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Variety in external knowledge sourcing and innovation novelty: Evidence from the KIBS sector in Spain

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ABSTRACT

This study explores variety in knowledge sourcing and its impact on the degree of novelty in KIBS innovation. The data analysed are part of the Spanish Technological Innovation Panel (PITEC) 2013, Spain's contribution to the European-wide Community Innovation Survey (CIS). Some evidence is found of a positive relationship between variety of market sources used and innovations new to the firm, and of a negative relationship between variety of research sources used and new-to-market innovations. R & D is negatively associated with innovation, whereas other internal information sources are positively associated, suggesting that the definition of R & D in KIBS should be broadened. Results differ between t-KIBS and p-KIBS – in particular cooperation is only associated with t-KIBS innovation.

1. Introduction

This paper examines the relationship between variety of knowledge sources and degree of innovation novelty in knowledge-intensive business services (KIBS) in Spain. Innovation in service activities occurs under different modalities, some of which are determined by the range of external knowledge and information sources that are used (Hidalgo and D'Alvano, 2014; Rubalcaba et al., 2012; Lighfoot and Gebauer, 2011; Droege et al., 2009). Service firms' use of external knowledge sources is important for widening their knowledge base and for enabling innovation (Chesbrough et al., 2006). In practice, a firm cannot generate internally all the knowledge that contributes to the development of solutions or of responses to problems arising in the innovation process. Therefore, in addition to internal innovation efforts, firms often rely on a variety of external and complementary sources of knowledge and on partners.

Innovation activity comprises not only the development of successful innovations but also ongoing and abandoned innovations: the concept of innovation-performance encompasses both. According to the Oslo Manual (OECD, 2005, p. 59) an innovation-active firm is “one that has had innovation activities during the period under review, including those with ongoing or abandoned activities”. However, until now most studies of innovation strategy have focused on firms that introduce innovations without taking into consideration that innovation success

and failure are closely intertwined (D'Este et al., 2016). In the context of open innovation, failure or “false negatives” can play a key role in the firm's strategy if they are “exposed to outsiders to gain their perspective on the potential of these projects” (Chesbrough, 2004, p. 25). That is, abandoned and ongoing innovation activities improve the firm's knowledge base and its probability of future success (Madsen and Desai, 2010; Townsend, 2010; Magazzini et al., 2012).

With regards degree of novelty, Amara et al. (2008) discuss various ways of conceptualizing and operationalizing it depending on whether unidimensional or multidimensional scales and typologies are employed. Most innovation surveys, like the Community Innovation Survey (CIS), follow the guidelines of the Oslo Manual and employ what Archibugi and Pianta (1996) describe as a “subject approach”, that is, they collect information for innovation-active firms. In the particular case of the CIS, two degrees of novelty are distinguished: innovation new to the firm and innovation new to the market. Innovations new to the firm concern innovations already implemented by other firms, so some work points out that this type of innovation can be regarded as imitation (Arvanitis and Seliger, 2014; Cappelli et al., 2014) – though imitation has, conversely, been recognised as a type of innovation (Godin, 2015), and one that is critical for firm survival and competitiveness (Shearmur et al., 2016). In contrast, an innovation is new to the market when the firm is first to introduce it. This type is commonly used as a proxy for radical innovation given that a long period of time is

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necessary to know if an innovation is really “radical” or “disruptive”.

Although there is a large and expanding body of work on knowledge sources and innovation, little of it deals with the connection between variety in knowledge sourcing and innovation novelty, and most of the research focuses on manufacturing firms (Amara and Landry, 2005; Nieto and Santamaría, 2007; Zeng et al., 2010). This study's contributions are threefold. First, the paper explores the nature and relative importance of different types of knowledge sources for service (KIBS) innovation. This involves viewing KIBS as both *users* of knowledge in their innovation process and as a potential *source* of external knowledge: indeed, “Knowledge-Intensive Business Services involve economic activities which are intended to result in the creation, accumulation or dissemination of knowledge” (Miles et al., 1995, p. 18). Traditionally attention has been directed to KIBS as agents in the innovation value chain, as *sources* of knowledge or know-how purchased by innovative clients. However, as den Hertog (2002) notes, this apparently simple relationship between KIBS and their clients hides a “bridging” process and, on many occasions, their activity has more in common with the role played by research and technology organizations or higher education institutions. In this study we observe KIBS as innovators, and analyse where they source knowledge during the innovation process.

Second, the paper examines the relationship between variety of knowledge sources and degree of innovation-performance novelty. It is commonly assumed that firms increase innovation success by accessing larger numbers of knowledge sources (Cassiman and Veugelers, 2006; Laursen and Salter, 2006; Leiponen, 2005; Leiponen and Helfat, 2010) but recourse to different sources is associated with different innovation results (Amara and Landry, 2005; Nieto and Santamaría, 2007; Zeng et al., 2010). For instance, the use of knowledge from research and higher education institutions is supposed to have a positive impact on radical technological innovation while knowledge from agents within the value chain is related to incremental innovations. We differentiate four types of knowledge source (internal sources; market sources; research sources; generally available sources of knowledge) and three degrees of innovation (on-going or abandoned; new-to-firm; new-to-market) and analyse connections between the two.

Third, the paper compares and contrasts knowledge sourcing and degree of novelty in two different KIBS sub-sectors: technological KIBS (t-KIBS) and professional KIBS (p-KIBS). T-KIBS comprise activities like IT-related services, engineering or R & D consulting. P-KIBS comprise more “traditional” business services such as legal, accounting, management, or market research. Like manufacturing industries, KIBS differ not only in terms of their output, but also in terms of their knowledge base and absorptive capacity: therefore, like manufacturing, KIBS cannot be analysed as an undifferentiated group of establishments (Rodríguez et al., 2016; Tether et al., 2012). The differences in knowledge sourcing across KIBS sub-sectors have not been explored.

The structure of the paper is as follows. In Section 2 the theoretical framework is described and the research hypotheses are outlined. Section 3 presents the data and the methodology. Section 4 reports the results. Finally, conclusions and implications are discussed in Section 5.

2. Theoretical framework and hypotheses formulation

Two sets of factors are thought to determine innovation novelty: industry-related factors and firm-specific factors (Barbosa et al., 2014). One of the most analysed industry-related factors is market structure, in particular degree of competition, on which there are two opposed views: the Schumpeterian view (Schumpeter, 1934), which suggests a negative relationship between innovation and competition, and the Arrovian view (Arrow, 1962) which suggests that competition fosters innovation. There is no agreement regarding which view prevails empirically. Other industry-related factors relate to the moderating role of protection regimes (Bessen and Maskin, 2009; Laursen and Salter, 2014) and to the industry's technological level (Aghion et al., 2005; Lee, 2005).

Of firm-specific factors, size and R & D - closely related to degree of competition - have been widely investigated (Barbosa et al., 2014). Earlier work on innovation focused on R & D, especially when conducted on a continuous basis (Rothwell, 1991). Attention has been directed at R & D as a contributor to absorptive capacity, that is, to the firm's “ability to recognize the value of new information, assimilate it, and apply it to commercial ends” (Cohen and Levinthal, 1990, p. 128). Thus, although evidence corroborates the idea that R & D is a key determinant of innovation, R & D does not necessarily result in innovation at the firm level (at least in the short to medium term) because there are other determinants, in particular external knowledge sourcing activities. Some authors identify a positive relationship between R & D activities and the use of external knowledge sources, finding that as R & D intensity and novelty increase so does the need for external knowledge (Bercovitz and Feldman, 2007; Hottenrot and López-Bento, 2014). However, other empirical work finds that external knowledge sourcing induces R & D (Veugelers, 1997). Whether there exists a causal direction, or whether R & D and knowledge sourcing grow concurrently, the literature, in particular on manufacturing, suggests the existence of complementarity between inflows and outflows of knowledge, and supports “the idea that marginal return from engaging in one type of knowledge flow increases as the intensity of the other increases” (Cassiman and Valentini, 2015, p. 1).

In the case of KIBS firms, Pina and Tether (2016) highlight a direct relationship between their primary knowledge base and the major drivers of innovation. Thus, while investment in R & D is related to product and process innovation in KIBS firms whose knowledge bases are primarily analytical or synthetic, in the case of firms whose knowledge bases are primarily symbolic R & D has no effect. This can be partially explained by the fact that internal capacity in KIBS is linked to two factors: i) labour force qualification, and ii) innovation effort. “Innovation effort” is partly captured by a classic variable like R & D. There is, however, some debate about R & D as an indicator of innovation effort in services (Doloreux et al., 2016). Some authors, like Young (1996) or Howells (2000), point to similarities between R & D conducted by (technology-intensive) manufacturing firms and by some service industries. Others (Hipp and Grupp, 2005) argue that R & D plays a minor role for KIBS in comparison to manufacturing. It has often been hypothesised that increased R & D expenditure in KIBS contributes to increased innovation (Amara et al., 2010; Freel, 2006) although some differences are found between industries (Freel, 2006) and between innovation types (Koch and Strotmann, 2008). For instance, Freel (2006) obtains different results for p-KIBS and t-KIBS whereas Koch and Strotmann (2008) find a significant effect of R & D on radical, but not on incremental, innovation. Overall, t-KIBS seem more prone to carry out R & D than p-KIBS, but Doloreux et al. (2016) suggest that this may be because KIBS firms (and researchers who explore KIBS) fail to recognize social-science type research (such as that carried out by legal or marketing firms) as research: thus, the apparent predominance of R & D in t-KIBS may be because only technological research is recorded. In terms of the identification and measurement of innovation expenditures, this could translate into other types of expenditure, not necessarily recorded as R & D, contributing to innovation in KIBS firms. Following the above reasoning, two hypotheses are formulated:

H1. Internal R & D has a positive effect on the development of innovation.

H2. Variety in innovation expenditures other than internal R & D has a positive effect on the development of innovation.

The resource-based theory of the firm emphasises that firms require complementary resources to innovate and that their choice of partners depends on the type of resources sought (Fritsch and Lukas, 2001; Tether, 2002; Miotti and Sachwald, 2003). Two broad categories of partners are differentiated: market/value chain and research/institutional. Within the market category, two kinds stand out: clients and

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