Has Swedish companies' ability to protect their innovations decreased due to a shift towards more software and business method-based innovations?

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Has Swedish companies' ability to protect their innovations decreased due to a shift towards more software and business method-based innovations?

Master's Thesis

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Abstract

The goal of this master's thesis was to investigate if the possibilities for Swedish companies to protect their innovations have decreased due to a shift towards more software and business method-based innovations. The investigation was based on interviews with respondents working as IPR consultants, with technical development or as patent attorneys at different Swedish companies together with collected data from different Swedish and European databases.

The mature Swedish companies, within the electronic and telecommunication industries, have experienced a shift moving from offering a product towards offering a product and a service. The newer companies, within financial technology and the app-industry, have not experienced this shift since they have been offering a product and a service from the beginning.

The collected data of filed and granted patent applications from the European patent office indicates that the number of applications has increased over time. The number of companies within the newer industries, such as programming and IT-services, has increase, which according to this thesis protect their innovations by patent to a lesser extent in comparison to the mature companies.

Further, the possibilities for Swedish companies to protect their innovations by patent have not decreased, but there are more problems or difficulties for the newer companies in comparison to the mature companies to protect their innovations by patents.

For future work, e.g. the investigation could be based on big data or artificial intelligence instead of computer programs and business methods which were this thesis main focus.

Keywords: Software, business methods, intellectual property rights, technical development

Sammanfattning

Syftet med examensarbetet var att undersöka om möjligheten för svenska företag att skydda sina uppfinningar minskat på grund av en glidning mot mer mjukvaru- och affärsmetodsbaserade uppfinningar idag än för ett par år sedan. Arbetet bestod huvudsakligen av intervjuer där respondenterna arbetar som IPR ombud, med forskning och utveckling samt som patentombud på olika svenska företag. Utöver intervjuerna samlades även en rad statistik in från olika svenska och europeiska databaser.

De äldre och mer etablerade svenska företagen vars expertis är inom elektronik och telekommunikation har upplevt glidningen från att erbjuda en produkt till att erbjuda en produkt och en tjänst. De nyare företagen vars expertis är inom fintech och app-industrin har inte upplevt skiftet på grund av att de har erbjudit en produkt och en tjänst redan från början.

Statistiken över inlämnade och godkända patentansökningar från det europeiska patentverket visar på att antalet ansökningar har ökat över tid. Statistik visar även att antalet företaget inom de nyare branscherna så som programmering och IT-services har ökat. De nyare företagen, enligt undersökningen i detta examensarbete, skyddar sina uppfinningar med patent i en mindre utsträckning jämfört med de äldre och mer etablerade företagen.

Möjligheten för svenska företag att skydda sina uppfinningar med patent har inte minskat, men de nyare företagen upplever mer problem och svårigheter då det kommer till patentskydd för sina uppfinningar om man jämför med de äldre och mer etablerade företagen.

För framtida arbete kan undersökningen bland annat bygga på ”big data” eller artificiell intelligens istället för mjukvara och affärsmetoder som var detta examensarbetets huvudfokus.

Nyckelord: Mjukvara, affärsmetoder, immateriella rättigheter, teknikutveckling

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There are a couple of people I would like to thank. Without them this thesis would not have been possible. My university supervisor Fredrik Edman for his patience and support during this time as well as my supervisor Joacim Lydén at AWA for his good support when discussing different approaches of the thesis.

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Finally, a big thanks to all of the respondents who have participated in the interviews and contributed a lot of material to this thesis.

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Olivia Berglund Darell

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List of acronyms

AI	Artificial intelligence
BoA	Board of Appeal
CII	Computer-implemented inventions
CIPO	Canadian Intellectual Property Office
EPA	European Patent Attorney
EPC	European Patent Convention
EPO	European Patent Office
IA	Intangible Assets
IP	Intellectual Property
IPC	International Patent Classification
IPR	Intellectual Property Rights
JPO	Japan Patent Office
PCT	Patent Cooperation Treaty
PRV	Swedish Patent and Registration Office
R&D	Research and Development
WIPO	World Intellectual Property Organization

1. Introduction

Intangible assets (IA) are assets, in for example a company, that are not visible. Non-physical devices, such as the name or logotype of the company, computer programs, applications and music can be protected or controlled by intellectual property rights (IPR). As a company, it is of great interest to invest in and work with its IA, to have a business strategy or intellectual property (IP) strategy, and thereby strengthen the competitiveness of the company, gain a competitive advantage [1].

When looking at this from a greater perspective, research and development (R&D) of innovations and inventions is also important factors for social development and contributes to long-term economic growth for the country [2].

Sweden is a country which embraces new technology and drives the technical development further. As a result, this has generated many companies on the international market such as the well-known companies Ericsson, Volvo and Axis, but also newer companies such as financial technology (fintech) companies and music streaming companies. One thing all of these companies have in common is that their main development is within IT, electronics and/or software.

A general perception within Swedish companies, and maybe large companies in particular, is that they have experienced shift from offering a product based mainly on mechanics and electronics together with some non-intelligent software, to offering a product and a service where software is a more important component in comparison to a few years ago. Today, software is a component that companies are competing with since almost all of the companies in the same industry have the same hardware. As an example, there is almost no difference between the hardware in an Apple or a Samsung mobile phone. The differences are within the software and its design. That are the two components which determine which phone the costumer wants, these are the components which make money for the companies.

Further, since software becomes more important for the inventions and thereby more important for the company, it might be of interest to protect and control it using IPR. However, computer programs and business methods as such are two types of work or creations that cannot be protected by patents.

An effect of this may be that it is much tougher for companies to protect their new inventions.

This introduction opens up to the title of this master's thesis: "*Have Swedish companies' ability to protect their innovations decreased due to a shift towards more software and business model-based innovations?*".

In this thesis an investigation is carried out looking into the possibility for Swedish companies to protect their inventions today, when more inventions are based on computer programs and business methods, compared to a few years ago.

1.1. Goals

The goals of this master's thesis are to analyse the effects of the exception for patentability of inventions within software and business methods and to investigate how the exception affects the possibility for Swedish companies to protect their inventions, which today are based on computer programs and business methods, to a much larger extent than compared to 10-20 years ago.

The hypothesis of this thesis is that the probability for Swedish companies to protect their innovations has decreased due to a shift towards innovations based on software and business methods. To evaluate the hypothesis, the following problem statements were investigated:

1. Do the companies consider the hypothesis: "that they over time have been moving from mainly offering electronic and mechanical based products to now offering products and services where software is a much greater component" being correct?
    - If yes, to what extent?
    - If no, why not?
2. Have the business and R&D strategy for the company directly or indirectly been affected over time by the possible shift towards offering products and services where software is a much greater component?
    - Can this change be confirmed by how the companies are working with their patent portfolio and other intellectual property protections and documentations (ex. strategy document)?
    - Are the companies conscious of a possible change or are they non-conscious of that they have been changing their behaviour?

3. Do the companies consider it a problem if they cannot protect their innovations based on software or business methods?
4. Have the business and R&D strategy for the company directly or indirectly been affected over time by the exemption?
    - If yes, to what extent?
    - If no, why not?
5. In what way are innovations based on software and business methods handled today compared to some years ago?
    - Can this change be confirmed by how the companies are working with the patent portfolio, other intellectual property protection and documentation (ex. strategy document)?
    - Does the company employ a "design for patenting" strategy?

1.2. Scope

The main focus in this thesis will be on the Swedish patent system accompanied with some discussions on the European patent system and convention.

Only Swedish companies have been chosen to participate in the interviews and to be investigated in this thesis. The companies have mainly been chosen based on their technical development. The mature companies that have been chosen have their expertise in electronics and telecommunication while the newer companies specialise in fintech and the application industry.

1.3. Method

In this master's thesis the hypothesis was evaluated through literature study and data collection, such as interviews and statistics, and technical analysis of patent documents.

The literature study was based on intellectual property rights, technology development and the European patent system together with patent applications and claims.

The literature study has been followed up by questionnaires and interviews with intellectual property attorneys who possess a great knowledge of electronics, telecommunications and inventions based on software, followed by key persons at the investigated companies such as patent engineers and people employed at the R&D department.

The interviews have been followed up by a data collection of statistics from both the Swedish Patent and Registration Office (PRV), the European Patent Office (EPO) and the World Intellectual Property Organisation (WIPO) together with data collection from the patent databases Patbase from Minesoft and Orbit (v.1.9.8) from Questel.

The respondents were divided into three different groups. The first group comprised of respondents working at AWA, the second group comprised of respondents working at companies with technical expertise in electronics and telecommunication and in the third group comprised of respondents working at companies with technical expertise in fintech and the app-industry.

The statistics were divided into three different subchapters where the first subchapter consists of filed and granted patent applications at both PRV and EPO, collected from respective website. The second subchapter consists of number of Swedish start-ups and existing companies within different industries such as programming, information services and manufacturing and the third subchapter consists of number of filed and granted patent applications and data broken down in different subclasses for Axis.

The technical analysis was based on different patent documentations from PRV and EPO amongst others which have been studied. A great knowledge in technology, electronics and physics was required to perform this analysis since all of the documentations were based on inventions within these different areas.

1.3.1. Interviews

In this thesis, 16 interviews have been conducted with IPR consultants whose job is to help companies and private persons protecting their inventions as well as people working with technical development or as patent attorneys.

The interviews in this thesis are based on the same framework but with different questionnaires between the three groups of respondents. The questionnaires are based on open questions and the respondents have got the opportunity to make individual comments and inputs outside the questionnaire. Consequently, the interviews in this thesis consist of a mixture of a structured and a semistructured interview method [3].

Prior to each interview, the questionnaire was sent to the respondents together with an approximate duration of the interview. The reason for this was to increase both the reliability and validity. Further, since the questionnaire was sent in advance, the respondents had time to prepare for the interview and to note if there were any questions that the respondent could not answer for whatever reasons.

The respondents were informed that all information that came up during the interview could be used in this thesis, as long as they approved it, and based on this, they had to decide whether they wanted their statements to be public or anonymous.

All interviews except one have been conducted over phone or face to face. All conversations have been recorded to include all information and avoid misunderstandings. After an interview, the recording was transcribed to make it easier to do the summary of all interviews, which can be seen in chapter 4 and in appendix A.3, B.3 and C.3. This summary was sent to all the respondents to ensure they approved of having their statements made public.

Respondents and companies

In the first group respondents working at AWA, which is an intellectual property law firm established in 1897 with approximately 300 employees, are included. There were three European patent attorneys (EPA) attending the interviews: Magnus Johansson from the office in Helsingborg, Fabian Edlund from the office in Gothenburg, and Mattias Pierrou from the office in Stockholm.

In the second group respondents working at mature companies which technical area is in electronics and telecommunications are included. There were nine respondents divided into eight interviews as the two respondents from Ericsson attended the same interview.

Till Burkert, EPA, and Mathias Hellman, vice president, Strategy & Portfolio Management of IPR and licensing, represented Ericsson during the interview. Ericsson is a provider of information and communication technology established in 1876. The company can boast of almost 96,000 employees worldwide, out of which approximately 13,000 are based in Sweden.

There was also an EPA representing Axis, Jonas Delander, and an EPA representing Scania, Christer Falk, during the interview. Axis is a provider in network video established in 1984 and has almost 3,000 employees. Scania is a provider of transport solutions established in 1891 and has approximately 51,000 employees.

From SKF Robin Ristander, IA & IP Professional, and Martin Jansson, Manager at IP strategy & IA, attended the interview. SKF is a bearing and seal manufacturing company established in 1907 and with almost 49,000 employees.

From Volvo Group, which is a manufacture of trucks, buses, construction equipment and marine and industrial engines, established in 1927 with almost 95,000 employees, Erik Wintzell, working as an IP intelligence analyst, attended the interview.

Two of the respondents do not want to have their name and company made public in this thesis for different reasons. The first anonymous respondent is called X in this thesis and works as a commercial manager at a large Swedish company and the other one, called Y in this thesis, is working as a patent manager at a smaller Swedish company.

In the third group, respondents work at newer companies which have their technical area within fintech or the app-industry.

Daniel Bernholc, Managing Director at iZettle Merchant Services, established in 2010, and Tomas Forsgren, Legal Counsel at Trustly, established in 2008, attended interviews. Both of these companies are fintech companies.

Two of the respondents do not want to have his or her name nor company made public in this thesis for different reasons. The anonymous respondents in this group is called A and B in this thesis. A works as a legal director and B works as a CO-founder for a curated platform for podcasts.

1.4. Thesis outline

This master's thesis will be structured as follows:

Chapter 1. Introduction

This chapter will introduce the reader to the problem statements, method outline and respondents who have participated in the interviews.

Chapter 2. Intellectual Property Rights

This chapter will introduce the reader to the basic theory of the intellectual property rights including the patent system.

Chapter 3. Technical background

In this chapter a technical background is presented with the washing machine as an example.

Chapter 4. Interviews

In this chapter the results from the interviews are presented followed by a summary of each group.

Chapter 5. Statistics

This chapter gives the reader the result from the collected data followed by a summary of each group.

Chapter 6. Discussion

Discusses the results of the interviews and collected data as well as the theory discussed in chapter 2 and 3.

Chapter 7. Conclusion

A conclusion related to the problem statements and hypothesis is described followed by some thoughts of future work.

2. Intellectual Property Rights

IPR is traditionally divided into four different categories; copyright, patent rights, trademark rights and design rights. This thesis' main focus is on patent rights but also discusses copyright and design rights. Further, there is also a brief discussion about database rights, which are related to copyright, and utility models, which are related to patent rights, and trademark rights.

In Sweden it is the PRV, established in 1885, that examines, assesses and finally grants applications for patent protection, design protection and trademark protection [4]. If an inventor wants to have a patent protection in more than one European country, there are mainly two approaches which could be used. The first one is to hand in an application to every country of interest, and the second is to hand in one application to the EPO and specify which of the member states that are of interest. This is possible through the European Patent Convention (EPC) which is an agreement between the 38 member states, formed in 1977.

The EPO is one of two parts within the European patent organisation where the other part is the administrative council which consists of representatives from the member states of the organisation and acts as the supervisor body of the EPO, see figure 1. The board of appeal is where decisions of the EPO can be appealed [5].

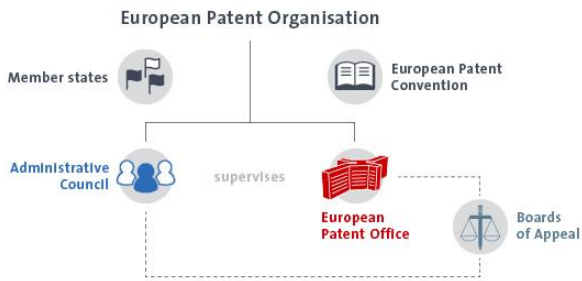

Fig. 1. Structure of the European Patent Organisation [5].

2.1. Patent

Patent protection is a strong protection for an invention, not only against copying but also because the protection covers the whole idea meaning that it prevents other devisers using the same idea. On the other hand, a patent

application and protection can be both expensive and time consuming for the inventor or the company.

The main idea behind the patent system is to spread, document and inspire to technical development and knowledge in exchange for a period of exclusive protection in each country where the application has been granted. The exclusive protection gives the inventor the possibility to retrieve the investments that have been made and gain an excess to reinvest in new technology.

In addition to the PRV and the EPO, but also in addition to other national patent offices, such as the Canadian Intellectual Property Office (CIPO) or Japan Patent Office (JPO) amongst others, one can hand in an international patent application as well, called a Patent Cooperation Treaty (PCT) application, which has to be converted to national or regional patent application at a later stage. It can be handed in to any of the 152 member states or straight to the UN agency WIPO.

What is patentable?

Inventions in any field of technology are patentable as long as they are novel, involve an inventive step and are capable of industrial applications, according to article 52(1) in the EPC, see article 52 EPC below.

"*Article 52, patentable inventions*

(1) European patents shall be granted for any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application.

(2) The following in particular shall not be regarded as inventions within the meaning of paragraph 1:

- *a. discoveries, scientific theories and mathematical methods;*
- *b. aesthetic creations;*
- *c. schemes, rules and methods for performing mental acts, playing games or doing business, and program for computers;*
- *d. presentations of information.*

(3) Paragraph 2 shall exclude the patentability of the subject-matter or activities referred to therein only to the extent to which a European patent application or European patent relates to such subject-matter or activities as such" [6].

There is no clear definition for what an invention is, it can only be referred to case law. However, there is a list of non-patentable works and creations that are considered as abstract, intellectual or non-technical and are excluded as inventions, according to article 52(2) EPC, equal to 1§ in the Swedish patent law, which can be seen below, and are furthermore non-patentable.

"*1 § Patentlagen*

Den som har gjort en uppfinning, som kan tillgodogöras industriellt, eller den till vilken uppfinnarens rätt har övergått kan, enligt 1–10 kap, denna lag, efter ansökan beviljas patent på uppfinningen i Sverige och därigenom få ensamrätt att yrkesmässigt utnyttja uppfinningen. Bestämmelser om europeiskt patent finns i 11 kap.

Som en uppfinning anses aldrig vad som enbart är

1. *en upptäckt, vetenskaplig teori eller matematisk metod,*
2. *en konstnärlig skapelse,*
3. *en plan, regel eller metod för intellektuell verksamhet, för spel eller för affärsverksamhet eller ett datorprogram, eller*
4. *en presentation av information. Lag (2007:516)"* [7].

Further, the listed works and creations in article 52(2) EPC are only excluded from the patentable area "as such" according to article 52(3) EPC. Meaning that if the invention has a technical character or is a technical solution to a technical problem, the work can be patentable.

Examination of a patent application

When examining a patent application there are four steps that the application needs to pass in order to be granted. The steps are as follows:

1. Is it an invention?
2. Is the invention novel?
3. Does the invention have an inventive step?
4. Does the invention have industrial applicability?

All of these steps are examined isolated from each other. In the first step when examining if it is an invention or not it does not matter if the invention is novel, has an inventive step or if it has industrial applicability, as long as it is an invention. In the second step, only the novelty of the invention is being examined and so on.

In summary, the invention needs to fulfil the demands stated in article 52(1) EPC and at the same time not be on the list in article 52(2) EPC. If it is on the list, the work "as such" cannot be protected by a patent protection, but it is almost always protected by copyright, see subchapter 2.4.

2.1.1. International Patent Classification

There are several different classification systems related to the patent system to classify inventions and in this thesis the international patent classification (IPC) is used. The reason for this choice is because it consists of many subclasses which makes it easier to determine the selection and the techniques that have been investigated in this thesis.

In 1975, the international patent classification (IPC) was formed and the aim of this classification was to have a framework for an international system of classification within all patent systems across the world. The classification is also used as an effective tool for patent offices or inventors to investigate whether an invention is novel and provides an inventive step.

IPC is divided into eight different sections and this thesis is focusing on section G, physics, and H, electricity. See table 1 for all sections.

Table 1. The different sections and descriptions within the international patent classification.

Section symbol	*Section title*
A	Human necessities
B	Performing operations; Transporting
C	Chemistry; Metallurgy
D	Textiles; Paper
E	Fixed constructions
F	Mechanical engineering; Lighting; Heating; Weapons; Blasting
G	**Physics**
H	**Electricity**

Further, all sections are divided into different classes, for example H04. All classes are divided into different subclasses such as H04W, followed by

different main groups, such as H04W 8/00, and finally divided into different subgroups, see table 2 below [8].

The hierarchical structure relating to the four-dot subgroup H04W 8/10 is explained in the table 2 below:

Table 2. The hierarchical structure relating to H04W 8/10 [9].

Section	H	Electricity
Class	H04	Electric communication technique
Subclass	H04W	Wireless communication networks
Main group	H04W 8/00	Network data management
One-dot subgroup	• 8/02	Processing of mobility data, e.g. registration information at HLR (Home Location Register) or VLR (Visitor Location Register); Transfer of mobility data, e.g. between HLR, VLR or external networks
Two-dot subgroup	•• 8/04	Registration at HLR or HSS (Home Subscriber Server)
Three-dot subgroup	••• 8/10	Between location register and external networks

So, Group H04W 8/10 should then be interpreted as containing documents concerning electric communication techniques for wireless communication networks relating to data management regarding processing of mobility data e.g. registration at HLR or HSS between location register and external networks.

2.1.2. Utility models

Utility models, also called petty patents, is a type of simplified patent with a shorter protection period, usually between 6-10 years from the filing date. Utility models are used in some countries, however not in Sweden. Further differences between patents and utility models, except the protection period, is that examination of the application is less stringent for the utility models, for example, lower requirement of inventive step, which causes cheaper and shorter processes for an application.

Inventions that can use this protection may vary significantly from one country to another, but usually the protection is for this type of protection when the invention may not meet the inventive step criteria [10].

Figure 2. shows an example of a registered Chinese utility model of a mini-LED lamp with CN207750763 U as the publication number.

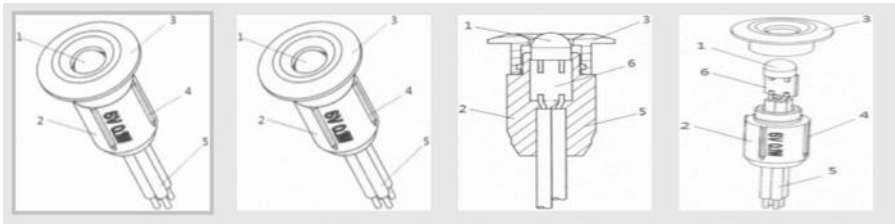

Fig. 2. The view of a mini-LED lamp which is protected by utility models.

2.2. Design rights

Design rights is a protection for example appearance and shape of a product (not for the idea or its functionality) as long as it is new and has distinctive character, meaning that it is not of an "simple" shape such as a square or circle. The protection is valid for five years and can be extended up to 25 years.

Figures 3 and 4, show an example of a registered design from Apple Inc with the international registration number D0825556. The oblique shade lines in the figures show transparency or translucency [11].

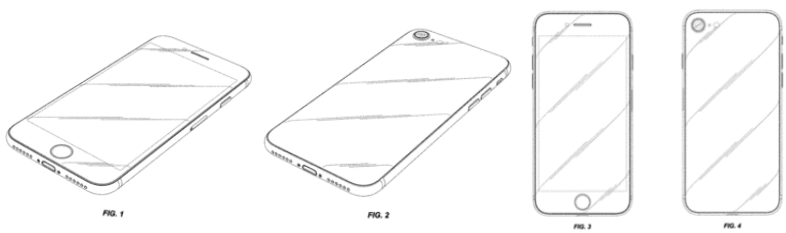

Fig. 3. The picture to the left is a bottom front perspective view of an electronic device showing the claimed design. The next picture, from the left, is a bottom rear perspective view thereof and the next one is a front view thereof. The picture to the right is a rear view thereof [11].

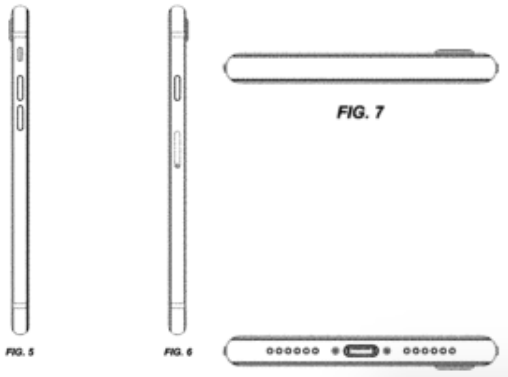

Fig. 4. The picture to the left is a left side view thereof and the following is a right-side view thereof. The picture on top to the right is a top view thereof and the picture on bottom is a bottom view thereof [11].

2.3. Trademark rights

A trademark is something that is characteristic for a company such as slogans, figures, sounds amongst others or a combination of these.

Figure 5 shows two examples of a trademark, the name of the company and the slogan of the company, from Acast.

ACAST Makes good stories great

Fig. 5. The name and slogan of the company protected by trademarks.

2.4. Copyright

Music, movies, algorithms and computer programs are examples of works that fall under the title of "literary and artistic works" and could all be protected by copyright. Copyright is a protection that the author of a work, that falls under the title, gets automatically and for free, and without any application or registration, as long as the work is having originality. Furthermore, works that are listed in article 52(2) EPC such as computer programs, see figure 6, and business methods amongst others, works that are not considered as inventions, could be protected by copyright instead. In Sweden, the lifespan of a copyright is 70 years after the death of the creator.

According to the copyright act, the author has two different kind of rights, the economic rights and the non-profit rights. The economic rights provide protection against dissemination and copying and could be assigned to someone else. The non-profit rights mean that the creator should be named when using the work and to get respect for the work. These rights cannot be assigned to someone else.

Furthermore, one should have in mind that it is the work as such, exactly the written code in a computer program for example, that is protected by the copyright, not the method or the thing that is happening when running the program. For example, if someone has been writing a computer program or an algorithm and someone else is writing a different code but the outcome will be the same, then the second person has not done any infringement of copyright since it is not the outcome that is protected, it is the written code or algorithm [12].

Fig. 6. Example of a programming code which is protected by copyright [13].

2.4.1. Database rights

The database protection is in the field of copyright, but with a shorter protection period and slightly more narrow protection. The protection covers a catalogue, table or as such where a great amount of data is collected, and the owner of the collected data is entitled to prohibit extracts and/or reuse of essential parts of the content [14].

2.5. Summary

All of the IPR introduced in the previous subchapters can be combined together to make as strong protection as possible for a product. Depending on how complex a product is and how many devices there are within a product there can be many different protections in the same category, such as patents or trademarks. For instance, take the mobile phone which had its breakthrough in the end of the 1990s. In the beginning it was just a technical

gadget which could be used for phone calls followed by sending texts. Today, the mobile phone, also called smartphone, is a small computer which can be used in a lot of different ways such as ordering food, pay bills but also control equipment at home such as the vacuum cleaner or washing mashing.

Table 3 (which is a modified version of a similar table at PRV [15]) illustrated how a mobile phone, and all its components, can be protected by overlapping intellectual property rights. An "X" indicates that this type of protection can be relevant if the conditions for the protection are met.

Table 3. A list of different components within a mobile phone and in what way they can be protected.

Mobile phone	*Patents*	*Trademarks*	*Design*	*Copyright*
Design of the phone		X	X	X
Name of the phone		X		
Name of company behind the phone		X		
Logotype on the phone		X	X	X
Font		X	X	X
Graphic profile		X	X	X
Technical solutions used in the phone (can concern many different aspects)	X			
Components in the phone	X			
Manufacturing methods for components/phone	X			X
The camera in the phone	X			
System for sending/receiving different types of information	X			
Transmitters/base stations, etcetera	X			
New areas of use	X			
Business plans concerning the phone				X
Concept for selling the phone				
Computer software in the phone	X			X
Apps	X		X	X
Games concept				
Document concerning strategies				X

3. Technical background

Research and development (R&D) are usually based on problems that need to be solved or something that needs to be streamlined or implemented in an easier way but also further development of prior technology. It may for instance be problems such as how to make it easier to transport crops on farms, how to avoid candles as a light source and fire as a heat source, to how to control the vacuum cleaner or the home alarm by the mobile phone. All of these problems have been solved by inventions or innovations which have been developed based on new technical areas such as electronics and telecommunication.

An invention is a technical solution to a technical problem while an innovation is a new solution or a new idea as a result from a development process which has been needed at the market and can be both a product, service, business method or technical solution.

Development of new inventions and improvement of existing gadgets is an ongoing process as technology evolves. The washing machine may act as a good example of this process. At the end of the 18th century the first washing machine was invented. It was comprised of a barrel of wood rotating with a hand-driven crank, a pure mechanical invention. In the middle of the 19th century, the washing machine was improved by replacing the barrel with a gas heated kettle, still rotating with a hand-driven crank. The next real improvement came in the 20th century when the electric power washing machine was introduced on the market. In the middle of the 20th century the washing machine came into common households and today, the development of the washing machine has come so far that it can, for example, dispense laundry detergents by itself based on the content to be washed. This has been made possible due to the introduction of sensors and more advanced software inside the machine. Further development of the software and electronics has today made it possible to control the washing machine remotely using the mobile phone, and the same has happened for a lot of traditional mechanical contraptions such as the vacuum cleaner, refrigerator and oven. Today these appliances are all part of the connected home [16]. A good example of this development is for instance patent US7866190B2 where LG Electronics Inc has protected a broadcasting receiver equipped washing machine for washing or drying laundry (see figure 7).

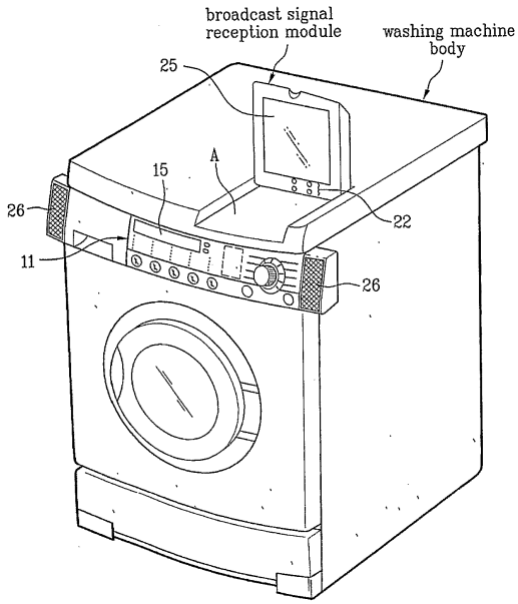

Fig. 7. A view of a washing machine which has a broadcasting receiver.

The development of inventions has gone from being pure mechanical gadgets to being inventions based on both mechanics and electronics, so called electromechanical inventions.

Today, a shift has been made and most of the inventions in e.g. the electronics and telecommunication area are based on both hardware and software. Consequently, more and more of the technical development belong to the non-patentable area, even if the companies are oriented within technology, most of their developments are in the area which is covered by this exception.

3.1. Hardware

All physical parts of a computer, or within any invention, use the collective name hardware. Since all computers are build up in nearly the same way there are always the same hardware components within all computer-implemented inventions (CII) and the components can for example be the memory, processors, input/output devices (I/O devices) and buses [17].

Figure 8 shows an example of a combined washing machine and dryer from Whirlpool for which has been filed a patent protection with application number US201715434527.

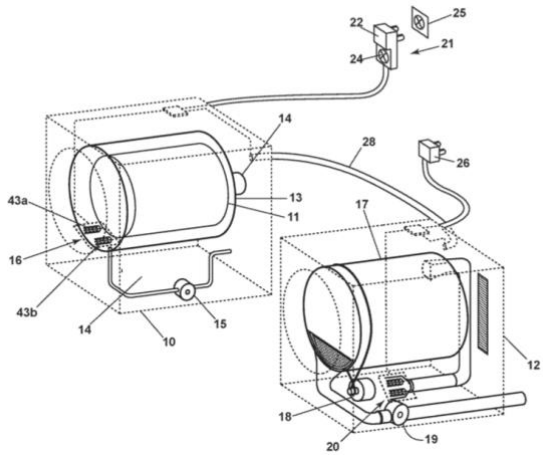

Fig. 8. A schematic three-dimensional view of a combined washing machine and dryer.

3.2. Software

Hardware is in the most modern products nothing without its software. For instance, the operating system (OS) with its programs and applications within computers, and the program, allowing a user to communicate with the washing machine over the Internet.

The OS is a software platform which takes care of the basic communication between the hardware and the application software, which is running on top of the OS, see figure 1. The most important parts of the OS are the process management, memory management and file system.

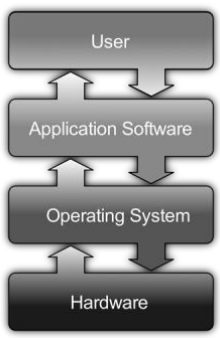

Fig. 9. A schematic picture how the user interacts with the application software [18].

3.3. Computer-implemented inventions

According to EPO "*a computer-implemented invention (CII) is one which involves the use of a computer, computer network or other programmable apparatus, where one or more features are realised wholly or partly by means of a computer program*" [19].

Figure 7, in chapter 3, could be seen as an example of a computer-implemented invention.

Within the patent system the computer programs have two different definitions where the first one is when the computer program is used "as a method for solving a mathematical or logical problem, an algorithm". In this case, when it is an algorithm as such, it is excluded from the patentable area. In the other case where the definition is "the approach when driving a computer" meaning when one is using, for example, the algorithm in a technical context could the technical solution using the algorithm be patentable. In summary, as long as there is a technical solution or a technical effect within the computer program it could be patentable [20].

4. Interviews

In this chapter, summaries of the interviews conducted with the three groups described in chapter 1.3 are presented. The summaries are followed by an analysis of the answers in relation to the hypothesis of the thesis and the problem statements in chapter 1.1. For convenience the summaries of the interviews have been divided into three subchapters based on the groups described in chapter 1.3, namely patent attorneys at AWA, mature companies and newer companies.

The summaries are based on the answers to the questionnaires which can be found in appendix A-C for respective group.

4.1. Group 1 - Patent attorneys at AWA

The goal with the questionnaire was to get an opinion from patent attorneys working at AWA about the non-patentable area and how they as patent experts experience their work with their clients regarding computer related inventions and business methods.

Do you or your clients consider it a problem that computer programs/business methods/presentation of information as such belong to the non-patentable area?

The majority of the three respondents do not think it is a problem that computer programs/business methods/presentation of information as such belong to the non-patentable area. As long as the invention is a technical solution to a technical problem or has a technical effect it is patentable even if these works "as such" are not patentable. This is in line with the theory discussed in chapter 2. Computer programs embedded in systems and control programs, communication solutions or encoding techniques for sound and picture are generally patentable. Computer programs, such as an application or a user program, are difficult to protect by patents however they are always protected by copyright. There are different difficulty levels to the different type of works and some of the respondents think that business methods are the type of work that can cause the most problem and that there is a grey area related to this type of the work.

Further, all of the respondents agree that clients whose patent applications are rejected because the invention belongs to the non-patentable area consider it a problem. These thoughts are not related to the size of the company, even

if the larger companies express their frustration to a greater extent, but sometimes from which country the application comes from.

The clients may experience a grey area for the delimitation of the exemption and because of this they consider it a problem, while the attorneys have a much clearer picture of what can be patentable and what cannot.

In what way do clients developing within the area of computer programs/business methods/presentation of information think of the possibility of maybe not having a patent protection for the product?

Inventors operating within the area of computer programs/business methods/presentations of information, and who not aware of the exemption can be frustrated because of the risk that they might not be able to protect their invention with a patent.

Developers of applications or other software-based inventions usually know that it can be difficult to protect their inventions by patents and so they put more effort into other aspects of the product, e.g. a good-looking design, a great database and to get it fast onto the market.

On the other hand, the classical industrial companies put more effort into an application for patent protection for their software-based inventions since they often come from a culture where the inventions often are protected by patents.

Do you feel like there are more clients applying for patent protection for inventions that could be more considered being computer programs/business methods/presentation of information today than a couple of years ago?

The thoughts from one of the respondents are that patent applications for software-based inventions have increased, especially within the mature industrial companies. Another respondent thinks that patent applications for business method-based inventions have decreased, which may in part be due to the knowledge and advise of the attorneys, that it can be difficult to get a granted patent application for a business method-based invention.

Further, one of the respondents thinks that the great peak of patent applications for inventions that can be considered being computer programs/business methods/presentation of information, was in the late 1990s or in the beginning of 2000s.

Have you noticed any effects related to computer programs/business methods/presentation of information being in the non-patentable area?

One effect, from a historical point of view, is that the technical development goes rather fast, definitely faster than the case law and law change. According to one of the respondents this is one of the reasons for the turbulent years a couple of years ago involving computer-implemented inventions. At first too many applications were granted and then nothing was granted. Today, it has reached a reasonable level. This, together with that the case law according to case T641/00 has been better, has resulted in a much clearer picture of what can be patentable and what cannot. As the case law has become tougher and since all computer-implemented inventions must have a clear technical connection, these inventions are as patentable as other inventions.

T641/00 is a decision from the Board of Appeal (BoA) at the EPO which is also known as Two Identities/COMVIK. This case is based on a patent application which was rejected based on the lack of an inventive step, one of the examiner steps discussed in chapter 2, together with an action of a non-technical aspect [21].

Further, one of the respondents thinks that there might be a new wave of uncertainty in the patent system when the number of applications relating to big data and artificial intelligence (AI) will grow. The fear of how to handle applications relating to AI and machine learning was also voiced by several employees of the EPO in the conference "*Search Matters 2018*" [22].

The respondents agree that one effect is that business method-based inventions become more expensive to drive through, to go from an application to a granted patent. The protection for this type of inventions become rather weak, partly because the protection become too narrow compared to the application and partly because the patents are very vulnerable to possible invalidity attacks.

In addition, one respondent thinks that one effect of the technical development being that it is more important for start-ups within the software-based industry to make the company widely known. It is crucial to create a trend within the target group and to have a great marketing strategy in comparison to what it might have been traditionally within technical developing companies, where the invention has been kept as a trade secret and where the patent application was filed before the launch of the product.

Do you think that there is a clear division between what can be seen as hardware and software?

Whereas the respondents do not agree with each other regarding if there is a clear division between hardware and software, none of them regard it as a problem.

One opinion is that there is no clear division. The interviewee explains that usually when writing a patent application for what EPO calls a computer-implemented invention, so called "functional features" are used, which are method steps done by different hardware element, such as a processor, transmitter, receiver etc.

Another opinion is that there is a clear division in that computer programs are instructions read by a computer and if it is something that the computer does not read, it is considered to be hardware.

4.1.1. Analysis

All respondents agree that a CII can be protected by patent in most of the cases, as long as the invention is a technical solution to a technical problem or if it has a technical effect. Further, they think that the clients have some difficulties knowing where the delimitation between patentability and non-patentability is while the attorneys have a quite clear picture of this. The respondents have different opinions if the number of patent applications within the exemption have increased or decreased and if there is a clear division between what can be seen as hardware and software. On the other hand, the respondents agree that the patent offices have reached a reasonable level of granted patent application for CII and this has resulted in a much clearer picture of what can be patentable and what cannot.

The respondents do not experience any problems related to the shift or the exemption. They do consider that there can be some difficulties for more software and business method-based companies, such as fintech companies amongst others, to have a patent protection for their innovations.

4.2. Group 2 - Mature companies

The goal with the questionnaire was to gain a greater knowledge about in what way the exemption for the possibility to patent protection for computer programs, business methods and presentation of information affects the business strategy and business model of the company.

Do you consider it a problem that computer programs/business methods/presentation of information as such belong to the non-patentable area?

None of the respondents consider it a problem that computer programs/business methods/presentation of information as such belong to the non-patentable area but for different reasons. All agree that there is no problem for the companies to protect their software-based inventions by patents because all of these inventions have a technical effect, and when this is the case the software is not "as such" according to the EPC, which is in line with the discussion in chapter 2. If there are any problems with the application it can always be rewritten, and the problem can be worked around, the invention can usually be more technical if needed. Software as such, such as source code or machine code, is protected by copyright which in most cases is a sufficient protection.

For business methods and presentation of information the thoughts are quite different between the respondents.

An invention is a technical solution to a technical problem where the main word is technical, according to the theory in chapter 3, and two of the respondents consider neither business methods nor presentation of information to have this technical solution and based on this it should not be patentable.

One respondent thinks that there are some business methods embedded in some of the company's patents and the same with presentation of information, but the patent is not based on it. One of the respondents does not think that business methods should belong to the patentable area: it might even cause a problem if this would be the case. One respondent does not see any problem with having a patent protection on the presentation of information, as long as it has a technical effect.

Even if the respondents have different thoughts about the patentability of business methods and presentation of information, they all agree that it is not a problem that business methods and presentation of information as such belong to the non-patentable area.

Do you feel like your company is filing more patent applications for inventions that could be considered as computer programs/business methods/presentation of information, today than a couple of years ago?

All of the respondents have answered this question based on software and neither on business methods nor presentation of information.

The majority of the respondents thinks that their company files more patent applications for inventions that are based on software today compared to some years ago. Reasons for this are e.g. an underlying trend in the industry

that many companies place processors into multiple gadgets and have more software components within their inventions.

Further, many of the companies are in general filing more patent applications today compared to some years ago.

According to one of the respondents there is a great challenge with software-based inventions. The development of these inventions are rather fast and there must be a great knowledge whether it is worth protecting the invention with patents or not.

Another respondent explains that the company has decreased the number of filed patents within the company. Because of this they do not apply for more patents, but the proportion of patents for inventions based on software have increased. Another respondent explains that the company has increased the number of patents for inventions based on software but that the proportions of these patents remains the same.

Do you consider patent or some other protection of intellectual property (IP) important for your business model?

The majority of the respondents think that protection of IP is important for the business model of the company, not necessarily with patents but with trademarks or design protection as well, but for different reasons.

According to one respondent, patents are really central within the business of the company, partly because of licensing and partly because of using the patents in various negotiations to create business benefits.

One other respondent thinks it is important to protect the investments of the company within technology and product development with different IP protections, for instance to ensure freedom of trade and to offer a unique product.

One of the respondents does not think it is important for the business model of the company but that it has been important over time for different reasons.

Further, one respondent argues that it depends on where in the company the invention is, if it is within their traditional productions site or if it is within their new technology.

Do you as a company consider there being a change in the development where you have been moving: from mainly offering electronic and mechanical based products a few years ago to offering solutions based on

both a product and a service where software is a much more important component today than a couple of years ago?

- ***If yes:***
  - ***how and to what extent do you see this change?***
  - ***do you see it as a problem of you potentially having more resources within the non-patentable area?***
- ***If no,***
  - ***what do you think about the development?***

The majority of the respondents agree with the question. They think their company has been moving from offering a product to offering a product and a service, which is in line with the theory discussed in chapter 3. This question is part of the hypothesis and consequently the majority of the respondents agree with the first part of the hypothesis.

Reasons for this shift, according to the respondents, are e.g. that the customers require a comprehensive solution to a greater extent today in addition to software being a much more important component in their inventions.

One effect of this shift is that previously, when the company wanted to upgrade a product, the customer needed to buy a whole new product and today it is often just a software upgrade which can be done without changing the product. The hardware remain the same and the development is within the software.

One of the respondents is somewhat sceptical about the hypothesis when it comes to absolute sales numbers for the company today, but thinks that it is the way in the future.

The respondents agree that this change has occurred to a great extent, many of the hardware components have been replaced by software components or the companies have added a software component to the inventions.

The majority of respondents do not see any problem with them possibly have more resources within the non-patentable area because, and this was mentioned in the first question in this subchapter, almost all of the software-based inventions have a technical effect and based on that it can be protected by patents.

One respondent explains that within the industry of the company it is not the number of patents which is considered the important factor, but a few high-quality patents together with many trade secrets. Because of this the respondent does not consider it to be any issue if they possibly have more resources within the non-patentable area.

One of the respondents mentioned that the problem that might occur when AI gets bigger, the same thoughts shared with one of the respondents from AWA.

Further, one of the respondents thinks that it might not be as clear as previously that they can protect the whole "product" (here the "product" is in reality a product and a service) by patents and this can be a problem since they want to protect as much as possible of the products and services they sell.

Do you as a company consider your research and development (R&D) directly or indirectly affected over time by the exception and the potential shift from offering a product to offering a product and a service?

- ***If yes:***
  - ***do you have an example of a technical development where this shift moving towards more software implemented inventions is represented?***
  - ***can this change be confirmed by in what way you are working with the patent portfolio, other intellectual property protections and documentations (ex. strategy document)?***
- ***Has the overall business strategy for the company been affected?***
  - ***If yes, can this change be confirmed by how you are working with the patent portfolio, other intellectual property protections and documentations (ex. strategy document)?***

Five of the six respondents do not consider the company's R&D has been affected by the exemption and/or the shift going from offering a product to offering a product and a service. They develop first and after that they investigate if and how they can protect the invention, not necessarily by patent protection. The companies develop what their costumers ask for, that is the main purpose for their R&D, not the patent system or other IPR.

One of the respondents thinks that the company's R&D has been affected by the shift since they are doing more software-based researching today compared to some years ago but not by the exemption.

Three of the respondents think that their company's business strategy has been affected for different reasons. One reason is that the companies need to be kept more on their toes and offer faster solutions. One reason is that if the company cannot protect their invention because it is based on software or business methods, they need to protect it as a trade secret instead.

Two of the respondents do not know if their company has changed the business strategy, but one of them thinks that it has to since "*one cannot deny that the world is changing and to not change with it*". The other respondent knows that the strategy of licensing business of the company has not been changed.

One of the respondents does not think that the company's business strategy has been changed at all.

Further, none of the companies think that the company's business strategy has been affected by the exemption over time.

None of the respondents could confirm their comments with how they are working with for example their patent portfolio or strategy documentations.

4.2.1. Analysis

The companies do not experience any difficulties or problems to protect their inventions because they almost always have a technical solution to a technical problem or a technical effect. This is in line with the comments from group 1 seen in the previous chapter.

All the companies are well-informed on the subject, both with the patent system and other IPR, and they know what can be patented and what cannot.

The majority of the respondents think that their company is filing more patent applications in general today compared to some years ago, but they do also file more applications with software-based inventions.

Almost all of the respondents agree that patents or other IPRs are important for their company´s business model but for different reasons.

All of the respondents consider that their company has made a shift from offering a product to offering a product and a service where software is a much more important component. This is in line with the technology development discussed in chapter 3. Further, none of the respondents consider it being a problem that they possibly have more resources within the non-patentable area since, as described previous in this subchapter, almost all of their inventions have a technical effect and based on that, do not belong to the non-patentable area.

The majority of the respondents do not consider that their company has changed its R&D because of the exemption in the patent system or the shift.

Some of the respondents think that their company's business strategy has been affected due to the shift but not on the exemptions.

In summary, these comments are partly in line with the hypothesis of this thesis. All of the respondents have seen that their company has experienced

the shift to offering a product and a service where software is a much more important component, however they do not consider that the potential to protect their innovations has decreased as a result of this.

4.3. Group 3 – Newer companies

The goal with this questionnaire was to gain a greater knowledge about in which way the exemption from the possibility to patent protection for computer programs, business methods and presentation of information affects the company's business strategy and business model. The aim is also to get an understanding of in what way the company is using the different intellectual property protections practically, and what their competitive situation looks like.

How do you work with protecting your innovations?

- ***What is the reason for your course of action?***
- ***Have you noticed any problems or difficulties with protecting your innovations?***

Three of the four attending companies protect their innovations by patents together with copyright, trademarks and trademark secrets.

Two of the companies work with attorneys and, when they think there might be something of interest to protect, they investigate and if it proves to be of interest, they procced by drafting an application. The third company, whose innovations largely are method innovations, works with a patent strategy and a patent program but lacks systematic experience.

The fourth company does not have any patents but protects the innovations, which in general are business ideas, by copyright and trade secrets in addition to a trademark for e.g. the name of the company. The respondent does not think that patent protection is relevant for the company, even if there probably are possibilities to investigate the solution, arguing that IPR is unsafe and costly.

Since all of the companies are developing within a software and business method-based area, they sometimes need to put in extra effort when drafting the patent applications. The applications need to be drafted with a certain hardware component, which is considered an obstacle.

Problems related to the companies' development area is that the open source community is both great and strong within many software developers and the fact that granted patent applications can be rather narrow. Another

issue is that it can be difficult to hinder or discover copycats or people who try to trespass within the software.

One of the respondents explains that "*there is a division between the innovations that are public when they are used, for example within the flow that we are using for the consumers, in this case it is obvious for everyone what we are doing, it is known to a consumer when using the service and it is easy to copy what we are doing. In other cases, when there are innovations that are not shown to the consumers, we have the opportunity to protect the innovation as a trade secret. For the innovations which are easier to copy and which we cannot protect, when that is the case there is of course a problem for us*".

What competitive situation are you in?

All of the respondents consider that there are actors who do similar things, solutions, as they do. The majority of the respondents' experience competition between the different actors while one of the respondents does not experience the same competition.

Are there any competitors that you consider have copied your product/service?

The majority of the respondents consider that there are competitors that have copied their product or service. One of the respondents explains it in the following way: "*being first with something takes a lot of energy, you encounter many problems, you make the wrong decisions and choose the wrong way sometimes, but you learn from it. Because of this, it is a much faster process for our competitors to reach the same level as we are at when they have seen our mistakes.*"

One of the respondents does not consider that any other actors within the same industry has copied their innovations since all of the different companies want to add own edge to the innovation.

How long do you usually stay alone on the market?

Two of the respondents argue that it is hard to say, but usually between a couple of months up to one year depending on the type of innovation it is and how easy it is to understand the underlying technology.

Do you consider that patent or some other intellectual property protection is important for your business model?

- ***Why/why not?***

The majority of the respondents do not consider that IPR being important for their business model and explain that they do not run after people who infringe on their innovations.

One of the respondents consider that copyrights and trademarks are important for the company's business model because it makes it difficult for other people to copy their innovations and doing the same thing: otherwise it would have been much easier to be subjected to unfair competitions.

If your company has patents, in what way are you using these?

Neither of the companies with a patent portfolio has used it. One of the respondents explains that there has been one solution which does very similar solutions to what the company is doing but they did not take actions because of time constraints.

Do you consider it a problem that software/business methods/presentation of information belong to the non-patentable area?

- ***If yes, what problem/s do you experience?***
- ***If no,***
    - ***why not?***
    - ***do you think that one could have conceptual patent protection for the idea behind the software?***

One of the respondents considers it being a problem as they have innovations which cannot be protected by patents because of the excluded area while another respondent does not consider it being a problem because this is a world they have been working in from the beginning and they are used to it and try to protect as much as possible anyway.

Do you have any final reflections?

All of the respondents think that the processing time for a patent application is too long in relation to the development of their innovations or within the whole software-world.

One of the respondents has the following thoughts: "*if one is thinking of the traditional time for patent protection, 20 years of protection, is almost not relevant anymore, at least not within our industry. I think, if I should come with a constructive proposal, that the wise thing to do would be to broaden the possibilities for protection and maybe include method patents for example but having a significantly shorter protection period, so that innovations become publicly available. I see this from a societal perspective and not from the company's perspective*."

Another comment is "*the patent world is coming from a hardware world from the beginning which is not completely in line with the software development as it is so much faster. It feels like if we are going to have some sensible protection and actually have any value within the protections it has to be much faster, today the technology could be outdated before the protection is granted*."

4.3.1. Analysis

All of the companies protect their innovations with IPR such as patents, copyright and trademarks. They experience some difficulties and problems related to the patent system and the majority of the respondents agree that the patent system is made for a more hardware-world compared to the software-world they work in. Another problem with the patent system is the processing time which is too long compared to the speed of development within the software-based area.

All of the respondents think that there is competition from other actors in the same industry and some of the respondents think that it can be difficult to find out if their IPR has been infringed.

The majority of the respondents do not consider IPR to be important for the business model of their company.

In summary, these companies have not experienced the shift mainly because of one reason. All of these companies have their technical area in fintech and the application industry and they have from the get-go been offering a product and a service where software is an important component. Further, the companies experience problems and difficulties with the patent system in relation to their development area.

These comments are not in line with the hypothesis because they have not experienced the shift and they have not experienced a decrease of patent applications in relation to this shift.

4.4. Summary of the analyses

In summary, the respondents in group 2 do partly agree with the hypothesis, they have experienced the shift, while the respondents in group 3 have never experience it since they started their company within the software-based industry.

The companies in group 2 file patent applications to a greater extent than the companies in group 3 and one reason for this can be because the patent system is created for inventions and innovations the mature companies are working with in comparison to the newer companies.

The respondents in group 1 think that business methods and presentation of information "as such" should not be patentable, which is in line with article 52 EPC, together with some of the respondents in group 2 which have the same thoughts. The inventions that the respondents in group 3 are working with are mostly based on business methods and they think it would have been good if they could protect their inventions by patent, or some alternative protection.

5. Statistics

In this chapter collected statistics from different websites and databases divided into three different subchapters are presented. The subchapters are based on the same groups as described in chapter 1.3. Method. In the first group data of filed and granted patent applications both in Sweden, from PRV, and in Europe, from EPO are included. In the second group data related to Swedish start-ups and existing companies working with IT-services, telecommunications and manufacturing are included. In the third group data for Axis is presented, both filed and granted patent applications together with filed patent applications broken down in different fields and subclasses.

The goal with this chapter was to strengthen the theory and the results from the interviews and further answer the hypothesis and problem statements in a reliable way.

5.1. Patent

The goal with this subchapter was to investigate how the number of filed and granted patent applications has evolved over time so as to strengthen or dement the answers of the respondents together with the hypothesis.

Data related to filed and granted patent applications in Sweden, collected from PRV, and in Europe, collected from EPO, is presented in two different subchapters. All data are from 2008 until 2017 and are retrieved from the respective website.

5.1.1. PRV

In figure 10 all filed (dark grey line) and granted (light grey line) patent applications at PRV are presented.

As can be seen in the figure there has been a small decrease of number of filed patent applications at PRV almost every year since 2008. Year 2010 until 2014 a decrease of almost 800 granted applications is seen, from the highest to the lowest level and from 2014 and further there has been a great increase.

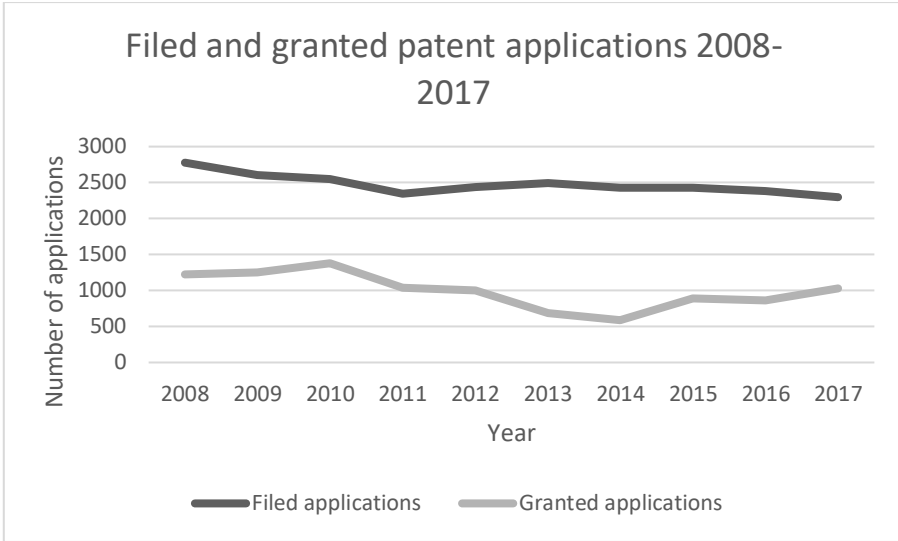

Fig. 10. Number of filed and granted patent applications, all applicants in total, 2007-2018 at PRV [23].

In figure 11 filed (dark grey line) and granted (light grey line) patent applications from Swedish applicants at PRV are presented.

As can be seen in the figure the data for Swedish applicants is following the same structure as for all applicants in total but not as deep decrease of the granted applications in 2014 as in the previous figure.

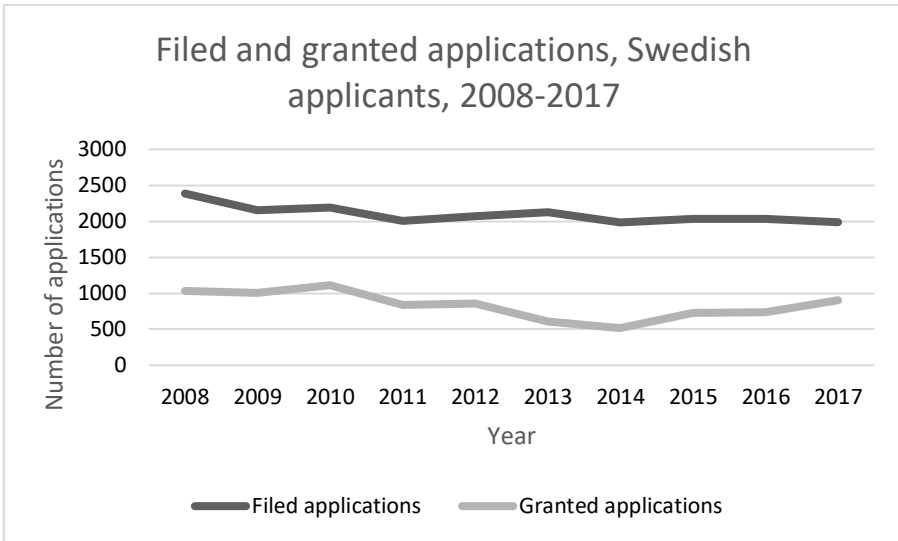

Fig. 11. Number of filed and granted patent applications, Swedish applicants, 2008-2017 at PRV [23].

5.1.2. EPO

In figure 12 all filed (dark grey line) and granted (light grey line) European patent applications at EPO are presented.

As can be seen in the figure there was an oscillation around 150000 filed applications from year 2008 until 2011 but since then there has been a small increase of filed applications at EPO every year.

As can be seen in the figure there has been a great increase of granted applications since 2015 and before that there was an oscillation number around 60000 applications per year.

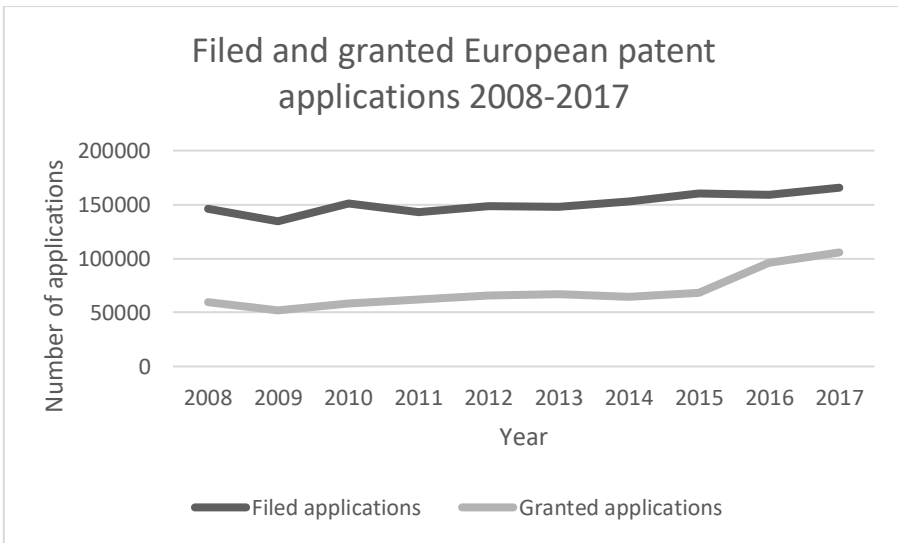

Fig. 12. Filed and granted European patent applications 2008-2017 at EPO [24].

In figure 13 filed (dark grey line) and granted (light grey line) European patent applications from Swedish applicants at EPO is presented.

As can be seen in the figure, the lowest number of filed applications was presented in 2008 and 2009 followed by 2016 and the highest number was presented in 2014 and 2015. Since 2010 the number of filed applications from Swedish applicants has been between 3500 and 4000 applications per year.

From 2014 there has been a great increase of granted applications every year and before that there was an oscillating number around 1500 granted applications per year.

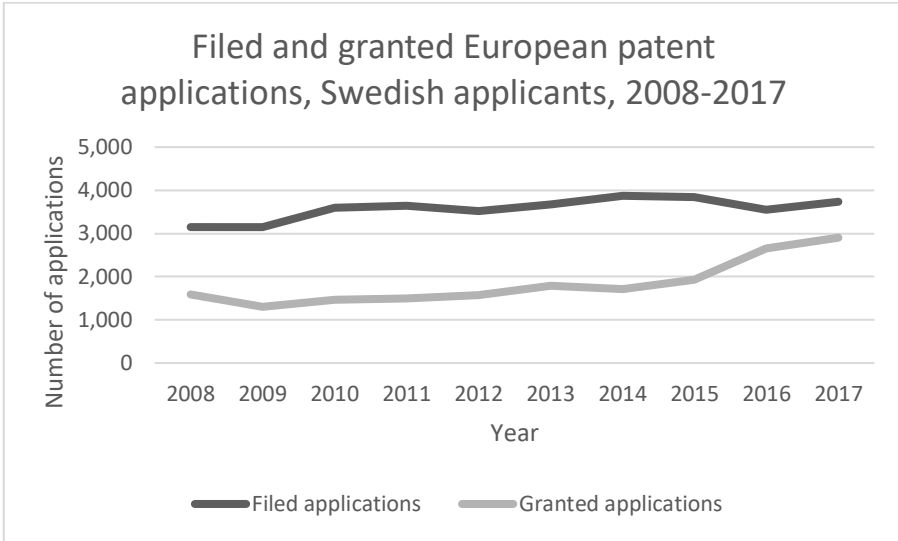

Fig. 13. Filed and granted European patent applications, Swedish applicants, 2008-2017 at EPO [24].

In figure 14 filed European patent applications by three fields of technology, telecommunications (dark grey line), IT methods for management (grey line) and computer technology (light grey line), which can be seen as software-based industries, together with electrical machinery, apparatus, energy (black line), which can be seen as a hardware-based industry, European patent applications at EPO is presented.

As can be seen in the figure the number of filed applications by computer technology have increased every year since 2011 together with IT methods for managements. Filed applications by telecommunications have decreased almost every year since 2008. Electrical machinery, apparatus, energy have increased since 2015.

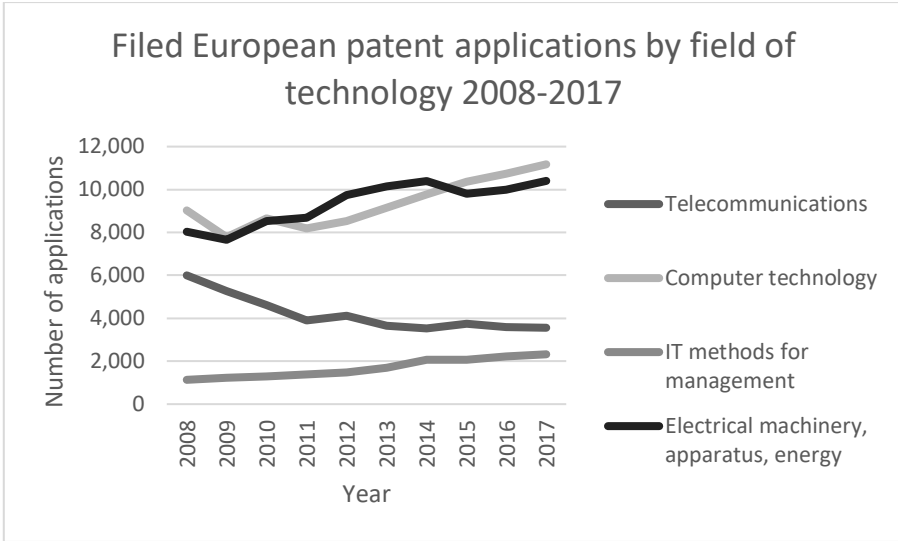

Fig. 14. Filed European patent applications by field of technology 2008-2017 at EPO [24].

In figure 15 granted European patent applications by three fields of technology, telecommunications (dark grey line), IT methods for management (grey line) and computer technology (light grey line) which can be seen as software-based industries, together with electrical machinery, apparatus, energy (black line), which can be seen as a hardware-based industry, European patent applications at EPO is presented.

As can be seen in the figure, granted applications by computer technology and telecommunications have increased since 2015. The number of granted applications by IT methods for managements have had a small increase the last year. Granted applications by electrical machinery, apparatus, energy have had an overall increase since 2008 but especially since 2015.

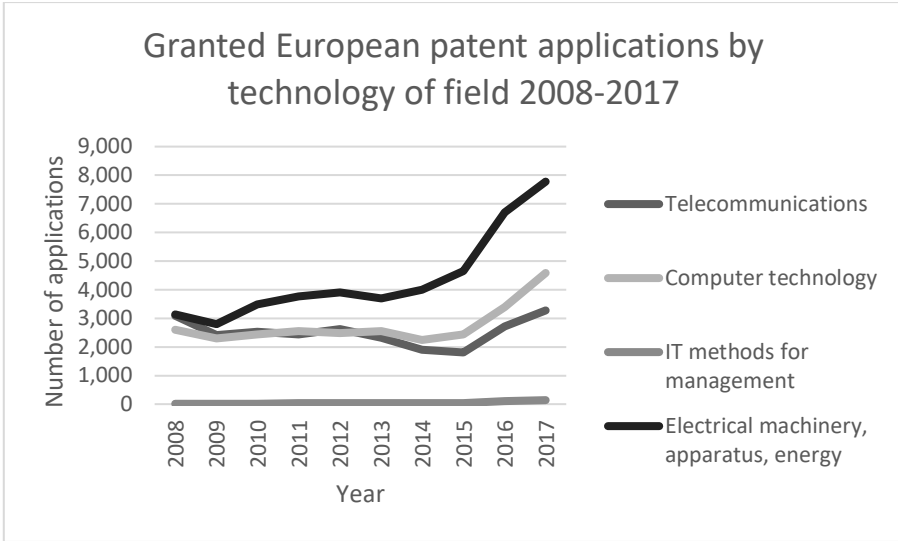

Fig. 15. Granted European patent applications by field of technology 2008-2017 at EPO [24].

5.1.3. Analysis

Since 2008 there has been a small decrease of filed applications at PRV from both Swedish and international applicants while there has been an increase of filed European applications at EPO since 2011.

Between 2010 and 2014 there was a great decrease of granted applications at PRV, both for Swedish and international applications. When studying the diagram of granted applications at EPO the trend is rather different, since 2014 there has been a great increase of granted applications, for applicants overall, but there has not been the same deep decrease before 2014 as can be seen at PRV. One reason for the great increase of granted applications at EPO may be that case law has stabilized, as many of the respondents explain, and that it is clearer today what can be patented and what cannot. A couple of years ago maybe the inventors filed applications without knowing if the invention had patentability or not and were hoping for the best. Today, they know to a greater extent what can be protected by patents.

The number of filed and granted applications at PRV has decrease until 2011 where the number of granted applications increased until today. Both international and Swedish applicants follow the same trend. One reason for this can be that inventors to a greater extent decide to hand in a national patent application at EPO instead of handing in an application in every country of

interest, but to be sure about this analysis there need to be collected statistics in the same way from the rest of the member states of EPO.

EPO have the opposite trend where the number of both filed and grated applications from both Swedish and international applicants have increased during the last years, one reason could be the same as described above, why the applications at PRV have decreased.

The discussion related to the applications at EPO do not go in line with the hypothesis for this thesis which is: "*the probability for Swedish companies to protect their innovations has decreased due to a shift to innovations based on software and business methods to a greater extent*".

The filed applications at PRV do go in line with the hypothesis but not the granted applications at PRV.

The number of filed and granted patent applications in computer technology have increased the last couple of years which is not in line with the hypothesis. The number of filed applications in IT methods for managements have increased almost every year but the number of granted applications is rather low in comparison to the number of granted applications in the other field of technology.

The number of filed and granted applications relating to electrical machinery, apparatus, energy have both increased since 2008.

Further, the number of filed applications relating to telecommunications has decreased but the number of granted applications has increased, this can be an effect of that the case law has stabilized, it is easier to understand what can be patentable and what cannot be.

In chapter 4 many of the respondents explained that their company was filing more applications today compared to some years ago, which is in line with the data discussed in this chapter where the filed and granted applications have increased almost every year in recent years.

Another reason for the decreasing number of filed applications between 2008-2009 could be related to the financial crisis.

Error sources: The collected data does not say anything about number of filed and granted application related to IPC which means that it can be that the software-based innovations has decreased while the hardware-based innovations have increased, and if this is the case the statistics are in line with the hypothesis. There need to be more collected data with more information before any final conclusions can be made.

5.2. Swedish start-ups and existing companies

SNI is a standard for Swedish nutrition and SNI2007 is the standard used since 2008 and is what these statistics is based on. The reason for not using any older statistics is because the coding was different, and the statistic is not reliable since it is based on collected questionnaire and not on basic fact. SNI2007 is divided within different so-called codes and in this section statistics for start-ups within programming and information services, SNI 62-63, and manufacturing and such, SNI 05-39, are used.

In programming and information services companies working with computer programming, computer consultancy activity (developing computer systems), computer facilities and other IT- and computer services amongst others are listed, more software-based companies.

In manufacturing and such, which is a large category, companies working with mining and quarrying, electricity, gas, steam and air conditioning supply, water supply; sewerage, waste management and remediation activities and different types of manufacturing such as food, drinks and carpets, but also manufacture of electronic components, printed circuit boards, computers and peripherals and manufacture of communication equipment, amongst others are listed, more hardware-based companies coming to computers amongst others [25].

The goal of this subchapter was to investigate whether the number of companies in software-based and hardware-based industries have increased or decreased over time and further connect it with the patent applications by field of technology.

5.2.1. Programming and information services

Data related to Swedish existing companies within the programming and information service sector, SNI 62-63, together with telecommunications, SNI 61, from 2009-2017 are presented. In figure 15 and 18 the programming and information service is broken down and only the data for IT-services, SNI 62, is used.

In figure 16 number of Swedish companies within the programming and information services sector is presented. There has been an increasing number of companies since 2008, based on both start-ups and companies that have gone bankrupt. Overall there is an increase of companies working with programming and information services.

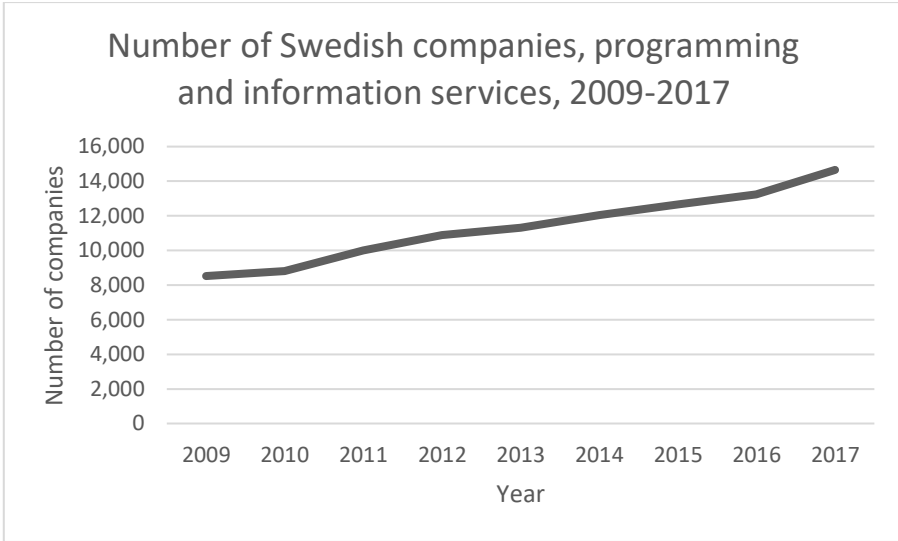

Fig. 16. Number of Swedish companies, programming and information services (SNI 62-63), 2009-2017 [26].

In figure 17 the number of Swedish companies within telecommunication is presented and as can be seen, there has been an increase since 2009 going from almost 300 companies until almost 500 companies in 2017.

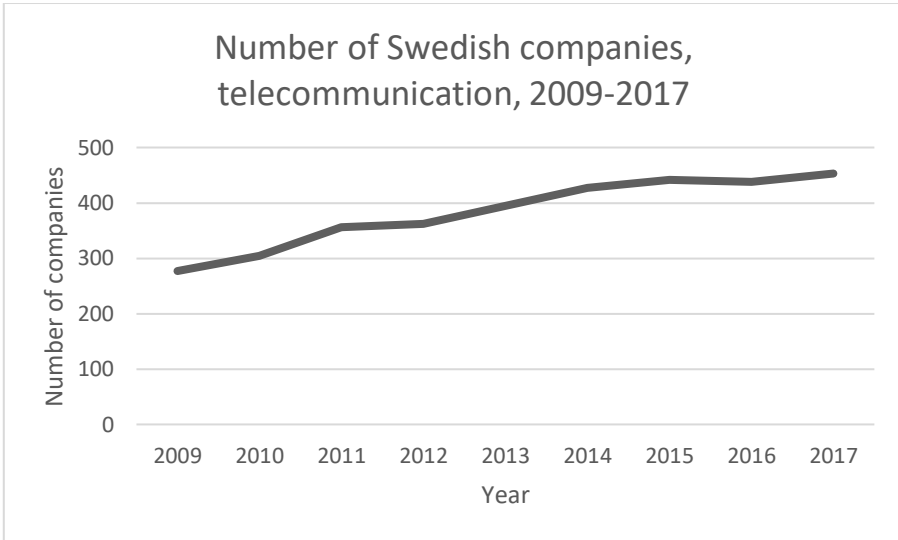

Fig. 17. Number of Swedish companies, telecommunication (SNI 61), 2009-2017 [26].

Further, companies within IT-services have also increased since 2009, which can be seen in figure 18. In 2009 there was around 8,000 companies within this industry and in 2017 there was almost 14,000 companies.

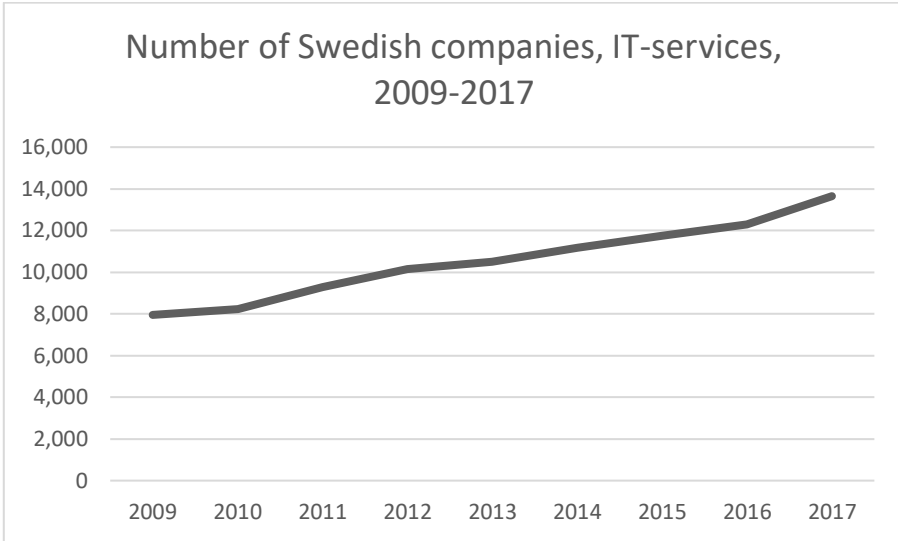

Fig. 18. Number of Swedish companies, IT-services (SNI 62), 2009-2017 [26].

5.2.2. Manufacturing and such

In this subchapter data for Swedish existing companies within the manufacturing and such sector, SNI 05-39, from 2009-2017 is presented. In some of the diagrams the sector has been broken down to manufacture of electronic components, printed circuit boards, computers and peripherals and manufacture of communication equipment, SNI 26110, 26120, 26200, 26300.

In figure 19 the number of existing companies within manufacturing and such is presented and as can be seen there was a great decrease 2012-2016 followed by a small increase in 2017.

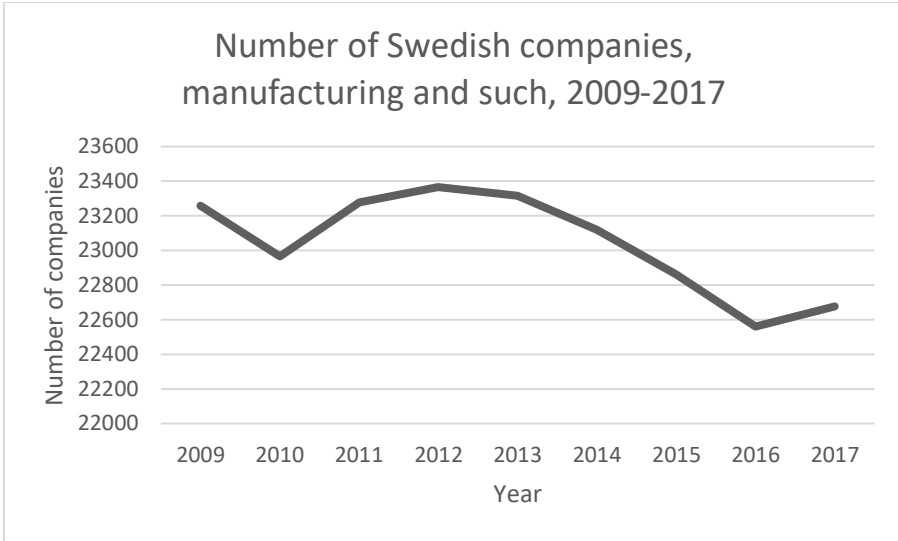

Fig. 19. Number of Swedish companies, manufacturing and such (SNI 05-39), 2009-2017 [26].

In figure 20 the number of existing companies within SNI 26110, 26120, 26200 and 26300 is presented and as can be seen there has been a small decrease from 2009 until 2016 followed by a small increase in 2017.

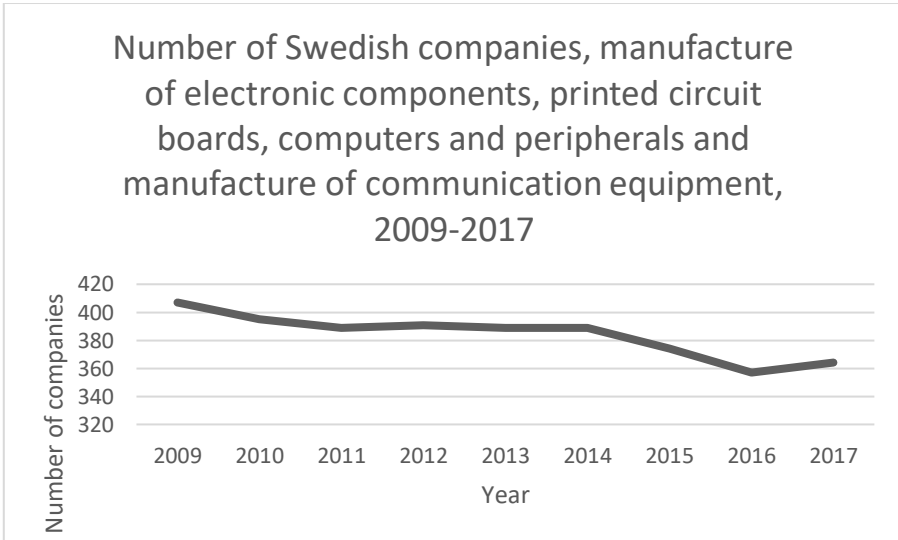

Fig. 20. Number of Swedish companies manufacture of electronic components, printed circuit boards, computers and peripherals

and manufacture of communication equipment (SNI 26110, 26120, 26200, 26300), 2009-2017 [26].

5.2.3. Analysis

During all the investigated years there has been an increase of existing companies within programming and information services together with the broken-down codes telecommunication and IT-services. All of these industries are connected to the software industry and as can be seen, there is an increased number of companies working with software every year.

Existing companies within the manufacture of electronic components, printed circuit boards, computers and peripherals and manufacture of communication equipment has decreased from 2009-2016 followed by a small increase in 2017. These industries are connected to the industry based on hardware in a greater extent compare to the industries within programming and information services.

The number of filed and granted patent applications by computer technology have increased the last couple of years which is not in line with the hypothesis. The number of filed applications by IT methods for managements have increased almost every year but the number of granted applications is rather low in comparison of the number of granted applications by the other field of technology.

Based on that the number of Swedish companies within the really software-based industries per se programming, IT and telecommunication is increasing every year together with that the number of companies within the more hardware-based industries manufacturing and such is decreasing it may indicate that the shift explained in the hypothesis has occurred.

The number of companies within both programming and information services, telecommunications and IT-services have increased every year since 2008. The data discussed in chapter 5.1.2. shows that the number of filed and granted applications by computer technology and IT methods for management have increased every year, which is in line with the increasing number of companies within these industries. The number of filed applications by telecommunications have decreased together with that the number of companies within the industry have increased, which contradict something, less of the companies are filing applications in relation to the number of companies. The data discussed in chapter 5.1.2. show that the number of filed and granted applications by electrical machinery, apparatus, energy have increased every year which do not correlate with the number of companies within the industry of manufacturing which have decreased almost every year since 2008.

5.3. Companies

In this subchapter data connected to Axis, which is one of the companies that participated in interviews, are presented. The reason for why Axis is the chosen company was to investigate whether the thoughts from the respondent from Axis are in line with the collected data from the database PatBase, which also was the goal of this subchapter.

The selected subclasses to investigate where G06T, image data processing or generation, in general, G06K, recognition of data; presentation of data; record carriers; handling record carriers and G06F, electric digital data processing (computer system based on specific computational models, G06N). The reason for selecting these subclasses was because these are software-based subclasses which can indicate on the shift mentioned in the hypothesis.

In figure 21 the number of filed, the blue line, and of granted, the orange line, applications for Axis from 1999-2017 is presented. As can be seen in the figure, the highest number of filed applications was in 2016 and the highest number of granted applications was in 2017.

This data is not entirely credible when it comes to the relation between filed and granted applications since one application can be filed in for example 2006 and granted in 2013 while another one can be filed in 2012 and granted in 2013, but as can be seen, there has been an increased value for both filed and granted applications over the years.

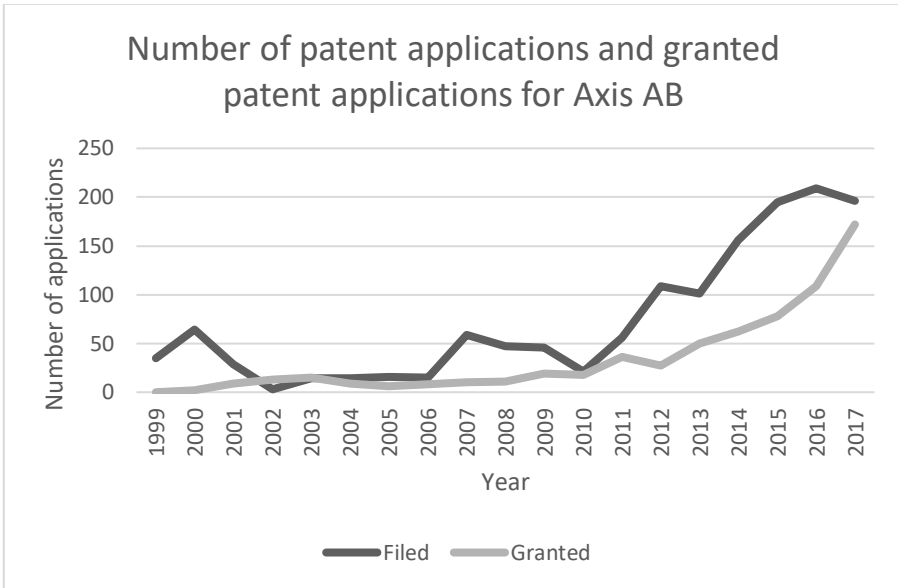

Fig. 21. Number of applied and granted patent applications for Axis AB 1999 – 2017 [27].

In figure 22 the number of applications has been broken down into subclasses in the IPC. It is only the ten largest subclasses that are presented in the figure and based on that it is not the same number of filed applications as in figure 23 together with that some applications are within several subclasses.

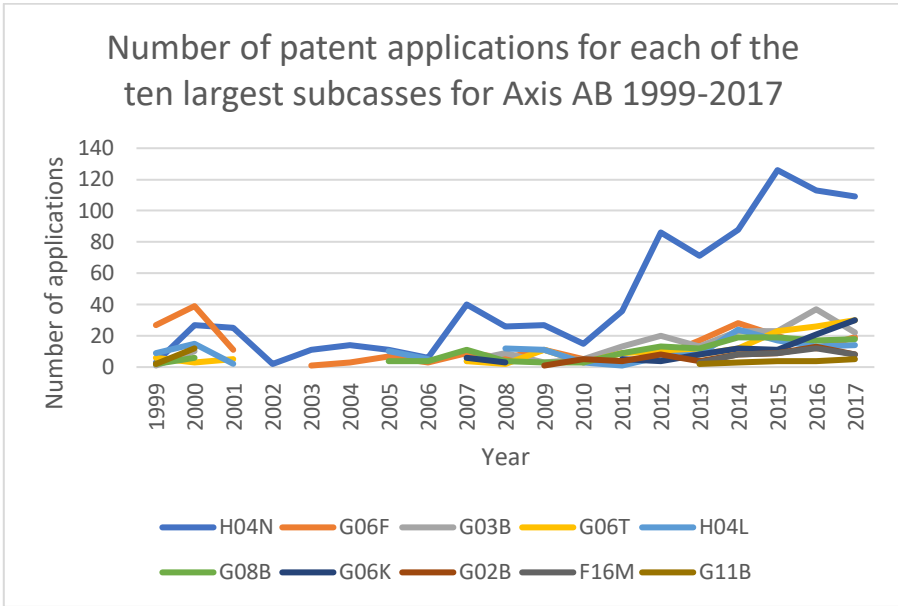

Fig. 22. Number of patent applications for each of the ten largest subclasses for Axis AB 1999-2017 [27].

In figure 23 the three subclasses within G06, G06F, G06T and G06K, are presented and all of these subclasses are based on some sort of software. As can be seen in the figure, there was almost not any filed applications in G06K before 2011 which has increased since then. G06T has also increased overall during the years and the same with G06F, except 2014-2015 where a great decrease can be seen.

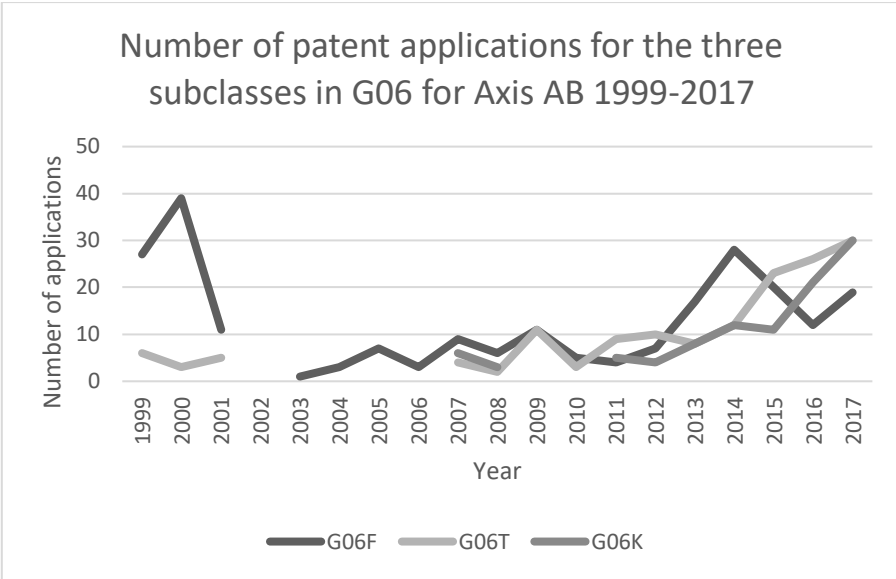

Fig. 23. Number of patent applications for the three subclasses in G06 for Axis AB 1999-2017 [27].

5.3.1. Analysis

The number of filed patent applications for Axis has increased since 2009 and as a consequence there has been an increased number of granted patent applications as well.

The largest subclass which Axis is filing their applications is H04N, pictorial communication, e.g. television, which can be called a pure hardware subclass. The largest subclass relating to software for Axis over the years is both G06T and G06K, in 2017 and was G06F in 2014.

Further, Axis is filing more patent applications within the software subclasses today compared to some years ago but as Delander explained in the interviews, percentage filed applications within the software subclasses has not increased, but the number has. This cannot be confirmed based on the data presented in this thesis.

The data related to Axis does both go in line and not in line with the hypothesis for this thesis.

The data seen in figure 22 indicates that a shift has taken place and that Axis today offering more software-based innovations since they have increased the number of filed applications within the so-called software-based classes in IPC, which is in line with the hypothesis. Further, Axis files

more patent applications per year together with that they have more granted applications per year, which is not in line with the hypothesis.

5.4. Summary of the analyses

The number of filed and granted applications at PRV is lower today compared to 2008, but the number of granted applications has increased since 2014. These comments are related to both Swedish and international applicants.

The number of filed and granted applications at EPO is higher today compared to 2008, where the number of granted applications has the highest increase. These comments are related to both Swedish and international applicants.

The number of existing companies within the different industries doees correlate with the number of filed applications by computer technology and IT methods for managements but not for telecommunications.

Existing companies in software-based industries such as programming, IT and telecommunications have increased since 2009 while companies in more hardware-based industries such as manufacturing and such have decreased over the years.

The number of applications filed to and granted to Axis has increased compared to 2009 and Axis is filing more applications within the software-based classes in IPC today, which is in line with the thoughts of the respondent from Axis.

In summary, the number of filed and granted applications at PRV and EPO is not in line with the hypothesis which says that the possibility for Swedish companies to protect their innovations has decreased due to the shift today compared to some years ago meaning that there should be less filed and granted applications today.

Further, the number of companies within software-based industries has increased together with that the number of companies within more hardware-based industries has decreased. This indicates that the shift mentioned in the hypothesis have occurred and is therefore in line with the hypothesis.

The data related to Axis are partly in line with the hypothesis. The number of filed and granted applications has increased over the years, which is not in line with the hypothesis, while the number of filed applications in the software-based classes in IPC have increased, which is in line with the hypothesis.

6. Analysis

In this chapter the theory will be connected with the result from the interviews and the collected data based on the five problem statements in this thesis.

In addition to the work presented in previous chapters, a few other investigations have been done in order to try to confirm or refute the hypothesis.

In order to find evidence for the mentioned technology shift and for that the companies willingly or unintentionally may have compensated for this when writing their patent applications, we tried to investigate if the style of writing claims within a certain IPC class have changed over the years. The theory was that the claims in patent documents within a specific class have over time gone from "pure hardware description" to more include features and/or formulations that reads on software parts in the invention. The investigations were very time consuming and highly advanced both regarding the technical content and patent technical aspects. Unfortunately, there was no obvious evidence for this change of style on a larger scale and therefore that work has been left out of the thesis.

Further, an investigation related to all rejected patent applications between 2015-2017 at PRV was done. The theory was to see if the number of rejected patent applications due to 1§ PL had increased over the years and also to analyse the rejected documents to see if the rejections was due to the exception. An increase in such rejections could then indicate that the number of "software" invention had gone up over the years. Some evidence that supported an increase was found but unfortunately the statistical basis was too small to draw any conclusions. A request for the same kind of material as was provided by PRV was also sent to EPO. However, the EPO did not respond to the request or delivered any data within the time period of the master's thesis.

6.1. Problem statement 1

Based on the theory, that the technical development has been going from pure mechanical devices followed by electromechanical devices to devices of today having both hardware and software or pure software components. Connecting this with the answers from the respondents in group two where all of them agree that a shift from offering a product to offering a product and a service where the software is a much greater component today compare to some years ago, the respondents' answers are in line with both the theory and

the hypothesis. Further, as seen in the data of numbers of companies in the programming and information services industries, where the number of companies has increased every year since 2009. The same with the data from Axis, where an increase of number of applications filed in more software-based subclasses is presented.

Further, the number of filed and granted applications in computer technology and IT methods for management have increased over time, which also is in line with the hypothesis.

One reason that the shift has occurred is because the companies' customers would like to have a whole solution to a greater extent today. Another reason that some respondents bring up is that the development is going in the direction where software is a much more important component within innovations. In many cases competing companies have the same hardware and they only compete against each other with the software controlling the hardware. A good example of this is for instance modern home-alarms where companies uses the same platform, such as Raspberry PI, but have completely different software to present information to the user and to connect to peripherals.

The companies in group three are young companies in relation to the companies in group two, the oldest company in group three is established in 2005. Based on this, the companies in group three have not experienced the shift since they have been in the software-world from the beginning.

6.2. Problem statement 2

All of the respondents of group 2 agree that their company has not changed the R&D based on the shift. All of the companies do first develop and after that investigate how and if they are going to protect the invention.

The majority of the respondents of group 2 do not think that the business strategy of the company has been affected by the shift.

The thoughts and comments from the respondents cannot be strengthen by any documents, such as patent portfolio or strategy documents.

The feeling is that the companies are conscious about that they have not been changing their behaviour, most of the respondent are well-informed on the subject.

The companies in group 3 have not experience any changes because they have not been doing the shift.

6.3. Problem statement 3

The majority of the respondents in group two do not experience any problems with that they might not be able to protect their software and business methods-based innovations by patents. Their software-based innovations do always provide a technical solution to a technical problem or a technical effect, and when that is the case the software is not as such and can be protected by patents.

Further, the majority of the respondents in this group do not think that business methods should be possible to be protect by patents, since it is not a technical solution to a technical problem or have a technical effect.

As discussed in chapter 3, Technical background, an invention is a technical solution to a technical problem and in article 52 EPC the work or construction must be an invention if it should be possible to protect by patents. Further, the respondents are in line with the theory that business methods as such should not be possible to protect by patent since it is not an invention per definition.

The companies in group two have been a part of the patent-world for a long time and based on that they have great knowledge on this subject and know how to write applications and what is required for an invention to be protected by patent. Further, most of the companies are large companies and except knowledge they do also have time, money and employees to put a lot of effort in IPR, and patents in particular, in their business.

The companies in group three do experience problem with the patent system and think that the system is made for more hardware-based industries than their own. On the other hand, they do protect their innovations with other IPR and some of the attended companies do also have patent protection for some of their innovations.

The reason why there are some difficulties for the companies in group three to protect their innovations by patents is because almost all of their innovations are based on software and/or business methods. If they do not have any clear technical solution to a technical problem the invention should not be possible to protect by patents according to article 52 EPC.

Another difficulty within the patent system related to these software-based companies is that the processing time is too long compared to the rate of the development in the company.

Consequently, some of the companies would like to protect their innovations to a greater extent but the patent system is not made for their industry. Also, the companies are smaller, have less money, time, experience,

employees and maybe also knowledge to some extent, compared to the companies in group two.

6.4. Problem statement 4

None of the respondents in group 2 think that the business strategy and R&D of the company has been affected by the exemption within the patent system. They do always try to protect the invention that they think they should, and the inventions have almost always a technical effect.

Further, this cannot be strengthened by any documents such as patent portfolio or strategy documents for the company.

The reason for this is because they do not develop for patent, they do develop based on the industry and what their customers want.

6.5. Problem statement 5

According to the respondents in group one the only difference that have been seen for software and/or business method-based innovations over the years is that there is a much clearer picture today compared to some years ago of what can be patentable and what cannot.

The majority of the respondents in group two do not experience any changes of handling the companies' innovations based on software and/or business methods today compared to some years ago.

According to the data for Axis, they are filing more patent applications in the so-called software-based classed in IPC today compared to some years ago and this is in line with the technology development that is discussed in chapter 3.

None of the companies employ a "design for patenting" strategy based on the same discussion as in the previous problem statements, 6.4.

In summary, the companies do protect more software-based innovations by patent today, but they do not handle the innovations in some different way apart from that they need to think twice before writing the applications, so the innovations are as technical as needed.

7. Conclusion

In this master's thesis the hypothesis that: "*Swedish companies' probability to protect their innovations has decreased due to a shift to innovations based on software and business methods in a greater extent*" have been investigated based on the four problem statements.

The problem statements and the hypothesis are going to be answered based on the discussion in the previous chapter followed by a conclusion and comments on future work.

1. *Do the companies consider the hypothesis: "that they over time have been moving from mainly offering electronic and mechanical based products to now offering products and a services where software is a much greater component" being correct?*
    - *If yes, to what extent?*
    - *If no, why not?*

Yes, the companies in group 2 agree that they have been moving from offering a product to today offering a product and a service compared to some years ago. This change is to a great extent because their customers today are looking for a whole solution. Also, the industry is changing, which is in line with the discussion in chapter 3.

No, the respondents in group 3 have not experienced the change since they have been offering a product and a service from the beginning.

2. *Have the business and R&D strategy for the company directly or indirectly been affected over time by the possible shift towards offering products and services where software is a much greater component?*
    - *Can this change be confirmed by how the companies are working with the patent portfolio, other intellectual property protections and documentations (ex. strategy document)?*
    - *Are the companies conscious of a possible change or are they non-conscious about that they have been changing their behaviour?*

Partly, the respondents in group 2 do not experience that the R&D of the company has been affected by the exemption or the shift while some of the respondents consider that the business strategy for the company have been affected by the shift but not by the exemption.

This change has not been able to be confirmed by how the companies are working with their patent portfolio, other IPR, or other documentations in this thesis.

The experience is that the companies are conscious about the changes that have been made.

3. *Do the companies consider it as a problem if they cannot protect their innovations based on software or business methods?*

The respondents in group 2 do not experience it as a problem because most of them do not think that business methods "as such" should be patentable and all of their software-based inventions have a technical effect.

Some of the respondents in group 3 think it is a problem because if they cannot protect their innovations in any way it is much easier for copycats to do the same thing as they do.

4. *Have the business and R&D strategy for the company directly or indirectly been affected over time by the exemption?*
    - *If yes, to what extent?*
    - *If no, why not?*

No, none of the respondents in group 2 experience any problems based on the possibility to protect their innovations based on software and business methods.

Partly, some of the respondents in group 3 do experience problems based on the possibility to protect their innovations based on software and business methods.

5. *In what way are innovations based on software and business methods been handle today compared to some years ago?*
    - *Can this change be confirmed by how the companies are working with the patent portfolio, other intellectual property protections and documentations (ex. strategy document)?*
    - *Does the company employ a "design for patenting" strategy?*

No, there has not been any changes in what way innovations based on software and business method handle today compared to some years ago, but one effect can be that the case law has been more stabilized over the years.

This change cannot be confirmed by any documentations in this thesis.

None of the companies employ a "design for patenting" strategy.

In summary, the mature companies are well informed about the patent systems and have great knowledge in how the system works and what can and cannot be patented. IPR is important for their business model, partly for licensing and partly to be able to use it in case of infringements. It is easier to detect an infringement in mechanical and electronic-based inventions than in software-based inventions.

The newer companies experience problems with the patent system and do not think it is made for them, since they are a more software-based industry and the patent system is made for a more hardware-based industry, together with that the processing time is too long.

A suggestion that the majority of the respondent in group three raise is that there may be an alternative protection to patent, a protection with both shorter processing time but also shorter protection time.

According to the data over existing companies within the software-based industries the number of companies are increasing every year. Also, newer companies, which have participated in the interviews, think that there might be problems in the patent system in the future.

The mature companies do not experience any problems and are protecting their innovations with patents in the same way as before, the number of filing and granted applications are increasing according to the respondents.

Hypothesis:

According to the answers of the respondents together with the data for Axis, the shift moving from offering a product to offering a product and a service can be confirmed.

According to the answers of the respondents together with the data of number of filed and granted patent applications at EPO, the decreased probability to get your patent application granted due to the shift cannot be confirmed.

The newer companies experience difficulties with the patent system, a process that can be both expensive and time consuming followed by narrow patents if the application become granted. An alternative protection form with shorter processing time and shorter protection time is one proposal that occurs in the interviews.

The conclusion for this master's thesis is that there should be an investigation whether also Sweden should work with utility models, discussed in chapter 2, as an alternative protection when the requirements for patents are not met.

7.1. Future Work

As the research within this thesis mainly focused on companies within the electronic and telecommunication industries together with the fintech and app-industry it could have been a wider ranch of companies in order to get a better overview of possible issues.

There has only been an investigation based on the exemption in article 52(2) EPC such as computer programs and business methods but one interesting thing to investigate in a future thesis could be based on big data and AI, that the next confusion within the patent system could be based on.

Further, to have more reliable results comments and interviews by other countries and the patent offices in the world, such as the EPO, would have been needed. Also, to investigate the collected data in a better way, a wider collection would have been needed.

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Appendix A.1: Questionnaire group 1 - AWA

1. Do you consider it a problem that computer programs/business methods/presentation of information as such belong to the non-patentable area?

2. Do your clients think it is a problem that computer programs/business methods/presentation of information belong to the non-patentable area?

3. Do you feel like there are more clients applying for patent protection for inventions that could be considered as computer programs/business methods/presentation of information today than a couple of years ago?

4. Do you think that there is a clear division between what could be seen as hardware and as software?

5. In what way do clients developing within the area of computer programs/business methods/presentation of information think of the possibility of maybe not having a patent protection for the product?

6. Have you noticed any effects related to computer programs/business methods/presentation of information being in the non-patentable area?

Appendix A.2: Questionnaire group 2 – Mature companies

Patent

1. Do you consider it a problem that computer programs/business methods/presentation of information as such belong to the non-patentable area?

2. Do you feel like your company is filing more patent applications for inventions that could be considered as computer programs/business methods/presentation of information today than a couple of years ago?

Product development

3. Do you as a company consider a change in the development where you have been moving from mainly offering electronic and mechanical based products and today rather offering solutions based on both a product and a service where software are a much more important component today than a couple of years ago?
   - If yes:
     - how and in what extent do you see this change?
     - do you see it as a problem that you possibly having more resources within the non-patentable area?
   - If no,
     - what do you think about the development?

4. Do you as a company consider your research and development (R&D) directly or indirectly affect over time by the exception and the possibly shift moving from offering a product to offering a product and a service?
   - If yes:

- do you have an example of a technical development where this shift moving towards more software implemented inventions is represented?
- can this change be confirmed by in what way you are working with the patent portfolio, other intellectual property protections and documentations (ex. strategy document)?

- Has the overall business strategy for the company been affected?
- If yes, can this change be confirmed by how you are working with the patent portfolio, other intellectual property protections and documentations (ex. strategy document)?

Supplementary question

Do you consider that patent or some other protection of intellectual property (IP) is important for your business model?

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Appendix A.3: Questionnaire group 3 – Newer companies

1. How do you work with protecting your innovations?
    - What is the reason for your course of action?
    - Have you noticed any problems or difficulties with protecting your innovations?

2. What competitive solution are you in?

3. Are there any competitors that you consider have copied your product/service?

4. How long do you usually stay alone on the market?

5. Do you consider that patent or some other intellectual property protection is important for your business model?
    - Why/why not?

6. If you are having patents, in what way are you using these?

7. Do you consider it a problem that software/business methods/presentation of information belong to the non-patentable area?
    - If yes, what problem/s do you experience?
    - If no,
        - why not?
        - do you think that one could have conceptual patent protection for the idea behind the software?

Supplementary question

Do you consider that patent or some other protection of intellectual property (IP) is important for your business model?

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Appendix B.1: Respondents group 1 - AWA

Name	*Office*	*Position*	*Date*	*Location*
Magnus Johansson	Helsingborg	European Patent Attorney	4.5.2018 17.5.2018	Malmö, by phone Helsingborg
Fabian Edlund	Gothenburg	European Patent Attorney	9.5.2018	Malmö, by mail
Mattias Pierrou	Stockholm	European Patent Attorney	22.5.2018	Malmö, by phone

Appendix B.2: Respondents group 2 - Mature companies

Name	*Company, founded* *Industry*	*Position*	*Date*	*Location*
Jonas Delander	Axis Communications, 1984 Video surveillance	European Patent Attorney	4.6.2018	Lund
Mathias Hellman Till Burkert	Ericsson, 1876 Telecommunication and networking equipment	Vice President, Strategy & Portfolio Management of IPR and licensing European Patent Attorney, IPR & Licensing	30.5.2018	Lund
Erik Wintzell	Volvo Group, 1927 Heavy equipment	IP Intelligence Analyst	3.7.2018	Malmö, by phone
Robin Ristander Martin Jansson	SKF, 1907 Manufacturing	IA & IP Professional Manager at IP strategy and IA	13.6.2018 18.6.2018	Malmö, by phone Gothenburg
Christer Falk	Scania, 1891 Automotive	European Patent Attorney	29.6.2018	Malmö, by phone
X		Commercial Manager	11.6.2018	Malmö, by phone
Y		Patent Manager	21.6.2018	Malmö, by phone

Appendix B.3: Respondents group 3 - Newer companies

Name	*Company, founded Industry*	*Position*	*Date*	*Location*
A	2005	Legal Director	26.7.2018	Malmö, by phone
B	A-cast, 2014 Podcast application	Co-Founder & CTO	4.7.2018	Malmö, by phone
Daniel Bernholc	iZettle Merchant Services, 2010	Managing Director	14.8.2018	Malmö, by phone
Tomas Forsgren	Trustly, 2008 Fintech	Legal Counsel	21.8.2018	Malmö, by phone

Appendix C.1: Summary group 1 - AWA

Do you consider it a problem that computer programs/business methods/presentation of information as such belong to the non-patentable area?

All three agree that there is no major problem for computer programs as long as the invention has a technical effect. Pierrou says that "*the exceptions are quite narrow, especially when it is about computer programs, there are almost nothing that is excluded from the patentable area*".

Fabian Edlund adds that he does not think it is his task as a patent attorney to set limits for what can be patentable and what cannot.

Johansson thinks that presentation of information can be a little bit tougher but that it usually is used together with some technical device and because of that can be seen as presentation of information and not presentation of information "as such".

Further, Johansson and Edlund agree that business methods normally are the part that can cause problems. Edlund thinks that the examiners in all cases gives a great deal of interpretation when it comes to business methods. Both Johansson and Edlund think that case law underlying the interpretation of the invention step, T641/100, can be experienced as a grey area and the examiners have a great freedom to self-interpretation in this case.

Do your clients think it is a problem that computer programs/business methods/presentation of information belong to the non-patentable area?

All three respondents agree that clients who get rejection on their application because the invention belongs to the non-patentable area think it is a problem that computer programs/business methods/presentation of information "as such" are excluded from the patentable area. It can be both small and big companies where Edlund thinks that it is more common that the big companies are expressing their frustration about this. Johansson thinks it is a clearer difference depending on where in the world the application is coming from, more than if it is a small or big company.

Pierrou thinks that the clients experience a great grey area for the delimitation of the exemption and because of this they think it is a problem, while the attorneys have a much clearer picture of what can be patentable and what cannot.

Pierrou says that "*another problem is the companies where the invention truly is a new business idea which is implemented in a smart application or*

something like that. These companies have a problem with protecting their business, there might be something that can be patentable, but it is normally some small detail solution which certainly can be implemented in some other way as well. A new idea which often is implemented in some sort of application nowadays can be really difficult to protect". Further, he does not think there is a problem in the patent system, but more a problem of competition, to be first on the market. He rounds this question off with "*that one should think about this in some different terms, software embedded in systems and controls, communication solutions or coding techniques for sound, image and thing like that are definitely patentable, but thinking about software as a computer program for an application or user program, in this case I think it is really hard to have a patent protection. Actually, I do not even think that the copyright is enough in this case*".

Do you feel like there are more clients applying for patent protection for inventions that could be considered as computer programs/business methods/presentation of information today than a couple of years ago?

When asking the respondents if they consider that more applications for a patent protection for inventions that can be seen as computer programs/business methods/presentation of information are made today than a couple of years ago the answers are rather different. Johansson does not think that this is true, he thinks that the peak was in the end of 1990s or in the beginning of 2000s while both Pierrou and Edlund consider that patent applications handling computer implemented inventions have increased, especially within the classical industrially companies according to Pierrou. Edlund considers that patent applications for business methods have decreased and think this is partly because of the knowledge of the attorneys that it can be really difficult to have a granted application within business methods.

Do you think that there is a clear division between what could be seen as hardware and as software?

The respondents have relatively different opinions if they think that there is a clear division between what could be seen as hardware and as software. Johansson does not think that there is a clear division and explain that "*usually when one should do a patent application for what EPO is calling computer implemented inventions or mixed inventions we use so called functional features, which in principle are method steps done by different hardware element, typical a processor, transmitter, receiver etcetera*".

Johansson thinks that this is working out well and that there are actually not any differences between writing claims for a devices or computer programs. "*Per definition, according to case law, software is a device, this is the way EPO is interpreting it*".

Edlund's comment to the question is that "*this division is normally not a problem*".

Pierrou on the other hand consider that there is a clear division, "*computer programs are instructions read by a computer, this is the definition in patent context, that the computer is loading, that is computer program, and that the computer is not loading, that is not computer program*".

In what way do clients developing within the area of computer programs/business methods/presentation of information think of the possibility of maybe not having a patent protection for the product?

Johansson thinks that the clients developing within the area of computer programs/business methods/presentations of information can be frustrated because of the possibility to maybe not be able to protect their developed invention with patent. Usually one can avoid problems based on how the application is written.

Edlund's perception is that there is usually not any major problem with this, but the clients are satisfied with the assessment, sometimes they even consider it as one less problem to care about.

According to Pierrou, the ones who are developing applications and things like that have accepted that it might be difficult to protect their inventions with patents and are instead focusing on doing a good-looking application that can be presented fast on the market and having a good database. At the same time, he thinks that the classic industrial companies are working harder for this when they are implementing something since they are coming from a culture where one likes to protect the invention with patent, they are used to doing it, and now they are entering a new world different from what they are used to.

Have you noticed any effects related to computer programs/business methods/presentation of information being in the non-patentable area?

According to Johansson, "*one effect is that inventions within business methods become more expensive to drive through and the protection for this type of inventions become worse, partly because one maybe not get a granted*

patent for the things one was applying for and partly because one gets very vulnerable within possible attacks. If one has had a long and hard process to get a granted application one has at the same time open up for several attacks as well, so at the same time they may become weaker patents I would say". Johansson considers that the effects have been better over time because the case law following the case T641/100 have become clearer, it sprang much more a couple of years ago. Today there is a much clearer picture of what can be patentable and what cannot be. Case law for computer implemented inventions is to remove all non-technical details when coming to determining an inventive step of the invention.

According to Edlund the case law has been much tougher since 2003 and says that "*mostly of all computer implemented inventions are having clear technical connection and are as patentable as other inventions*".

Pierrou says that "*if one is having a historically point of view one effect is that the technical development is going rather fast, definitely faster than case law progress and law change*". He is in the same track as the other respondents, that it was rather unclear what could be seen as patentable and what could not a couple of years ago but now it has been stabilized on a reasonable level. Pierrou continues with "*one effect that occurs in relation to the small start-up companies for example, there I think it is quite clear that the most important thing for them is marketing, to quickly make it widely known, to make it a trend within the target group for the company is much more important than it might have been traditionally within technical developing companies, where one have been keeping it as a trade secret, handed in the patent applications and so on before launching the product. In this industry, where one mainly cannot protect the inventions with patent, one is not thinking in that way, so that might be one effect*". He does also think that a new wave of unclearness within the patent system is coming when big data and Artificial intelligence (AI) is growing.

Appendix C.2: Summary group 2 - Mature companies

Do you consider it a problem that computer programs/business methods/presentation of information as such belong to the non-patentable area?

Jonas Delander, Axis, does not see the exemption as a problem except for presentation of information, which can be a little bit harder to work around sometimes, but as long as it feels like a technical invention one can circumvent it in most cases.

Till Burkert, Ericsson, explains that the possibility to protect computer programs with patent is not a problem for them since they are working with technical innovations all the time and because of that they do always have a technical effect within the invention.

Mathias Hellman, Ericsson, continues, "*our software development is always within a technical context, it is not an application or a website, but it is about, for example, how to get a more efficient execution of a base station or get it to work faster. This software is within a technical solution which is very concrete today*".

Further, Burkert does not think business methods should be patentable, he thinks that one should only get patent for something that has a technical solution, which, according to him, business methods do not have. Coming to presentation of information, this could be patentable, as long as it has a technical effect, but the boundaries are quite problematic, and this is something EPO has tried to clarify. Last fall, when EPO updated their guidelines they did clarify this part and exemplified what is patentable and what is not.

Christer Falk, Scania, does not see any problems with the exemption either, "*one can protect a functionality of the computer program in a technical extent, and this is normally enough. Having a direct protection for the computer program as such is totally pointless since it is easy to get around this protection, it is protected by the copyright*." Further, Falk thinks the same as Burkert, an invention is a technical solution of a problem where the important word is technical, and he does not think presentation of information or business methods are having this technical component that makes it patentable.

Respondent X, working at company A, explains that there is almost always some type of software component within a lot the technology the company is working with, but he has not experienced any problem with having their patent applications granted. Further, X says that "*business*

methods are embodied in some patents, a big source of income within the industry is to sell updates for computer programs, and this business model can in some way be controlled by patents by patenting a technology that enables it, but not the computer program as such."

Robin Ristander, SKF, does not see any problems that computer program as such belong to the non-patentable area, he rather thinks it is a good thing, that one cannot have sneaky-patent on methods or computer programs. He continues, "*SKF's business is to sell bearings, not selling computer programs which is just a part of it, we are not selling software patents. It is better helping each other than making it more difficult for each other, with patents for example*."

Martin Jansson, SKF, agree that they have not experienced any problems that computer programs as such belong to the exemption. Furthermore, he thinks that it would have been a greater problem if business methods as such could be patentable than today, when it belongs to the non-patentable area, and the same with presentation of information.

Respondent Y, working at B, does not see it as a problem, the patent system says that different technical solutions are patentable, but not computer programs as such, which Y thinks is good since computer programs have been such conceptual, an abstract element. Much of the development within the company is today protected as trade secrets and all source code amongst others, the computer program as such, is of course protected by copyright.

Erik Wintzell, Volvo Group, do not think there is a major problem with the exemption, it is a fact, that one has to work around. An implemented method can be patentable and the computer program as such is protected by copyright, the same as Falk and respondent Y said.

Do you feel like your company is filing more patent applications for inventions that could be considered as computer programs/business methods/presentation of information today than a couple of years ago?

According to Delander, Axis is applying for more patens overall per year today than a couple of years ago, but he does not think that the percentage of software patents have increased over time.

Hellman thinks that Ericsson must apply for more patents related to computer programs/business methods/presentation of information today than a couple of years ago for two reasons, "*one reason is that we are applying for more patents overall today than some years ago, there is an upward trend. The second reason is that our research and development (R&D) are more based on software today than some years ago, say ten years ago. This can be*

seen in our incomes, what comes from selling hardware and what comes from selling software, and a greater part is from the latter today than before".

Falk considers that Scania apply for more patents related to computer programs/business methods/presentation of information today than some years ago and continues that "*the reason for this is because we are putting processors within more devices which make possibilities for new functionalities. Further, today everything should be connected to the internet which is partly made possible by the software*."

X agrees with the respondents above and explains it as an upward trend within the industry, inventions are being more based on software today than a couple of years ago, one is moving from selling boxes to sell systems. "*It is a challenge as well, the software development goes so fast that one needs to patent something that is going to last a long time, otherwise it is unnecessary*." X continues with "*the costumers do not care if we have increased our performance a little bit, for example, they care about what you are updating, how your service is and things like that, things that you not having patent for, you are protecting these things as trade secrets instead*."

Ristander explains that SKF of course is applying for more patent for inventions having data processing, but in general SKF has decreased their patent applications based on their new strategy.

Respondent Y says, "*because of the nature of the company, the protection, or the usual patents for protecting inventions in increasing*".

Wintzell explains that Volvo Group today is having software in a greater extent within their development which lead to more patent on inventions implemented as computer programs, but not software patent in itself, it is the strategy being patented.

Do you consider that patent or some other protection of intellectual property (IP) is important for your business model?

Delander considers that "*it is not important for Axis' business model, however, it has been important over time for other reasons, but I do not think anyone sees it as important from the business model aspect*".

Hellman explains that patents are really central within Ericsson's business, partly because of licensing and partly to use the patents in various negotiations to create business benefits.

Falk says that "*the short answer is yes, it is important for Scania to protect their investments within technology and product development with*

different IP protections such as patent, design, trade mark etcetera, for instance to ensure freedom of trade and to offer a unique product".

According to Ristander patent and IP is indeed of value for SKF, but it does not necessarily have an effect to the model of how business is done, especially not in the traditional bearing business. Jansson agrees but thinks that "*when talking about the service offering and the new integrating and partly digitized business models such as Rotating Equipment Performance (REP) is IP-protecting, or controlling the innovations, centrally. Not especially by patent but definitely by copyright, but also technical and contractual control*".

According to Y is the answer "*yes, we firmly believe that whatever we cannot control, we do not own, thus, impossible to use for building a sustainable business model*".

Wintzell thinks patent and other IP-protecting is important for companies overall since it is a tool for relations and since it protects investments within the technology.

Do you as a company consider a change in the development where you have been moving from mainly offering electronic and mechanical based products and today rather offering solutions based on both a product and a service where software are a much more important component today than a couple of years ago?

- ***If yes:***
    - ***how and in what extent do you see this change?***
    - ***do you see it as a problem that you possibly having more resources within the non-patentable area?***
- ***If no,***
    - ***what do you think about the development?***

Delander agrees with the hypothesis, that it is more important today than a couple of years ago. Also, he thinks that there always has been some kind of services within their inventions, but it has become even more important.

Burkert and Hellman do also agree with the hypothesis, where software has been a much more important component, for example within the radio network. Hellman explains that "early, when there was a new generation of the radio network, for example from 2G to 3G, one needed to change everything, but since 2015 the radio network is already prepared for the 5G. When 5G starts, it is more or less just a software update one needs to do, this is the first time doing a change of generation like this". Burkert says that the

extent is quite considerable, and Hellman continues that it really depends on the overall trend in society.

Falk does also agree with the hypothesis and explains that the customers requires a comprehensive solution to a greater extent today compared with some years ago.

Respondent X explains that there are software components within a lot of the technique they are working with and the edge one has developed depend a lot in how good one has integrated hardware and software, and this is where many patents are based on.

Ristander is somewhat devoted to the shift mentioned in the hypothesis and says "*there is a lot of talking about the change, it becomes more service and service contracts, but if looking at absolute sales numbers then I think, we are still selling components. But if looking at the ambition in the future, then everything is about REP, it is not about selling bearings but for example sell in that one is keeping their machines rolling a certain number of hours per day, it is more a service contract*". He continues with that they might be using AI in the future in order to predict data for example.

Jansson summaries it that everything is about this today, product and performance, everything is about the software.

Wintzell do also agree with the hypothesis and explains it with that there are no levers anymore but software to a great extent.

Do you as a company consider your research and development (R&D) directly or indirectly affect over time by the exception and the possibly shift moving from offering a product to offering a product and a service?

- ***If yes:***
    - ***do you have an example of a technical development where this shift moving towards more software implemented inventions is represented?***
    - ***can this change be confirmed by in what way you are working with the patent portfolio, other intellectual property protections and documentations (ex. strategy document)?***
- ***Has the overall business strategy for the company been affected?***
- ***If yes, can this change be confirmed by how you are working with the patent portfolio, other intellectual property protections and documentations (ex. strategy document)?***

Delander does not consider that Axis' R&D have been affected by the exemption or the shift towards offering solutions based on both a product and

a service in any way, they are developing and afterwards they are thinking about how they can protect the invention. Neither the business strategy has been affected by this but Delander thinks that from the beginning, patents were just something that was there to interrupt but since some years ago it has been more okay working with it.

Burkert explains that Ericsson has not changed their R&D based on the exemption within the patent system, but they are developing based on what their customers want, which is software rather than hardware. They develop first and then after that they look so they can protect the invention.

Hellman explains that it is hard to say if their business strategy has been affected since they are such a great company, but at least he does not think their license business has changed substantially. "*If one is building a product based on hardware components which contains software and put it together, if one is building a Lego tower, for instance, where it costs to build each component, then everyone tends to build their own thing, one is being integrated with subcontractors. When everything is based on software there is no cost for copying all these Legos and then open source pops up and suddenly there are a lot of Legos that are completely unfavourable. The things you used to buy from your subcontractor, which were unnecessary for your offer to your customers but that you needed to make it work, suddenly it is here for free with open source. This is a trend I think is going to change the society and have changed Ericsson's strategy a lot. In summary, in an eco-system based on software, then you need to know what your customers are willing to pay premium and choose to buy your product, these things you, as an owner, has to protect with patent very carefully and control, everything else you should get as cheap as possible.*"

Falk considers that it could be difficult to detect infringement within their CII patents, e.g. it could be difficult to detect if someone is using their software solution for effective motor steering. A strategy for solving this problem could be that they are protecting this type of solutions as trade secrets.

Respondent X says that the products are changing and that patents necessarily are not the only way to protect and control the important things within it. It is hard for the respondent to comment if the business strategy has been affected, but the personal opinion is that is has to, "*one cannot admit that the world is changing and then not change with it*".

Ristander does not see that the exemption or the shift have affected their R&D but that they always are affected by the global trend with digitizing amongst other, that affect how they are working but not the exemption itself.

The business strategy has been affected in the way that they must be on their toes and faster offering solutions like this.

Wintzell explains that neither the exemption nor the shift have affected their R&D, they are developing first and then want to put the product as fast as possible on the market, it is just a bonus if they can protect it with patent. Volvo Group's strategy have been affected in a great extent because the products have been developed and changed.

Appendix C.3: Result group 3 (newer companies)

A

This company, compared to e.g. Ericsson and Sandvik, which is working really systematic and have many years of experience when coming to patent, comes from another industry where patents are not that common. They work with patents and have a patent program, they have granted applications but not any systematic experience.

Most of the innovations the company wants to protect is method innovations and A explains that it is methods which one can do by hand, but they are doing it with algorithms and computer programs which also make it more difficult to protect, which they know and have experienced.

A considers it more difficult to have a granted patent application in Europe than in for example in USA even if it has been harder for business method patents there as well, but it is still easier than in Europe.

If one experience the problem that it is difficult to protect the innovations from the company's perspective, then there is a problem since they want to protect as much of their innovations as possible since they experience themselves as really innovative and they do see other which do copy their solutions. "*There is a division between the innovations that are public when they are used, for example within the flow that we are using for the consumers, in this case it is obvious for everyone what we are doing, it is known as a consumer when using the service and it is easy to copy what we are doing. In other cases, when there are innovations that are not shown for the consumers, we have the opportunity to protect the innovation as a trade secret. For the innovations which are easier to copy and which we cannot protect, when that is the case there is of course a problem for us*".

Further, the company is working with protection such as trade mark and copyright as well apart from patents, but A does not consider that patent or some other intellectual property protection is fundamental to the company's business model.

Finally, A continuous with "*if one is thinking of the traditional time for patent protection, 20 years of protection, is almost not relevant anymore, at least not within our industry. I think, if I should come with a constructive proposal, that the wise would be to broaden the possibilities for protection and maybe include method patents for example but having a significantly shorter protection period, so that innovations become publicly available, this I see from a societal perspective and not from the company's perspective*".

B

This company is a podcast platform with an application. The company has granted patents which are related to the application, it is the logic for how they are using the technology, how they are connecting some functionalities. They have protected the possibilities to connect online content to downloaded content in the application. They are offering that one can connect pictures, links and videos that will show up in the timeline when one is listening, and this is what they wanted to protect since they were first out doing it for a podcast, but the protection became too narrow.

B explains that when they find something of interest that they want to protect they investigate it together with their patent lawyer to see if there are any possibilities to protect it. If they have something unique, they start to build up the different shells of patent. The problems the company have had with their patent applications are that the final protection has been too narrow and also that it has cost too much time, energy and money.

B think it is quite tedious that they cannot protect as much as they would like to and consider it a problem that they cannot. Furthermore, he thinks a good thing for them would be if business methods were not a part of the excluded area and continues, "*our history is that we are/were first doing a lot of things, we entered a rather unmatched market, the podcast-world. There was already a lot of listeners, but the technology was not good, and the advertising was not as good as YouTube's and the rest of the internet at all, but we built the technology needed to go there. Being first with something takes a lot of energy, you encounter many problems, you make the wrong decisions and the wrong way sometimes but learn from it and so on and because of this it goes much faster for our competitors to reach the same level as we are when they have seen our mistakes*".

Further, since the lack of opportunity to protect their innovations a lot of competitors have come up when the company already developed the technology.

B explains that since they are a quite young company, established in 2014, they do not have any statistics for how much time it takes until their competitors are doing the same things as they are, but he guesses that it takes approximately six months.

B does not think that patent and IP is important for the company's business model and he continues with "*we have never had to use our patent to fight with someone else. Now there is a service that really look like ours, this with putting things in the timeline, but I thought about if we were having*

time and energy to fight with them, and I do not think we have, so I would say no, it is not of importance for us".

Apart from patent protection the company is also working with trademark protection, they have trademark protected their slogan.

B's final thoughts about the intellectual property rights are that "*the patent world is coming from a hardware world from the beginning which do not goes totally in line with the software development because it goes so much faster. It feels like if we are going to have some sensible protection and actually have any value within the protections it has to be much faster, today the technology could be outdated before the protection is granted*".

Finally, B thinks it is much more complex to explain software and there are so many options to reach the same result which make it much more complex to create a protection that covers.

iZettle

iZettle was established in 2010 and their main idea is solutions for card payments. It is based on using a smartphone or tablet together with a small box where one can put in the credit card and do card payments. One can find iZettle in ten European countries together with Mexico and Brazil and the company have more than 500 employees.

iZettle protects their innovations, mainly with patents, and they work together with an external patent office to examine the value of the idea for the company and how reasonable it is to get through with a patent application for each innovation before writing and filing an application. Depending on the value for the company they file applications within different amount of countries.

One challenge with software innovations is the culture clash where open source communities are really strong, but this is just an internal challenge. An external challenge since the major work within the company is based on software is how to write the applications, there is certainly no impossibility to have a granted patent based on software, but one need to formulate the application in a way that the innovation is based on a system together with a hardware, for example a computer.

There are a few actors doing the same as iZettle, but Daniel Bernholc does not experience any competition between them, they do not copy solutions since all of the companies want to have their own twist for the solution, but the development area is restricted and based on that the solutions resemble each other.

Bernholc does not consider that patents and IP is important for iZettle's business model, this is just a hygiene factor. In addition, the granted patents can be good for the company to have if they make an infringement without knowing it, if that's the case they may use their patents in a negotiation, but it is not a part of their nature to hunt other companies who make an infringement.

iZettle have some applications that have been granted in USA and rejected in Europe, but they have had the other way around as well but either way Bernholc thinks it is easier to have a grated application in USA compared to Europe.

Finally, Bernholc thinks that the patent system is a little bit outdated, but he does not have any suggestions or changes that he thinks should be done.

Trustly

Trustly is a Swedish fintech-company established in 2008 and their main idea is solutions for direct online bank payment technology.

The innovations of Trustly is mainly business ideas or business methods and are protected by copyright or as trade secrets. The company does not have any patents for their innovations and the reason for this is because it is costly together with that it is uncertain and Forsgren does not consider that patent protections is relevant for the company at the moment.

Difficulties and problems that the company has experienced is mainly to detect and counteract IPR infringements which is much more difficult for business methods and computer programs in comparison to more hardware-based innovations.

Another problem is the processing time for patent applications which is too long. The rate of the development within the company is much higher than the processing time and it is not certain that the company is going to use the same solutions in a couple of years as today.

Forsgren explains that it is a big competition in payment solutions, from traditional card payments, e-wallet solutions to factoring payment solutions. Further, there are copycats and if Trustly comes up with a new solution they are probably alone with this solution at the market for a couple of months up to one year.

IPR, and especially copyright and trade secrets together with trademarks, are important for the business model of Trustly, but not patents which was discussed previously in this summary. The reason for why this is important for the business model is because if their competitors could copy the solutions

of Trustly without any consequences, that could affect the market position for the company.

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