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Title

Human capabilities and innovation in young companies

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Approach

The importance that human capabilities and skills have for innovation and in general performance in companies has been widely acknowledged in the literature, and research has evidenced a positive association between human capital and innovativeness (Leitner, 2011). In fact, two different bodies of scholars have looked into these issues. On the one hand, integrating research in areas such as human resources and organizational learning, the dynamic capabilities approach (Teece et al., 1997) explains firm-level success and failure as the result of the combination and exploitation of firm-specific competences and resources, and the development of difficult-to-imitate organizational, functional and technological skills. Similarly, the knowledge-based view of the company (Grant, 1996) highlights the relevance of knowledge resources as the key for successful performance, emphasizing the importance of skill acquisition, learning, and knowledge management (Swan et al., 1999). In relation to the management of knowledge, innumerable authors have also confirmed the crucial role that tacit knowledge (embedded in individuals) has for innovation in companies (Nonaka and Takeuchi, 1995), as it represents the more sticky and difficult to copy typology of knowledge. On the other hand, research on intangibles and intellectual capital has adopted a perspective closer to accountancy area (Lev and Zarowin, 1999), in which aspects such as disclosure of reliable information have been more analyzed. Although we consider that the mentioned two distant bodies of research deal with very related problems, for the purpose of this paper we are going to adopt the approach of the innovation literature, emphasizing the role of human capabilities and skills on the innovation performance of Spanish firms.

The current economic crisis has increased competition and price/performance rivalry, as a consequence of the reduction of the demand for products, and has affected innovation in many different ways (OECD, 2012). In this context, the dynamic capabilities approach (Teece et al., 1997) has taken a new topicality, and so has the need of considering the importance of intangibles such as human capital for innovation. However, some authors have analyzed the impact of human capital on entrepreneurship, finding that these variables positively affect the discovery of entrepreneurial opportunities but do not influence on their successful exploitation (Davidsson and Honig, 2003). In this sense, we aim at analyzing the effects of human capital on innovation performance of companies, that is, looking at the outcomes coming from innovation that provide an idea of the success of the exploitation process.

However, the development of these individual capabilities and know-how takes time, as they are often created on the job through “learning-by-using” or “learning-by-doing” (Jensen et al., 2007) and, as a consequence, young companies could be expected to have disadvantages, which could affect their innovative performance. In fact, research shows that human capital and the management of human resources is crucial for innovation in start-ups (DeWinne and Sels, 2010). Similarly, research has shown that young innovative companies often find stronger barriers to innovation, such as internal and external financial constraints (Schneider and Veugelers, 2010).

Objective

Our study follows a twofold objective: First, we aim to analyze the effect that human capital has on innovation performance of companies, considering aspects such as the educational level of employees in the company, or the relative importance of employees with a knowledge intensive work within the company (e.g. employees that work in science and technology or in R&D activities). Second, we aim to compare the effects of such variables on innovation in recently created companies (less than 5 years old) with their effects on older companies (more than 5). In this sense, we will analyze whether there human capital is a higher barrier for innovation in young companies in comparison with older ones.

Methodology

The analysis is based on the results of the Spanish PITEC database, which is equivalent to the Community Innovation Survey (CIS). This survey was developed to collect micro-level data on the innovation activities of firms and has been extensively used for the analysis of innovation in

Spain and in other European countries, addressing issues such as the effects of absorptive capacity on the ability to manage external knowledge flows and stimulate innovation (Escribano et al, 2009), barriers to innovation (D'Este et al., 2011), or the effects of external knowledge inflows in absorptive capacity and innovation (Kostopoulos et al., 2011). We use this database for different years (2008, 2009 and 2010), in order to analyze lagged explanatory variables. We have a sample of 10163 companies of different sizes and operating in diverse industries.

Table 1 shows the variables of our model. Our dependent variable is innovation performance measured by the natural logarithm of business revenues coming from product innovation (per employee). Other authors have focused on the effect of human capital on product innovativeness, evidencing a positive relationship between them in Australian SMEs (Leitner, 2011). Similarly, we have based the selection of the independent variables on recent research analyzing the effects of human capital, such as training-related measures (McNamara et al., 2012) or Income and education-based approaches (Prados de la Escosura and Roses, 2010), on organizational performance. Additionally, and in order to control the effects on innovative performance of variables such as the size of the company, we have also included some control variables (following Frenz, 2008).

Table 1

Dependent variable	
INN_PER	Natural logarithm of business revenues coming from product innovation, per employee.
Explanatory variables	
GFORM_P	Natural logarithm of expenditure on training, per employee.
GFORM_AC	Natural logarithm of cumulative expenditure on training, per employee (2008-2010).
REMSUP	Natural logarithm of the percentage of employees with advanced degrees.
RET_PID	Natural logarithm of the average earnings of R&D employees.
ANIOS	Natural logarithm of the age of the firm.
PERS_NCUAL	Lack of qualified staff perceived as a major barrier to innovation (dummy).
QUIEN	Innovation developed by the company, and not by other companies or in collaboration (dummy).
OBJET12	The company developed a technological innovation in order to make improvements in health and safety (dummy, with one-period lag).
OBJET15	The company developed a technological innovation in order to promote an increase in employee skills (dummy, with one-period lag).
ORGTRAB	The company has developed new business practices in work organization (dummy, with two-period lag).
LUGTRAB	The company has developed new organization of the workplace with the aim of better sharing of responsibilities and decision making (dummy, with two-period lag).
Control variables	
SIZE	Natural logarithm of the number of employees.
GINN	Natural logarithm of innovation expenditure, less expenditure on training and earnings of R&D employees (which already appear in the model as variables of human capital).
INT_MARKET	The company operates in the international market (dummy).

The proposed specification closely follows the Frenz (2008) approach, which estimates a censored data model using a correction term for selection bias. This bias comes from the fact that the CIS data contains mostly innovative companies. It is a two-stage model known as Heckeman correction method (Heckman, 1979). In the first stage, a Probit model is estimated to explain the decision to innovate. The expected value of this variable (i.e. the propensity to innovate) is used to obtain the correction term. In the second stage, we estimate a Tobit model explaining innovation performance, including the correction term as an additional control variable.

Expected results

We expect companies with a higher level of human capabilities, measured as a combination of the listed independent variables, to have better innovation performance. Our preliminary results seems to point in that direction (see Table 2), but it is necessary to analyze alternative specifications for the model.

Table 2

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
C	-9,41 ***	-9,07 ***	-7,15 ***	-12,55 ***	-7,11 ***
GFORM_P	-	-	-	-	0,24 ***
GFORM_AC	0,18 ***	0,17 ***	0,26 ***	0,27 ***	-
REMSUP	0,20 **	0,24 **	0,27 ***	0,30 ***	0,27 ***
RET_PID	0,20 ***	-	0,43 ***	0,46 ***	0,44 ***
ANIOS	-0,01	-0,01	-0,01	-0,01	-0,01
PERS_NCUAL	0,23	0,25	0,14	0,17	0,17
QUIEN	9,93 ***	10,12 ***	10,08 ***	10,12 ***	10,11 ***
OBJET12	1,12 ***	1,19 ***	1,24 ***	1,28 ***	1,27 ***
OBJET15	0,72 *	0,78 *	0,86 **	0,91 **	0,91 **
ORGTRAB	1,49 ***	1,59 ***	1,59 ***	1,63 ***	1,65 ***
LUGTRAB	0,97 ***	0,99 ***	1,01 ***	1,00 ***	1,06 ***
TAMAÑO	-0,04	0,06	-0,17 *	-0,02	-0,17 *
GINN	0,53 ***	0,72 ***	-	-	-
INT_MARKET	0,23	0,16	0,16	1,20 ***	0,18

Expected results about the effect of the age of the company on innovation performance are mixed. On the one hand, we expect young companies to have higher deficits regarding qualified employees, human capabilities and skills. However, recently created companies could have been created as a spin-off and, with the purpose of marketing a new product or service and, hence, could have obtained higher innovation performance.

Interest for innovation policy development

OECD policy analysis raised years ago the fundamental question of whether companies who invested in high tech were keen to develop their human capital or whether those companies with highly qualified human capital would increase their investment in technology. The two alternatives (human capital following technology or technology following human capital) drive very different innovation policies. The importance of investing in intangibles (human capital among them) is today out of question (OECD, 2012, a and b). This paper aims to shed new light in this regard, emphasizing the importance of these capabilities in the innovative performance of firms.

Besides, this research aims to highlight the problems that newly created companies can encounter if they have maintained deficits in this regard. In fact, the research shows that, although the initial innovative performance of newly created firms could show a positive picture, as a consequence of the “fresh idea” that made the company flourish, if these companies have a deficit regarding human capital, its innovative performance could be damaged in the future.

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