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INVESTIGATION OF INDUSTRIAL INTELLECTUAL PROPERTY PROTECTION METHODS AND THEIR IMPROVEMENT

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Abstract. This article main purpose is to analyse the existing industrial intellectual property protection methods and to provide some suggestions for improvements. It gives insights on all possible protection methods, when it is best to use it and how to choose. This article shows a different approach taken to solve a complex and lengthy process. In this paper, Business Process Modelling techniques have been introduced and applied providing a different point of view to solve some of the issues. The main idea is to remove non-value adding processes and introduce ICT based software between different parties involved.

Keywords: intellectual property, industries, protection, investigation, improvement, patent, utility models, application.

Introduction

More and more people (business industries, companies, universities, even countries) are focusing and giving more attention to intellectual property (IP). First, it is important to know what intellectual property is. It refers to creations of the mind like inventions, literary and artistic works, symbols, names and images used in commerce.

There are several compelling reasons why it is important to promote and protect intellectual property. For the well-being and future of humanity we must create and invent new works in the areas of technology and culture. Moreover, the legal protection of new creations encourages the commitment of additional resources for further innovation. Lastly and significantly, it spurs economic growth, creates new jobs and industries, and enhances the quality and enjoyment of life. Having assessed the growing importance of intellectual property and its protection methods, both globally and nationally, I have chosen to examine this theme on the final work.

In this research, the already existing methods of intellectual property is being analysed and survey carried out. After, the results are being investigated and an approach is being chosen. Finally, the improvements are being suggested. A new enhanced method should be designed and used for industrial intellectual property in any size of companies or individual researchers. The research will cover the analysis of people questioned and the models created by modelling techniques.

So far there are many different researches about how governments and responsible entities are trying to deal with separate problems arising in the field of intellectual property protection. One of the huge proceedings which is now in progress in making Unified Patent and Unified Patent Court. This should help with some of the issues like making patenting process faster and cheaper, but not all issues would be touched. In my research I will focus more on over viewing all possible causes of making intellectual property poorly protected and how all those issues affect researchers and inventors negatively as well as greatly influence innovation, competition and economy in general.

1. Problem analysis and formulation

Currently, in intellectual property field used protection methods still have many disadvantages and loopholes where inventors are not protected. Those conditions are especially hard for small companies or individual inventors because patenting or other protection methods are very expensive and usually time consuming (can take up to 4 years) and by then market may have changed or

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technology may have overtaken your invention. Conditions are literally working against the inventors and scientists. In addition to that even when a person patents his invention or product, it can still be stolen or copied, so the inventor should consider his ability to defend his patent in case of infringement. And that must be done even before applying for patent. It goes without saying that timing is very important in all stages of thinking about patent. And these are the problems which are similar in all countries.

One more issue is that even though patenting and other methods are considered as a way of sharing technology, ideas and promoting scientists to do more and more in research field, statistics show that most firms use the patent system to prevent other firms copying their technology and blocking. It means that owners wish to prevent others from using the technology and creating. It is obviously a potential danger and concern because patents should be encouraging the innovation, not opposite. Two important strands of literature investigate the way the effect of intellectual property rights (IPR) on innovation depends on either the initial IPR level or the level of economic development (Hudson & Minea, 2013). While thinking about economy it is believed that stronger intellectual property systems engender higher levels of economic complexity. Nevertheless, only countries with an initial above-average level of development and complexity might be able to enjoy this effect (Sweet & Maggio, 2014).

Other concern is intellectual property laws distinction between many countries, it is especially visible between US and EU patent systems. There is long history with an issue of patent harmonization. And it is one of the things which should be tried to be solved.

Another less know and acknowledged issue is patent thickets which is the result of the companies competing to create or acquire enormous patent portfolios which gives the company advantages against others. Usually this happens in the industries where one product is covered by many different patents meaning there are many different patent holders. There is a mutual dependence since the other companies also need licenses and they end up granting cross licenses (Shapiro, 2001). It is believed that patent thickets slow down the innovation as well as increase the costs of research and development. This might decrease the work of small companies and individual researchers, because large companies which hold many patents might not even allow those without patents to enter the market (Wagner, 2015).

All the problems are shown in problem tree (Figure 1).

In the middle of the tree there is a core problem which is formulated as a "Intellectual Property and their owners are poorly protected". That is the consequence of immediate and secondary causes like "poor conditions", "patent thickets", "government failure" and so on. What was not mentioned is modularity which despite bringing many technical and organizational benefits, including the division of labour, reduced cognitive complexity, and higher adaptability, it is not always straightforward for firms to

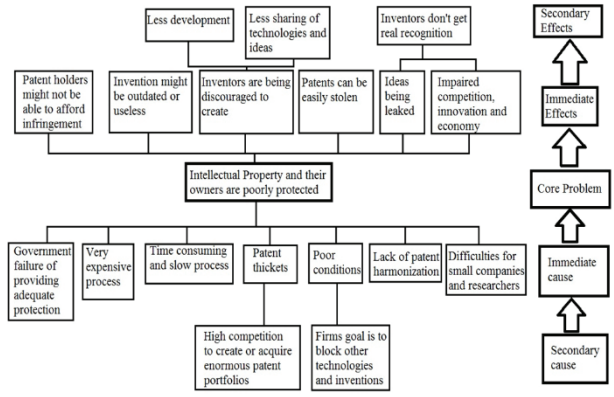

Figure 1. Problem tree (created by author)

capture value and protect their IP in a modular system. In fact, modularity is considered to increase threat to IP (Baldwin & Henkel, 2015). All that leads to the problem and then to immediate and secondary effects like "patents can be easily stolen", "ideas being leaked", "impaired competition, innovation and economy".

2. Theoretical part of industrial intellectual property protection methods

It is best to start by first analysing what is intellectual property and overviewing the protection methods for industrial property used nowadays as well as some alternatives.

Intellectual property (IP) is non-material property, which is the human creative spirit and mental work result, mind product, protected by law like any other form of property. Intellectual property law protects inventions, creativity and ingenuity. Looking at the industrial property protection there are 3 main ways:

- Registered designs.
- Registered trademarks.
- Patents and utility models.

It is important to note that patents can be quite useful in some situations. For example, it can help to find out what already exists and build on it, to keep track of who's doing what, to avoid infringing other people's patent rights and to improve the quality of your patent applications. It is relatively easy to find the needed patent because Patent Offices have classified all of them, for that they use International Patent Classification (IPC) with its extension The Cooperative Patent Classification system (CPC).

Also, there are many alternatives to patents which might be more suitable for specific cases or fields. For example, in semiconductors industry there are two other methods considered to be more superior than patenting. It is namely secrecy and lead time or first mover advantage. It is especially more valued by small companies who are just using patents to acquire venture capital. Many alternatives strategies to patents have been developed by the companies. These are secrecy, accumulated tacit knowledge, lead time, product complexity, standards, branding and

many other. This was because they felt other forms of IP protection were better suited to their needs (Leiponen & Byma, 2009).

Considering an issue, one of the factor is poor Intellectual Property protection and rights as it also affects innovation due to clear relationship and nonlinearities between IPR and innovation (Papageorgiadis & Sharma, 2016). One of the things influencing this is that firms' goal is to prevent other technologies and inventions. These days patents are very valuable to researchers and scientists. They can use previous patents to see how the problems they face have been tackled in the past. Also, they can identify how their current area of work fits in with those areas of science and technology that have been developed and patented previously. All this industrial intelligence can help research teams and companies to develop and modify their own strategy or to pursue a different approach to a problem (Trott, 2012). According to Professor William Haseltine, who has been working on deciphering the DNA of the HIW virus, the patents stimulates innovation. He also said, "I can think of no case in which a patent has ever inhibited an academic scientist." But there is a different approach to this question too. In a Table 1 which is shown below you can see the reasons why firms patent. Most firms use the patent system to prevent other firms copying their technology and blocking. When we mention blocking, it refers to owners of a patent preventing others from using the technology. It is obvious now that there is a potential danger and concern because there is increasing evidence that now firms use patents to prevent others from developing technologies even though the aim was to encourage the innovation (Quinn, 2011).

It is also important not to forget that the process is very expensive. There are high fees for obtaining the patent and keeping it. And even if entrepreneur can afford these costs, protecting a patent against possible infringement can simply be prohibitive. In case you would need to go to the court regarding the infringement you must be able to finance the case, which many small companies cannot do. Therefore, many entrepreneurs consider the whole issue of IP as nothing more than a smokescreen (Greenhalgh, 2010).

Table 1. Reasons why firms patent (source: Cohen, W. M. (2002). Patents: their effectiveness and role. Carnegie Mellon University & National Bureau of Economic Research)

	Products, %	Processes, %
Prevent copying	96	78
Patent blocking	82	64
Prevent suits	59	47
Use in negotiations	48	37
Enhance reputation	48	34
Licensing revenue	28	23
Measure performance	6	5

One more important factor is that the process of patenting (the most popular method of protecting intellectual property) is very time consuming. This includes the lengthy process to write and file for patent, then it typically takes around 3 years until it is granted. Figure 2 below depicts how many patents worldwide are still undetermined. Moreover, obtaining and then defending the patent also consumes a lot of time (Colson, 2007).

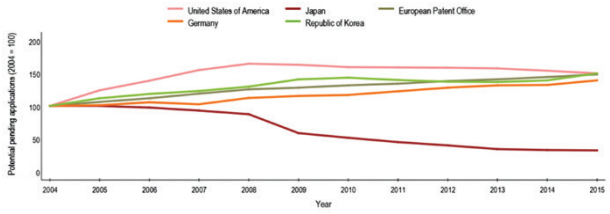

Figure 2. Potentially pending applications at the top offices (source: WIPO Statistics Database, October 2016)

Note: Application processing varies across offices, making it difficult to measure pending applications. In some offices patent applications automatically proceed to the examination stage unless applicants withdraw them; in other applications do not proceed to the examination stage unless applicants file a separate request for examination. Data for the State Intellectual Property Office of China, the office that receives the most applications, were unavailable.

3. Background for suggested solutions

One of the solutions which is already in progress is creating Unitary Patent Protection (UPP) & Unified Patent Court (UPC). The aim of the reform is to offer business an alternative by simplifying the existing system and support a cost-effective route to patent protection and dispute settlement. With this being introduced there will still be possibility to use old patent system meaning that in the future there should be three routes to patent protection in Europe. Shown in the Figure 3.

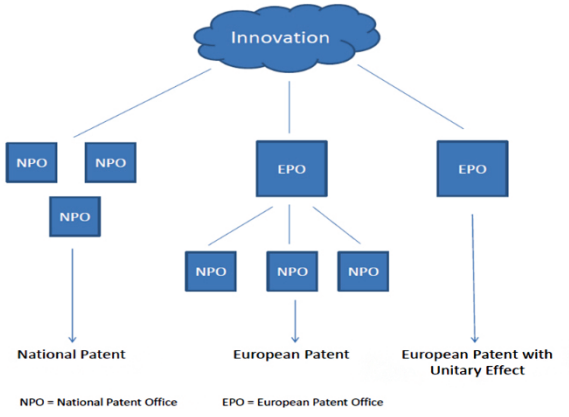

Figure 3. Routes of possible patent protection (source: EPO Database)

Another source is "FT.com" where H. Greenhalgh wrote an article about theft of intellectual property and whether it should be a crime. This issue is one of the few immediate effects which is caused by poor IP protection.

By some of the inventors and entrepreneurs it is believed that their intellectual property (IP) is being stolen and the government as well as the courts fail to offer adequate protection. It is believed that the ruling is not adequate, for example if someone steals from you, that person is probably going to the jail, but if someone were to steal your IP, it might just be a civil case and that's if a victim can afford paying a lot of money to the lawyer. Even with a patent, copyright or trademark in place, IP theft is still very common.

And even if entrepreneur can afford these costs, protecting a patent against possible infringement can simply be prohibitive. In case you would need to go to the court regarding the infringement you have to be able to finance the case and many small companies cannot do. That is the reason why many entrepreneurs consider the whole issue of IP as nothing more than a smokescreen.

One of the solutions of protecting your idea being leaked and gaining a trust with your colleagues is that all parties concerned on this matter would agree to sign a non – disclosure agreement. At least in UK, the Intellectual Property Office has shown no plans of making patent infringement into a criminal offence. And without this the inventor will not get a real recognition. Baylis says: "We have to make society realize that the most important thing the nation has is knowledge and creativity."

A non-disclosure agreement (NDA), sometimes called a confidentiality agreement, allows a company to share its IP with others, whose input it needs, without unduly jeopardizing that information (John Reh, 2016). For example, if you have a new product or feature in development, but you need to consult an expert for advice on how to proceed, an appropriate NDA can ensure that the expert does not hand the details of your new product to a competitor of yours. It is a legal contract between you and the other party in which you agree to disclose certain information to them for a specific purpose and they agree to not disclose that information to anyone else.

4. Empirical research for protection methods and improvements

For my work I decided to choose qualitative research methodology. The human instrument applies appropriate data collection technique, complemented by tacit knowledge to the investigation. As for research methods I am planning on using survey. The purpose of survey research is to gather and analyse information by questioning individuals who are either representative of the research population or are the entire research population. The aim of survey research is to study relationships between specific variables, which are identified at the outset of the research and stated as either a hypothesis or a research question, or to describe certain characteristics of the population.

In my research I will use a questionnaire-based survey which we will send to the chosen participants via email or other communication platforms. Questionnaires provide a relatively cheap (in many cases free), quick and efficient way of obtaining large amounts of information from a large sample of people. Data can be collected relatively quickly because the researcher would not need to be present when the questionnaires were completed. This is useful for large populations when interviews would be impractical. It can be an effective mean of measuring the behaviour, attitudes, preferences, opinions and intentions. The length and tone of your survey dramatically impact your response rate. If survey is long and your questions are text heavy, respondents can feel overwhelmed and exit your survey therefore it is important to take time while preparing survey (Beard, 2013).

While choosing the methods it was also taken into consideration probable effects of survey design and methods on the feedback obtained when interpreting that feedback (Duncan, 2008).

Starting from the beginning I will overlook the answers of the survey which show more importance.

So, first it is interesting and important to know what business/field interviewed people represent. It includes: agriculture, engineering, innovation management, food technology, food and safety, industrial engineering, insurance, management engineering, manufacturing and mechanical engineering, physics, production of medical equipment, architecture, mechatronics and robotics, production management and so on. It is shown in Figure 4. It is also important to highlight that some of interviewees do not work on innovation now.

For my project, it was very important to establish what patents and other protection methods means to participants and how they see it. In the Figure 5 below there are few sentences stated and participants could choose up to 3 options which, in their opinion best represents forms of protection. The top 3 ideas were:

– "It helps to protect your idea from being leaked";
– "Patents can be easily stolen";
– "Does not provide adequate protection for creators".

In the Figure 6 there are some of criteria which participants had to rate. From this I can highlight that the most important were quality and speed. Price was relatively important too.

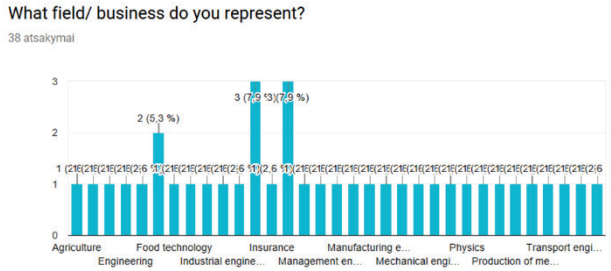

Figure 4. What field/business do you represent?

For making some conclusions later, I wanted to find out what in participants' opinion are the bottlenecks of existing methods. In the Figure 7 there are few of them, and most likely the most important are "Time consuming and slow process", "Expensive process".

For these and many other reasons, most of the participants believes that intellectual property protection methods need improvements in the future (Figure 8).

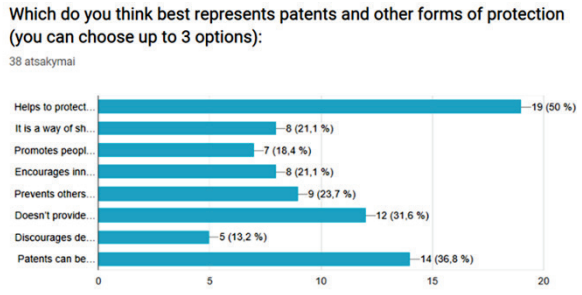

Figure 5. Representation of patents and other forms of protection

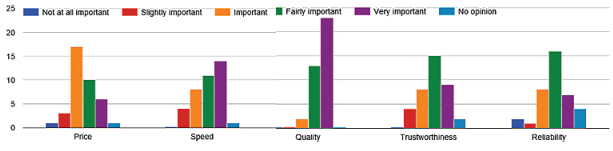

Figure 6. Rating of criteria while choosing protection method

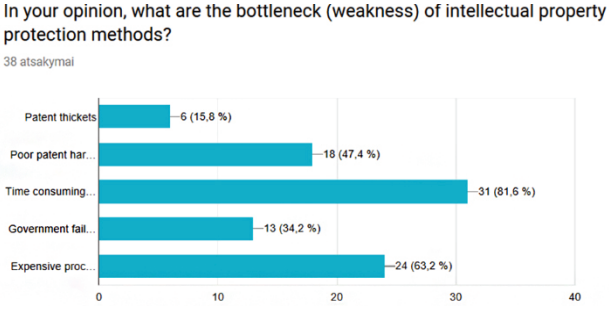

Figure 7. Bottleneck of intellectual property protection methods

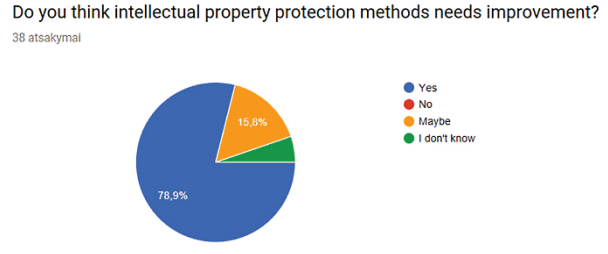

Figure 8. Need of intellectual property protection methods' improvement

5. Recommendations

Looking back at the carried-out survey, the last question should be considered one of the most important. In that question there were few possible solutions provided for improvement regarding different problems and aspects. Participant evaluated all of them in the scale saying which of them, in their opinion, would be most helpful and which would be least helpful (Figure 9). In this closed question the options were:

- Reducing the time required to acquire a protection for your innovation/idea/product;
- Promoting knowledge management in the companies/society;
- Removing or reducing the gap between differences of intellectual property laws enforcement throughout EU and US;
- Changing the approach of companies which only use patents to block/prevent other technologies and inventions;
- Making patent infringement (theft) into a criminal offence instead of just civil case;
- Cutting the cost of intellectual property protection methods or making a reasonable paying plan to help inventors, especially in case of infringement case;
- Creating a unified application processing system for all patent offices (instead of waiting for applicant to file a separate request for examination, the application should be proceeded to examination stage automatically in all offices unless applicant withdraw it);
- Establishing a separate national office or providing a separate service which would help patent holder in case he needs financial help or legal consultation while protecting his innovation (specially in courts in case of theft and ideas leakage).

First of the options, which participant thought would be most helpful was about patent infringement. They agreed that in case of patent theft it should be a criminal offense and not a civil case. The theft of idea/innovation/

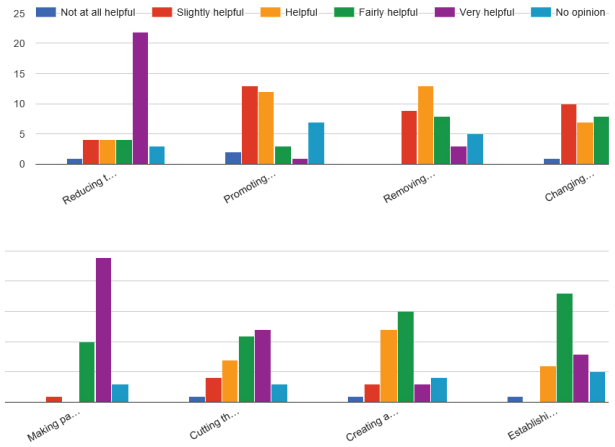

Figure 9. Changes which would help enhance methods of intellectual property protection

patent should be considered equally as a theft of physical goods (car, phone, money). This change could lead to great improvements in the future, but to prepare the plan and implement would be extremely hard, because many changes in laws should be made.

Another suggestion was to reduce time which is needed to acquire a protection for your idea/innovation/product. It is important for innovators because, for example patenting process may take up to 4 years and by then, the innovation might be irrelevant. Reducing time is closely related to another idea mentioned in the survey, which is "Creating a unified application processing system for all patent offices (instead of waiting for applicant to file a separate request for examination, the application should be proceeded to examination stage automatically in all offices unless applicant withdraw it)". It is one of the ways to reduce time and at the same time to reduce work load for workers in patent offices.

One more helpful suggestion was to establish a separate entity/service/office which would help patent holder in case he needs financial help or legal consultation while protecting his innovation (especially in courts in case of theft and ideas leakage). This would most likely stimulate the development and innovators to continue to create because they would get recognition and courage to protect his intellectual property in court. Depending on the needs, it could be established in every Europe country or just in the most important countries concerning patenting.

6. Methodology for designing solution

After the implementation of a survey research among people who work in innovation and development field in any size of companies or as an individual researcher I need to prepare methodology for designing solution. The focus was to find the biggest bottleneck which influences used methods the most and which improvements would be considered most helpful.

The way I designed the survey should help to find out the performance gap between current and desired performance. After data collection and investigation, I will improve or create a new possible model of protection method. For this task I am going to use techniques like IDEF0, BPMN and possibly UML which are qualitative analysis techniques for modelling business processes before (AS-IS) and after changes (TO-BE), making it easy to compare and make conclusions. These techniques are supported by software like Microsoft Visio and Bizagi. All modelling possibilities are shown in the Figure 10. In each of them, process is represented through graphical notations as well as with explanatory text.

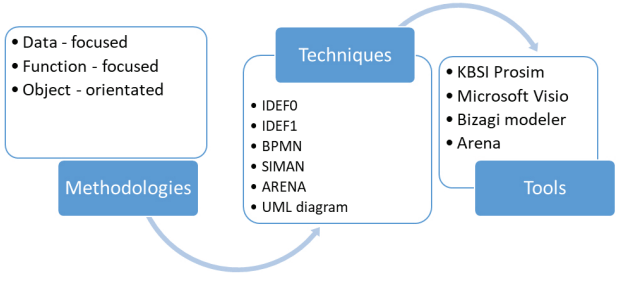

Figure 10. Process modelling steps (created by author)

After modelling, the next step will be to prepare an implementation method and suggestions. This step is very important and therefore should be well asserted. For that existing implementation techniques should be analysed and used properly.

7. Designing solution using business process modelling techniques

At this step I will model a "Management of Application and Issue of the Patent" process. First, I am going to start with an existing model (called "AS-IS") and then continue with an improved model ("TO-BE"). I will do it using two modelling techniques – IDEF-0 and BMPN known as a Business Process Modelling Notation. The difference between these two are that IDEF-0 modelling technique graphically represents "what" does a process through the conduct of its activities meanwhile BPMN modelling technique shows "how" these tasks are performed.

While modelling with IDEF-0 technique, first step is to identify: context, purpose and point of view.

1. Context: Management of Application and Issue of the Patent.
2. Aim: to analyse the process and clarify the hierarchy among the tasks to identify which steps of the process are the more critical (unnecessary) and how to change it.
3. Point of view: Patent applicant.

It was chosen the perspective of patent applicant to develop a model because it is a central figure in the process being analysed, as it relates to all processes mentioned. This allows me to have a more objective vision of the entire process.

Once defined context, purpose and viewpoint, development of the context Diagram (A-0) (Figure 11) has been started. This, separating the problem being analysed from the neighbouring environment, automatically defines the context. The inputs are the actual request for patent by the applicant and the paper forms that during the process will be used to. The resources needed to carry out the process are the human resources (including Patent Office workers, examiners, Agent or Lawyer) and the supporting devices as phones, scanners, printers and computers.

As for restrictions, the diagram shows how the process is subject to the legal regulations, time and budget. Another constraint is the type of patent and application because different type may require different documentation and way of doing it. First, according to the patent validation countries, patent's application might be National, Regional and International. It also depends on the product being patented, for example you can request for utility plant, plant patents and design patents. Finally, the output is the real issue of the patent.

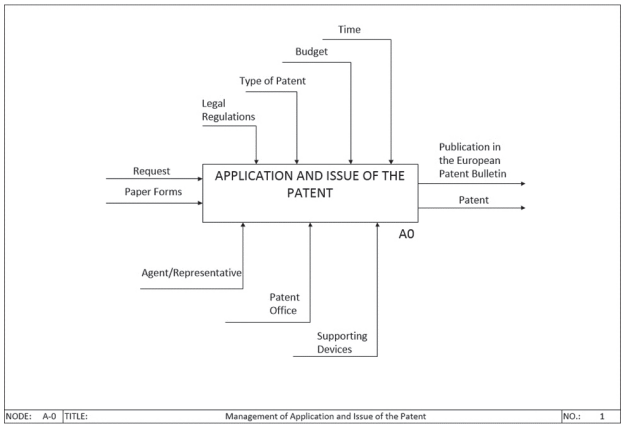

Figure 11. Diagram A-0, Management of Application and Issue of the Patent (AS-IS) (created by author)

Proceeding to the decomposition of the context diagram you see 3 main activities (Diagram A0) (Figure 12):

Preparation of Patent Application. This activity is mostly influenced by such constraints as type of patent and standards. During this step the most needed resources are agent or representative and supporting devices. It is clear, that during this step working together with the agent, the patent applicant must do a thorough research, prepare all documentation which includes a request for a patent, details of the applicant, a description of the invention, claims, drawings, an abstract. The output is final and full application.

Application Filing. This activity starts after application is submitted by applicant and his agent. The constraints are time, budget and legal regulations. This activity is further decomposed into four subtasks (Diagram A2) (Figure 13). First is Submission of the signed documents and payment of application fee. After that, the application is given a filing date - also known as your priority date. After filing there is an examination for filling and formalities to ensure that your documentation is correct and complete. At any time in the next 12 months applicant can file for patent protection in other countries and have those later filings treated as if they had been filed on your priority date. In practice, this gives you a year to decide how many countries you wish to include in your patent protection. After this subtask, if there is no need for corrections they continue to "Search of patents". The output of this subtask is a search report which is sent to you. It includes listing, copies of all prior art documents found by an experienced examiner and regarded as relevant to your invention. The search is based mainly on your claims for novelty, but your description and any drawings will also be considered. The report will often include an initial opinion on the patentability of your invention. Next and final subtask of this activity is "Publication in database". The application is published 18 months after the filing date. The invention will appear in databases accessible to other people around the world. It will act as prior art against any future patent applications from other inventors or companies for similar inventions.

Prosecution. This activity consists of six subtasks (Diagram A3) (Figure 14). The applicant has six further months to make two decisions. The applicant has six further months to make two decisions. First is to decide which countries to include ('designate') in patent protection which is followed by designation fees payment. And another important decision is whether to continue with application. In this case applicant must request a more thorough ("substantive") examination and confirm application. If request of substantive examination is made, the Examining Division of Patent Office must decide whether invention and application meet the requirements of the European Patent Convention. For maximum objectivity there are usually three examiners, one of whom maintains contact with your agent (patent attorney). This stage will often involve dialogue between the examiners and patent

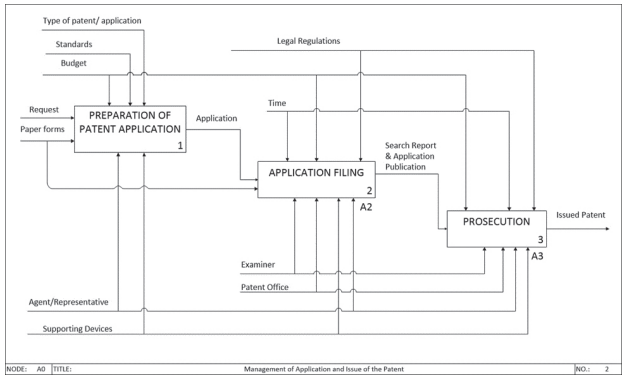

Figure 12. Diagram A0, Management of Application and Issue of the Patent (AS-IS) (created by author)

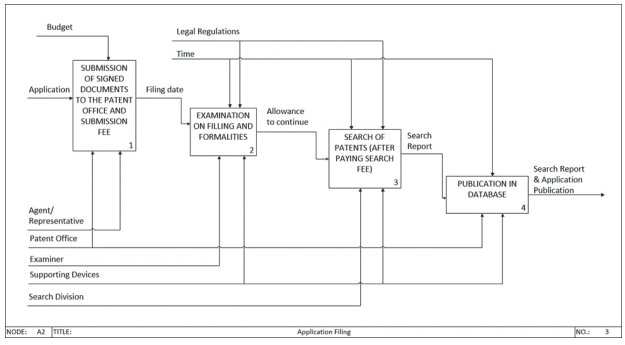

Figure 13. Diagram A-2, Application Filing (AS-IS) (created by author)

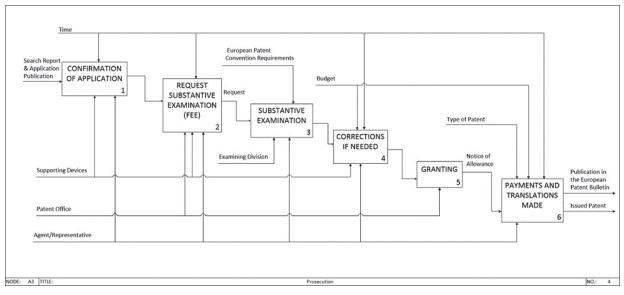

Figure 14. Diagram A3, Prosecution (AS-IS) (created by author)

attorney, which may result in the re-drafting of key parts of application. Patent attorney will defend your application, and this is one more reason why it is essential to have professional representation. Later, corrections may be done if needed. After the patent is granted, applicant must pay all the fees and file claims translations. The output of this subtask is the final output which is publication in European Patent Bulletin and issued patent.

After having thoroughly analysed the Management of Application and Issue of the Patent process with modelling AS-IS and also carrying out the survey, I have suggested a few small improvements. The most critical and time-consuming sub process is prosecution. I have decided that "Confirmation of application" and "Request of substantive examination" are not necessary activities so it can be removed (Figure 15). In this case after first examination and publication of search report, the examination should continue automatically, unless the applicant submits a withdrawal. The fee of examination would be paid together with the final fee and that would cut the time.

This is only first of the suggested improvements which would help to reduce the time needed.

After "Management of Application and Issue of the Patent" process has been modelled with the help of IDEF-0, I proceed with modelling using software Bizagi through BPMN to show how the process is done. First, the actors involved has been defined and presented. These are patent applicant, agent/patent attorney and Patent Office.

In Figure 16 it is shown one of critical phases where are number of unnecessary processes like confirming your

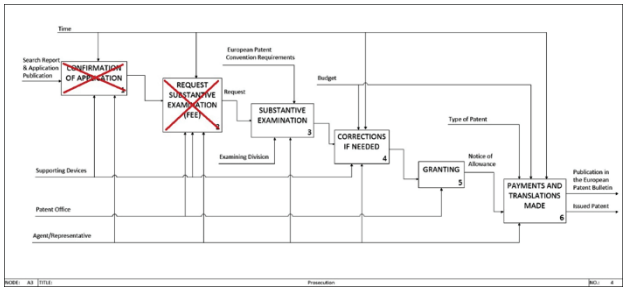

Figure 15. Diagram A3, Prosecution (TO-BE)
(created by author)

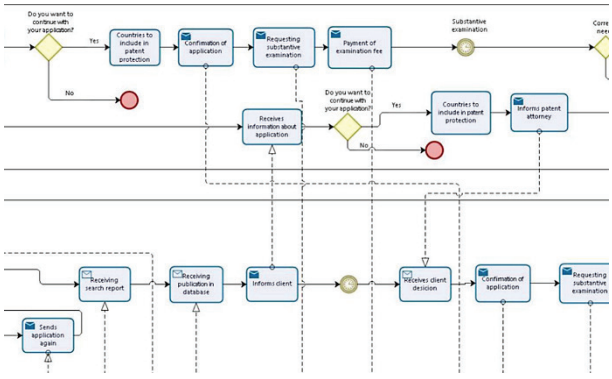

Figure 16. Critical phase 1 of BPMN Diagram
(created by author)

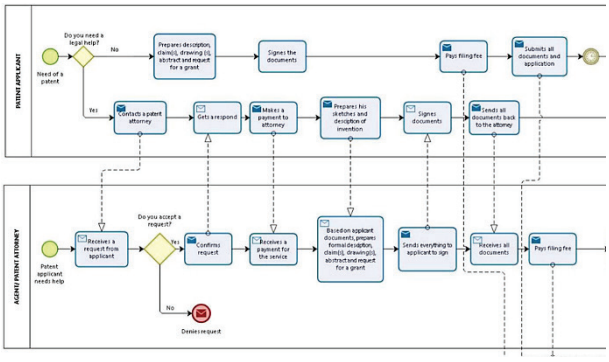

Figure 17. Critical phase 2 of BPMN Diagram
(created by author)

application and requesting further examination. Another critical phase, especially for reducing time needed could be introducing a special platform/ software by using ICT (Information and Communication Technologies), where all three parties – applicant, agent and Patent Office could upload, update, make corrections to application and cooperate to each other.

It is illustrated in the Figure 17 how many times information must be exchanged just at the tiny part of the process between agent and applicant. Then it produces a waiting time for responding and managing.

After modelling with Bizagi software and analysing the flow, an outcome was that and ICT should be used to introduce a platform for all 3 parties to communicate easily and quickly. For businesses, advances within ICT can bring a slew of cost savings, opportunities and conveniences. ICT encompasses both the internet-enabled sphere as well as the mobile one powered by wireless networks. It could be an ICT based cloud/platform providing user-centric services. That means content would be shared in a user-friendly and secured way. It would be able to give personalized service provision based on real time data. It would also notify all parties included immediately if any changes were to happen to the application (Rorís, 2016).

The platform should meet some conditions:

- Cost-effective and universal: the use of the platform should not require a relevant cost in effort or resources, no especial technological skills should be required.
- Reusable: the platform must be adaptable to changes in the procedures and applicable in different contexts.
- Security constraints: the system must ensure data will not be accessed without proper authorization.
- Flexibility: allow making changes, editing and managing application related fees.

All that would eventually lead to the better flow of messages and allow modifications to happen faster.

Conclusions and proposals

The aim of this work has been to analyse existing industrial intellectual property protection methods and provide possible solutions for further development. It has been

established that this is important subject as patent system and intellectual property in general, are valuable source of technological knowledge and it is used by many companies. It also encourages growth of innovation, economy and quality of life.

During theoretical analysis the main issues affecting protection methods were discovered. These included high expenses in case of infringement, impairment of innovation, time consuming and slow process, ideas leakages, lack of patent law harmonization. Literature review presented not only already main existing methods, but also alternative ways used to protect industrial intellectual property. In addition to that, many specific and exceptional cases were discovered, which was used for creating a better survey. According to authors analysed, some legislations can create a barrier for innovation and discourage researchers small – medium size enterprises to work in this field.

After gathering information from different sources including main databases of European Patent Office (EPO) and World Intellectual Property Organization (WIPO), the questionnaire-based survey was prepared allowing to carry out the empirical research. It is worth stressing out that date received from this research support theoretical issues discussed in the work which was done before. During this part of research, 38 participants were questioned, which is equal to 58% of the whole extent of the research. They were given 19 different questions.

Some of the findings from empirical research were that 78.9 percent of participants use or are planning to use intellectual property protection methods meaning that the problems are relevant to them. According to the results, higher number of questioned people are going to use it in the country their live, and due to the extent of questioned people, it is mostly in Europe. That brought attention to legal aspects of protection system and government role towards intellectual property. From the survey it was found out, that around 60 percent of participants were not aware of its role thus questioning involvement of government in general. Nonetheless 19 percent of the rest of the people acknowledged that government do not provide adequate protection for creators. At this part some limitations were faced because laws take effective time to be considered and changed. Other important data received from survey was that 78.9% participants believed protection methods require improvement. According to participants, the most important criteria while choosing protection method was quality, speed and price, which lead to discover that the most helpful changes would be reducing time required to acquire protection thus speeding up the processes in general and minimizing the fees.

After empirical data was analysed, the methodology for designing solution was prepared. The novelty of this part was, that a slightly different approach was chosen and Business Process Modelling techniques were applied. With the help of two qualitative analysis techniques IDEF-0 and BPMN, the process of protection acquirement was visualized, what and how happens currently and with suggested changes were presented. The main finding of the modelling part was that the application management process has some non – value adding activities which only lengthens the process. As suggested, the removal of such activities as "Confirmation of application" and "Request of substantive examination" would significantly reduce the time of the process, which was acknowledged in the survey as one of the key issues. Another factor influencing the length of the process was heavy and slow flow of information and documents between involved parties. Due to many people being involved, the process showed some delays which could be reduced by inserting ICT based platform and simplifying protection system.

Improvements suggested in this research could lead to minimizing some of the issues raised in this thesis. The outcome of this research could stimulate positive implications in the companies and industry field, as well as promote innovations and fair competition between researchers.

For future work, a deeper analysis and modelling of other phases of the protection process could be done. From each part of the research, more critical stages of protection methods were highlighted. One of the options which could be pursued in the further work is focusing on the processes, which comes after acquiring protection and in cases of theft or ideas leakage. There are many possibilities for improvements, one of them establishing a separate national office or providing a separate service which would help protection holder in case he needs financial or legal help. This is one of other mentioned issues and proposals for it, which would have positive output on the IP protection systems. As it is very wide and complicated field, continuous improvements should be made.

References

Baldwin, C. Y., & Henkel, J. (2015). Modularity and intellectual property protection. *Strategic Management Journal*, *36*, 1637-1655. https://doi.org/10.1002/smj.2303

Beard, R. (2013). *7 ways to increase survey response rates*. Retrieved from https://blog.clientheartbeat.com/7-ways-to-increase-survey-response-rates

Colson, T. (2007). *Protecting your intellectual property with patent alternatives.* Retrieved from https://www.industryweek.com/regulations/protecting-your-intellectual-property-patent-alternatives

Duncan, D. Nulty. (2008). The adequacy of response rates to online and paper surveys: what can be done? *Assessment & Evaluation in Higher Education*, *33*, 301-314. https://doi.org/10.1080/02602930701293231

Greenhalgh, H. (2010). *Theft of intellectual property 'should be a crime'*. In *Financial times*. Retrieved from https://www.ft.com/content/d95fc81c-c7f7-11df-ae3a-00144feab49a

Hudson, J., & Minea, A. (2013). Innovation, intellectual property rights and economic development: a unified empirical investigation. *World Development*, *46*, 66-78. https://doi.org/10.1016/j.worlddev.2013.01.023

John Reh, F. (2016). *Non-Disclosure Agreements (NDAs) protect your intellectual property.* Retrieved from https://www.thebalance.com/ndas-protect-intellectual-property-2275250

Leiponen, A., & Byma, J. (2009). If you cannot block, you better run: small firms, cooperative innovation and appropriation strategies. *Research Policy*, *38*, 1478-1488. https://doi.org/10.1016/j.respol.2009.06.003

Papageorgiadis, N., & Sharma, A. (2016). Intellectual property rights and innovation: a panel analysis. *Economics Letters*, *141*, 70-72. https://doi.org/10.1016/j.econlet.2016.01.003

Quinn, G. (2011). *If you are against software patents, you are against innovation*. Retrieved from https://www.techdirt.com/articles/20100107/0515207655.shtml

Shapiro, C. (2001). Navigating the patent thicket: cross licenses, patent pools, and standard-setting. In *Innovation policy and the economy* (pp. 119-150). Cambridge: The MIT Press I. https://doi.org/10.2139/ssrn.273550

Sweet, C. M., & Maggio, D. S. E. (2014). Do stronger intellectual property rights increase innovation? *World Development*, *66*, 665-677.

Trott, P. (2012). Managing intellectual property. In *Innovation management and new product development* (5th ed., pp. 154-191). Harlow, England: Pearson.

Wagner, S. (2015). *Are* 'patent thickets' smothering innovation*?* In *Yale insights.* Retrieved from http://insights.som.yale.edu/insights/are-patent-thickets-smothering-innovation

PRAMONINĖS INTELEKTINĖS NUOSAVYBĖS APSAUGOS METODŲ TYRIMAS IR JŲ TOBULINIMAS

D. Paškonytė

Santrauka

Pagrindinis šio straipsnio tikslas – išanalizuoti esamus pramoninės intelektinės nuosavybės apsaugos metodus ir pateikti galimus pasiūlymus juos tobulinti. Analizuojamos įžvalgos apie daugumą galimų intelektinės nuosavybės apsaugos metodų, nagrinėjama, kada geriausia juos taikyti ir kaip pasirinkti. Straipsnyje pateikiamas ir kitoks požiūris į problemų sprendimą šio sudėtingo ir ilgo proceso metu, pasirinktos ir pritaikytos verslo proceso modeliavimo technikos, padedančios pažvelgti į problemas kitu kampu. Pagrindinė šių technikų idėja – pašalinti vertės nepridedančius procesus ir pradėti naudoti informacijos ir komunikacijos technologijomis grįstas programas.

Reikšminiai žodžiai: intelektinė nuosavybė, pramonė, apsauga, tyrimai, tobulinimas, patentai, naudingasis modelis, pritaikymas.