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## Absorptive routines and international patent performance

Fernando E. García-Muiña\*, Rocío González-Sánchez

Rey Juan Carlos University, Economía de la Empresa (Adm., Dir. y Org.), Economía Aplicada II y Fundamentos de Análisis Económico, Pº de los Artilleros s/n, 28032 Madrid, Spain

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**Abstract** Patents on an international level are essential for firm results. Accordingly, the use of external sources of knowledge acquires crucial importance to get global innovations and create competitive advantages. For that reason, the literature has highlighted the strategic role of the absorptive capacity construct.

We enrich the treatment of the absorptive capacity phases including the moderating effects between routines associated to the traditional potential-realized absorptive capacities. Taking into account external knowledge search strategies, the deeper external relationships, the better transference and appropriation of specific external knowledge. Nevertheless, when the moderating role of assimilation is included, cooperation agreements appear as the most efficient source of external knowledge. Finally, we show that technological tools let firms store and structure the information making easier its use for international patenting. This positive effect is reinforced in the presence of exploitation routines, since technological knowledge will better fit to the industry's key factors of success.

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### Introduction

The economic crises that many firms have had to deal with in their domestic markets and the global nature of most industries explain the need to be internationally competitive (Yu et al., 2013). Based on this premise, some authors have defended the need to improve the management of

international patents for firm success (Mangematin et al., 2003; Al-Aali and Teece, 2013; Thomä and Bizer, 2013; Useche, 2014). Different studios have supported the use of international patents as a mechanism to promote the cross-country technology transference and exploitation in a more efficient manner (Harhoff et al., 2009; Johnstone et al., 2011; Berry, 2016). In addition, the publication of the patent only in the home-country language, without an international protection, can increase its vulnerability to imitation (Eaton and Kortum, 1999), and thus make it less valuable.

The high complexity and dynamism of industries at international level make very difficult for firms to develop the

\* Corresponding author.  
E-mail addresses: [fernando.muina@urjc.es](mailto:fernando.muina@urjc.es) (F.E. García-Muiña), [rocio.gonzalez@urjc.es](mailto:rocio.gonzalez@urjc.es) (R. González-Sánchez).

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necessary innovations with their own resources only. Accordingly, the use of external sources of knowledge acquires crucial importance in value creation (Van den Bosch et al., 1999; Camisón and Forés, 2010; Love et al., 2014; Monteiro et al., 2016).

In this context the *absorptive capacity* construct emerges as a strategic dynamic capability to improve the innovative potential of companies (Cohen and Levinthal, 1990; Zahra and George, 2002; Xia, 2013), and their ability to adapt to context circumstances (Helfat, 1997; Zollo and Winter, 2002; Helfat and Peteraf, 2003; Reitzig and Puranam, 2009; Fisher and Oberholzer-Gee, 2013). Since the seminal work of Cohen and Levinthal (1990), a wide body of literature has been developed to get a better understanding on its internal elements as well as on its role in firm performance.

Although many contributions to the field have considered the absorptive capacity as a one-dimensional phenomenon (Tsai, 2009; De Jong and Freel, 2010; Flatten et al., 2011), in recent years such consideration has been abandoned. Some authors have adopted a multidimensional approach to the concept from an organizational routines point of view (Nelson and Winter, 1982; Jansen et al., 2005; Noblet et al., 2011). In this way, numerous works define this construct as the set of organizational routines required for recognizing, assessing, assimilating, integrating, transferring and applying the new external knowledge (Cohen and Levinthal, 1990; Zahra and George, 2002).

However, these processes have been structured in a sequential and independent manner, which makes it difficult to analyze synergies or complementarities among them (Jansen et al., 2005; Todorova and Durisin, 2007; Noblet et al., 2011). All this literature supports the general conclusion that the efforts made in any absorptive routine will improve the performance of the company. To fill this gap, in this paper we study the complementary role of the different phases of absorptive capacity. To carry on this research, we define the following research questions:

- 1) Do the assimilation routines moderate the relationship between acquisition phase and international patenting?
- 2) Do the exploitation routines moderate the relationship between transformation phase and international patenting?
- 3) Does the moderating role played by assimilation routines change according to the depth of the relationships a firm maintains with external agents?

Since resources are scarce, the first contribution of this paper is to support the making-decision process concerning their allocation along the knowledge absorptive phases. Our starting point is the well-recognized structure proposed by Zahra and George (2002), who divided absorptive capacity into two factors: *potential absorptive capacity* (PACAP) and *realized absorptive capacity* (RACAP).

We analyze in an innovative manner the moderating role that assimilation and exploitation phases play in the relationship between acquisition and transformation absorptive routines and firm innovative performance, respectively. Therefore, we followed the ideas proposed by previous authors (Schleimer and Pedersen, 2013; Ebers and Maurer, 2014), who suggested the interest of reaching a holistic approach to the absorptive process in future researches.

That is, we consider that part of the innovative potential of the company – in terms of international patenting – can be explained by the coherent effort along the different routines of the absorptive capacity.

In addition, we pay special attention to acquisition routines, analyzing different sources of external knowledge that have not received enough attention within the context of absorptive capacity. *External knowledge search strategies* framework (Laursen and Salter, 2006, 2014; Lin and Wu, 2010) studies the impact of different external sources on results. There is a large body of theoretical and empirical literature that shows the strategic role of external relationships in organizational learning, in accordance to *breadth* and *depth* of such relationships (Laursen and Salter, 2006; Hohberger et al., 2015; Zobel et al., 2017). After a proposal of knowledge acquisition strategies, we empirically test if deeper or stronger external relationships (firm acquisition/participation) are preferred options to transfer and appropriate specific and tacit knowledge, instead of cooperation agreements (Desyllas and Hughes, 2008), in which international patents are based on (Zobel et al., 2017).

Nevertheless, integrating search strategies within the absorptive capacity landscape offers new areas of debate to improve our comprehension on the role external knowledge may play in international patenting. Therefore, our second contribution has to do with the moderating role that assimilation routines may play taking into account different levels of depth among acquisition strategies.

The data used for the empirical analysis are from a sample from the *Spanish Business Strategies Survey* (SBSS, SEPI Foundation) for the years 1997–2007.

Following this introduction, the paper presents a brief definition of the concept of absorptive capacity, as well as the model for empirical verification. A description is then made of the methodology used and, finally, the main findings, conclusions and future lines of research are presented.

## Literature review and research model

### Absorptive capacity from an organizational routines approach

In a wide sense absorptive capacity can be defined as the firm's skill to recognize, assimilate, integrate and exploit new external knowledge (Cohen and Levinthal, 1990; Zahra and George, 2002; Noblet et al., 2011). The treatment of such absorptive capacity as a strategic variable has been very diverse in the literature, both from the point of view of its role in firm performance and from the perspective from which it has been raised its definition and measurement.

With respect to the role of absorptive capacity in firm performance, numerous scholarly works adopt a theoretical approach to defend the significance of absorptive capacity (Lane et al., 2006; Flatten et al., 2011), and reach the empirical conclusion that there is a direct relationship between that capacity and organizational performance (e.g., Jansen et al., 2005; Murovec and Prodan, 2009). Secondly, other studies consider that the potential of absorptive capacity depends on certain contingent variables, such as the context in a broad sense, so there is no conclusive results

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