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**Software patents as a barrier to the development of start-ups**

**Abstract**

The purpose of this paper is to examine the assessment of software patentability by certain IT companies and to compare them to the literature. This is done through qualitative research by interviewing managers from ten different software companies. Comparing their reasons for not patenting their software with the generally stated reasons gathered from a literature review allows for the identification of the relationship between the theoretical and empirical findings. The qualitative research also provides empirical data about the strategies that are used in certain small and medium sized software companies to deal with software patenting problems especially patent thickets. Different aspects of the malfunctioning of legal protection for software that may be solved at the company-level are also explored in the paper.

**Keywords:** intellectual property, software patents, intangible assets management, industrial property law.

**JEL Code:** K11

**Introduction**

Protection of software is the key issue of intangible assets management in many companies. It plays a crucial role not only in solely software companies. This aspect is deeply considered in most IT firms. On the one hand, legal protection (like patents and copyrights) is seen as a default strategy in the business. However, on the other hand, in the digital world, patent procedures are too slow. Moreover, software patents are seen as a relatively weak mechanism, which is a result of high level of unpredictability in intellectual property court cases. Yet the practice of software patenting is very widely spread – mostly in the US. Additionally, the popularity of software patents is growing very fast.

Many authors like M. Lemely[[1]](#footnote-1), S. Miller[[2]](#footnote-2), B. Coriat and F. Orsi[[3]](#footnote-3). M. Cambell-Kelly[[4]](#footnote-4) R. Mann[[5]](#footnote-5) identify the main drawbacks of software patents. Software is a peculiar category, because products within this area are just the emanation of certain functionality. Software are logic algorithms for processing data that is implemented via stored instructions residing on a disk or other storage medium or in read-only memory. This is a widely accepted definition, which allows to select such categories from the catalogue of patent classification that contains software patent[[6]](#footnote-6).

Controversies related to the software patents are one of the main arguments for liberalization of industrial property law[[7]](#footnote-7). It is considered that weaknesses of patents and their irrationality, which appear under certain circumstances, are most clearly visible in the area of software. However, total abandoning of software patenting is hard to imagine because software is a significant part of the innovation. Moreover, it is strongly interlinked with non-software inventions. Therefore, it could be very difficult to set the boundaries of a patentable area. Since, the society is “doomed” to keep software patents which are poorly constructed, it is necessary to improve the efficiency of this form of protection. What is needed to be taken into consideration when conducting such reforms is the reason of patenting dysfunctions - their nature and mutual relationships. This is a crucial task for the whole patenting system, because the share of software patents in a total number of patents is growing rapidly.

However, some authors recognize areas where software patents could be useful. They indicate that patents provide a sort of insurance against risk associated with intangible assets for venture capitals. From the founder perspective[[8]](#footnote-8), it cannot be denied that patents are able to provide some range of security[[9]](#footnote-9).

At the beginning, it is worth emphasizing that each computer program is protected by copyrights. The code of the program is automatically protected. However, software patents give a stronger protection for authors, because they do not only cover implementation but also programming methods. Consequently, if other programmer gains the same effect with a different code, it is not a violation of copyrights, but it can be considered as a patent infringement. Thus, the copyright law is able to protect ideas to a limited extent. Therefore, there are many differences between these two protection regimes and some creators are interested in protecting their work taking into account both of the regimes in order to guarantee as broad protection as possible. However, from the perspective of law and economics, the key question is the cost benefit balance of such practices for the society.

**Methodology**

This paper is based on law and economics approach, which puts the issue of economic efficiency of regulations in the center. The literature study is compiled with qualitative research based on interviews with companies’ owners. The interlocutors were selected from a population of technology SME’s operating under the umbrella of Krakow Technology Park in Poland, an institution supported by local authorities as a part of Krakow Special Economic Zone located in the biggest city of Malopolska Region. What is worth mentioning is that most of them are startups. They were selected according to their business profile. Such companies were identified where the core activity is related to creation of software. The interviews were conducted with the owners of these companies, who are also involved in the day-to-day management (they perform functions such as CEOs or CTOs).

Additionally, the usage of several cognitive perspectives provides an opportunity to build the list of causes, which make the practice of software patenting so controversial and widely criticized. What is even more important is to identify relations between these causes. Naturally, it is practically impossible to carry out experiments in this area. As the result of increasing global unification of intellectual property protection, the comparative analysis of legal systems is increasingly difficult, too. In the face of methodological difficulties described above it is necessary to seek causal relationships based on rational choice theory in the context of law and economics approach.

The subject of the analysis covers the following stages of business activity:

a/ the deciding on entering a software-related business (preceding any patent related issues)

b/ creating intellectual property (IP) – stimuli to create or resign from creating a certain type of IP, the speed of patent races

c/ selecting IP management methods – keeping company secrets, applying for patent, relying on copyrights, making defensive publications, contributing to the open source, etc.

d/ enforcing the rights – tendency to sue, predictability of courts’ verdicts, etc.

**Results**

Only one out of ten studied companies is involved in patenting software. Additional one has patented inventions with a small software component. The only strong reason to patent software was indicated by the company which is involved in the Bluetooth standard products and is interested in contributing to this patent poll. It wants to be a part of Bluetooth ecosystem products because it opens a very wide market for its products. Consequently, this is a peculiar situation because this company does not patent in order to exclude others from using its inventions, but to put it into the open standard and to encourage others to use this particular innovation in their products, as well.

TABLE 1:Results of interviews.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **COMPANY A** | **COMPANY B** | **COMPANY C** | **COMPANY D** | **COMPANY E** | **COMPANY F** | **COMPANY G** | **COMPANY H** | **COMPANY I** | **COMPANY J** |
| **basic information about a company** | Software for the Internet of Things | Monitoring of smart building construction systems | Technology for smart real-estate management | Application of the artificial intelligence in economy | Solutions for verifying online identity  | Creating internet sales platform | Business analytics tools | Decentralized communication between smart devices | Code analysis tools | Picture analysis tools and sensors |
| **fact of patenting / non-patenting software and reasons of this decision** | YES-About 50 patents in the US – about 30 of them are expanded to other countries-US patents are enough in most cases because this market is sufficient as an entry-barrier in the global scale-They bought several third party patents in the past-Only defensive reasons – they are not going to sue anybody- They do not patent for protection needs-They patent to be able to contribute to a Bluetooth standard | YES/NO-They do not patent strictly software, but they have got other patents-Their projects are too big to be able to patent them as a whole-They do not want to waste time for checking the patent state-of-the-art-As a small company they could have difficulties in executing their rights in case of infringement-The cost of patenting is seen as a problem-They expect to get some revenue from selling a certain product before bearing the cost of patent procedures | NO-It is seen as too costly and difficult- Several years ago they considered software patenting, but they decided that it was not necessary in their situation-They have got a competitive advantage even without registered intellectual property rights  | NO-It is hard to patent software because theoretically it is not patentable-If it would be possible to patent software without violating law, they could patent and bear costs of this procedure | NO-They do not patent because they act mostly in Poland and in Europe- If they open a company branch in the US, they would have to reconcile patenting software-Patenting does not bring operational benefits | NO-They believe that in Poland there is no need to patent software | NO-There is no need to do that-They registered a trademark once-They do not patent because they are convinced that the product protects itself and the code itself does not represent the main value on its own | NO-They think that time advantage is more important-The problem in patenting is the fact that it is necessary to reveal a lot – it is expected to describe in details how something works-They believe that it could be hard to execute their rights in a court (plus a problem with the duration of such procedures) | -NO-There is a lack of lawyers who understand IT-It is hard to find competent people to examine a patent purity- The process of patenting is too slow.- More important is to get a time advantage-It is impossible to successfully protect against IP violation | NO-Patenting procedures take too much time-They do not want to reveal solutions in patent applications, because it is easy to change a small detail of a patented invention and create a working imitation-They have got some bad experiences in registering a trademark in the US. |
| **identified purposes of software patenting (in general, not only from this company’s point of view)** | - To increase a company valuation and to be more credible for investors | - Possession of patents matters when a company is seeking for investors, especially in the situation when a  product is easy to be copied-However, a business plan and the market details are more important for investors in most cases | -It is useful in the context of a company valuation, therefore they suppose that it would be useful for them in 3-5 years | -In the situation, when there is no efficient technical protection, then some legal methods could be the only way to secure intellectual property | - It matters in the context of acquiring investors, but it is not necessary | -It is expected by some investors | -In Poland even investors rarely ask about software patents – it is not important for them | -It is useful only in small, narrow markets with very specific software (for example for oil companies)- Some investors ask about patents, but it is possible to convince them that a company policy is different and finally it is not a problem | -The only purpose of patenting software is to troll others- Very little usefulness in attracting investors could be indicated | -It is expected by foreign partners |
| **the scope of usage of alternative methods of intangible assets management** | -Company secrets are too “soft”, because clients and investors seek for patents | -Trade secrets are a good alternative for patents-Know-how is a sufficient protection – especially in more complex products which are joint with unique tangible elements of a product-Their products protect themselves with their complexity | -They base on time-advantage and quick development- They did not value their intangible assets, however they want to know the value of their intangible assets, but it is a too long and costly process | -Trade secrets are useful- The key aspects are the speed of action and customer service- Software itself is not unique enough and the main value for customer is beside software- They are aware of a big discrepancy between market value and replacement value | -Time-advantage is the most important-Trade secrets are useful- However, the most important element of a protection system are hardware devices (where their software could be launched) | -They do not need any particular protection because their software works on their servers – Trade secrets are present in their company but mostly in an informal form- The best strategy is to share the main solution cheaply or even for free and eventually earn on after-sale support | - The code is not a value -more important are people-Even if someone copied their software 1 to 1, then there is no danger of destroying company’s the competitive advantage (because they provide a unique user experience)- They do not value intangible assets because their business is based on personal brand which cannot be valuated properly-Trade secrets are important because of data provided by their customers- Software itself always stays easy to be copied, therefore they rely on different aspects | -Wide application of trade secrets (both in employee contracts and with external entities) -They do not valuate intangible assets, because there are no reliable methods to do that in start-ups. Moreover, they do not need this information for any reason-They widely share their solution, because they care about a range of their peer-to-peer network-They appreciate a strategy based on free-sharing and earning on providing the support | -Time-advantage is the most important-Company secrets are important mostly in the context of being stolen by employees-know-how plays a crucial role, but it cannot be protected in an efficient way  | -They rely on time-advantage-Additional protection comes from the fact that their software works only on their hardware-They valuated intangible assets on regular basis – but not as a replacement value but in terms of market potential |
| **dealing with the risk of unintended violation of somebody’s intellectual property** | -The company is not afraid about doing unintended violation- However, they admit that generally in the branch this risk is very high- A Bluetooth standard is some kind of protective umbrella | -If they entered the US market, they could insure from unintended violation- In such a situation they could carefully examine the-state-of-the-art- This risk was not a subject of detailed analysis – only in a general way | -In their business there is no high risk of unintended violation- As long as they do not exceed a local scale, they feel secure | -They have never experienced any unintended violation problems and therefore they do not identify such a risk precisely | -In Europe nobody cares about this risk and almost nobody examines a patent purity | -They do not have any anxiety and do not take any preventing actions | -They have never taken this problem into consideration- They believe that they are too small to experience this kind of problem | -They analyze similar solutions and competitors’ activities -Sometimes they hire patent attorneys- However, despite such actions the risk of unintended violation cannot be totally excluded | -As a result of being in Open Source, they are more exposed to intellectual property accusation- However, the open source society is liked and respected and this fact discourages from suing- They did not take actions to reduce the risk of unintended violation, although it is high | -They examine a patent purity at a very late stage – when they really commercialized (This stage occurs much later than preparation or even shaping of a product for a particular order)- The risk of unintended violation is present in this branch |
| **experiences with patent trolls** | -The company is not threatened by patent trolls activity and their possibility to take action were significantly reduced by the US court decisions  | -They were warned about patent trolls but they have not experienced patent trolls activity  | No problems | No problems | -As a result of doing business in Europe they are not threatened, but they are aware that in the US they could have such problems | No problems | No problems | No problems | No problems | -They received a proposal to patent software and became a patent-troll, but they refused that |

Source: Own research.

Despite the lack of patenting in most companies, almost each of them takes the fact that software is patentable into consideration. There are many reasons why they do not patent their software. The most common answer was a conviction that they do not need this kind of protection. They believe that in their branch time advantage is a better source of competitive advantage. They rather want to focus on developing a better version of a product than waste resources for gaining protection for something which in the meanwhile can get devaluated.

What has been noticed was the issue that describing details of invention in a patent application is required. This could make imitations easier. However, some part of software could be relatively easily decompiled, so even without revealing details of invention in patent application, imitators can obtain this kind of information. Yet creators of Software as a Service platforms rely on the protection which results from running the whole process on their own machines. Additionally, in some cases, managers desire patent protection for software but they recognize their products as too complex to cover such a wide area with patent claims. They also indicate that, inventing around a patent is relatively easy in the context of software.

There are also examples of lack of trust in legal enforcement of invention protection. Court disputes are seen as unpredictable and expensive ones. From time to time the researched companies can afford to bear the cost of getting worldwide patent protection. At the same time, they do not have enough resources to defend their rights in case of any violations. Moreover, it was mentioned that there was a lack of lawyers who understood IT well.

Nevertheless, the researched companies are aware of the legal framework of invention protection. They declare that they could be forced to pay more attention to software patents if they ran they business in the US. They are aware that in Europe, the role of software patents is significantly smaller.

In the Polish context, only one purpose of patenting software is widely recognized. This is useful to some investors, but only part of them ask about software patents. For this group of investors software patents could increase the valuation of the company. A significant part of investors, however, understand there are multiple strategies in managing intellectual property and they do not consider the lack of patents as a problem.

Instead of patent protection, most interviewed managers use alternative methods of intangible assets management. The most popular one is the above mentioned time advantage. The second popular instrument is trade secret, which is used together with the time advantage. There is also a widely spread conviction that an appropriate merge of software and hardware (for example: the offered software can be launched only on the machine created by the same company) is a better protection than patenting.

In some cases, companies provide their products for free (or at a very low price) but they build their business model on providing after-sale services. They are aware that as creators they are the most desired trainers, implementers and servicemen for these products. In such situations, they do not care about excluding anybody from using their products because the key issue for them is to build as big market for providing complementary products and services as possible. Consequently, such solutions will become the most important source of income. Such steps are mostly visible in peer to peer mechanisms.

In the context of intangible assets management, it is worth mentioning that the interviewed managers do not recognize any appropriate methods of measurement and valuation. Even if they aware that they do not have enough knowledge in this area, they cannot find any appropriate solutions. They are aware that the real value is quite different than the simply calculated replacement value.

The research revealed an important role of Open Software. Even if a company does not contribute, it uses many open source solutions. Sometimes this kind of software is recognized as a poor quality one, but even then some companies are interested in developing products which are the enhanced version based on open software.

In the literature one of the biggest problems related to software patents is a high risk of unintended violation. Most researched companies are aware of this danger but they do not take any significant actions to reduce it or actively manage it. They believe that in the Polish context they can feel safe. However, all the interviewed managers are aware that in the case of operating in the US or significantly increasing the scale of their activities, they need to examine patent purity. This sense of security is justified because the interviewed companies have not been affected by lawsuits.

Therefore, it is not surprising, that most interlocutors are favorable the idea of excluding software from patenting. This kind of protection is useless or inaccessible for small and medium-sized companies. However, they have to deal with patent thickets which are created by mass software patenting.

**Discussion**

The results of this text correspond with some reasons for malfunctioning of software patents which were indicated in the literature before. The analysis of the literature and available data makes it possible to indicate a number of reasons causing malfunctioning of patents in relation to software.

Generally, the authors identify 12 factors responsible for negative assessment of patenting in the context of software. None of these authors identifies all 12 factors. The cited authors focus rather on details of a certain issue. As result, they do not notice the whole picture and the relations between the issues (first of all, what the reason and the consequence is). Therefore, the wider analysis in this text can provide some new insights.

The list of issues related to negative effects of software patenting:

1. Lack of need for patenting in software branch[[10]](#footnote-10)

2. Use of patents against their model socio-economic purpose[[11]](#footnote-11)

3. Determination of the requirement for non-obviousness at a low level[[12]](#footnote-12)

4. Rapid growth of granting software patents[[13]](#footnote-13)

5. Acceptance of functional claims by patent offices[[14]](#footnote-14)

6. Fuzzy boundaries of certain patents[[15]](#footnote-15)

7. Low average value of software patents[[16]](#footnote-16)

8. Emergence (formation) of “patent thickets”

9. Formation of a convenient space for non-practicing entities[[17]](#footnote-17)

10. Major obstacles for free software developers[[18]](#footnote-18)

11. Increasingly stronger restrictions on the possibility of implementing large projects

12. High risk of litigation.

Software patents have taken very deep roots and they appear as elements of innovation in so many different sectors that today even the radical opponents of software patents do not propose their complete abandonment, but only a far-reaching restriction. From the point of view of a present perspective, one can specify a range of damages that have been caused by the liberalization of patent offices policy in the area of software patenting. Reversing this trend appears to be feasible, however, because even defining software patents seems to be very difficult. Many of the solutions in this category are in fact heavily interlinked with other - purely technical - solutions for which there are no reasons for restricting patenting.

However, there are also examples of the negative consequences of non-patenting strategies. It is the result of a wide-spread conviction that patent is the main innovation indicator. As the result, many small companies are undervalued when they do not own a patent portfolio. It is hard to indicate the precise difference, but many investors are looking for patented technologies. As the result, a more open strategy could slow down the development of such companies.

**Summary**

Interviews with managers of IT start-ups revealed that not every issue which was identified in the literature of software patents exists in this kind of companies. However, the gathered data shows that, in fact, software patents are not useful for these companies. This is in contrary to officially declared purpose of legal invention protection - to protect small inventors against bigger competitors.

Moreover, in most companies the fact that software is patentable is a source of problem in the context of unintended violation risk. The interviewed managers see patents as a game which is reserved for the biggest players. And this game is not about protecting inventions, but it is rather some kind of an armed race.

As it was described above, the large scale of software patenting entails negative effects for each of the analyzed stages:

a/ before creation of intellectual property – because it discourages from doing business in the area which is covered with patent thickets. As result, it is an extremely high entrance barrier caused by uncertainty in many areas. It mitigates innovation in key economy branches when software patenting is widely-spread (USA) and it does not have such consequences if software patents are rare (for example in Poland).

b/ creation of intellectual property – it encourages to base on the model software-as-a-service even if it is not the optimal business strategy. Moreover, it discourages from creating complex projects because of the high risk of litigation which could delay premiere or even block the entrance to the market.

c/ selection of IP management method – companies decide to patent not because it is seen as the best method of protection. They do that despite the fact that it is not the most suitable tool to manage their IP. They are forced to patent against its social and economic purpose.

d/ enforcement of the rights – weak patents make court disputes unpredictable. The plurality of patents on the one hand creates a wide area of huge unpredictability and on the other hand provides relatively low probability of effective legal enforcement of IP rights.

The researched companies proved that it is possible to find non-obvious business models which let them profits. However, it requires extremely fast improvements in order to be able to use time advantage. Sometimes, there is a need to find the main source of profits beyond the primary activity and gain income from after-sale services and selling complementary goods as well as services. The researched companies declare that they could be forced to pay more attention to software patents if they ran they business in the US. They are aware that in Europe, the role of software patents is significantly smaller.

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