



## A framework for assessing a portfolio of technologies for licensing out



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### ABSTRACT

Companies invest in R&D to create and exploit new opportunities. In recent years, leading innovative companies have attempted to establish a market for technologies and create leveraging opportunities through such markets. In this paper, we consider the question of how a firm can evaluate its patent portfolio for licensing purposes. To this end, we propose an approach that enables large corporations to scrutinize their portfolio of (patented) technologies and to subsequently set up royalty rate values to support the negotiation process of a particular technology. We use case-based research to develop our approach, which we illustrate with an in-depth assessment of 50 technologies. We conclude by discussing the pros and cons of our approach and its potential generalization to other companies and considering how it can be used to indicate value drivers for R&D strategy.

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### 1. Introduction

Markets for technologies have major implications for corporate strategies. They not only affect the role of companies, both as technology users and as technology suppliers, but also open up a series of strategic routes that a company can pursue to gain a competitive advantage through technological development and commercialization. In short, such markets enlarge the strategy space because they allow organizations to choose between licensing technologies (in or out) and develop them in-house.

In this paper, we consider the fact that firms can leverage opportunities in a market for technologies and investigate the question of how a firm can assess its portfolio of technologies so that they can be licensed. Companies engage in a market for technologies motivated not only by the possibility of taking advantage of the value of a particular patent but also by the possibility of making a strategic move to position themselves in the competitive landscape. For instance, in 2011, Google bought more than a thousand patents from IBM to defend itself against smartphone lawsuits (Efrati, 2011). In the latter case, the companies at stake had to assess a large volume of patents to set a value for the whole portfolio to ground the negotiation.

The market for technologies opens up a series of potential avenues for corporate venturing. Corporate venturing is usually described as

the process by which large companies create opportunities through innovation and strategic renewal. Specifically, as discussed by Elfring (2005), large corporations can either create an environment in which entrepreneurial initiatives might emerge throughout the organization or focus on corporate venture capital programs for financing innovation. Our paper fits the former approach on corporate venturing, particularly with regard to how technologies developed in-house can be licensed out (for a discussion on licensing strategies, see, e.g., Davis, 2008 and Lin, 2011).

In short, we will consider an R&D company that develops technologies in-house and that has the option to take advantage of the value of assets by embodying them into its products and services and/or by trading them in the market. As discussed in the next section, to the best of our knowledge, previous approaches are not suitable for large corporations to scrutinize their portfolio of patents so that the patents can be licensed out.

Our main contribution is to propose a framework that enables large corporations to scrutinize their portfolio of patented technologies and, subsequently, to set up royalty rate values<sup>1</sup> to support the negotiation process of a particular technology or for the whole portfolio of technologies. In doing this, we will offer a rationale for negotiating licensing agreements for a large volume of patents that relies upon market data and/or economic assessment to base the valuation.

The remainder of this paper is organized as follows: using the relevant literature, we will highlight the novelty of our approach in Section 2. We will then describe our research method in Section 3. An

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<sup>1</sup> Royalty rate is the sum of money paid to the licensor/innovator by the licensee for the use of a patent.

introduction to our framework is presented in [Section 4](#), while, in [Section 5](#), we will illustrate the framework using a practical application conducted in a cosmetics company. [Section 6](#) will be devoted to a discussion regarding the lessons learned from this application, highlighting its pros and cons. We will then conclude our paper in [Section 7](#).

## 2. Relevant literature

R&D companies which develop technology in-house often face the challenge of how to assess the value of technologies to take full advantage of their possibilities. There are two different streams of research that are in line with this management problem. The first one focuses on the technology itself and usually sheds light on decisions regarding the development strategy. For instance, [Teece \(1986\)](#), [Pisano \(1990\)](#) and [Hill \(1992\)](#) consider the question of whether technologies should be developed in-house. The second stream focuses on establishing a market of technologies. For example, [Arora et al. \(2001\)](#), [Ziedonis \(2004\)](#), and [Gambardella \(2002\)](#) considered the required features of a market for technologies.

Technologies in general are highly differentiated, and their “price” likely reflects factors that are idiosyncratic to both the buyer and the seller ([Arora et al., 2001](#)). [Hsieh \(2013\)](#) agrees with [Arora et al. \(2001\)](#), discussing how difficult it is to assess a patent value before the patent is commercialized in the market. Although a company might not have a precise measure to set values for technologies, it makes implicit assessments of the value of a certain technology when investing in R&D. Similarly, when deciding on whether to patent a technology, a company also makes implicit assessments on the cost of making a patent application and the potential value that can be generated by disclosing information that may grant the company the right to exclusively explore the technology.

As described by [Arora et al. \(2001\)](#), a valuation may enable companies to specialize in developing technologies without necessarily having to acquire downstream capabilities. Here, the decision about in-house exploitation not only depends on development costs but also on the competition landscape in different markets throughout the “value chain” of innovation. In addition to this, an accurate valuation is particularly important in cases where the company lacks downstream assets to commercialize the technology.

To take full advantage of a portfolio of patent technologies, some researchers have also tackled a similar research question to the one we address in this paper, namely, how a firm can evaluate its patent portfolio for licensing out purposes. For instance, [Pitkethly \(2001\)](#) and [Fröhling \(2005\)](#) have considered the question of how to value a patent, and [Sohn et al. \(2013\)](#) have extended this question taking into consideration the different perspectives of the willingness to pay and sell and specifically focusing on academic patents.

Even closer to our work is that of [Sherry and Teece \(2004\)](#), who examined the question of how to determine a reasonable royalty rate to set the price for the right to use a patented invention. Also noteworthy is the work of [Lemley and Shapiro \(2007\)](#) who focus on patents that cover one component or feature of a complex product/technology, and investigate the impact of a potential hold-up and royalty stacking in the negotiation of royalty rates for these patents.

However, neither of these papers provided a satisfactory answer to our particular research problem, which was based on a portfolio of licensing out technologies (not an appraisal of a single product/technology) and the idea of fostering a market for technologies. In particular, the main difference between our work and the work of [Sherry and Teece \(2004\)](#) is the fact that they focus on “reasonable royalty rates for proven-valid-and-infringed patents” as opposed to our focus on technologies that can be licensed out (and which have not necessarily been infringed on or used by other firms).

In other words, the novelty of our approach lies in the fact that we focus on patents that can be licensed out by large corporations in a technologies market, in line with [Arora et al. \(2001\)](#). In addition to this, we

address some of the challenges surrounding the process of defining royalty rates for licensing out patents to support the negotiation process of a particular technology, such as the criteria for sorting the patent portfolio and the choice of method to evaluate each group. Furthermore, we address the main issue of how to use the market approach for patent royalty rate valuation in the outward-licensing concept by basing the appraisal of technologies developed in-house on the registered transactions of other patents.

In recent decades, companies have increasingly assessed the competitive landscape through patent analysis ([Abraham and Moitra, 2001](#); [Brockhoff, 1992](#)). In a similar vein, [Baldini \(2010\)](#) and [Fukugawa \(2009\)](#) have investigated incentives and key factors to foster licensing activities. Despite the fact that the problem tackled in this paper can be regarded as a portfolio for patented technologies, it should be noted that a company needs to engage in other relevant strategies to truly gain a competitive advantage in terms of strategies for innovation and intellectual property. Examples of these are open innovation (for a recent review, see, e.g., [Huizingh, 2011](#)) or the establishment of a broad perspective of intellectual property rights within innovation management (for an analysis of the literature, see, e.g., [Candelin-Palmqvist et al., 2012](#) and [Hanel, 2006](#)).

Even though much work has been performed on the value assessment of patents, to the best of our knowledge, there is no comprehensive approach from which to assess a portfolio of patents and define the royalty rates for licensing the patents out. In part, our work aims to fill in this gap by grouping patents into three categories, and basing part of our appraisal on the registered transactions of other patents (see [Section 4](#), where we provide more detail about our approach).

## 3. Research method

In this study, we used case-based research to develop our approach (see [Voss et al., 2002](#) or [Yin, 2009](#)). Here, we started with an in-depth discussion between the four authors – two of whom work in the studied cosmetics company – on how to define royalty values for technologies that can be licensed out.

As we mentioned, we first conducted a major literature review and noticed that there was no satisfactory approach to efficiently set values for a portfolio of technologies to be licensed out. By “efficiently,” we mean that current approaches are either too detailed/customized or too superficial and are therefore inappropriate for practical purposes. Then, we proposed an initial framework through induction to fill this gap. Having come up with our initial framework, we tested it in a series of case studies to refine it.

Specifically, we investigated the practical applicability of our framework through an in-depth assessment of 50 technologies from Natura, a cosmetics company in Brazil. It should be noted that each patented technology assessed by means of our framework represents one unit of analysis. Moreover, for each technology (case), all of the team members involved in developing the particular technology were engaged in assessing the technology through our framework (for more details on each assessment, see [Section 4.1](#)).

## 4. Approach

Our framework is divided into two macro-phases, namely, technology classification and assessment. In the first stage, we evaluated the potential markets for the technology, considering the patent licensing eligibility (i.e., whether it can be licensed) and assessing its value potential for licensing according to technological and marketing criteria (for a suitable example of how to assess the technological criteria, see [Van Wyk, 2010](#)). This qualitative appraisal indicates whether a more detailed analysis is called for or if a short one is adequate.

By the end of this first stage, it will be possible to group the patents into three categories: (i) those that will not be licensed due to strategic or legal limitations; (ii) those that should proceed to a qualitative

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