Automated patent valuation: background and main questions

Dr. Dierk-Oliver Kiehne
Feb 16th 2016
http://www.intracomgroup.de

Valuing patents with indicators - how does the value determination work using indicators?

The main principle to determine a value based on indicators is not new. The value of a used car or of a real estate is determined the same way. Example: location, square meters, year of construction, amount of rooms, equipment etc. these are all indicators. And without ever have seen a certain real estate, a value range can be assigned. For this purpose in real estate business catalogues and databases for different regions are available – for different years. The calculated value is a market value. It must not correspond with a price that is paid later. Typically a vendor has a higher price expectation than a buyer, so price is always a matter of negotiation.
The indicator-based patent valuation is the same principle. It takes a set of electronically available data into account and this makes it neutral with respect to a vendors or potential buyer's interest. The value determination is based on empirical data of traded patents. So the value is – according to real estate valuation – a market value.

Indicators – what indicators are used for patents?

The current valuation approach takes 25 indicators into account, some are shorty explained here.

- **Community application:** takes the amount of different applicants into account. By experience multiple assignees make a usability of a patent more difficult and also the claims coverage is smaller, because each partner is interested to have enough space for own/single usage and further own inventions. If a community patent is traded, it means having multiple partners with multiple interests sitting at the table.

- **R&D strength of the invention:** This indicator is based on the amount of inventors mentioned in the patent/application. The theory here is that a single inventor often indicates a random invention. A big RnD project is often documented with a certain set of inventors if it comes to an invention. But this is not a linear effect. 10 inventors or more often indicate the opposite.

- **R&D applicant ratio:** This is a company specific indicator, taking into account if this is a technological driven company or not. Here the total amount of patents are compared with the employees of a company. This also takes into account how important patents are for a certain industry. The higher the ratio, the more important patents are within the sector.

- **Technology in different term trend**: if a certain technology is a trend technology, this is indicated by comparing the common activity within an IPC (international patent classification) to a reference period: if the activity is higher compared to the earlier period, it indicates a trend technology.

The short and medium term comparison are based on different reference periods and lead to these different indicators.

- **Sustainability of technology trend**: the sustainability of technology trend compares different reference periods in order to make sure that typical global economic related movements are not directly taken into account and to see if a technology field is having a very short trend or if the trend is sustainable. This also shows the innovations cycles of a technology/industry.

- **Total size of activity:** this indicator counts the total amount of inventions that were made within a certain period in this technology field. This is the total activity per time period.

- **Family size**: a family in this definition are equivalent patents that all relate to the same invention, including so called divisional and continuation patents. This finally means, how many economies are covered with IP-protection. For the indicator not only the amount of family members but also the size of the covered economies are taken into account.

- **Transferability to different industries:** Is a patent a basis key invention or a more or less proprietary solution for one single problem? This can be found out by the amount of different IPC sectors that are mentioned within the patent, this indicates i.e. the usability for different branches the invention can be applied to, i.e. in consumer goods as well as in handling machines.

- **Heterogeneity of potential applications:** within a certain technology field the question may be similar: are different technology fields thinkable within a given sector? For this question to answer, a different IPC analysis algorithm is applied.

- **Exploitation in different technologies (within a certain industry):** this is a general indicator using a third different algorithm on the IPC classes mentioned. It is to find out how different addressed applications may be. The three IPC indicators taking different depths into account: a general industry independency, a technology independency and an application independency.

- **Total amount of exploitation possibilities**: this indicator does not measure the heterogeneity but the total amount of different industries, technologies, applications.

- **Evidence of use**: an important value indicator is if an infringement can be detected. The more difficult it is the less sense is making the patent itself. For process patents this is typically the case: infringement is difficult to prove.

- **Relevance for other technologies/applications:** one important indicator is how many other patents of foreign assignees refer to the given patent, taking the patent age into account. The more cited-by are available (done by foreign assignees), the more relevant the technology/application/formulations must be. The bigger the claims coverage of a patent, the more often other patent attorneys will need to refer to the patent in order to differentiate.

- **Differentiation to the state of the art:** Alternative, evolution or revolution is a key question for patent valuation. Alternatives are easy to bypass and have a small blocking effect. So the question ”is it really new?” is essential. Here citations made i.e. by the patent office indicate the differentiation of state of the art in general.

- **Differentiation from direct competitor-technologies**: Oppositions that are done by different companies during the opposition phase show the direct relevance for others in terms of utilisation. So this also indicates that a technology is close to the state of the art but directly in relation to a competitor.

- **Interfering with competitors technologies**: Oppositions also document that there may be a direct utilisation option either by selling or by licensing: This certain patent seems to bother someone and as long as it is of general relevance, documented through cited-bys, the value is high.

- **Validity level:** shows the oppositions ratio to cited references by patent office examiners – so if a certain patent obviously bothers someone and it is far from the state of the art in general the value is high.

- **Patent maturity:** this indicator takes the remaining time for exploiting the given patent into account. A young application may have a maximum remaining term of utilisation but it may be not granted in that form (see state of the art). The value maximum according to this starts after opposition phase and decreases afterwards. Within the final half a year before a patent ceases, it is practically not tradeable anymore according to the remaining term of utilisation, the value decreases drastically in its final stage of lifetime.

- **Claim width and coverage**: The amount of claims is a cost issue in terms of fees that are to pay. Secondly it documents how many different applications and forms an invention may have. The claims are essential for the legal coverage of a patent. Even more important than the total amount of claims are the independent claims. They directly document the coverage and potential blocking effect of a patent. Often patents with different independent claims like i.e. combined procedural and product patents are split into several patents (divisional patents).

- **Validity in certain countries:** For i.e. European countries only it counts the amount and economies of the currently covered contracting states, where the patent fees are maintained. For single countries the economical size of the country the patent is filed in is taken into account.
  Whenever a patent protection is not kept it indicates that a technology has lost importance in a certain market. So either the market shrinks or the general relevance of a technology decreases. Both has a negative impact on a patent value.

- **Intended worldwide protection:** If the family contains a PCT filing it documents that a worldwide protection is planned and the market for the invention is global.

- **Procedural State:** There are in general 3 different stages of a patent in terms of it procedural status, all patents are going through: Application, Grant or Expired Patent. Expired patents (by age, by non-payment of fees, rejection or other legal issues) have no value and so there is no value

assigned. Applications may lead to a granted patent but don't have to, so the value of an application is much lower compared to when it is granted. This lower value takes the uncertainty of getting granted into account.

For each thesis behind an indicators there may exist single exceptions. E.g. a single inventor who has invented a huge innovation leading to a high value. In order to address these phenomenon, different indicators are used for a single key figure (as described below) like i.e. a technical quality of a patent.

The indicators also impact the value differently. So i.e. the relevance for other technologies, procedural state or the independent claims indicators have a strong impact.

Key figures – how can a patent quality be broken down?

Five key figures deliver a qualitative picture of a patent.

Assignee score: There is no doubt that the assignee or finally the owner of a patent has a strong influence on its value. Examples: during invention phase larger companies are considered to assign a higher R&D budget on a certain technology field, these companies have a better influence on their market, on what is marketable and what might lead to a standard. The Assignee related indicators are summarized here.

Market coverage score: this key figure summarizes indicators where the amount of markets and the sizes of the economies are considered. So the figure reflects a market size that is potentially addressable with the invented technology/formulation with a legal intellectual property protection which also includes a freedom to operate.

Market attractiveness score: the market attractiveness reflects if a technology/formulation follows a trend. So the trend and total technical activity indicators are considered here. For patents, competition is a very strong value determination: if there were no competition, a patent wouldn't make sense at all. The more competition, the more potential licencees, the more potential buyers for a patent, the bigger the market is in general. On a company level the market attractiveness is often also an indicator how diversified a company is.

Technical Quality: All indicators that point to the nucleus of the invention itself like technical coverage the detectability of infringement, the differentiation to state of the art, the technical relevance etc. are summed up in this key figure. On a company level it shows the degree of innovation that can be derived from a company's IP.

Legal score: The indicators that are summed up here take the legal aspects into account like the procedural state, the age or claims related aspects. On a company level it is the legal strength of IP in terms of its degree of protecting effect.

Value determination – how does this work?

Aside a qualitative picture of a patent a monetary value is calculated. Here for a reference database for traded patents was built up. This is based on several M&A transactions where patents had been manually valued, hundreds of patent valuation projects as well as several patent auctions – so there is a price assigned to patents. All have additionally been valued with the indicator method. A learning algorithm was trained with the reference data and allows now to calculate – based on the empirical data – a value interval for all patents alive, worldwide. The only requirement is that the patent or application is already published and its data are available electronically.

What kind of value is calculated here?

According to fact that a value is equal to a final price (the price is what is set for transaction finally), there are different approaches to determine value of a patent in general. They can be divided into three major sections, where different approaches are offered: Market approach, income approach and cost approach. Here, within the indicator method, **a fair market value** approach (indicator based Market Analogy) is used. It calculates the value of an IP as if it would be a traded good. Here the value is determined exactly for the intended use: to get it traded, if needed (i.e. in terms of M&A, securities, sale and lease back, licensing, liquidation etc.). So the value is very close to a final price determination. The indicator based method for value determination described before follows this approach by referring to prices of traded patent in the past.
Other valuation approaches that that are often seen in rating patents are i.e. the **income value** – it reflects the real revenue that is done (or expected to be done) by a patent by the Net Present Value. This sounds to be a very reliable value but it is depending on who owns the patent and it also depends on future expectations regarding a certain income. So company A may have a different market access and different infrastructure than company B so that the income value will completely different for both and there is no "fair value". Additionally this works properly only for patents that are already in use. For applications and patents that are not utilized so far, all assumptions are vague and require good market knowledge. For patents in use the value determination can be done only internally by a company itself knowing the income – if there is not the required data infrastructure available, it is extremely costly. For the income approach there are different variations of calculation available.
Another, often seen calculation method is the **cost approach** values all the cost that have been produced which led to the patent. Here must be strictly distinguished between research (not being considered) and development (considered) cost. It does not need too much explanation to understand that for an innovation cost is not proportional to value and high expenses do not guarantee high value inventions. Additionally the correct collection data in term of collecting cost is very difficult.

Reliability – how strong is this approach?

And indictor based method is strong and absolutely tamper proof so the approach is good for a value impression as the value-interval delivers. But of cause it also has its limitations especially when single patents are rated. The experience shows an extremely good and unrivalled hit rate. The failure range of alternative patent valuations performed i.e. with an income approach in comparison to a cost approach is extreme: failure rates of many thousand percent are typical.

The indicator method calculated failure rates have been in average just some few percent. Even 100% (i.e. calculated value 100.000, sold later for 200.000) is an excellent result in terms of patent valuation.
The algorithm was finally adjusted in a conservative way. That means that the calculation tends more to understate than to exaggerate values.

Risk management – how can risks in terms of a wrong calculation be handled?

The method and the implementation was done according to current highest quality standards. So a full FMEA (Failure Mode and Effects Analysis, according to QS9000) has been performed. Different methods to lower risk on the data level, the indicator level and even the value calculation level have been implemented. The algorithm is being trained regularly in order to adjust the value calculation or to improve it. All these measures and the total method itself lead to the most reliable approach for patent valuation so far.

What kind of IP can be valued with the approach?

In general with this approach mention here patent applications (application), patents and utility models can be valued.
Trademarks, Design patterns or copyrights cannot be valued within this method.