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The patent portfolio value analysis: A new framework to leverage patent information for strategic technology planning

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ABSTRACT

Patents and patent portfolios are valuable assets. Companies need a conceptual structure to assess the value of their patent portfolio. This paper develops a practical and reproducible framework that can support scholars and practitioners to leverage the value of patents and to extract all possible strategic information from patent portfolio. The patent assessment process aims at comparing and contrasting the management of patents to the company's technologic and innovative strategy. The framework employs determinants of patent value that are elicited from patent databases, such as claims, citations, and market coverage, and that are expressed in terms of judgments achieved by interviewing involved managers, such as strategic relevance and economic relevance. The paper examines the main methodological issues in assessing patent portfolio value then, it describes the characteristics of the framework; subsequently, it illustrates the implementation of the proposed framework into two companies which operate in the aerospace and defense sector. The two implementations show that the framework can be used for strategic planning and strategic technology management.

1. Introduction

A number of articles show that management of knowledge assets, in general, and patents, in particular, are increasingly important, as the value of knowledge intensive companies is partly determined by the value of their patents. Today, a few organizations have made significant investments in training human resources to manage and evaluate patents and patent portfolios, and it would be extremely advantageous that these efforts be emulated by plenty of other business companies. Literature on the value of patents has proposed different methodologies of evaluation: qualitative and quantitative and monetary and non-monetary (Sapsalis et al., 2006; Sapsalis and van Pottelsberghe de la Potterie, 2007). The choice of a method often depends on the purpose of the valuation and includes market transactions, financial reporting, estimation of damages for infringement, or financial access. Basically, it is possible to say that patents can assume different values depending on the purpose and the context of the evaluation (Harhoff et al., 2003). Different methods of patent portfolio evaluation have been proposed in literature to meet the needs of different business issues, such as motivation of employees; attraction of customers, partners, and investors; intimidation of competitors; access to third party technologies and generation of income (Hall et al., 2005). However, the analysis and the understanding of the intrinsic value of a patent portfolio for internal business purpose have been little explored in literature, both from a theoretical and a practical point of view. This is confirmed by the fact that the assessment of the potentiality of a portfolio to sustain a company's strategic business has not been explored thoroughly yet. This preamble suggests that while many aspects in a company are considered to be valuable factors, such as legal advice, technological aspects, and scientific and bibliometric issues, patents and patent portfolios, too, should be considered as relevant in fostering the value creation process in a company. Indeed, data from a patent, such as technological innovation,

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scientific research and results, investments and economic returns, can be put together and processed in order to generate strategic information.

However, the objective of this paper is not to measure the value of a patent portfolio or decide which data are to be analyzed to assess it. The aim of this paper is to assess the perceived value of a patent portfolio and extract information from its data following an internal business perspective. In order to do this, it is necessary to understand the value of the patent portfolio deeply, to manage it strategically, and to grasp its strength and weaknesses, so that its patent catalogue data can be improved. This means that the strengths of patents and patent portfolios and the solution to their weaknesses must be exploited; that decisions on selling or keeping a patent should be taken fittingly and that the modalities of negotiating license agreements with partners must be evaluated appropriately. So, the analysis of the perceived value of a patent portfolio can help clarify decision making processes and define the best patent strategy in a company. Moreover, the analysis of a patent portfolio can improve the patent and patent portfolio management and make the intellectual property portfolio structure more clear in order to take on the competitive landscape.

Patent portfolio assessment is a business responsibility, and the concept of value is here intended as the power of patent portfolios to support the company's value creation process and its strategic business objectives. On this purpose, the patent portfolio assessment process needs other data in addition to objective and quantitative data, such as bibliometric, financial, and technological data. The process also requires the involvement of those decision makers who can supply their judgments to the highest degree of completeness, precision, and accuracy, based on the strategic business and economic relevance. Analyzing all these aspects means making an investment in the knowledge of a patent portfolio and to enable its better leverage and, consequently, to reduce the risk of taking inappropriate strategic measures.

This study therefore proposes a framework which supports companies in assessing the perceived value of patent portfolios. The intention of this paper is to take strategic information out of patents in order to support the managers' decisional process for patent management and verify their accordance with the technologic and innovative strategy in the company. The framework is innovative in that it combines the economic–strategic and the technologic–bibliometric perspectives to leverage the value of patents appropriately. In order to do this, five features have been selected in this *ad hoc* tailored framework, which is based on a multiple criteria principle: two qualitative features relate to the economic–strategic perspective and three quantitative features relate to the technologic–bibliometric perspective.

The contributions of this paper are the following. It summarizes the theoretical analysis of the literature regarding the five identified criteria and supplies a methodological framework to get a synthetic graphic representation from the combination of quantitative and qualitative analyses. More specifically, the framework aims to help managers make strategic decisions by the combination of the economic–strategic judgments with the bibliometric–technological information. Then, the application of the framework is illustrated. The findings of this work can provide useful insights into the matter, and be of help to a company's management as to who is in charge of patent portfolio control.

The remainder of the paper is organized as follows: Section 2 reviews the literature of patent value and discusses the rationale by which the five criteria will be selected. Section 3 describes the framework. Section 4 analyzes a practical implementation of the framework into two companies operating in the aerospace and defense sector. Finally, conclusions are drawn in Section 5.

2. Literature review

A large number of researchers have acknowledged the importance of finding a method to assess the value of patent portfolios as a result of the increase in patent applications and the awareness that patents are substantial tools to study the evolution of technology within markets. Since the proprietary technology is considered as a decisive factor to achieve market success and a valuable asset to many industries, benchmarks of patents provide useful insight into the competitive position of a company (Ernst, 2001) while patent portfolio assessment represents a promising way to compare technological know-how of companies objectively (Campisi et al., 1997; Ernst, 2003; Fabry et al., 2006). Moreover, as patents normally anticipate the real use of technologies in commercial applications, benchmarks may also have the function to give a first outlook into the future competitive landscape (Ernst et al., 2010).

Studies regarding patents for the strategic technology planning can follow two main approaches: the bibliographic approach and the value creation approach. The bibliographic approach uses bibliographic patent information including citations, applicants, inventors, and international patent classification codes. Although it is widely used to identify criteria such as International Patent Classification (IPC) class, inventors, and assignee, the bibliographic approach cannot either identify detailed technological features or provide significant knowledge of the value of a portfolio (Lee et al., 2009a). However, the bibliographic approach can be extended by the content-based approach to emphasize technologically significant patterns, trends and opportunities by extracting useful information such as abstracts, detailed description of invention, geographic protection and claims from patent text (Yoon et al., 2011).

From the value creation approach, patent literature is focused on the estimation of the economic and strategic value of patents, by making use of databases or surveys, and on the evaluation of the impact of innovation and technology on the company value. A few methods belonging to this approach are used to investigate different determinants and patterns in relation to patent value (Lanjouw, 1998; van Zeebroeck, 2012) or to transform patent data into useful information to manage intellectual property and analyze market competition (Chakrabarti and Dror, 1994; Hall et al., 1986; Tseng et al., 2011). Some of these approaches recognize the importance of managers' perception of the strategic and economic relevance of patents for an internal assessment of intangible assets (Grimaldi et al., 2012; Reitzig, 2003).

In conclusion, we noticed that there was a need for more research frameworks based on the analysis of both objective data, such as technologic–bibliometric information, and strategic–economic information, derived from the patent value creation analysis. In order to take account of both approaches and to consider all the fundamental elements regarding strategic technology planning, we selected five criteria: claims, citations, market coverage, strategic relevance, and economic relevance. The first three refer to