary. In addition, having and developing IPR has helped them build distribution channels; distributors also want protection so that they

will not be sued for selling a product that does not have patent protection. The CEO of Firm B views licensing as somewhat challenging, but the company has licensed something; they have a few significant license agreements and incomes. Even so, licensing is not part of this firm's strategy: instead, these deals have been born by coincidence.

Firm C, in turn, aims to get license-out its patented technology and they have had such negotiations going on for several years and still have. Their basic strategy is protecting core technology if there is a chance for patenting. Due to high costs of patenting and lack of resources, all ideas are not patented and indeed, part of a small firm's patent strategy is trying to minimize unnecessary costs. Part of their strategy is also knowing what others have patented to avoid accidentally infringing someone else's patent and ending up in a costly, laborious and risky juridical process. They also aim to lift the company profile by letting consumers and buyers know the technology they are selling is their patented technology and innovation, thus creating an image of trustworthiness patented technology. Additionally, they have used patents to get funding when business has not been profitable yet because volumes have not been high enough to cover all costs. The Vice COB also recognizes that licensing and OEM negotiations with large companies is not wise without patents that give exclusive rights to the technology because the other party could easily copy the idea, but patents make the firm valuable operator to start doing business with. Moreover, because of the patent protection, the licensee gets a benefit against other firms when the first licensee can for example be granted a period of exclusive right to the licensed technology. Overall, having patents has allowed the firm to grow to the point where it is today, and the Vice COB believes the company would not exist without them.

#### **4.4.1 Past and Future**

Firm B's patent strategy has gone through the most changes, which is not that surprising considering its age compared to the other two companies. The CEO explains that they do not apply for as many patents anymore as they sometimes have because the costs are high, the protection patents give can be quite small and patents do not quite have as great a meaning as they once did. The patent strategies of Firms A and C have not changed that much. Firm A has not identified a reason to change it, and while Firm C's patent strategy has gone through some changes, nothing radical has happened and the Vice COB explains that their patent strategy is generated by always searching for the most flexible road.

In terms of changes and improvements these firms would like to make to their patent strategies, resources were something all three companies mentioned as a key issue. The CEO of Firm A says that their patent strategy always reflects the amount of money they have or do not have and at the moment, all or most of their monetary resources go to developing sales and marketing, but if they had to change something, protecting more items would be a goal – if only they had the resources. The CEO of Firm B also says that altering the patent strategy is hard because it has to be based on existing economic resources, revenue and profitability, but if something from the past could be changed, they would not apply for as many patents as they have; they have applied for too many patents at one point, which has generated large expenses, and thus considering needs is something they should have done more in the past. The Vice COB of Firm C thinks that they should be able to regularly go through their products and abilities and try to recognize investment-worthy matters from a patenting standpoint because patents do expire eventually, meaning that competitors can do the same without any problems. That is why it is important to have property protected by patents and proprietary rights to do things for the future as well, which is sort of a competitive advantage. What the Vice COB views as important is applying for patents for innovations with the best potential, which calls for ability to find more both economic and human resources. These ideas reflect what was mentioned earlier about IP strategy; it should include monitoring IPR, utilizing the IP portfolio or creating new IP and being future-oriented.

When asked about what they would keep the same about the patent strategy, all firms seem to be content with what they have been doing recently. The CEO of Firm A thinks that their current strategy – trying to move larger expenses as far into the future as possible until it is reasonable to expand geographical scope, for example – has worked well for the company and feels rational right now. Firm B's CEO is content with how the company has been building an image of having IPR and protecting its innovations, which can, for example, give them a chance to higher pricing. The Vice COB of Firm C does recognize that some mistakes have been made in terms of investments and decisions but overall, they have been doing the right things and seem to be able to expand business from patents and other IPR and securing continuity, indeed, is something the company should aim to do.

## **4.5 Open Innovation**

All three interviewees believe open innovation is important for SMEs. While the CEO of Firm A thinks that open innovation would be useful for the society, patents are still crucial in his opinion. In their company, external information, such as scientific research, has been used and open data has been found useful. The CEO of Firm B also finds open innovation useful for SMEs and they have been taking advantage of it up to a certain point. The Vice COB of Firm C explains that their firm utilizes technology and patents of third parties and that is part of their patent strategy and business model. They look for partnerships that have mutual benefits and thus have acquired new business and technology they could not or did not otherwise know how to get. The Vice COB believes that there may be some risks involved, but because of resources and costs, it is easier to acquire something that already exists than trying to come up with everything alone. Moreover, this person believes that in the future, there will be more and more collaboration rather than business that is purely done inside companies.

## **5 DISCUSSION AND CONCLUSIONS**

This chapter presents the key findings of this study along with conclusions and suggestions for managers based on the findings. At the end, limitations of this research will be discussed and suggestions for future research will be made.

### **5.1 Findings**

The increasing number of firms and IP registrations in the health technology industry do pose some threats to SMEs, especially if they need to battle large competitors in court because there is a risk of even accidentally infringing some other party's patent. Legal battles also tend to be expensive, which is a risk for SMEs; if a firm lacks resources, costly legal battles can be very challenging. Lack of resources also generates difficulties because patent processes can be very costly and time consuming. Moreover, similar patents pose threats to getting patents granted or may even result in losing a patent, thus resulting in having spent resources "for nothing". The high mobility, flexibility, dynamicity, reactivity, flexibility and ability to operate under the radar unlike stiffer large firms are features SMEs may possess and should take advantage of to maximize the opportunities patents offer.

SMEs can benefit from patents in a multitude of ways: they can use patents to block competition out and succeed in commercialization, while monetary benefits can include getting increased turnover, getting investors and funding and achieving financial benefits from selling and licensing. Patents can also help SMEs get protection in the long run and give them more time to enter and take control of markets while getting more time to create cashflow.

As established earlier, a patent gives an exclusive right to use an invention, which protects innovations. Even though the firms used in this study do use patents for protection, they also have many other strategic reasons behind their patenting activities. In fact, it seems that the protection is what allows firms to make these strategic moves. The strategic goals of Firm A include funding, licensing-in and conquering new markets or using market force. The most focal strategic goals of Firm B can be summarized as blocking others out and growing globally. For Firm C, strategic goals are licensing-out, avoiding patent infringements and getting funding. Thus, funding seems to be a dominating goal among younger firms, while licensing and taking advantage of market power to expand to new markets also seem to be popular options. Open innovation is seen as an important aspect of cooperation and all the three firms have been using it in their own ways.

Based on this study, collaborative strategies should be useful for SMEs because of their lack of resources. Collaborative strategies, such as licensing in and out can create cashflow or allow SMEs to get access to technologies and external knowledge. Open innovation is something worth considering for firms that want to open up information flows to gain knowledge from outside the firm and share what they know with others, which would be smart especially in the case of limited resources, which often tends to be the case for SMEs. In health technology, the market power patents offer is also something SMEs should take advantage of to be able to thrive among their larger competitors. Getting more time to take control of markets is a valuable advantage not to be disregarded. Selling could also be an option if firms do not want to use the invention themselves and are in need of money. Buying is also an option that would offer a means to obtaining external knowledge and innovations, but it might turn out to be too expensive especially for firms that do not have endless resources. SMEs could also take advantage of user innovation by actively involving customers and users in innovation processes to generate new, possibly patentable ideas and business for the long-run while saving resources. Finally, due to their lack of resources,

SMEs can use patents to attract external financing. In fact, investors often require firms to have patents, thus practically making patenting a prerequisite for funding. Donating is also an option, however, not necessarily a very viable one as there are better forms of open innovation with more benefits for SMEs. For firms with mobile applications, for example, creating an API for

## **5.1 Conclusions**

The main research question was “How can small and medium sized firms take advantage of patents?” and the answer to this question is that there are multiple uses: protection, using patent protection to buy more time for entering new markets, searching for external financing and funding, and collaboration with other firms especially in the form of licensing, open innovation and user innovation. Overall, even though high costs and risks are involved, SMEs do seem to benefit from patents more than not getting advantages. Just like Innanen and Jäske (2014, 240-246) explain, IP strategy should include monitoring IPR, utilizing the IP portfolio or creating new IP and being future-oriented. Precisely, a crucial part of taking advantage of patents and being future-oriented includes being aware of other parties’ patents to avoid infringement and expensive lawsuits. Thus, even though a firm does not have any patents of its own, keeping an eye on others’ patents should always be a part of patent strategy because of the risks of accidentally infringing someone else’s patent. Being future-oriented also includes making smart decisions about what to patent and what not to patent. Like the interviews and for example Agostini et al (2016, 96) showed, when resources are limited, it is not wise to apply for patents for all inventions, but rather, making deliberate decisions and considering needs is important.

The second research question was “What kinds of patent strategies do health technology firms have?” The firms interviewed in this study tend to prefer using the market power patents offer to take over new markets, licensing-in for acquiring technologies and knowledge, licensing-out for creating cashflow and using patents to get funding. The market power aspect, especially, seems to be important in health technology because of the slowly developing nature of the industry combined with regulative burden and difficult standards that make fulfilling all requirements challenging, thus making validation and getting approval long processes. The life cycles of health technology products tend to be long, which is why patents can offer protection for these products. Moreover, because entering health



technology markets can take time, having patents that give more time for entry is useful for SMEs. Open innovation is also seen as a viable option that might have a growing importance in the future. Cooperation, in general, seems to be a wise strategy for SMEs because it allows firms to gain knowledge. Holgersson & Granstrand's (2017) finding, according to which attracting external financing is significantly more important for SMEs than it is for large firms backs up the findings of this research and it does seem like resources are the key issue in almost all areas of patent strategy: either by controlling what can be done or by determining what needs to be done. Licensing and open innovation are models that researches seem to find beneficial and based on the results of this research, that does seem to be the case.

### **5.3 Managerial Implications**

Along with the size and industry of the firm and the market in which the firm operates, managers need to consider available resources when thinking about patent strategy. They should see IP strategy as an important part of business strategy and when the business plan changes, the IP and patent strategy should be updated too. That is why managers need to understand what is important to the company. The strategy should include monitoring IPR, utilizing the IP portfolio or creating new IP and being future-oriented. Based on available resources, decisions about patenting should be made. Because SMEs usually have limited resources, managers or those responsible for the patent strategy need to prioritize. What is also important is knowing what patents others have in order to avoid patent infringement and lawsuits and thus firms should regularly keep track of what is happening around them in terms of patenting actions of other firms.

Using the market power patents give is a useful strategy for entering new markets. Collaboration with other parties can be useful for SMEs because it enables them to bring new knowledge into the company and also generate revenue; Licensing-in can be used to gain external technologies and knowledge if the firm has the resources to do so. Licensing-out can be useful for expanding business and creating revenue. User innovation helps firms create new innovations or updates to their existing inventions to enable future success and ensure continuity of patenting. For companies that hope to get external financing, patents may even be almost a compulsory issue as investors, for example, tend to require patents to protect their investments. Selling and buying patents are also options, but not necessarily

as viable as for example licensing-out, which creates continuing cash flow, and licensing-in. APIs are a growing phenomenon and something worth considering for health technology firms of all sizes. Donating patents may offer economic benefits for example firms in the United States, but especially for SMEs, donating may not be a very wise option and there are better forms of open innovation for SMEs to use.

## **5.4 Limitations and Future Research**

This study does contain some limitations. First, as the evidence presented is case-based, it cannot be universally generalized because it is distinctive to the behavior and context of the three firms used in this study; nonetheless, it does provide interesting insights for future research. Second, the analysis suffers from a limitation of in-depth information regarding the patent strategies and behavior of these three firms due to the restriction of shareable information that ensuring anonymity of the firms causes.

When it comes to future research, open innovation is a topic that could be studied more in terms of SMEs and health technology. It has been gaining increasing interest and seems to be something SMEs find beneficial, especially due to the limited resources they generally have. Because IPRs in this research were limited to patents and thus other intellectual property rights were left out of the scope of the study, future research could focus on other aspects of IPR, such as trademarks and possible strategies to be formed around them.

## REFERENCES

- Ackigit, U., Celik, M.A. & Greenwood, J. (2016) Buy, Keep, or Sell: Economic Growth and the Market for Ideas. *Econometrica*, Vol. 84, No. 3 (May, 2016), pp. 943–984.
- Agostini, L., Filippini, R., Nosella, A. (2016) Protecting intellectual property to enhance firm performance: Does it work for SMEs? *Knowledge Management Research & Practice* (2016) 14, pp. 96–105.
- Artjoki, S. (2016) Terveysteknologia mullistaa taloutta ja yhteiskuntaa. Finnish Representative Office of European Commission. *Europa Teema* 2016. [Online Source] [Published 4/2016] [Cited 1.6.2018] Available:  
[https://ec.europa.eu/finland/sites/finland/files/europa\\_teema\\_4\\_2016\\_final.pdf](https://ec.europa.eu/finland/sites/finland/files/europa_teema_4_2016_final.pdf)
- Beatty, J. (2017) How Small Businesses Can Increase Their Digital Capabilities. *Harvard Business Review*. [Online Magazine] [Published 25.7.2017] [Cited 10.8.2018] Available:  
<https://hbr.org/2017/07/how-small-businesses-can-increase-their-digital-capabilities>
- Belingeri, P. & Leone, M. I. (2017) Walking into the room with IP: exploring start-ups' IP licensing strategy, *Management Decision*, Vol. 55 Issue: 6, pp.1209-1225.
- Bessen, J. (2014) The Evidence Is In: Patent Trolls Do Hurt Innovation. *Harvard Business Review*. [Online Magazine] [Published 12/2014] [Cited 10.8.2018] Available:  
<https://hbr.org/2014/07/the-evidence-is-in-patent-trolls-do-hurt-innovation>
- Brem, A., Nylund, P. A., Hitchen, E. L. (2017) "Open innovation and intellectual property rights: How do SMEs benefit from patents, industrial designs, trademarks and copyrights?". *Management Decision*, Vol. 55 Issue: 6, pp. 1285-1306.
- Chesbrough, H., Vanhaverbeke W. & West, J. (2014) *New Frontiers in Open Innovation*, Oxford University Press, Oxford, pp. 3-28.

Deichmann, D., Rozentale, I. & Barnhoorn, R. (2017) Open Innovation Generates Great Ideas, So Why Aren't Companies Adopting Them? Harvard Business Review. [Online Magazine] [Published 20.12.2017] [Cited 10.8.2018] Available:

<https://hbr.org/2017/12/open-innovation-generates-great-ideas-so-why-arent-companies-adopting-them>

European Commission (2016) User guide to the SME Definition. [Online Source] [Published 24.2.2016] [Cited 31.5.2018] Available: [https://eda.europa.eu/docs/default-source/documents/smedefinitionguide\\_en.pdf](https://eda.europa.eu/docs/default-source/documents/smedefinitionguide_en.pdf)

EPO (2018a) The Future of Medicine. European Patent Office. [Online Source] [Cited 1.6.2018] Available: <https://www.epo.org/news-issues/technology/medical-technologies.html>

EPO (2018b) Annual Report 2017; European patent applications: Top technical fields. European Patent Office. [Online Source] [Cited 1.6.2018] Available: <http://www.epo.org/about-us/annual-reports-statistics/annual-report/2017/statistics/patent-applications.html#tab3>

Harroch, R. & Chatterjee, N. (2017) 10 Intellectual Property Strategies for Technology Startups. [Online Source] [Published 6.6.2017] [Cited 10.8.2018] Available: <https://www.forbes.com/sites/allbusiness/2017/06/06/10-intellectual-property-strategies-for-technology-startups/#66546fe2ab1b>

Healthtech Finland (2018) Terveyttä ja kasvua teknologialla: Terveysteknologian vuosi 2018. [Online Source] [Published 4/2018] [Cited 31.5.2018] Available: [https://healthtech.teknologiateollisuus.fi/sites/healthtech/files/terveysteknologian\\_vuosi\\_2018.pdf](https://healthtech.teknologiateollisuus.fi/sites/healthtech/files/terveysteknologian_vuosi_2018.pdf)

Holgerson, M. & Granstrand, O. (2017) Patenting motives, technology strategies, and open innovation. *Management Decision*, Vol. 55 Issue: 6, pp.1265-1284.

Holgersson, M., Granstrand, O., Bogers, M. (2017) The evolution of intellectual property strategy in innovation ecosystems: Uncovering complementary and substitute appropriability regimes. *Long Range Planning*, Vol. 51, Issue 2, pp. 303-319.

Huckman, R. S. & Uppaluru, M. (2015) The Untapped Potential of Health Care APIs. *Harvard Business Review*. [Online Magazine] [Published 23.12.2015] [Cited 10.8.2018] Available: <https://hbr.org/2015/12/the-untapped-potential-of-health-care-apis>

Innanen, A. & Jäske, J. (2014) *Brändin suoja*. Edita Publishing, Porvoo, Finland.

Iyer, B. & Subramaniam, M. (2015a) Are You Using APIs to Gain Competitive Advantage? *Harvard Business Review*. [Online Magazine] [Published 13.4.2015] [Cited 10.8.2018] Available: <https://hbr.org/2015/04/are-you-using-apis-to-gain-competitive-advantage>

Iyer, B. & Subramaniam, M. (2015b) The Strategic Value of APIs. *Harvard Business Review*. [Online Magazine] [Published 7.1.2015] [Cited 10.8.2018] Available: <https://hbr.org/2015/01/the-strategic-value-of-apis>

Jalfin, S. (2017) The Good, Bad and Ugly of Cross-Licensing Your Technology Patents. *IP Watchdog*. [Online Source] [Published 15.12.2017] [Cited 10.8.2018] Available: <http://www.ipwatchdog.com/2017/12/15/good-bad-ugly-cross-licensing-technology-patents/id=90954/>

Kauppakamari (2015) Rahoitusongelmat jarruttavat PK-yritysten vientiä. [Online Source] [Published 17.11.2015] [Cited 10.8.2018] Available: <https://jasentiedote.fi/fi/jasentiedote/lansi-uudenmaan-kauppakamari/2015/6/rahoitusongelmat-jarruttavat-pk-yritysten-vientia/>

Kauppalehti (2016) Pk-yrityksen kasvu on liikaa pankin varassa. [Online Source] [Published 7.12.2016] [Cited 10.8.2018] Available: <https://www.kauppalehti.fi/uutiset/pk-yrityksen-kasvu-on-liikaa-pankin-varassa/dMcuV5ZT>

Kennedy, L. D. (2015) Medical Device Patents: Design or Utility? *Intellectual Property & Technology Law Journal*. Volume 27, Number 11, pp. 12-14.

Koskisto, K. (2015) Patent strategy and patent valuation for startups. Master's Thesis. Aalto University.

Lehesranta, S. (2017) Growing competition in healthtech underlines the importance of IP rights for startups. Papula-Nevinpat. [Online Source] [Published 11.9.2017] [Cited 11.8.2018] Available: <https://www.papula-nevinpat.com/growing-competition-in-healthtech-underlines-the-importance-of-ip-rights-for-startups/>

Naqshbandi, M.M., & Kamel, Y. (2017). Intervening role of realized absorptive capacity in organizational culture–open innovation relationship: Evidence from an emerging market. *Journal of General Management*, 42(3), pp. 5-20.

Nielsen, K. R., Reisch, L. A. & Thøgersen, J. (2016) Sustainable User Innovation from a Policy Perspective: A Systematic Literature Review. *Journal of Cleaner Production*, Vol. 133, pp. 65-77.

OECD (2018a) Glossary of Statistical Terms. Market Power. [Online Source] [Cited 1.8.2018] Available: <https://stats.oecd.org/glossary/detail.asp?ID=3256>

OECD (2018b) Glossary of Statistical Terms. Licensing. [Online Source] [Cited 1.8.2018] Available: <https://stats.oecd.org/glossary/detail.asp?ID=3245>

Parnell, J.A., Long, Z. & Lester, D. (2015) Competitive strategy, capabilities and uncertainty in small and medium-sized enterprises (SMEs) in China and the United States. *Management Decision*, Vol. 53 No. 2, pp. 402-431.

PRH (2018) Patents. Finnish Patent and Registration Office. [Online Source] [Cited 12.8.2018] Available: <https://www.prh.fi/en/patentit.html>

Somaya, D. (2012) Patent Strategy and Management: An Integrative Review and Research Agenda. *Journal of Management* Vol. 38 No. 4, pp. 1084-1114

Teece, D.J. (2018) Profiting from innovation in the digital economy: Enabling technologies, standards, and licensing models in the wireless world. *Research Policy*, Vol. 47, Iss. 8, October 2018, pp. 1367-1387.

Tuomi, J. & Sarajärvi, A. (2018) *Laadullinen tutkimus ja sisällönanalyysi*. Tammi, Helsinki, Finland.

Viik, J. (2016) *Terveysteknologia*. Lecture slides. Tampere University of Technology. Institute of Biosciences and Medical Technology. [Online Source] [Cited 1.6.2018] Available:

[https://www.superliitto.fi/site/assets/files/57628/terveysteknologia\\_viik\\_2016\\_super.pdf](https://www.superliitto.fi/site/assets/files/57628/terveysteknologia_viik_2016_super.pdf)

West, J., & Bogers, M. (2014) Leveraging External Sources of Innovation: A Review of Research on Open Innovation. *Journal of Product Innovation Management* 2014; 31 (4) pp. 814-831.

WIPO (2018) Patents: What is intellectual property? WIPO: World Intellectual Property Organization. WIPO Publication No. 450(E) [Online Source] [Cited 31.5.2018] Available: [http://www.wipo.int/edocs/pubdocs/en/intproperty/450/wipo\\_pub\\_450.pdf](http://www.wipo.int/edocs/pubdocs/en/intproperty/450/wipo_pub_450.pdf)

WHO (2018) Health technology assessment: What is health technology? World Health Organization. [Online Source] [Cited 1.6.2018] Available: <http://www.who.int/health-technology-assessment/about/healthtechnology/en/>

Xuefeng, L. & Minguang, L. (2011) Research on new energy technology patent strategy in China. *Energy Procedia* 2011, Volume 5, pp. 624-628.

Zhao, D. (2017) Choices and impacts of cross-licensing contracts. *International Review of Economics and Finance* 48 (2017) pp. 389–405.

Ziegler, N., Gassmann, O. & Friesike, S. (2013) Why do firms give away their patents for free? *World Patent Information* 2013, pp. 1-7.