ARTIFICIAL INTELLIGENCE:

Does It Work for Patent Valuation?

▶ **Considering the differences between the patent appraisal and evaluation processes, it may make sense to automate one process but not the other.**

Whether you are a solo inventor developing your first patent or you work for a large multinational corporation that owns thousands of patents, you have certainly asked yourself, "How much are my patents worth?" This deceptively simple question is difficult to answer, in part because the traditional process of appraising the monetary value of a patent is completed manually. Recently, however, capabilities have emerged that attempt to automate the appraisal process in much the same way that the evaluation process has been automated.

What is the difference? The evaluation process assesses the technical merits of a patent, while the appraisal process provides a value expressed in dollars and cents. Although professionals are increasingly adopting artificial intelligence to evaluate the technical merits of a patent this method does have limitations.

The Traditional Patent Appraisal Process

Appraising the monetary value of a patent requires a nuanced approach that considers a variety of factors and methods. The typical patent appraisal is performed in three phases: the diligence phase, the analysis phase, and the reporting phase.

Diligence Phase

In the first phase, the appraiser collects information that will contribute to the performance of the appraisal. While not all the desired information will be available, it will likely include certain business, technical, and legal documentation (historical costs incurred to develop the patent-at-issue, limitations of the patent-at-issue, license agreements, etc.)

Analysis Phase

In the second phase, the appraiser will typically consider the three most common approaches of appraising monetary value: the income approach, the cost approach, and the market

approach. The weight given to any one of these approaches will vary with the unique facts and circumstances of the appraisal and the availability of reliable data. It is generally accepted, however, that the use of multiple appraisal approaches is preferred over reliance on a single methodology. In fact, the American Institute of Certified Public Accountants' Statement on Standards for Valuation Services No. 1 (SSVS) specifically states "in developing the valuation, the valuation analyst should consider the three most common valuation approaches" and "[t]he valuation analyst should use the valuation approaches and methods that are appropriate for the valuation engagement."

Reporting Phase

In the last phase, the appraiser may provide either an oral or written report that summarizes the assignment, the work performed, key assumptions, and the concluded monetary value. Regardless of format, it is common for the appraiser to provide the detailed valuation schedules that show all relevant calculations. If needed, the appraiser will prepare a formal report consistent with generally accepted reporting standards, such as those covered by the SSVS.

The Patent Evaluation Process Using Artificial Intelligence

A number of companies have introduced software for automating the evaluation process, including Thomson Innovation, Innography, Patent Ratings International, and Randolph Square IP. Our understanding of how artificial intelligence evaluates patents is based on discussions with professionals in the industry; however, we understand that there may be other companies that use different approaches. Some of these

companies advertise their services by stating that their algorithms can predict "patent value and relevance"[1] or "make certain predictive assessments about the quality and likely value of other patents."[2] Some common attributes on which these algorithms rely are forward and backward citation counts, citation velocity, and claim length.

Similar to the traditional appraisal process, the evaluation process is conducted in phases, but the diligence and analysis phases are abbreviated. It seems that the analysis phase is simply premised on the idea that an analyst can assess value by comparing a patent's attributes with the attributes of other patents with known value. As such, the due diligence phase may focus on gathering only the information that contributes to this limited scope of analysis.

In addition to the results of a financial analysis, reports generated from automated evaluations provide other information that may be relevant to a patent owner, such as a list of companies that cited the patent-at-issue, the number of forward citations received, and a landscape analysis of comparable patents.

The Recent Adoption of Artificial Intelligence

There are a number of companies that have recently expanded their evaluation software so that it can assess the value of a patent. These companies frequently point to academic research that suggests a patent's forward citation count – and other patent-related attributes – can be a measure of a patent's level of technological importance and a recognition of the patent's value by others.

Generally speaking, artificial intelligence algorithms work by first identifying – through public sources – patents with

known royalty rates and/or dollar values. In simple terms, the software links the observed market prices to the patent's attributes as a valuation multiple (e.g., the number of forward citations per dollars of value). The algorithm then applies the multiple to the patent-at-issue's attributes. For example, if a set of comparable patents has five forward citations per million dollars of value and the patent-at-issue has 10 forward citations, the algorithm might value the patent-at-issue at $2 million.

The Benefits of Using Artificial Intelligence

Artificial intelligence comes with several benefits, when used in the right context. Software programs can provide a less expensive, quicker, and more convenient method for evaluating certain aspects of a patent than retaining an expert to perform a manual analysis.

In addition to providing a rough, quantitative result, the software solutions can provide patent owners with information they can use to quickly identify potential licensing leads. The programs can also help patent owners analyze their own portfolios relative to those of another company. For example, software might be used to generate a ranked list of a competitor's key patents. Additionally, a software tool may allow patent owners to identify trends in innovation (e.g., white space analysis) that can be used by the company's management to direct research and development efforts.

The above-referenced uses for patent evaluations are generally based on the use of bibliographic information that is directly pulled from patent office databases (such as the United States Patent and Trademark Office), including the names of companies that cited the patent-at-issue, the number of forward citations received, and a list of comparable patents. For patent holders

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[1] https://www.innography.com/why-innography/patentstrength
[2] http://patentratings.mynetworksolutions.com/

that might not need a comprehensive appraisal of the monetary worth of a patent but instead want to begin with a high-level, qualitative analysis, consulting a software suite relying on algorithms could be a good starting point.

The Limitations of an Automated Approach

Although appraisal software may work as a starting point for a patent owner seeking a high-level evaluation, we are not aware of any software that can handle all the nuanced variables that must be considered in an appraisal of monetary value; thus, appraisals performed by professionals will likely yield more reliable and defensible results.

It is our impression that the software-based evaluation process employs only a form of the market approach when estimating value. While variations of the market approach can be useful and are often relied on by professional appraisers, they have certain limitations. For one, patents are unique, and thus identification of and sole reliance on prices of comparable assets may be challenging. Second, limited transactional data is available because the large majority of transactions are executed privately.

In light of these potential shortcomings, it is an industry-recognized best practice to use market approach results in conjunction with an income approach and/or cost approach (to the extent that such approaches provide reliable indications of value). We are not aware of algorithms that can adequately implement all three approaches, particularly given the onerous due diligence process, the number of available valuation methodologies related to each approach, the challenges in assessing and quantifying risk, the inability to consider commercially acceptable design-around solutions, and other issues relevant to the

implementation of the income and cost approaches. The following sections discuss some of the factors that should be considered when conducting an appraisal of a patent's monetary value but that likely cannot be addressed by software tools. We present them for illustrative purposes only, as there are many other factors that might differentiate the automated and manual appraisal processes for determining monetary value.

Advantages of the Traditional Appraisal of Monetary Value

Patent appraisals are context-specific and must consider the purpose of the valuation and the unique facts and circumstances associated with the patent-at-issue in light of that purpose. This makes it difficult for an algorithm to provide an accurate measure of a patent's monetary value. Presented below are two key advantages of a traditional appraisal of monetary value compared with the use of automated technologies.

Defining the Standard of Value

In every patent appraisal, the analyst will define the applicable "standard of value." Different options are available, including fair market value, fair value, and investment value. Acceptable definitions of these terms may vary depending on the context in which they are used, but it is well-understood that each standard of value is different from the others. While fair market value considers nonspecific parties to a transaction, investment value depends on one or more specific parties to which the value determination is relevant. For this reason, the valuation results may be different for different standards of value. Further complicating the analysis is the notion that the results of an appraisal performed under the investment value standard might be different depending on the selection of

the relevant party. For example, under the investment value standard, a patent used in the smartphone industry may be significantly more valuable to Apple (one of the largest smartphone manufacturers in the world) than to LG (a market participant with less market share).

The standard of value is typically determined by the purpose of the valuation. A valuation performed for financial reporting purposes will typically require the use of the fair value standard. Alternatively, a valuation performed to meet transfer-pricing tax regulations will typically require the use of the arm's length standard as defined by the relevant taxing authorities.

We are unaware of any algorithm that estimates patent values while identifying the purpose of the valuation and the related standard of value.

Alternative Valuation Approaches

Although the aforementioned market approach may be commonly used with existing software, professionals often apply two other methodologies to appraise the monetary value of a patent.

The Income Approach

Under the income approach, the valuation expert will define the business model that the patent owner will use to monetize the patent rights. How the patent-at-issue will be monetized, whether via product commercialization, litigation, licensing, outright sale, or some other business model, will have a significant effect on value and, therefore, must be defined and considered carefully. For example, the appraisal may be based on a patent's use in a commercial product that will be manufactured and/or sold by the patent owner. In this scenario, an expert will estimate the expected incremental benefits attributable to the patent-at-issue. Should the patent owner expect to execute a licensing-out campaign, the valuation expert will consider certain

economic factors that affect licensing revenue, including the identification of the licensing targets and their relevant products. For a patent owner that wants to sell the patent-at-issue, a valuation expert may identify potential buyers and determine the amount that each may be willing to pay.

In addition, many other important issues are similarly necessary to consider to generate a reliable indication of monetary value, including:

▲ Economic and legal life of the patented technology

▲ Products in which the patented technology is used

▲ Sizes and trends of the markets in which the relevant products are sold

▲ Competitive technologies, products, and companies, and their relevant market shares

▲ Nature of the expected benefits attributable to the patented technology

▲ Expected tax rates on the income expected to be generated from the patent-at-issue

▲ The risks and uncertainty associated with the implementation of the relevant business model[s]

We are not aware of software tools that incorporate the various income approach issues listed here or that are otherwise relevant to its implementation.

The Cost Approach

The cost approach is the third traditional patent-appraisal methodology. In theory, the premise of the cost approach is that a potential user of the patent would not pay more for a property than it would cost to replace it with another patent of equal or similar utility. Patent professionals will readily appreciate that a patent's monetary value is greatly affected by its claims, which define the scope of the patent's legal boundaries. A valuation expert may need to know the scope and breadth of a patent claim when considering the monetary value of the patent from the perspective of design-around costs.

Assuming that a patent appraiser can identify a design-around solution, he or she will consider certain expenditures such as research and development costs, prototype costs, engineering labor, and legal and consulting fees. The cost approach may be particularly useful for valuing patents associated with early-stage technology, because an in-depth understanding of the potential financial opportunity necessary to implement an income approach may not be available.

We are not aware of software tools that have the capability to address the cost approach.

Why Algorithms May Lack Efficacy

Patent evaluation software serves a good purpose, providing a relatively inexpensive, quick, and often convenient method of ranking patents, identifying potential licensees, or grouping patents together. However, such algorithms are often not an effective tool for appraising monetary value. Determining an

accurate, supportable monetary value for a patent requires the consideration of all three traditional valuation approaches. From our experience and knowledge of artificial intelligence algorithms that currently exist, such tools solely use a market approach for estimating patent value and are, therefore, significantly limited in their effectiveness. Furthermore, these tools do not appear to explicitly consider the purpose and standard of value related to the appraisal exercise. These limitations can have a significant effect on the final determination of monetary value.

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