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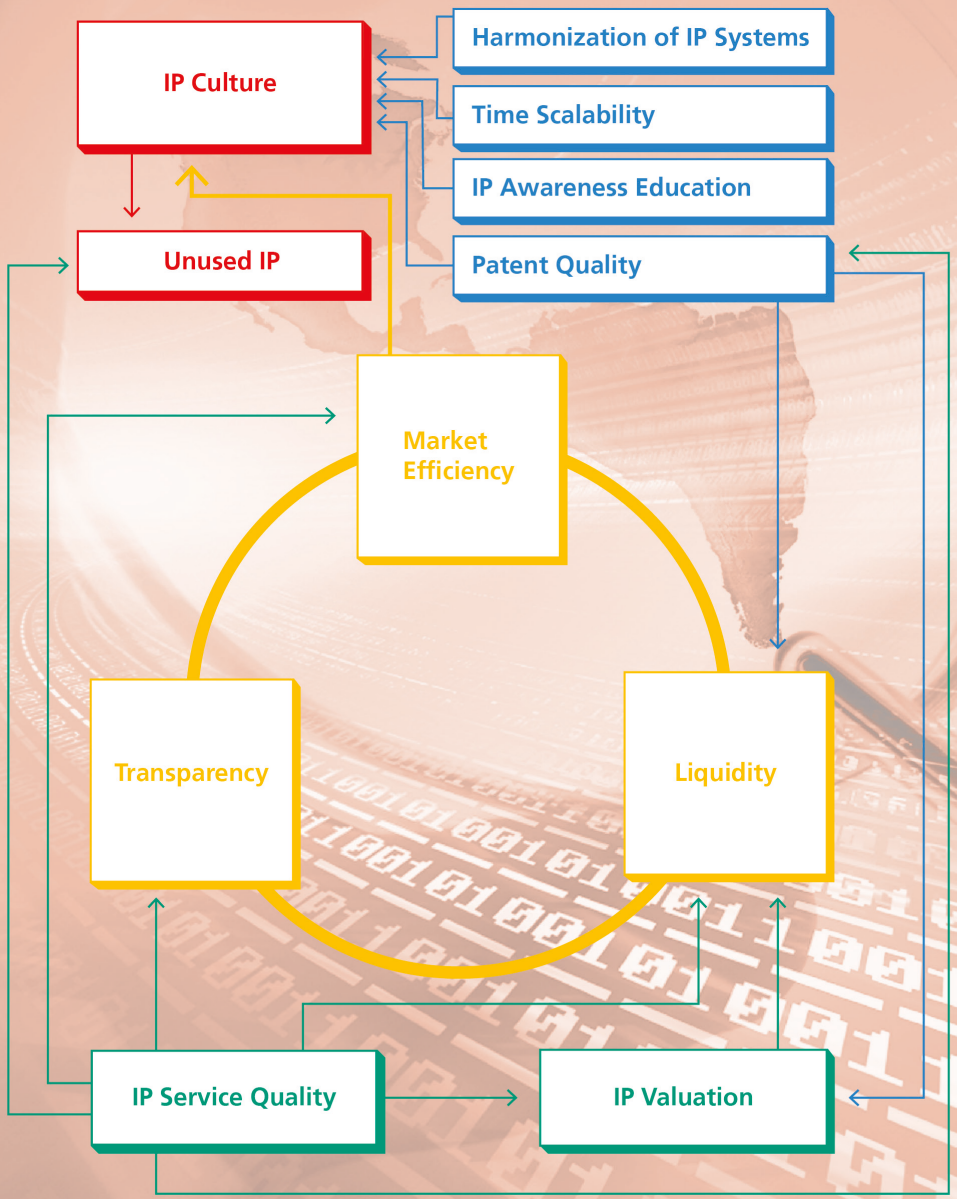
SHORTCOMINGS ON THE MARKET FOR INTELLECTUAL PROPERTY



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March 2016

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Qualitative study among intellectual property service providers on various problems related to intellectual property markets.

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1
The malfunctioning IP market

The organizational changes in technology companies have been tremendous (Palmisano, 2006). Intellectual Property (IP) management has become essential for successful corporate strategy and firms' competitive positioning (Hanel, 2006). Therefore, the IP market has made great changes as well to adapt to nowadays open innovation knowledge economy. Intellectual property rights (IPRs) have shifted during the last decades from purely exclusionary instruments into intangible assets that play a part in business strategy and have today monetary value as transactional goods (Monk, 2009). This is a characteristic of intellectual capitalism, which results from the combination of a capitalist economy and a knowledge economy in which intellectual capital has started to play a major role and is considered as the principal economic asset (Granstrand, 2000). Transferring knowledge takes place via IPR. We define the setting where knowledge gets transferred for innovation as an IP market place.
IP service providers have emerged in order to facilitate more efficient market transactions of technical knowledge, technologies, intellectual property and particularly, patents, by developing and executing new IP-related business models like patent auctions or patent portfolio funds, see Prilop et al. (2012). Several studies have analyzed the reasons for the increasing number of activities undertaken with IP by outlining the various ways of using patents (Blind et al., 2006). These activities are in many cases executed by not the owners of the IP, but rather outsourced to special firms that assist the technology companies with getting the maximum value out of their IP. We define these special purpose firms as IP service providers. They are organizations which help customers to protect, process and realize the value of their IP. All three functions of the IP service providers make transferring knowledge possible for innovation and the development of new ideas and technologies.

With the rising importance of IP for economies and emergence of new IP-related business models a whole new market – market for IP – has been developing within the last two decades. But there is broad consensus, that the IP market still has serious malfunctions. With this research we will provide an overview of the 11 biggest challenges the IP market is currently faced with. Improving the situation in these issues will help to improve the situation in the IP market. But where to start? Which problem should be tackled first? How this will affect the other challenges in the IP market? In order to answer these questions, we have developed a causal network on how the 11 biggest problem effect the IP market (see Figure 1). This causal network provides

evidence, how improvements in one area will chain to the others – and how in the end the core societal problem of unused and underutilized IP can be solved through a broad field of interventions in the IP market.

For this study 16 interviews were conducted with professionals of IP service providers operating globally in order to understand the state of the IP market and the biggest problems within it. Additionally, it was enquired from the IP experts to elaborate on how the IP market situation could be enhanced to be more efficient and better functioning. This research contributes to the understanding of the current state of the setting of knowledge transfer for innovation – the IP market's current state.

2
State of the Art

Innovation processes are strongly related to the underlying knowledge processes (Gloet and Terziovski, 2004). Profiting from knowledge is a crucial aspect of innovation management, especially in high technology firms (Carneiro, 2000). Therefore, IPR and IP management should be an important topic in scientific, non-legal literature. Nevertheless, until the mid-1990s, non-legal literature on IPR was limited both in scope and quantity (Hanel, 2006). The non-legal literature started growing hand-in-hand with developments in the IP market (Candelin-Palmqvist, et. al., 2012).
The growing IPR importance and increase in IP management related research is explained by the rise in patent applications during the 1990s, generally described as a patent surge (Neuhäusler, 2012). Open innovation platforms and crowdsourcing platforms have taken the concept of IP creation to a whole new level. The open-innovation paradigm has been shaking up the conventional understanding of IP (West and Gallagher, 2006). Many innovative IP related service providers have emerged during the last decade (Millien and Laurie, 2008; 2007). There has been a strong shift for the emergence of IP market with new actors and innovative IP business models (Monk, 2009; Tietze and Barreto 2007). However, the concept of IP market has various occurrences across companies and countries and has no clearly defined structure (U St. Gallen 2011). Furthermore, the roles and tasks of the market participants are quite diverse (Yanaglsawa, Guellee 2009). Although there have been many attempts to define IP markets, no clear commonly-agreed definition for IP market exists.

It has been debated in literature if there can be a market for IP, technologies (Aurora et. al., 2001; 2010) and ideas (Gans and Stern, 2010). According to scientific research the market for IP has many issues and inefficiencies (Andersen and Rossi, 2011), like transparency problems (Lemley and Myrvhold, 2008; Troy and Werle, 2008). Literature suggests that imperfections in the IP market may be important, and that formal IP rights may facilitate gains from technological trade (Gans., et. al. 2008). Many clearly understand the importance of the topic and have made attempts to classify IP market players (Yanaglsawa and Guellee, 2009; Millien and Laurie, 2008) as well as market structures (U St. Gallen, 2011; Gans and Stern, 2010). Nevertheless, while literature agrees that there are serious drawbacks for having a unified IP market there has not been any attempts to study the IP market problems on a "grass-root level". This research contributes to the understanding of current issues within the IP market.

3 Methodology

In the last quarter of 2013 and early 2014, in-depth interviews were conducted with professionals from IP service providers to understand their perspective on the current IP market state and its problems. The telephone interviews were conducted with 16 IP experts (listed below) worldwide. The IP experts were asked to define the biggest current problems on IP markets and were asked to elaborate on possible solutions.

All experts were presented an intellectual property services classification (IPSC [1]) which was sent to interview partners before the interviews took place in order to have coherent thinking between the expert group. Respondents were identified from previous research partners. Respondents included professionals from IP firms specialized in law related matters, IP finance, brokerage and IP strategy.

IP Expert	IP Service Provider	Area of Activities	# empl.
Joni Sayeler	Uppdragshuset Sverige AB [2]	IP Portfolio Analysis, Competitive Intelligence, IP Strategy Development, Patent Searches	11-50
Raj Mendhir	ICEBERG Capital Partners Ltd [3]	IP Brokerage, Purchase and Sale of IP, Licensing, IP Strategy Development, Competitive Intelligence, IP Contracting	11-50
Paolo Foà	Notarbartolo & Gervasi [4]	IP Protection, IP Contracting, IP Litigation, IP Portfolio Analysis	11-50
Raymond Millien	GE	Research (Licensing, Purchase and Sale)	over 10,000
Josep Maria Pujals	Oficina Ponti	IP Protection, IP Contracting, IP Litigation, Education, IP Portfolio Analysis	11-50
Manfred Plischke	Euro IP Strategy Consulting GmbH [5]	IP Portfolio Analysis, Competitive Intelligence, IP Strategy Development, IP	1-10

[1] Intellectual Property related Services Classification (IPSC) is a comprehensive taxonomy of IP services on current IP markets. Services that are not popular or not offered anymore are included into the IPSC as well in case there have been 3 or more service providers of such in the past. The latest version of the IPSC is always available at https://ipib.ci.moez.fraunhofer.de/taxonomies/services

[2] http://ipib.ci.moez.fraunhofer.de/companies/uppdragshuset-ab

[3] http://ipib.ci.moez.fraunhofer.de/companies/iceberg-innovation-capital-ltd

[4] http://ipib.ci.moez.fraunhofer.de/companies/notarbartolo-and-gervasi

[5] http://ipib.ci.moez.fraunhofer.de/companies/eipsc

		Commercialization, Internationalization Support	
Anant Kataria	Sagacious Research Pvt Ltd [1]	IP Protection, IP Contracting, IP Brokerage, IP Portfolio Management, IP Portfolio Analysis, Competitive Intelligence, Fighting Infringement and Counterfeiting, IP-driven M&A Advisory, IP Commercialization	1-10
Craig O'Dell	Valipat SA [2]	IP Document Processing, IP Software, IP Protection	51-200
Xiaodong Li	Beijing East IP Ltd [3]	IP Protection, IP Contracting, IP Litigation, IP Portfolio Analysis, IP Portfolio Management, IP Strategy Development, Fighting Infringement and Counterfeiting	51-200
Alexander Korenberg	Kilburn & Strode LLP [4]	IP Protection, IP Contracting, IP Litigation, IP Portfolio Analysis, IP Portfolio Management, IP Strategy Development, Fighting Infringement and Counterfeiting	51-200
Henry Suzuki	Axonal Technology Consulting Ltd	IP Protection, IP Contracting, IP Financing, IP Brokerage, IP Document Processing, Education	1-10
Mikk Putk	Sarap & Putk [5]	IP Protection, IP Contracting, IP Litigation, IP Portfolio Analysis, IP Strategy Development, Competitive Intelligence	1-10
Jonas Severin Frank	Philips Universität Marburg	IP related scientific Research	
Gary Ling	HKIPEx.com.hk Ltd [6]	Matchmaking, IP Exchange, IP Software	11-50
Akos Sule	Sule Law [7]	IP Protection, IP Contracting, IP Litigation, IP Document Processing, IP Strategy Development	1-10
Taavi Raidma	Deltasight [8]	Matchmaking, IP Portfolio Analysis, Competitive Intelligence, Crowd-Sourcing Platform for Prior Art Search	1-10

[1] http://ipib.ci.moez.fraunhofer.de/companies/sagacious-research
[2] http://ipib.ci.moez.fraunhofer.de/companies/valipat-sa
[3] http://ipib.ci.moez.fraunhofer.de/companies/beijing-east-ip-ltd
[4] http://ipib.ci.moez.fraunhofer.de/companies/kilburn-and-strode-llp
[5] http://ipib.ci.moez.fraunhofer.de/companies/sarap-and-partners
[6] http://ipib.ci.moez.fraunhofer.de/companies/hkipex-dot-com-dot-hk
[7] http://ipib.ci.moez.fraunhofer.de/companies/sule-law
[8] http://ipib.ci.moez.fraunhofer.de/companies/crowdipr

4
The 11 biggest problems on IP markets

The expert interviews revealed once more that IP markets differ in Brazil, South-Europe or China compared to the USA, the UK or Germany. In general, the USA, UK and central Europe were seen as the most efficient IP markets compared to other regions.

As already elaborated in the state of art, current IP markets have various problems (Hagiu and Yoffie, 2013; Millien and Laurie, 2008). Many of these problems mentioned in the literature were confirmed by the experts interviewed. Due to the current state of the patent system the IP market is arguably in a second-best world (Hagiu and Yoffie, 2013). Scholars have addressed the issues rather well. But what is missing from the literature is the perspective of the service providers who have to face the challenges of inefficient IP markets every day.

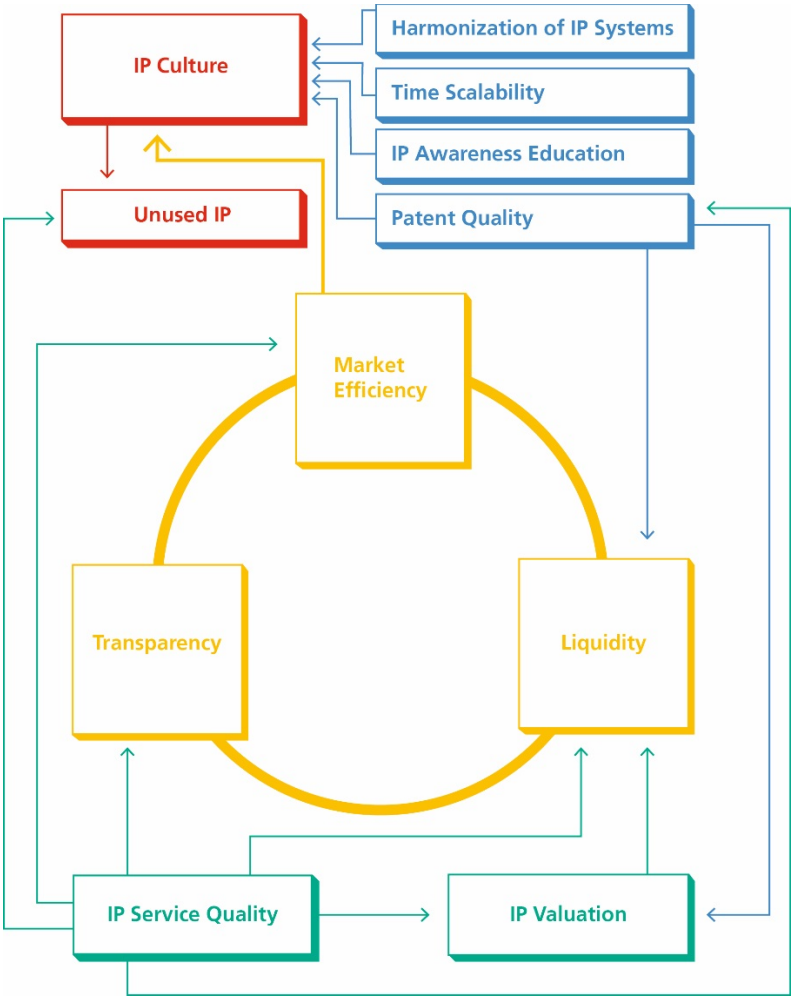

Figure 1 Network of causal effects between the 11 biggest problems in the IP market.

According to the interview partners, IP markets are inefficient and that is because of many interlinked problems such as IP assets' illiquidity, low market transparency, low awareness and IP culture. Assets in turn are illiquid because there exists no single, standardized and established method for IP valuation. Obviously the challenge of IP valuation cannot be easily resolved as the quality of issued patents varies to a great extent. On top of everything each country has a different IP market landscape with its own laws or regulations. Thus when in USA the quality is a bigger issue – time scalability is not as an urgent problem as it is in EU, where it takes longer to obtain a patent. But perhaps therefore the perceived quality is higher. Regions outside of USA and Europe seem to struggle more with a low quality of IP related service providers. And unused IP seems to be a shared problem.

Figure 1 depicts a causal network (Ryall, Bramson 2013) which shows how all these problems of the IP market are linked. In this causal network, the meaning of a directed arrow, linking from one problem, like patent quality, to another problem, like IP culture, is the following: solutions towards a better patent quality have a positive effect on IP culture, and both is improving the overall situation in the IP market.

This network of causal effects between the 11 biggest problems in the IP market provides a framework for future interventions towards a better-functioning IP market. It reveals that market efficiency, transparency and liquidity are something like a "magic triangle" for a well-functioning IP market. Furthermore, the network shows the pivotal role of the IP service industry and especially the quality of the services this industry provides. Finally, the importance of the IP culture for the activation of unused IP becomes evident through the causal network of the IP market problems. The IP culture can be improved through a variety of activities, like increasing patent quality or market efficiency. Finally, all this will pay-off into a broader usage of unused IP, which creates in the end the expected societal benefits through innovative products and new income streams from IP commercialization.
In the following chapters the 11 biggest problems on the IP market will be elaborate in detail.

4.1 Market Inefficiency

The IP market is a market which is not operating efficiently. IP is often misused or unused. Patents that are the primary assets for IP markets can be seen as "probabilistic property rights" or "lottery tickets" (Lemley and Shapiro (2005)). IP portfolio ownership

give too much power to the weak patents. Approximately 50 per cent of patents that are litigated end up being invalidated (Hagiu and Yoffie, 2013). Meaning patents that should be not asserted are asserted and vice versa (Indian IP expert, 2013).

The power of SMEs or single inventors to enforce their patents is weak (Chambers and Partners top ranked IP attorney, 2014)[1] and thus the multinationals are acting similar to monopolies on IP markets (North-European IP firm, 2013). These patent market failures are most problematic for individual inventors or small companies, who find it most difficult to get paid for their ideas. [2] This is an important issue as individual inventors and small companies account for the majority of patents. IP portfolio size effects create asymmetries between large operating firms on one side and individual inventors and small companies on the other side (Jaffe and Lerner 2004). Patents owned or created by SMEs have a lower probability of being monetized because they are part of smaller portfolios and because their owners typically have limited financial resources and legal expertise, which severely undermines their capability to bargain successfully (Hagiu and Yoffie, 2013). There are high search costs on both sides of the patent market with millions of patents in circulation that especially affect SMEs and inventors negatively because there are no good tools to effectively find the proper IP assets. Asymmetric information or search costs may also retard efficient technology transfer (Gans, et al. 2008).

The IP market consists mainly of confidentially negotiated, bilateral transactions, either sales or cross-licenses, between multinationals. There is no efficient, transparent online platform for IP sales or license or exchange for patents. When buyers and sellers do manage to find each other, they usually negotiate under enormous uncertainty: prices of similar IP differ a lot from transaction to transaction and the terms of the transactions are often confidential (Hagiu and Yoffie, 2013). Such inefficient trading mainly among big industry firms on IP markets is a welfare loss for the economy as a whole.

[1] In the following we refer to the interviews IP experts in this anonymized way.

[2] Case of Robert Kearns, an engineer who in 1964 applied for a patent for an intermittent windshield wiper system for automobiles. Manufacturers refused Kearns' requests to sign licensing agreements and began producing cars featuring the wiper system in 1969. Kearns spent decades battling 26 car companies in court for infringement. Finally, he earned $30 million in court settlements from Ford and Chrysler. In the process he lost his job, divorced and suffered multiple nervous breakdowns. Matt Schudel, "Accomplished, Frustrated Inventor Dies," The Washington Post, February 26, 2005.

4.2 IP markets legal and regional Differences

The 11 biggest problems on IP markets

Obviously one of the biggest and most holistic problems with current IP markets is that there are many with various laws and systems. Intellectual property rights are specific to particular jurisdictions. There is no such thing as an international patent, though there is an international patent application.[1] In general, an IP right is granted by the government of a country and is in force only within its territorial boundaries. Every country has its specific characteristics as does its patent system and there exists no central reference point for IP or central market place (St. Gallen, 2011). Furthermore, the IP legal systems are in different development stages and therefore many problems arise on current IP market as due to this fragmentation. IPR is not a homogenous, globally streamlined asset.

In China the IP market is in its early stages. The IP market is like in its "start-up" phase compared to the IP pioneer USA or EU (major IP law firm in Beijing, 2014). An Italian patent attorney gave the comparison of Israeli versus Italian IP market where in Israel the IP market participants are a step ahead and therefore more friendly towards IP education, services and culture compared to Italy. Some countries even within a homogenized regulatory framework clearly are less developed in terms of IP awareness/culture than others, like Italy compared to Germany in the EU regulatory system.

Harmonization of various IP systems creates IP ecosystem problems according to an Indian patent search expert. Changing IP law, however slowly, like it is happening at the moment in EU or when it happened in the USA made many IP service providers rethink their businesses and reorder their work. Every change on IP law has direct or indirect effects on its surrounding IP ecosystem and thus one of our interview partners especially stressed on the issue of increased efforts and amount of resources to deal with these changes.

All the mentioned issues are further explained below. But, in short, there are differences in IP law that makes it difficult for an IP market to operate as a unified one. Furthermore, there are country and culture specific differences that create issues for having a unified global IP market. An example was given by a Brazilian IP service provider where Brazil was stated to have adopted the German patent law system, but these two countries have still very different IP markets. The reason for these differences are strong variances in the IP cultures.

[1] The Patent Cooperation Treaty or PCT is an international agreement for filing patent applications having effect in up to 117 countries.

4.3 Lack of proper IP Culture

IP culture is defined as the general attitude towards IP. Usually academia has been stated to have a poor IP culture for commercializing their R&D efforts compared to industry firms (Powell and Owen-Smith, 1998). Nevertheless, IP culture can be observed on an inventor, company or country level. It reflects the attitudes and beliefs towards IP and related issues. A leading patent validation firm from Europe mentioned the issue of poor IP culture among European technology firms. When it comes to IP culture among young technology firms, the USA seems to be the pioneer (Rassenfosse, 2012). To create an IP culture, where IP is respected and protected, the push must come from both industry and government.

A push from industry to build IP culture and to raise the respect toward IPR among technology startups is on a rise due to Venture Capital (VC) investments requiring proof of IP coverage according to one of the interview partners. The reasons for applying for patents do surely differ. Nevertheless, key characteristics of the firms can have a major influence on attitudes towards IP. A company's industry and investors are significant indicators of companies' likelihood to apply for IP. VC investment can be more easily attracted in the presence of patents or patent portfolio according to our interview partners from the UK. Therefore, there is evidence on IP markets that IP culture is rising among technology firms who seek for VC investments.

While every region might have its specific issues when it comes to facilitating IP culture among technology firms, changing attitudes towards IP was believed to be a challenge in general. The interviewed patent experts from Europe explained that changing the IP culture is a huge challenge.

In China the lack of IP culture was seen a serious problem as there exists little IP related knowledge on which to build the IP culture. Therefore, step one for China and similar regions would be to generate the know-how and knowledge, and, in a second step, based on that expertise the optimal IP culture can be started to build (Beijing law firm, 2013). Governments could play a role here. Lack of IP related knowledge was mentioned also for South-American region, both on IP practical and strategic aspects.

To sum up, IP is often left without proper attention due to low IP culture on firm and country level. According the experts interviewed, knowledge has to be created via IP literacy tools (Viana and Maicher, 2014) in order to build a proper IP culture.

4.4 Low Patent Quality

Squicciarini et al (2013) stated that legal scholars conversely tend to interpret quality as the ability of a patent to withstand a court challenge without being invalidated. For

patent holders patent quality can be defined by the scope of the claim and quality of the underlying technology. The broader the claims, and the more valuable the underlying technology, the higher the quality of the patent. For economists a good patent is generally one that fulfils the key objectives of the patent system, i.e. to reward and incentivize innovation while enabling diffusion and further technological developments. For patent attorneys and engineers a high quality patent can be a well written patent, whose content is clearly described, or a patent protecting a major invention rather than an incremental step or technology (Squicciarini et al 2013).

IP markets are affected by the underlying IP law in the region. As already discussed, IP laws vary from jurisdiction to jurisdiction. IP rights vary in quality according to the legislation on which they are based. Changing the IP law to better achieve the patent system's goal of protecting inventors to foster innovation means for the market participants changing their business strategies (Asian patent search firm, 2014). Both Europe and the USA have recently engaged in a series of efforts to reform their patent systems. Europe is moving towards a unitary patent system governed by a Unified Patent Court. The Unified Patent Court will be a court common to the Contracting Member States and thus part of their judicial system. It will have exclusive competences in respect of European IP and European IP with unitary effect. The Preparatory Committee aims to have all the organizational, financial and other issues ready by mid-2016.
In America the America Invents Act was signed in September 16, 2011. The America Invents Act is designed to bring U.S. patent law in line with the rest of the world. Patent experts from North-Europe stated that politics behind IP markets are too slow (an example is the slow adoption of EU common patent law).

Low patent quality (mostly mentioned for the USA market) was mentioned as one of the biggest issues on IP markets at the moment by one professional from a Legal 500[1] and IAM Patent 1000[2] highly recommended expert firms. During the interviews most European attorneys stressed on the issue of different quality of granted patents in various regions. The difference between USA and EU granted patents was given as an example throughout the interviews. According to the patent attorneys interviewed,

[1] Legal 500 is a series of guides reviews the strengths and strategies of law firms in over 90 countries in Europe, the Middle East, Asia, North and South America, and the Caribbean. The cross-referenced guides provide research and law firm rankings to enable clients to identify the best law firm for the job (Legalise, 2014).
[2] The World's Leading Patent Practitioners in 2013 by IAM magazine

currently there are many low-quality, overlapping and excessively broad patents on the market.

Overlapping patents granted can create situations which require innovators to reach licensing deals for multiple patents from multiple sources. These situations are often described as patent thickets and are considered to harm innovation processes (Hall, et al 2012).

4.5 Time Scalability

The slowness of processes in the patent systems was mentioned as one the biggest problems by some high-tie European patent attorneys. This was stated as the time scalability issue of the acquiring patent versus commercializing it. It takes too long time to register a patent according to a Chambers and Partners top ranked patent attorney. The length of time that it takes to get a patent is highly variable, depending on the nature of the application and the country in which patent protection is being sought. Acquiring a patent in 3 to 5 years can be considered still helpful for technology companies because it is not too slow to make use of the technological innovations, but it can take longer according to an EU patent attorney (2014).

In case it takes more than 5 years to register a patent it is less useful for some of the technologies. The technology might become outdated by that point. Good example in this case is fast moving consumer electronics. A patent should be granted while the technology is still up to date, but unfortunately nowadays the patent system is sometimes too slow (Chambers and Partners top ranked IP attorney, 2014). Slowness of IP systems, which was especially stressed for the EU system, creates problems for technology companies who are operating in fairly quickly changing technological fields.

4.6 Unused IP

IP assets can be a significant component of a company's value. Opportunities exist for companies to gain new revenues or reduce costs by putting unused technology or other IP assets to use. Unused IP could be interpreted as a liquidity reserve and perhaps not as a problem of the IP market. Nevertheless not commercialized patents are not so easily discoverable by technology developers according to the interviews. Therefore, the IP that is not commercialized might end up not used although it could be proved to be useful for innovation. An Indian interview partner went even further and drew a comparison of "hidden / unused patents equals hidden technologies" (2014).

Many patents are not used to introduce new technologies, goods or services or to improve these in the market. According to the "Utilization of Intellectual Property

Rights in New Business Environment" survey (Japan Patent Office (JPO), 2008) half of patents were "used" and another half was "unutilized". After excluding "unused" patents for defense purposes, 20% of patents were "unused". In the USA a set of 145 research institutions were examined about unused patents. 65% of invention disclosure bundles remained, on average, unlicensed and unused each year over the period between 2002 and 2009. The European PatVal study (Gambardella, et al 2007; 2006; 2005) showed that about 36% of European patents are not used for industrial or commercial purposes. The PatVal EU study found that about half of the unused patents, or almost 19%, help to block competitors, while the other half, about 17%, are left unexploited.

The report of a recent Commission expert group on patent valorization quantified the share of European patents that could be valorized in the range of 8% to 24% of the total number of patents granted. The estimate includes patents that SMEs tried unsuccessfully to license (Expert Group on IPR valorization, 2012). OECD data show that only 20–40% of patents held by the technology transfer offices of public research organizations in countries taking part in the survey were licensed. Another OECD survey shows that only 15% of respondents from 150 technology-intensive patentees in Europe, Japan and the USA reported that they had no unused patents in their portfolios. Almost 25 % reported that they had more than 100 unused patents and 12% more than 1000 unused patents (Kamiyama et al 2005).

According to our expert interviews IP is left unused due to interlinked problems, like low IP awareness (South-European patent attorneys), cost sensitivity (North-European patent expert), inefficient IP markets due to low transparency and illiquid markets (USA and UK interview partners) and finally due to risks associated with IP handling (UK and German patent attorneys). Unused IP is a direct waste of all the resources which has been spent to develop the underlying technology and to create the IP, hence it is a direct loss to the economy. Reducing the rate of unused IP should have a very high priority because it is the main leverage to create societal benefits from the investments in innovation which has already been spent.

4.7 Lack of Transparency

The market inefficiency issue is closely related to the market transparency issue. For example, the ownership of a particular IP asset is often not clear (Oropo, 2015). Multinationals have many affiliate and subsidiary companies and it is not clear who controls the IP rights in the end – the big corporation, the affiliate or the subsidiary company or perhaps even a partner company or a third party which has purchased the IP in a non-disclosed deal? Patent document shows the name of the person who has

applied the protection for the technology, but further actions with the corresponding IPR are not mandatory monitored. In case the IP gets bought or sold there is no obligation to keep transparent track of it. Surely enterprises have the option to disclose assignments in the patent databases or to list IP on their balance sheets, but disclosing IP portfolio information is currently not very common (with an exception of Intellectual Ventures who in December 2013 released information about 82% of its patent portfolio). OROPO[1] aims to create an open, transparent registry on patent ownership. The law adoption of this registry by the industry (at the time of writing in early 2016) proofs the reluctance of market participants in disclosing ownership information.

That is mainly due to valuation issues and risks associated with being transparent about the IP portfolio. Therefore enterprises nowadays are cautious with being transparent about their IP assets -*"Never produce a value for your IP portfolio"* Timothy Lynch[2], IP Business Conference, Boston, 2013. It indicates that the technology companies clearly do not see the value of being transparent with their IP portfolios and that is another "slowing-down" effect for getting to more transparent markets.

Secondly IP trading is not transparent (Millien, 2013). Similarly, to the USA the existing situation on EU IP market was described as "where everybody knows that things happen, but not how and what happens". Besides the big infringement cases that get covered by media, trades of IP are not registered or reported. In the IP brokerage market especially, the lack of transparency is a key issue (UK, IP brokerage firm 2013).

Transparency is a fundamental issue in the design and regulation of markets (St. Gallen, 2011) therefore in order for IP market to be well functioning and efficient, a significant increase in market transparency is required.

4.8 Illiquidity

The market for patents is a large and inefficient market in the knowledge economy. Due to the fact that IP markets are inefficient and not transparent the underlying assets of the market – IP – is highly illiquid (Milien, 2013). One of the biggest IP market problems is its illiquidity according to both European and USA IP experts. Asset liquidity would benefit all IP market actors according to the St Gallen study (2011).

[2] Chief Intellectual Property Officer, Deputy General Counsel and Vice President, Eastman Kodak Company

The IP market illiquidity is a problem interlinked with the previously mentioned ones. There are some obvious reasons for why the patent market is highly illiquid: IP is the ultimate intangible asset and extremely hard to value. Moreover, there are very high search and transaction costs on both sides of the market (inventors or patent owners and operating companies or patent users/buyers) and the risk of litigation makes all potential participants even more cautious (Hagiu and Yoffie, 2013). IP market actors would appreciate the opportunity to sell or buy IP assets on an ongoing basis as this reduces the risks related or inherent to IPR trading. Meaning, if IP assets could be bought and sold more easily the risks associated with the processes would be reduced (St. Gallen, 2011). In this case, patent owners would not get stucked with IP that brings no extra value because it can be sold rapidly at any point of time. In a liquid market IP owners could create income revenue from their IP via licensing or sale with minimal loss of value.

But there are also beneficiaries from this illiquidity. Inefficient and illiquid markets, such as the one for patents, generally create profit opportunities for IP intermediaries (Hagiu and Yoffie, 2013).

Summarized, high asset liquidity provides tight bid-ask spreads which reduces slippage costs. That is not the case on illiquid IP markets which makes the IP trading process much more difficult as well as much costlier (information, attorney, and valuation costs, etc.). That again is a loss for the economy.

4.9 Valuation Problems

There is a lack of common understanding among market participants with regard to determining the overall economic value of IP. Companies struggle to have precise idea of the value of early-stage technologies; this is particularly challenging because these technologies are far from market applicability and their future is uncertain (St. Gallen, 2011). Valuing patents is much more difficult compared to the valuation of other assets. Other intangibles such as brand equity are routinely valued with well distinguished methods. There exists no clear commonly-agreed upon valuation method for IP (Tonisson and Maicher, 2012). Buyers, mainly NPEs, use various financial models when valuing patents. IP analysis and valuation that is currently used is more of a subjective analysis rather than a fundamental one according to an IP brokerage firm expert.

Having no clear valuation methods there are a lot more risks associated with trading IP which results in negotiations under unnecessarily high uncertainty. Prices of similar IP

differ a lot from transaction to transaction and the terms of the transactions are often unknown. This situation significantly adds up to market inefficiency.

4.10 Poor IP Service Quality

With industry at the center of the Europe 2020 Strategy for growth, among the various forms of IPR, the focus is on patents, notwithstanding the increasing importance of associated services. The IP service industry has made a rapid development within the last decades (emergence of non-practicing entities, litigation finance, various software solutions, IP insurances etc.). Europe has adopted many of the occurred new business models from the USA. The first and most notorious cutting edge IP services like litigation finance providers or NPEs like Intellectual Ventures, Rambus or Acacia Technologies first appeared in the USA. The rest of the word is lacking behind the USA when it comes to IP service providers according to some of our interview partners.

For multinationals the quality of outsourced IP services is most important. As new IP services emerge there is no real quality check for their provided services (North-European IP expert). Poor quality of the work of patent attorneys was especially stressed as an issue for less developed IP services market. The less developed ones were mentioned to be South-American, South- Europe and partly Asian IP markets.

Low IP service quality is an issue because it discourages firms to outsource the tasks for which they don't have resources and it can result in IP being left without proper attention. That generates the issue of low IP culture because if the companies cannot trust their middlemen they will choose not to enter the market and might get into legal difficulties later due to having no IP strategy (German patent attorney, 2014). That can harm the development of international innovation markets because without protecting technology they might have difficulties with entering another country once the company wants to grow internationally (Estonian patent attorney, 2014).

4.11 Low IP Awareness

Inventors, research institutions and SMEs need to have a raised awareness of the potential of IPR in order to make informed choices. At the moment IP awareness seems to be lower than necessary and especially among technology SMEs. An established European patent attorney said that one of the reasons is definitely cost sensitivity. For SMEs it is hard to get the market overview, within the IP market as well within the IP service market. In general, they have fewer resources and want to focus only on their technology or production and they are not keen on channeling their scarce resources

into learning about IP. SMEs have to think carefully when they make their investment decisions. For many, IP services seem too complex to understand. Therefore, they are reluctant to outsource various IP services. But IP management in-house is complicated and resource intensive as well. Consequently, rising IP awareness can only be seen as a first step in a process of improving the IP literacy within the SMEs (Viana, Maicher 2015).

Trademark awareness was stated to be higher (South-European patent attorney, 2014). Lack of knowledge on IP practical and strategic aspects is evident in South-America as well. It is important to raise awareness, understanding and willingness to develop the IP culture among SMEs globally. The (passive or even negative) attitudes toward IPR should be changed (EU patent attorney, 2014).

Once SMEs do get their patents registered they should think further. When making use of registered IP rights, businesses in general should integrate IP management into an overall business strategy (German patent attorney, 2013). When IP management in-house is too resource demanding outsourcing could prove to be a good option.

Small technology companies do hardly know about the right IP service providers for them to utilize. Furthermore, it is difficult to understand what services they could outsource. IP related information dissemination and outsourced IP expertise options should be made clearer for small enterprises. For big companies and multinationals it is somehow easier. Information and IP service provides come to them, therefore the problem is not urgent for big corporations according to German patent software provider.

Low IP awareness is a phenomenon which affects SMEs much more than multinationals. Nevertheless, the responsibility to realize the full potential that IP can provide to the economy is a shared one because otherwise once again unused or misused IP will prove to be a loss to the economy as a whole.

5 Conclusions

Current IP markets have many serious problems. In the IP Service World Conference (Munich, 2013) Ingrid Baele (Philips Corp) presented IP services outsourcing strategies for big corporations where she concluded that the quality of the services outsourced is a main concern. One potential solution to solve the market inefficiencies described in this paper would be to increase the quality of IP service providers. In the presence of coordination frictions, that is the current situation on IP markets as the market is not transparent and highly inefficient, middlemen emerge (Watanabe, 2004). Middlemen meaning the IP service providers can benefit the market only if they prove to speed up the necessary processes for various parties. Including divisibility of goods and productive heterogeneity leads to the emergence of IP service providers in an equilibrium search environment. In the baseline model, middlemen are welfare reducing and their number increases as market frictions are reduced. Meaning the more efficient the IP market will become the less IP service providers should exist. When the model is extended to allow for time taken in production and increasing returns-to-scale in the market meeting technology, middlemen can be beneficial to society by speeding up the innovation processes (Masters, 2007). Based on the interview results and the theory on middlemen the main conclusion of this study is that increasing the quality of the work of the IP service providers will be a good (mid-term) solution for having more efficient IP markets.

Our main contribution is the network of causal effects between the 11 biggest problems in the IP market presented in Figure 1. It became evident by the interviews that all the mentioned IP market problems are interlinked. Asset (patent) liquidity, trade transparency and market efficiency are the three core aspects of a well-functioning IP market, the "magic triangle". Because there are several issues with the three underlying qualities that are necessary for the well-functioning of the IP market increase in IP service quality was seen as a possible solution. Again, this shows the importance of the quality of IP services for a well-functioning IP market.

The final societal goal has to be the reduction of unused IP, hence it is a loss of investments in innovation which has already be done. The network of causal effects in IP markets shows, that there are two interventional opportunities to solve the problem of unused IP: on the one hand these are improvements in the IP culture, on the other hand it is an increase in the quality of IP service providers. With the model in Figure 1

we have shown, how all problems of the IP market are interlinked. This causal network helps to understand how punctual improvements on the discussed 11 problems can spread via chain reaction to the final goal of an IP market: reducing the unused IP and helping the innovators to extract more returns on their investments in innovation.

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