

VALUATION OF PATENTS

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Abstract : The article talks about the definition of a patent, what factors generate value in a patent, and what exactly is evaluated in a patent. It also elucidates about the various factors that impact patent value, the need for patent valuation, and the various methods of patent valuation – market-based method, cost-based method, income-based method, discounted cash flow-based method, and decision-tree analysis-based method. The article also discusses some of the emerging challenges in patent valuation such as identification of valuable patents based on their individual characteristics, how the change in strategy influences patent value indicators, how patents correlate to value indicators, and whether any indicators can help in sensible search of patent databases to identify patent infringement.

1. INTRODUCTION

WHAT IS A PATENT?

A patent is an exclusive right granted to an inventor for a specific period. A patent excludes others from manufacturing, using, or selling the invention in question for the duration of the patent. Once a patent is granted to an inventor, the inventor has the legal right to prevent others from manufacturing or selling the invention in the country where the invention is patented.

However, to be patentable, an invention must satisfy the criteria of being novel, unique, useful, and non-obvious. Moreover, an important prerequisite to patentability requires the invention to be capable of some practical application and industrial use.

2. WHAT IS 'PATENT VALUE'?

The value of a patent is the future commercial utility that can be harnessed from the use of the patent. The patent may be used to either protect one's own inventions, or to create a stream of licensing income.

A patent portfolio is the list of patents owned by an individual or a business enterprise. To remain competitive in the market and better determine the economic value of your own patents, the business enterprise should manage its patent portfolio effectively by comparing it with other business organizations. Patent portfolio management can aid business enterprises identify opportunity and risks factors.

The value of a patent is based on the reason for the evaluation and the exploiter of the invention. For instance, a patent will be valued differently if it is part of a bankrupt organization's assets than if it were a company with ongoing production. The value a patent holds for a bank, which can only resell it, is different from the value for a market participant, who has the means to manufacture the invention.

Apart from the conspicuous monetary value, patents also have intrinsic non-monetary value. For instance, they may enhance the brand image of an organization. Receiving patents for own inventions also boosts the inventors' reputation and serves as an incentive for even greater innovativeness.

3. WHAT EXACTLY IS EVALUATED IN A PATENT

Evaluation of a patent not only involves considering the exclusivity right of the patent, but also considering its underlying technology and the organization's ability to use its complementary assets, viz., its ability to commercialize the invention.

While an organization may want to value each patent individually, it may be difficult in practice to do so, especially in case of two interdependent patents. In a majority of the cases, it makes more sense to evaluate the entire patent cluster than evaluating each individual patent.

4. FACTORS IMPACTING 'PATENT VALUE'

Although patents have been used for a long time by inventors to protect their creations, it has been extremely difficult to determine the exact value of patents. Even today, valuing a patent in a meticulous manner is pricey, requires the hiring of patent law and economics experts, and involves a laborious process.

There are several factors that determine a patent's value, although the patent's complexity and the uncertainty surrounding it makes it quite difficult to gauge its definitive value. It is very significant to understand that organizations that intend to commercialize their patents don't get the value that their technology / patent deserves, but they get the value that they negotiate. The following are some of the factors that play a vital role in determining the value of a patent:

1. **Number of years of protection left in the patent:** Most investors are not interested in a patent that has limited years of protection, i.e., a patent that is more than 16 years old. However, a patent that has been issued within the last three years is expected to be litigation-free. The average age of patents when they are vulnerable to litigation is three years old. Hence, acquiring a patent after it has proved its validity during litigation, or has successfully overcome the period of challenge to its validity is most desirable. Usually, as a thumb rule, patents that are 10-13 years old are considered to be most valuable.
2. **Number of patent inventors listed on the patent:** The more the number of inventors listed on a patent, the higher is the quality of a patent, compared with a patent that has a fewer number of inventors listed. The logic behind this is that a greater number of brilliant scientists / engineers believed in and devoted their time to inventing the technology behind the patent. However, having several inventors listed on a patent can be a source of vulnerability, especially when there is a probability of one of the inventors mentioning the existence of prior art when the inventors are deposed or cross-examined and when their patent's validity is challenged. Also, the probability of risk of litigation is quite high when an inventor fails to list another co-inventor on a patent.
3. **Anticipated licensing revenues:** A standard procedure of valuing patent is to determine the net present value of royalties that will be received because of licensing the patent. A benefit of developing a highly-delineated model of projected royalties is that very specific factors can be considered.
4. **Ability to increase the sale of patented inventions:** Patents are considered the most valuable when they impel consumers to buy more of the patented product or upgraded versions of it. Patents that multiply the utility for existing or prospective users are generally more valuable. Such instances can be found in patents on the features of cell phones. Moreover, patents are valued highly when the patented feature is a significant factor in boosting the product's demand, i.e., the patent is the product. Instances of this kind include the primary patents encompassing many pharma companies – **Velcro** and **Post-It** notes.
5. **Ability to generate additional sales:** A licensee may gain significant additional benefits associated with selling products with embedded state-of-the-art or cutting-edge technologies. These benefits may be by way of enhanced traffic generation to its website, catalogs, or stores. In such instances, the licensor can seek higher licensing fees from the licensee as the licensee would be enjoying additional benefits associated with selling the state-of-the-art and cutting-edge technologies.
6. **Ability to induce sales in new markets:** Licensors usually seek lower royalties from licensees who will sell the related products in new markets, compared with royalties they seek from competitors who will challenge the licensors in their current markets. While the royalties per unit from the former licensee will be lower, there are two factors that add up to patent value in this case. First, the total royalties garnered by a licensee leading a new market are likely to be significant. Secondly, licensees venturing into new markets do not pose profit depreciation issues for licensors represented by the competing licensees.
7. **Stage of commercial development:** The licensing value of the patent depends on the stage of commercialization the technology is – the earlier the technology is in the commercialization stage, the lower the licensing value. This is because of high risks in the technology never being brought to the market –and if it ultimately becomes market-ready, then it will only be achieved at a significant expense. In cases in which the licensee would have to make much of this investment, the licensing fees would be less profitable for the patentee.
8. **Quality & reputation of the law firm:** Services such as *PatentCafe* rank law firms on their reputation and history of writing patents, and how successfully they overcome the invalidity challenge. Patents drafted by law firms that score highly on surveys are usually of a higher quality than patents that score poorly on such surveys.
9. **Quality of patent examiner:** Patents that are granted by patent examiners possessing longer experience and more impressive records of granting patents that successfully overcome invalidity challenge are statistically more valuable than patents without such pedigree.
10. **Size of portfolio being sold:** Research studies indicate that each patent family that comprises between 25 and 76 patent families will receive the highest price in a patent portfolio. Portfolios with over 76 patent families are ignored because the buyers believe that the sellers are thrusting many of their mediocre patents in the portfolio sale. On the other hand, selling too few patents fetches a discounted value per patent because of the inherent reluctance that patent managers must seek significant funds from their Boards of Directors to procure a small number of patents.

5. A 'NOVEL STUDY' ON PATENT VALUATION

Andrew Torrance (Torrance), the Earl B. Schurtz Research Professor of law at the University of Kansas and Jevin West (West), his co-author from the University of Washington Information School, have published a study titled '*All Patents Great and Small: A Big Data Network Approach to Valuation*' (published on March 27, 2017, in the *University of Virginia Journal of Law and Technology*), which offers a novel and powerful method to evaluate individual or grouped patents into gigantic portfolios. Their new method is based on network and big-data analysis, and can immediately determine which patents are the most significant, whether overall, or by owner, inventor, attorney, patent examiner or technology. This approach enables the authors to examine earlier unanswerable questions about patent law, and their novel method to 'patent analytics' has the scope to trigger a new area of legal study of patents, innovation, economics, and policy.

The findings by Torrance and West reveal that litigated patents tend to be much more valuable than unlitigated patents, and that the value of litigated patents tends to increase strongly with the level of court in which the litigation occurs. For instance, patents litigated in federal district court (the lowest level of court) are, on average, more than five times more valuable than unlitigated patents, and patents that reach the U.S. Supreme Court are, on average, more than eight times more valuable.

Another method to determine the patent value is to examine the venture capital funds raised for two similar companies – one having a large patent portfolio and the other having a small one. Presuming that the company with a large portfolio raised more money, it is assessed how much of it is an advantage due to the patents, as opposed to other factors.

One of the other valuation techniques is to use Black-Scholes analysis to determine patent value as if the patent is a 'stock option', since patents and stock options have very similar economic properties. A patent can be regarded as a 'call option' since both patents and call options are 'options' limited by time that may be exercised in the future.

Yet another valuation method is to view at a licensing model that determines a reasonable royalty for licensing the patent to competitors in the space. This will depend on royalty rates typical of the industry and product type.

There are many more economic valuation models for patents. For those in the intellectual property business, the economic models are often highly prized models that are used internally for valuing assets that they desire to buy or sell; so, people do not advertise their methods quite often.

6. NEED FOR PATENT VALUATION

Patents contribute to an organization's business results, revenues, stock performance and reputation. They are one of the most critical strategic assets for R&D-intensive business enterprises. Patents highly influence an organization's value in different ways, while simultaneously sending a message of the organization's innovation and creativity to consumers, competitors, venture capitalists, or other investors. They are recognized as a monetary asset and considered as valuable as a bond or currency by world trade regulation.

The value of a 'patent' is different from the value of the 'patented invention'. It's the difference between the value of the invention when the inventor holds a patent right (monopolistic scenario) and when the inventor has no patent on it (competitive scenario). The value of patents is not uniform, but is highly skewed – only a few patents are valuable, while most of them are associated with very little or no value.

It is important to know which patents are valuable and, if valuable, how valuable they are. Understanding which patents are valuable is especially important for those who make decisions about the usage and management of patents. It can help organizations determine the company value and settle on mergers, license deals and do acquisitions. It is critical to measure and compare the innovative output of organizations and nations. Furthermore, it can help determine damages in litigations. Finally, determination of patent value is important to policy makers because it can help them distinguish vital patents from insignificant ones and, consequently, to design a patent policy centered on more important patents.

Following these priorities, for a long time, economists, business scholars, practitioners and policy makers have sought to measure patent value. However, the task of assessing the value of patents has been particularly difficult because patents exist in a blind market with high information asymmetry and their value depends on highly idiosyncratic details, including the strategic function they hold in a competitive environment.

For those who manage both patent applications and granted patents, it is imperative for them to know the value of each patent accurately, if one is to make well-informed decisions about their management. As only a small percentage of patents turn out to be of extraordinary value in the long-run and considering that the budgets of IP departments are limited, any methods which lead to a better understanding of the value of given patent applications or patents should be accepted.

Explicit or implicit valuation of a patent involves making judgements about the future, which is akin to judgements made by investors about stock market prices regarding the future performance of a company. In this respect, some degree of 'speculation'

may be unavoidable. All patent valuation methods involve some element of forecasting ranging from forecasting depreciation rates to forecasting future cash flows, market conditions, effects of competition, and distributions and volatilities of patent returns. The 'speculation' becomes essential and unavoidable, as decisions regarding continuation of patent applications and payment of renewal fees for granted patents have to be made. Even owners making quick unreasoned judgments on such matters are making implicit valuation decisions, apart from more explicit valuations necessary when considering licensing, litigation or sale.

Patent owners cannot assume that valuation is optional and quite difficult to produce any effective answers. Like the uncertainty it tries to consider, it cannot be eschewed. Therefore, any insights which aid put valuations and decisions about the management of patents on a more rational basis should be encouraged.

The primary questions to be asked of any valuation are:

- who is doing the valuation?
- for whom? and
- for what purpose?

Objective methods are required to determine the amount to be spent on or paid for a given patent or patent application when the returns are compared with other similarly available risky options the money might be used for. The purpose of valuing both patent applications and granted patents is to enable those managing them to know their value accurately and objectively to make well-informed decisions pertaining to their management.

6.1 Dynamic Concept of Patent Value

From an economic perspective, value can be classified into two types: use-value and exchange value. The 'exchange value' of an object is equal to the relative share with which a particular product can be exchanged for another product or commodity of a different kind. In other words, it's similar to a product's market value. On the other hand, products have 'use-value' – an intrinsic value or utility to the owner or purchaser of such patents. This value is beyond market value, which is realized only by use or consumption.

Patents are commercially transferable, and a few authors view patents as commodities. However, it is not completely true because their valuation is based on highly distinctive details. Commodities are of standard quality and exchangeable, while patents are not. Understanding this and the distinction between the two types of values helps us understand more on the nature of value of the patents under the new strategy. Under these scenarios, patent value is not determined anymore by the company's market value or the owner's willingness to pay renewal fees on the patent, but by the ability to create credible threat of litigation. The value of patents does not relate to the actual infringement by other organizations, but just by the prospect of infringement.

Based on the above perspective, a patent's value under the new strategy is primarily driven by the evidence about its infringement. It is necessary to consider prices, costs, and quantities of products protected by patents sold by infringers to determine the monetary value of a patent.

The threat of litigation is the main mechanism that encourages exchange in the patent market – the higher the threat of litigation, the higher the monetary value of the patent. However, research also proves that most of the patents are of very little or no value and there are only a few patents that are worthy.

7 METHODS OF PATENT VALUATION

In valuing a patent, the fundamental issue is to determine by what extent the returns from all possible ways of exploitation of the patented invention are greater than those that would be obtained in the absence of the patent. Making such an assessment is difficult even when the returns from the patented invention are well delineated. However, many other types of uncertainties are also involved in the initial life of the patent or application. There will be ambivalence about both the technical and commercial success of the underlying invention in competitive markets as well as skepticism about the legal challenges the application and subsequent patent may have to face during its life.

Describing the possible lives that a patent might live is, therefore, an arduous task. A patent that is viewed as a financial money-spinner, right from filing of the application to expiry of the granted patent 20 years later is thus a complex cycle. All kinds of results are possible and there are many stages in the application process when it may be abandoned or after grant, when annual renewal fees become payable, when the resulting patent may be allowed to lapse.

A distinction has to be made here between valuation of overall average patent values, which is the aim of many economic studies and the valuation of individual patents. Russell & Parr divide all possible types of valuation of individual patents into Cost, Market and Income-based methods.

7.1 Cost-Based Method

Knowledge of at least the future costs of creating IPRs is required as part of almost all valuation methods. However, valuation methods based on the historic costs of acquisition less any allowances for depreciation or obsolescence are worth only the very pithiest of comments. Their most serious flaw is that they don't make any allowance for future benefits that might accrue from the patent. They are of not much help other than in historical cost-based accounting systems, or where taxation methods govern their use and futile for making rational decisions.

One of the approaches for the evaluation of intangible assets comprise the Reproduction Cost Method and the Replacement Cost Method. However, this approach has a significant conceptual drawback since it is not pragmatic and since the data used always refers to the past. For these reasons, the cost approach for the valuation of intangible assets can normally be used only to authenticate credibility or to decide minimum price limits, for instance, in purchase price negotiations. While applying the cost approach, either the costs required to create an exact duplicate of the asset in question (Reproduction Cost Method) or the costs for the production or acquisition of a use equivalent asset (Replacement Cost Method) can be used. It must be authenticated whether discounts are to be applied to properly consider economical, technical or functional obsolescence. The depreciation must be adjusted towards the expected useful life defined by economic criteria.

7.2 Market-Based Method

The objective of market-based method is to value assets by studying the prices of comparable assets that have been traded between distant parties in an active market. The most obvious case where the method might be said to work is when the cost concerned is the price paid for the same intangible asset in a very recent comparable commercial transaction.

In other cases, comparability with other patents, whose value is known from market transactions, is the primary issue. There is a risk that the comparisons made may not be justified. A significant point made by Parr and Smith (in 1994) is that the transaction used may pertain to an intangible asset, whose use may not serve the best use of the intangible asset to be valued. An intangible asset to be exploited to the maximum possible extent requires cent percent of the potential protected market for the underlying invention to be accessed. Some sale or licensing agreements may restrain this, and values derived from them will be sub-par.

One possible market-based alternative to valuation methods is described by Parr (1988). This comprises the valuation of the 'patented product' of a single product firm by estimating the residual value, after subtracting the total value of all other known assets from the market value of the company. This is akin to the 'Premium P/E' method, which attributes the extra price and thus P/E ratio paid for a business with significant intangible assets to the value of those intangible assets. Taking the residual value analysis further ahead, Parr determines the return to the IP by estimating the percentage of the actual total return that can be considered by standard rates of return to tangible and other identified intangible assets, thus leaving the return to the IP as the residual. The percentage of the total revenue that this represents is then used as a base for a rate of return to the IP in licensing negotiations. In referring to the 'IP' and not the 'patented product', the return is imputed solely to the presence of the patent enabling above-average profits. In other words, Parr's valuations accord a value for the invention and the patent, and a measure of the return to the patent, but not a value for the patent as such, unless the notional return is taken and used to calculate a supposed NPV over the remaining life of the patent.

While such a method may be a valid way of discovering the inherent market valuation of a 'patented product', one cannot be sure that it provides an objective valuation. Moreover, it is arguable that use of a residual valuation method is impossible since one cannot be sure that the residual is attributable to the patent alone and not to other intangible assets. Finally, there are few companies with only a single product.

In short, while cost and market-based methods of valuation may be comparatively easier to use, they may not be providing answers that are as accurate as one might wish.

7.3 Income-Based Method

The income approach is based on the presumption that the value of an intangible asset results from the future success that will be generated by the asset by way of cash flows.

The value of an asset is regarded as the sum of the present value of the future cash flows that can be generated as on the day of valuation (Discounted Cash Flow) from the use of the intangible asset, within the expected economic useful life and possibly its divestiture or disposal. The key tasks within a valuation are the forecast of the cash flows pertinent for the valuation and the settlement of the capitalization interest rate or capitalization cost rate, illustrating the risk of the concerned intangible asset.

A significant activity pertaining to the valuation of single assets is segregating the specific cash flows that can be credited to the asset to be evaluated. These cash flows are a type of added value to the cash flows that could be generated without the specific asset.

The planning period for the cash flows is to be based on the economical useful life of the intangible asset or its remaining useful life. The useful life of intangible assets is normally defined, where a valuation may not consider revenues in eternity from such an asset. In rare cases, revenues in eternity may be considered in case the useful life of the asset is adequately long so that it becomes immaterial whether the present value of a limited series of cash flows is considered or whether the present value of cash flows in eternity is considered.

The income approach enables valuations from different perspectives. Apart from standardized concepts of value, which are pertinent for an organization's external objectives, it is possible to include individual and subjective components and, thereby, reach strategically relevant decision values. This is pertinent in cases in which the valuation is carried out not only for tax or accounting purposes, but shall be used for a finding a purchase price, or facilitating other decision-making processes.

There are primarily four different methods to evaluate intangible assets based on an income approach, each of which allows for a different way of segregating the specific cash flow for the relevant intangible asset. These methods are usually equivalent. In individual cases, one method or the other may be better suited than another, due to the importance of the particular intangible asset for an organization, or the fact that the information required for the application of one particular method may be difficult to procure.

Within the income approach, the following methods are applicable:

- Direct Cash Flow Prognosis Method
- Relief-from-Royalty Method
- Incremental Cash Flow Method, and
- Multi-Period Excess Earnings Method.

Such methods are, in some sense, market-based methods since they rely on market-based averages. Moreover, a very common method, based on industry average royalty rates, presumes that the income due to a patent, as such, is the royalty which would have to be paid by a licensee.

7.4 Discounted Cash Flow (DCF)-Based Method

DCF methods of valuation are now used for all kinds of applications. The two key factors that they account for are the 'time value' of money and to an extent the riskiness of the predicted cash flows. These two problems can be solved either by using a risk-adjusted discount rate to discount the predicted cash flows, thus accounting for both factors at once, or using certainty equivalent cash flows, in which predicted cash flows are adjusted to account for their normal riskiness and dynamic riskiness over time. These are subsequently discounted at the risk-free rate to account for the time value of money. The latter method separates the two issues of risk and time, and can help prevent problems when the risk adjustment varies over time, as it will with patents.

A benefit of valuing patents with DCF method is that since patents have defined lifetime, one is not faced with the problem of calculating residual values for the cash flows beyond the edge of the predicted horizon.

For a given project, the cash flow could be one of a wide range of possible cash flows. Presuming that the probabilities of the various results are known, the simplest DCF method of analysis would be to simply work out all the possible cash flow outcomes and their probabilities, get the total expected cash flow and discount it using whatever discount rate the business enterprise used at the given time. However, such an approach overlooks several factors.

Firstly, the discount rate used should always be one which echoes the risk of the concerned cash flow. For instance, if the project is not an average project for the organization, it will not be the same as the organization's cost of capital. In practice, using the presumptions of the capital asset pricing model and by finding quoted companies with cash flows of equivalent riskiness, suitable discount rates can be procured. Secondly, with a multi-stage cash flow such as a patent or patent application, the risk correlated with the cash flow will differ significantly over the lifetime concerned. A newly-granted patent, which is about to be litigated for the first time, will be much riskier than a 15-year old patent that has successfully overcome several attempts to revoke it.

The use of a single constant discount rate makes the contrary presumption that the risk adjustment rises as the patent ages. The common idea of a discount rate's risk premium component differing over time is dealt with the use of an array of distinct risk phases in evaluating high risk projects, whose risk differs from one phase to another.

7.5 Decision-Tree Analysis (DTA)-Based Method

Apart from the problems of identifying discount rates appropriate to the risk associated with the different stages in a patent's life and those of estimating the possible cash flows that might occur, there is a third problem with simple DCF methods. It is that no account is taken of the several possibilities open to managers of a project or a patent. For instance, at various stages in the life of a patent or application, it could be allowed to lapse or be surrendered. After the primary application, there is also the option to enlarge the patent family by making correlated foreign applications.

To a certain extent, simulations such as those afore-mentioned can be used to try and account for the possible outcomes of management decisions, though the same warnings mentioned above apply. Where the number of such possibilities is restricted and the possibilities for management choice only occur at designated times, they may be accounted for using some form of Decision Tree Analysis. This need to be based on an underlying DCF analysis of each branch, starting with the final ones and working backwards in time to give a present value.

The significant benefit of the DTA method over simple DCF analysis is that it builds in the value of flexibility experienced in a project or patent. This enables at least some account to be taken of the ability to surrender the patent, though it does not solve the discount rate problem. The rates used need to correlate to the risk involved at each stage and pertaining to each type of decision, while, in reality, a constant rate is generally used.

8 EMERGING CHALLENGES IN PATENT VALUATION

The strategy of terrorizing with litigation is not an emerging development. Practitioners have been evaluating patent value under the new circumstances and the changed notion of patent value for at least a decade. However, there are no quantitative empirical studies of patent value and patent value indicators under the new strategy. The reason being that patent market is not transparent and accurate data about patent monetization are not available to researchers. Considering both the change in strategy engaged to distill value from patent rights and the significance of patent evaluation in a flourishing market, there is a pressing need to provide and analyze large-scale empirical evidence on patent value under the 'being infringed' strategy. In specific, its objective should be to provide initial answers to some of following questions:

- How to identify valuable patents based on their individual characteristics?
- Which indicators of patent value determine an individual patent's value under the 'being infringed' strategy?
- How do they correlate to value indicators used earlier?
- How does the change in strategy influence used patent value indicators?
- Are there any indicators that can help in sensible search of patent databases to identify patent infringement?

The common attribute for the afore-mentioned questions is the need to create a more successful model for forecasting patent value under the new strategy. This is the most interesting question and a subject matter for further research. Therefore, there is a need for new research in this field based on bibliographic or patent statistics data to understand the unexplained residual. The primary step in this direction would be to use a dataset with patents emerging from different organizations, in different technological areas and with different functions to conquer the problems influenced by technology or specific organizational issues.

9 CONCLUSION

Valuing intellectual property, especially patents, is still at a nascent stage, with the field itself hardly more than a few decades old. As the process continues to evolve and as experts continue to fine-tune a gamut of methodologies, the art of valuing intellectual property will continue to witness developments, innovation, dynamism, and diligent progression of techniques in future. With the effluxion of time, the techniques afore-mentioned will either be outdated or refined further to become industry standards. While we cannot make any definite assumptions about which techniques will come to the forefront of IP valuation, it is safe to presume that some of these methods will become obsolete, while others will move the ranks to mainstream.

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