

# Information Asymmetry on the Technology Markets: the Role of Patents

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## Summary:

This paper aims at investigating what happens on technology-driven markets when it is critically necessary to assess and evaluate information about the technology solutions prior to purchase. One of the major difficulties transaction participants face is that they are assessing not just technical properties but also intangible issues regarding the difference between technologies, the future performance of the technology, of the vendor, its behaviour, and other factors. Another major difficulty in the transactions on technology markets is managing the information flow. Here we can find a number of problems: how information about technical solutions is formed, gathered, processed, exchanged and understood from both parties in the transaction. This is where the theory of information asymmetry comes in place. Information asymmetry is the problem preventing communication processes to be effective. A possible mechanism to address the problems information asymmetry created on the technology markets is the intellectual property system in general and patent rights in particular.

In this paper we will analyse the hypothesis of using a well developed, well organized in terms of institutions classical market-regulating mechanism such as the patent system. We propose a model for

understanding and addressing information asymmetry on the technology markets, using one already existing legislative mechanism, namely patent rights. Our analyses are conducted using the technology markets in general and the software market in particular. These analyses are examined using theories of communication processes and theories of development of the patent system and its functions. The study resulted in the identification of information exchange pattern on the technology market and of the model of information asymmetry on that market. The paper ends by challenging the efficiency of patent rights, which though having the potential to address and solve the problem of information asymmetry on the technology markets, remains problematic and difficult to achieve.

**JEL Classification:** D82, L86, O31, O34

**Key words:** information asymmetry, technology markets, intellectual property rights, patents, software market

*"Much of my earlier research focused on the analysis of markets marked by information asymmetries. Sometimes I might wish that intellectual property rights extended to such ideas; if they had, I would probably be in a different economic position than I am today, but it would have been detrimental for society had these ideas been "covered" by intellectual property." Joseph E. Stiglitz*

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## 1. Technology markets

Technology nowadays is at the core of many diverse markets – from commonplace business and consumer products markets to markets of innovative products with various and in many cases fundamental applications. Market researchers are still far from forming a unified view on what technology markets are, how they are defined, and whether they experience the same forces as any other market or they have unique characteristics requiring completely different research, analysis and marketing approaches.

The aim of this paper however, is not to propose a framework for defining and analysing such markets in their whole. This paper aims at investigating what happens on the technology-driven markets when it is critically necessary to assess and evaluate information about the technology solutions prior to purchase.

One of the major difficulties transaction participants face is that they are assessing not just technical properties but also intangible issues regarding the difference between technologies, the future performance of the technology, of the vendor, its behaviour, etc. The latter aspect is particularly complex when the solutions in question are new and emerging. As it was studied (George, J. et.al., 1999), assessing these kinds of uncertainties is proving increasingly difficult and provokes confusion amongst market actors about how to proceed. There is a great challenge of appraising today's technologies in terms of the growing range, escalating complexity and rapid evolution of available products.

Another major difficulty in the transactions, happening on the technology markets is managing the information flow. Technology markets are markets in which the primary market value of the goods results from the information the goods

contain; given the intangible nature of technologies it is possible the information they contain to be materialized in different forms, with different materials, etc. And it is here we can find a number of problems: how information about technical solutions is formed, gathered, processed, exchanged and understood from both parties in the transaction. It is of utmost importance for the transaction, the information contained in the product to be transmitted in a way all parties, whether information owners or information absorbers, can understand, process, appraise and form a decision. This is where the theory of information asymmetry comes in place. Information asymmetry is the problem preventing communication processes to be effective. How common information asymmetry on technology markets is and what are its characteristics will be discussed in the next paragraphs.

A possible mechanism to address the problems information asymmetry creates on the technology markets is the intellectual property system in general and patent rights in particular. The system as a market regulator was established long before the problems of information asymmetry on the markets were discussed and some may argue it is inadequate to the problem. Furthermore it does not cover the concept of products, since the subject matter of protection is rarely something that can be offered directly to a market that might satisfy a want or a need. However, in this paper we will analyse the hypothesis since the idea of using a well developed, well organized in terms of institutions classical market regulating mechanism, such as the patent system, is more than attractive, and it definitely has the potential to provide the so necessary solutions for the technology markets in terms of appraising contemporary technological solutions and managing the information flow in a better way.

## 2. Pattern of information flow on the technology markets

Negotiations on the technology markets aim to reach the sign of a licensing agreement or other agreements beneficial and of interest to the organizations. An ideal situation when a licensing agreement is fully beneficial for all parties is hard to achieve but not impossible. We still remember 1999, when IBM and Dell Computer Corporation announced a strategic \$16 billion technology pact, believed to be the largest agreement of its kind in the information technology industry by then. As part of the contract, Dell would purchase storage, microelectronics, networking, and display technology from IBM for integration into Dell computer systems. In the future, the agreement was expected to include IBM's copper, silicon-on-insulator, and other advanced technologies. The arrangement also called for broad patent cross-licensing between the two companies and collaboration on the development of product technology.

If we relate this to the issue of information flow management on the technology market, we can say that in order to sign a beneficial licensing agreement (for all parties in the transaction) it is crucial the information to be well presented and well understood.

Furthermore, it should be pointed out that the institutional frameworks for promoting and assessing complex technological solutions have been improving their performance: consultancy organizations gather information about supplier offerings and the new kinds of technologies available, there many specialist industry analysts and research firms. The technology markets are being shaped by the aggregate activities of suppliers and their customers and in particular also by influential external analysts: consultants, policymakers, academics and industry analysts. George (1999, p.80) states that the group of

intermediaries has developed over time sophisticated equipment able to draw up signposts about the state of the industry and current and future developments.

Yet substantial and critical business decisions about what may be major strategic investments in terms of technology often are made in lack of the real expertise and experience needed for effective decision making. Why is that? We believe it is because of serious problems of codification of knowledge on the one hand. On the other, we believe that information during negotiations is often distorted: influenced, intentionally manipulated, hindered. Burk (2008, p.1010) states that codification refers to the collection and preservation of knowledge, particularly to recording knowledge in a stable format. It explores the conditions under which knowledge may be articulated and symbolized so as to be recordable in a particular medium. Codification of technical information, contained in a technical solution, will give the information/knowledge owner an opportunity to present his product in a way the information absorber will have higher probability of understanding it correctly. Costs of codification might be significant and there will always be knowledge that cannot be codified (mostly related to personal skills and know-how, achieved during the years of professional experience), but we strongly believe codification of technical knowledge, such as the patent system provides, can have a positive effect on the management of information flow on the market (incl. management of communication inefficiency, caused by information asymmetry).

The other significant problem that appears during transactions on the technology market is information distortion. Figure 1 illustrates the matrix of patterns that affect the actors engaged in the transaction process on the technology market. We assume that the lower the

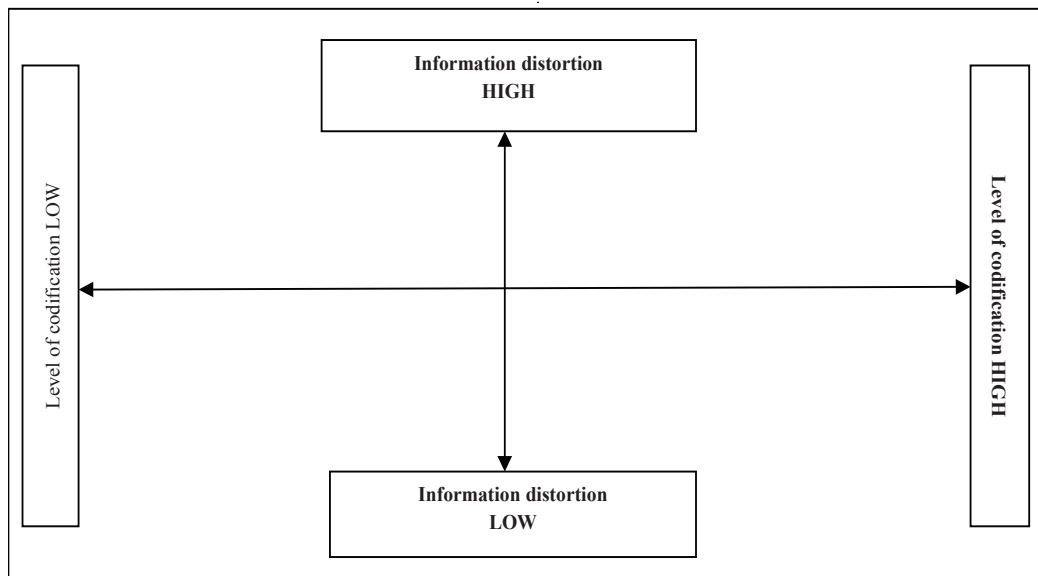


Fig. 1. Representation of patterns of information flow on the technology markets

information distortion is (i.e. the closer to the original information transmitted between the information owner and the absorber), and higher the level of codification of knowledge is (related to a technological solution, subject to a transaction) the lower information inefficiency, and respectively information asymmetry, is.

### 3. Information asymmetry model on the technology markets

The central element of the information asymmetry model is the experience of asymmetry between two actors during an information exchange, i.e., the information owner and the information absorber.

Figure 2 shows the information asymmetry model on the technological market. As it can be seen original information about the technological product can be hindered, manipulated, and influenced (whether intentionally or not) not only by the information owner but also by intermediaries, whose full understanding of the original information on the one hand is questionable in terms of asymmetry uncertainties in the

communication process and on the other, who aim to achieve their own business goals that might not be fully compatible with the business goals of the information provider. Another issue in the information asymmetry model on the technology market is the level of awareness of the information absorber about the manipulated information. Even if fully aware of receiving distorted information, the absorber might still want to take the risk and conclude the deal. This of course will put him in a situation to negotiate terms of transaction in different (and eventually more favourable) conditions for him.

One may regard information asymmetry as not such a big problem in case the information absorber is aware of information manipulation, which we assume he is, for number of reasons. Information asymmetry is an intrinsic characteristic of the technology market and is present in every type of transaction. Some may raise objections, since there is no specific research or studies showing quantification of the phenomenon in the different technological fields. Yet the question is that, if no such problem exists,

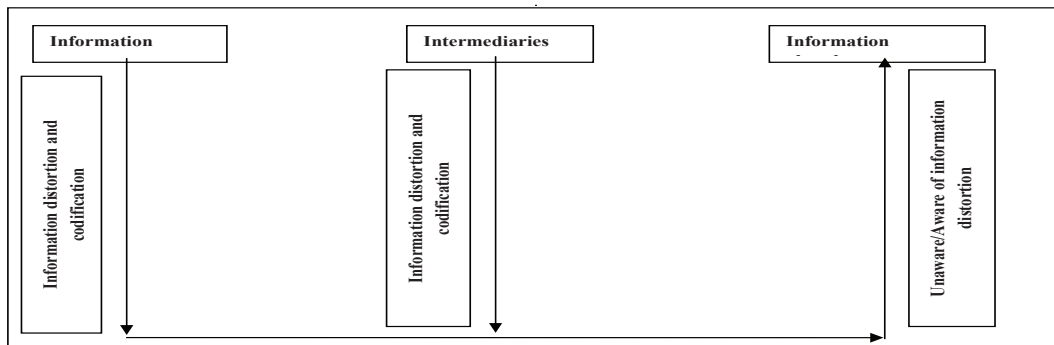


Fig. 2. Information asymmetry model on the technology markets

then why are there so many institutional and legal measures, techniques and procedures to set boundaries, guidelines, model forms of agreements to protect market competition with a view to promoting consumer welfare and an efficient allocation of resources.

The problems of asymmetric information, respectively of the fact that technology vendors have access to product information, whereas buyers do not have such access, can be viewed in several ways:

- this creates risks for the transaction deals to never be closed;
- it creates risks of adverse selection - a prerequisite to purchase a lower quality product by the consumer;
- this is a prerequisite for the formation of product prices that do not correspond to their value but are much higher. Quite often technology pricing policies are unclear to users, who are unable to determine why the price they are offered is such. Sometimes similar solutions are available in very large price range and the user has no real expectations as to how much to pay; it is difficult to determine whether a price is high or low;
- this is a prerequisite for manufacturers to bear a higher risk of developing technological products since imperfections and errors in the solutions can easily be attributed to bad faith on the part of the user;

- this creates serious challenges in forming stable long-term technology transfer partnerships.

#### 4. The impact of patent rights on the information asymmetry model on the technology markets

Intellectual property (IP) has become one of the major issues of global society, especially as the world is moving toward a knowledge-based economy. How we regulate and manage the production of knowledge and the right of access to knowledge is at the centre of how well this new economy works and of who benefits.

Patent protection in particular has been historically credited with a variety of functions and this topic has been already studied (Pammolli and Rossi, 2006):

- the incentive function - generally associated to the so-called "reward theory" of patents. The argument for the existence of an incentive function of patents rests on the hypothesis that, absent patent protection, innovators would find difficulties in appropriating the returns from their intellectual creations, with obvious negative consequences in terms of innovation incentives. Society is thus ready to grant a limited monopoly for a fixed term on the newly created intellectual assets in return for the inventor's innovative effort, so that a

trade-off between monopoly costs and benefits in terms of increased innovation is established;

- the transactional function - patents aim to solve the well-known Arrowian paradox, allowing for the exchange of intangibles. This is true not only when intangibles are in the form of end products, but especially when they constitute inputs into further innovative activities. Thus, the availability of patent protection has been identified as a necessary precondition for the emergence of markets for technology and specialized technology suppliers and the existence of patent protection over the inputs to a collaborative research endeavour is commonly held as a factor facilitating inter-firm R&D collaboration.
- the disclosure function, according to the so-called "contract theory" of patents. Disclosure of technical information that would otherwise be kept secret is seen as the quid for the quo of legal protection in a bargain between the inventor and society. In other words, patents constitute a legal instrument inducing the free dissemination of innovative knowledge. In this perspective, the requirement common to most patent systems that patent applications provide sufficient information to enable a person skilled in the art to reproduce the invention can be interpreted both as a way of clearly delimiting the boundaries of the object of legal protection and as an expression of the disclosure objective embedded in the patent system;
- the signalling function - possession of patents may serve the purpose of signalling a firm's innovative capabilities and increase its ability to raise the necessary capital, especially through

venture capital financing. In so doing, patents thus help channelling funds in the most appropriate directions and play a role in promoting market entry. The relevance of the signalling function tends, of course, to be inversely correlated to firm size. Indeed, small innovative firms are capital-constrained and often lack means other than venture capital financing in order to pursue their innovative endeavours.

Technological knowledge is not a physical asset, though it is possible to trade and exploit an idea on a legally binding document such as a patent (though it is not the only option). The stronger the protection of technical information from the legal system, the less the need to keep such knowledge in firm boundaries.

Patent protection is supposed to balance the interests of different stakeholders – developers and users. Its functions described above have the potential to regulate the misbalance and uncertainties of communication (information asymmetry) in order to tackle these issues. Considering the tempting idea to use patent rights to solve the problem of information asymmetry on the technological markets we need to find if patents can influence the communication inefficiencies and if the matrix of patent protection has intersections with the matrix of currently available solutions of the information asymmetry problem:

- in terms of impact of patents on communication inefficiencies our starting point is that in order for the problems with information asymmetry to be solved the information needs to be revealed and the patent system is able to provide the necessary information to the parties in the technology transfer agreements



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- codified knowledge, full disclosure of the technical nature and characteristics of the solution;
- information asymmetry is a prerequisite for purchasing lower quality products, but the patent system can guarantee quality of protected solution in comparison with similar technologies, at least in terms of novelty and industrial application of the solution;
- information asymmetry is also a prerequisite for product pricing that does not correspond to their value – but if there is a patented technology solution, product pricing would be easier because the value of the technological solution will be somehow already estimated as high for the solution to be protected;
- the two primary solutions to the problems caused of information asymmetry are signalling and screening. This topic has been thoroughly studied (Spence, 1974) and it is accepted that signalling covers the concept of one party credibly conveying some information about itself/ its products to another party, while screening strategy suggests that the under-informed party can induce the other party to disclose their information. Considering the functions of the patent protection, we can suggest that both signalling and screening using patents are possible options – signalling, used by the patent holder, to convey information about the technical solution in the form of patent description. And screening, used by the under informed party, to make the other party reveal information for a technical solution (for the purposes of obtaining a patent for example – following a legally binding procedure for full disclosure of technical information, about the solution to be protected).  
So as we can see there are intersections

between the IP rights, patent rights in particular, and the information asymmetry phenomenon. Apparently the effective legal mechanism and instrument is likely to have a positive impact on a market failure characteristic on a specific market, on which this instrument was not initially intended to regulate.

So the major question is whether patents can in practice provide the solution of the information asymmetry problems on the technology markets. The answer of this question is that they can, if the patent protection system takes into account the specificity of technology markets and further develops in order to provide technology vendors and consumers with what falls within the scope of its major functions, which has lately been called into question. How and why this is so we will investigate with the example of the software market.

### 5. The case of software markets

Before reaching the question as to how patent rights can influence the information asymmetry on the software market, and whether they really manage to do so or they fail to balance the interests of all stakeholders, we would like to do a brief account of the nature of this market. Economic theory considers a market to be a set of economic relations between entities, arising in connection with the movement of goods and money, based on mutual consent, equivalence and competition. Often in the transactions concluded on the software market one side (the user) is put in a situation in which he either must buy the software as offered by the manufacturer, or else leave the transaction. When we speak of end user of software often the moment

of consent and agreement between the parties with respect to the purchase of software is missing. The user must buy a product that he has not seen nor tested, and which has a functionality about which he can only speculate on the basis of information provided by the manufacturer (and actually it may be missing). This is the case for example in the so-called click-wrap and shrink-wrap licenses.

When we speak of technology transfer type of agreements with subject matter software, the situation is little bit different. Currently there are numbers of software development models that allow the development of the software according to user-defined characteristics and testing in the process of development. We may assume that information asymmetry is thus eliminated. Yet such asymmetry exists in every process of software development – specification, design, validation and evolution. The practice is that all these processes need to be refined several times before the software is ready to use. The reason for this is that information flow between parties runs into the above-discussed problems of uncertainty.

It is also questionable whether there is competition on the market of software, and whether the user has the option to buy the same software from other market participants under different conditions. Another specificity of the software market is that software is subject to intellectual property protection carried out in different ways (copyright, patents, trade secret, adding to all of these also technological measures for protection, which are subject of protection themselves). Furthermore intellectual property is intangible in nature, as it may be regarded as a set of content,

objective form of the content (carrier or medium, in which it is materialized) and the rights to dispose of the content, which are subject of licensing. The social contract providing monopoly rights for a limited period of time for the creators of intellectual products occurs at a time very different from the information age we live in today. These three elements of intellectual property rights historically were identified in one final product that consumers used, and it was not a problem with respect to their inability to copy the product in large quantities and carry out operations with it, infringing authors' rights. Today, however, the possibility of reproduction of digital products at almost zero cost makes owners distinguish these three elements and "sell" only part of the "product" on the market, namely the right to limit the usage. Thus the license outlasts the carrier of the object; the content easily evolves; it can also be exploited, allowing companies to take advantage of a public which has grown used to owning its goods and which now has no ownership at all.

There is no primary and secondary market for software. The value of the good stays the same no matter how many people used it before. Naturally in the course of time software manufacturers provide upgrades to make the consumer feel he is using "obsolete" and outdated version of his product. But why is the product obsolete: just because there are new operation systems not running it anymore? Furthermore the end user licensing agreements (EULA), which accompany software bundled with new computer, prohibit selling the unused licenses without the computer. As Lawinski (2008, p. 4) states in his analysis of one of the important software cases Apple



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vs. Psystar - the consumer can sell the monitor, the keyboard, but not the software, because according to the court ruling the software user is "licensee" not "owner", and his options to use the software are very restricted.

The problems of the existence of asymmetric information on the software market can be viewed in several ways:

- it is a prerequisite to purchase a lower quality product, since the buyer is often unable to determine by himself if a software solution is good or bad. Given the intangible nature of software, the user can not assess its usefulness before actually consuming it. Consumers rely more on critical analysis and evaluation from third parties and other secondary sources of information in forming their decision for purchase rather than on information from the manufacturer himself. This is good for the software developers who do not suffer the consequences from a misunderstanding of the product information from the consumer since they are not the ones who provided it. Furthermore whether software is good or bad is a question not that simple.
- it is a prerequisite for product pricing that does not correspond to their value and are much higher. Usually the software pricing policies are unclear to users, who are unable to determine why the price they are offered is such. Similar software solutions are available in very large price range and the user has no real expectations how much to pay for certain types of software; it is difficult to determine whether a price is high or low;
- it is a prerequisite for software manufacturers to bear a higher risk of developing software products since imperfections and errors in software can

easily be attributed to bad faith use by the user;

- users are prone to illegal use of software, since they do not understand fully the legal parameters of the deals. One of the key findings of the 2010 Global Software Piracy Study of Business Software Alliance (BSA) was that many PC users lack a clear understanding of whether common ways of acquiring software are legal or illegal, especially in high-piracy markets.

### ***5.1. The impact of patent rights on the information asymmetry model on the software markets***

In terms of information asymmetry we consider the patent protection of software fails to regulate the software market. The reasons why we speak about failure and misbalance of the interests of the different stakeholders on the software market can be summarised as follows:

- The patent system fails to provide the necessary information to the customer as it is supposed to do.

When we speak about information asymmetry we speak about disparity of the level of information each party in the transaction has. In order for the problems with information asymmetry to be solved, information needs to be disclosed. Yet the question is which information? If there is unexploited value, buyers and sellers have an incentive to find ways to capture that value. So what makes software valuable? Simple as it is: value is in the eye of the beholder. It might be many things: shorter time to perform tasks, possibility to solve problems, ease of use, etc. Developers see that as functionality. But according to a research, performed by Standish Group in

2002, in one typical software solution 7% of the functions are used always, 13% often, 16% from time to time, 19% seldom and 45% never.

So, software developers are trying to create software with more and more functions, though customers do not use them. Hence developers fail to signal the software's functionality to the buyers in the best possible way. After all, if customers were aware of the full functionality, they would use this software. One will say there are manuals on how to use the software, which are the necessary knowledge codified. They have manuals but they are not always provided with the software. Which brings us to the main question as to what kind of information should be disclosed? Apparently customers do not want to hear about functionality but about productivity, effectiveness and problems solved. But if a seller tries to market his product in such a way, there will always be the question how credible that information is, which is related of course with reputation and image of the company. What if there was a third party, credible enough, which can provide that information and furthermore free of charge to the customer?

A patent gives an inventor an exclusive right to make use of software, and by doing so, limits, for a specified duration, the possibilities of using the software by others. In return for this exclusive right, the patent system requires the creator to disclose to the public the patent information about the software. The patent system requires the disclosure of information to be made not only in terms of description of functionality of the invention (software), but also in terms of problems solved and effects produced. So this information can be used by the customer

to see what kind of problems the software solves and based on that the customers can make his decision for purchase. Furthermore the patent document has the following distinct features: it provides details of the invention, including information on how the reader could carry out the invention; it describes the invention claimed in essence identifying the legal scope of the patent right; and it identifies the inventor and the patent owner (which are sometimes different entities) and any other legal information, which could be of help when one wants to commercially use the invention. So the customer should be able to understand the legal scope of using the software. However the reveal of information in terms of software solutions in a patent often lack the so necessary "bit" to fully understand its functionality.

- Patented software is not offered to the market as a distinguished product, as other patented products as medicines, or particular technology.

Marketing software as a protected intellectual product can help software publishers on the one hand to maximize their profits, offering it at higher prices, and on the other hand reduce also the pirated use of their software. The number of patent applications with regard to software related inventions in the European patent office shows a steady trend, even increasing in the last 10 years, which means that companies are definitely interested (see Table 1).

If protected software was marketed as a distinguished product on the market would not customers buy more of it even if it is sold at higher prices? The answer is they would, as there are many examples from other industries. If so, why owners of software patents do

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Table 1. Patent applications in the field of software-related inventions, filed before the European patent office 2001-2010

Field of technology		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Electrical engineering	Electrical machinery, apparatus, energy	6630	5791	6201	6342	6590	7064	7271	8121	7782	8241
	Audio-visual technology	5086	4627	5452	6349	6799	6577	6134	5793	4741	5151
	Telecommunications	5889	5117	5317	5581	5633	5740	6117	5963	4497	4391
	Digital communication	3126	3257	3921	4388	4856	5367	5815	6362	7153	7959
	Basic communication processes	1552	1359	1491	1406	1389	1398	1243	1249	1031	1129
	Computer technology	7185	7610	8338	8874	9034	8796	8703	9198	8013	8257
	IT methods for management	19	64	62	100	507	1052	1125	1158	1190	1173
	Semiconductors	2533	2091	2591	2686	2862	3146	3194	3598	2958	3714

Source: European patent office; European Patent Bulletin

not market their products in this way? The answer to this question however is not that simple. It could be because they know buyers would not "read" that information as desired and would not go for the higher price. It could be because "software patent" is still a dirty word for most customers. However, the 2010 Global Software Piracy Study of BSA highlighted few very important issues with this regard: public opinion strongly favours intellectual property rights (seven PC users in 10 support paying innovators for their creations to promote more technology advances); PC users around the world recognize licensed software to be better than pirated software, with 81 percent saying it is more secure and reliable. If we believe the figures software publishers should pay attention on this feature, when marketing their products.

Software companies devalue their own products to establish market share or destroy competitors (predatory pricing problem). As Pollack (2003, p.10) states, because of the elastic value, one software company can undersell its competitors by

wrapping products together and selling them cheaper (bundling), giving products away until their competitors are bankrupt (dumping), changing elements which break competitor's programs (monkey-wrenching), and offering buybacks of competitors licenses (slamming).

No matter what the licensing policy a company uses is, the price of the software remains unclear for the customer. Even experts say that "valuing intellectual property is an interesting mix of art and science," (Brian W. Napper, a partner in Intellectual Asset Management Consulting at Deloitte & Touche in San Francisco). Some practitioners even call it "the fudge factor", which apart elements like the total costs involved for development, the hourly rate, hours worked on the project, the value of a similar product plus an undetermined percentage based on the new product's uniqueness, a client's expected use and number of users, include also: what the market will bear; how desperate is the client; how many alternative solutions are there; what is the client's budget, etc.

Or may be the reason why software developers do not market their products

in this way is because customers do not believe that patented software is better than the software, which is not protected. Why does not the system prove that protected software is of high quality? This is yet another argument for the failure of the patent protection.

- Patented software is not regarded as better or as software of higher quality compared to not protected solutions.

The question with the quality of the software brings us to what is good and what is bad software. It is more than obvious that the user/stakeholder and the developer have different notions about it and different methods how to differentiate good and bad software product.

An end-user primarily makes his assessment based on his ability to use the software product to accomplish the task he wishes to accomplish with the software product. This in itself is interesting, because from an end-user perspective, the software product that does the best job at helping him accomplish his task, may be priced too highly for him to afford, or be too hard to learn, or not work on his system - thus making it "bad" in his eyes.

On the other hand, a stakeholder may view a software product as good if it generates sufficient revenue or publicity, if it reduces costs, if it optimizes processes, even if it referred to generally as "low quality" product.

Since the patent system has very strict requirements about the novelty, applicability and innovative character of the software and these requirements should be met if a software developer wants its product to be protected we may say that if a software solution is protected then the problems it is told to solve are really solved, thus making

the software good product. Furthermore if one software product is protected and third parties are excluded from the possibility to use it, these parties are urged to develop their own solutions (to protect eventually), which must go one step further than what already exists, thus providing more value for the customer. The fact that customers do not regard protected software as "better" compared to not protected software could mean that the requirements of the patent system are not adequate with regard to software. Possible reasons for that could be that: abstract algorithms can be described in so many ways; jargon and lack of tangible components can make a routine software idea sound technical; it is impossible for a patent examiner to judge obviousness, since software developers use so many ideas during their work that only a small percent ever get submitted to the patent office or otherwise published.

## Conclusions

Information asymmetry is an intrinsic characteristic of the technology markets. It creates serious problems in terms of how information about technical solutions is formed, gathered, processed, exchanged and understood from all parties in the transaction. There are existing solutions of addressing information asymmetry like signalling and screening, which however are difficult to apply on technology markets taking into consideration the codification of knowledge and the different mechanisms of preventing third parties from access to the information needed. Instead of trying to create new mechanism to tackle information asymmetry on the technology market we considered the possibility of studying the potential of already existing one, which

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even if not developed for addressing this particular market failure might hold a possible solution in hand. Thus, in this paper, we focused our efforts on the analysis of a well developed classical market regulating mechanism, being also well organized in terms of institutions, such as the patent system. Overlaying the model of information asymmetry (the problems it creates and possible solutions to address them) and the model of patent rights (functions and specifics of granting) it shows that there is a number of concurrences between the two. So by studying the specifics of a particular technology market – the software market – we also studied the potential of patent rights to address the problems of information asymmetry, created on that market.

But the patent protection fails to balance the interests of software developers and customers, thus failing to provide a solution for the information asymmetry on the market:

- patent protection for software is inadequate;
- patented software is not recognized as quality software, despite of the heavy requirements a software invention should meet in order to be protected;
- the patent system does not play a significant role in the market success of protected software either.

So if patent rights, as an instrument, fail to solve the problems information asymmetry creates on the software market, would this instrument be effective on other technological markets. Is it possible for us to unequivocally say that patent rights cannot solve the problem of information asymmetry on the technology markets? The answer of this question is no – we cannot claim failure of patent rights as a solution of information asymmetry on the technology markets.

The patent system has been created to be adequate to the technological fields, existing at the time of its creation (starting from the first Decree granting patents since 1450 in Venice). No matter of the existing modern instruments of adaptation (as updating technological fields in the International patent classification; adding new subject matter of protection, having broad definitions of state of the art and person, skilled in the art and others) the patent system still tends to proceed on the assumption of the appropriateness of an all-encompassing approach. Questions concerning the factors likely to have a bearing on the differential role and effectiveness of patents in different technological domains as well as the varying degree of relevance of the various functions of the patent system in different technological regimes have not been particularly appealing to theorists so far.

Following the analyses done it is clear that the patent protection can address information asymmetry problems. However in order for such a possibility to be realized as a solution, we believe the system must change. This change should take into account the specifics of technology markets, which are drastically changed since the time the IP system was created. It is not as adequate to protection of technology solutions and balancing the interests of market players and society as it used to be. The development of the system we see in understanding technology markets with enough data about their nature and working and adapting the system according to the changed situation - possibly by introducing the following measures: sui generis protection in specific technology fields; specific requirements for the innovative character of the technological

solutions; specific scope of legal protection and not interpreting existing scope of rights with regard to any field of technology and constantly updating technological classifications in order to put all that emerges in one already existing framework, which might or might not be adequate.

**References:**

Burk, D., 2008, The role of patent law in knowledge codification, *Berkeley Technology Law Journal*, vol. 23:3, pp.1009-1034

Business Software Alliance, Global piracy study 201, available at <http://portal.bsa.org/globalpiracy2010/>, [accessed October, 06, 2014]

European patent application 2001-2010 per technical field, available at <http://www.epo.org/about-us/statistics.html>, [accessed September, 10, 2012]

George, J. et.al., 1999, Marketing in Technology-Intensive Markets: Toward a Conceptual Framework, *Journal of Marketing*, Vol. 63 (Special Issue), pp. 78-91

IBM, Dell Announce \$16 Billion Technology Agreement, available at <https://www-03.ibm.com/press/us/en/pressrelease/2258.wss>, [accessed September, 29, 2014]

Johnson, J., Standish Group Study, reported at XP2002, available at <http://martinfowler.com/articles/xp2002.html>, [accessed October, 01, 2014]

Kajtazi, M., Information Asymmetry in the Digital Economy, International Conference on Information Society (i-Society 2010), 148-155

Lawinski, J., 2008 "Psystar Releases Mac Clone, But Has Apple Shut Them Down?", CRN, April 14, available at <http://www.crn.com/blogs-op-ed/components-peripherals/207200440/psystar-releases-mac-clone-but-has-apple-shut-them-down.htm> [accessed October, 03, 2014]

Nabil, M, Govardhan A., A Comparison Between Five Models Of Software Engineering, *IJCSI International Journal of Computer Science Issues*, Vol. 7, Issue 5, September 2010

Pammolli, F.,Rossi, M., 2006 Intellectual Property, Technological Regimes and Market Dynamics, Universita di Firenze, pp. 3-5

Pollack, J., "True Property: A free market solution for information licenses", (c) 2003, available at <http://www.jordanpollack.com/softwaremarket/>, [accessed October, 06, 2014]

Pollock, N., Constructing Technology Markets: How Industry Analysts Organise Technological Fields, Working Papers on Information Systems | ISSN 1535-6078, Permanent URL: <http://sprouts.aisnet.org/9-10>

Spence, A. M., 1974, Market Signalling: Informational Transfer in Hiring and Related Screening Processes. Cambridge: Harvard University Press

Stieglitz, J.,2008, Economic Foundations of Intellectual Property Rights, *Duke Law Journal* Vol. 57, pp. 1693-1724

Varian, Hal R., 2001, High-Technology Industries and Market Structure, Prepared for Federal Reserve Bank of St. Louis, Jackson Hole Symposium