The Impact of Innovation and Entrepreneurship on Competitiveness

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5.1 Introduction

The notion of competitiveness has been of central importance in the strategic management literature (Hu and Trivedi, 2020; Klein, Dooley, Lapierre, Pitura, & Adduono, 2020; Martin, Raj, Javalgi, & Ciravegna, 2020; Michael, Reisinger, & Hayes, 2019; Teixeira, Lopes Casteleiro,

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Rodrigues, & Guerra, 2018) and has experienced an increased profile since the 1980s (Chursin & Makarov, 2015; Clark et al., 1988; Rugman, 1987; Tyson, 1990). Even though the concept of competitiveness has been deployed with increasing frequency, it remains both relatively complex and controversial (Aiginger & Vogel, 2015; Antonio et al., 2020; Klein et al., 2020; Nenem, Graham, & Dennis, 2020) with researchers defining competitiveness broadly in accordance with their own respective points of view and scientific fields (Delbari, Ng, Aziz, & Ho, 2015; Lei, Yao, & Zhang, 2020).

A White Paper released by the National Commission on Entrepreneurship (NCOE, 2001) contends that innovation constitutes the greatest contribution made by entrepreneurship at the local level. Since the 1980s, there has been an evolution in the traditional and linear model of innovation in order to incorporate more dynamic and interactive visibility (Kline & Rosenberg, 1986; Lentz & Mortensen, 2016; Li, 2017; Raposo, Ferreira, & Fernandes, 2014; Von Hippel, 1988). Currently, innovation receives widespread recognition as one of the main drivers of economic growth in what is termed as the "age of knowledge" (Aiginger & Vogel, 2015; Bush & Starkie, 2014; Chan & Quah, 2012; Stough, 2003). Therefore, within the scope of the increasingly competitive global business environment, innovation has steadily become a critical factor to companies striving to attain dominant positions (Cheng, Lai, & Wu, 2010) and to revitalize their competencies (Hu & Hsu, 2008; Kaminski, de Oliveira, & Lopes, 2008). Thus, there is the perception of innovation being one of the main means of adapting to increasingly dynamic surrounding environments (Doloreux & Melancon, 2008; Hua & Wemmerlov, 2006; Roberts & Amit, 2003). According to Wood (2005), research findings on regional innovation only echo the national

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studies in attributing primacy to regional competitiveness as an oriented process and technologically driven by innovation (Chen et al., 2018; Huggins & Williams, 2011). Nevertheless, this recognition has now extended to stressing the importance of the innovation taking place inside institutions to this same regional development and competitiveness (Den Hertog, 2002; Gupta, Malhotra, Czinkota, & Foroudi, 2015; Luh, Jiang, & Huang, 2016; Wood, 2005). Despite those who defend that innovation is fundamental to the performance and competitiveness of companies, the literature does not provide any consensus as to the best means to evaluate this (Akman, Okay, & Okay, 2013; Drazin & Schoonhoven, 1996; Gupta et al., 2015; Kodama, 2006, 2009; Tushman & O'Reilly, 1997).

Innovation has been approached from different perspectives that are based on the objects they focus on, their concepts, strategic considerations, methodologies, and models for measuring and analysing innovation. Various researchers have displayed a particular interest in emphasizing the characteristics of companies and the factors that drive them to innovate (Hwang, 2004; Lemon & Sahota, 2004; Tidd & Bessant, 2009). In regional terms, competitiveness gets determined by the productivity with which the region deploys both its human and natural resources and its capital (Li, Ku, Liu, & Zhou, 2020; Martin et al., 2020; Porter, 1990, 1998; Porter & Ketels, 2003). There are also empirical findings that indicate how the number of patents registered provides a fairly reliable measure of ongoing innovative activities (Acs, Anselin, & Varga, 2002; Furman, Porter, & Stern, 2002; Jonker et al., 2017; Teixeira et al., 2018), in conjunction with the registration of brands (Greenhalgh & Rogers, 2012; Mendonça, Pereira, & Godinho, 2004). Hence, our research seeks to address the gap in the literature concerning the measurement of innovation and entrepreneurship, and its influence over competitiveness. Through enabling evaluation of the impact of innovation and entrepreneurship on competitiveness, we seek to contribute by advancing the literature in this research field.

5.2   Literature Review

The effective implementation of innovation has gained increasing recognition as the foundation for the building of sustainable competitive advantage, and, thus, boosting the performance of organisations (Abbas,

Avdic, Xiaobao, Hasan, & Ming, 2018; Koc & Ceylan, 2007; Przychodzen, Przychodzen, & Lerner, 2016; Razumova, Ibáñez, & Palmer, 2015; Zhang et al., 2017).

The specific social, cultural, economic, and political environment are together framing the context for any innovation combine to take on a systemic character (Liu, 2018; Zheng & Wong, 2010). Edquist (1997) defines innovation as the interaction of the complexes of factors or components that mutually work together to condition and contract other complexes, with each facet retaining their well-defined functions. According to Lundvall (1992), an innovation system features inputs and relationships that interact in the production, dissemination, and application of new economic knowledge. This approach serves as the foundation for the exploration of regional innovation systems (Cooke, 1998; Cooke, Uranga, & Etxebarria, 1997; Fukugawa, 2016; Galindo, Vaz, & Nijkamp, 2011; García-Rodríguez, Gil-Soto, Ruiz-Rosa, & Gutiérrez-Taño, 2017). In addition to agglomeration and competitiveness, innovation represents one of the most important aspects underlying economic growth in the current knowledge era (Huang et al., 2020; Stough, 2003).

Porter and Stern (2001) explain that the vitality of innovation depends on the *capacity for national innovation*. This capacity above all conveys the potential for each country, in political and economic terms, to produce flows of commercially relevant innovation.

According to Drucker (1985), innovation provides a specific tool for entrepreneurs to endow resources with a new capacity for generating wealth. Therefore, innovative companies correspondingly tend to turn in better economic and financial performances than their non-innovative peers (Batle, Orfila-Sintes, & Moon, 2018; Belitz & Lejpras, 2016; Ferreira, Marques, & Fernandes, 2010; Jonker et al., 2017; Marques, Garry, Covelo, Braga, & Braga, 2011). Innovation is fundamental not only to the survival of any sector of the economy but also to prevail in an increasingly globalised world.

In the global business context, innovation is often linked to knowledge-intensive technologies and inventions. Hence, the emphasis on protecting this knowledge and technology by patenting around the world. While the research on innovation in small-and-medium-enterprises has primarily been on firms in the United States (Pérez & Rose, 2010), there is a growing interest in the role the regional dynamics play in the innovation of European entrepreneurial firms (Nicolini & Resmini, 2011; Petrakos, Skayannis, Papdoulis, & Anastasiou, 2011).

For international entrepreneurial and born global firms, the speed of internationalisation and transfer of knowledge across national borders is of critical importance and provides them with a competitive advantage (Hilmersson, Jansson, & Sandberg, 2011). However, the local institutional environment, the competition landscape, knowledge absorption capacity, and consumer perception and behaviour vary across regions and require firms to adapt their business activities. Despite the claim that business is global, many studies argue that multinational enterprises (MNEs) are, in fact, regional in their focus (Verbeke & Kano, 2016). Countries within regional markets like Europe have lower psychic, geographic, and institutional distances, and European entrepreneurial firms have the opportunity to increase their consumer base without significant changes to the way their products and/or services are offered.

Innovation enables companies to respond to diversified and constantly changing demand and enables improvements to be made to the different domains and activities ongoing in a particular society (Cooke, Heidenreich, & Braczyk, 2004; Fundeanu, 2015; Gomezelj Omerzel & Smolčić Jurdana, 2016; Grillo, Ferreira, Marques, & Ferreira, 2018; Meissner & Shmatko, 2017). Thus, innovation gets perceived as a motor of progress through enhancing both competitiveness and economic development (Cibinskiene & Navickas, 2011; Del Giudice, Carayannis, & Maggioni, 2017; Johansson, Karlsson, & Stough, 2001; Kolehmainen et al., 2016; Romer, 1994).

Since innovation has also been proven to be a complex process, small- and medium-sized companies encounter obstacles to innovation and may only be able to engage in innovation through cooperation with other firms optimising the utilisation of their own internal knowledge in combination with the specific competencies of their partners (Muller & Zenker, 2001). Kleinknecht (1989) identifies the following as obstacles to innovation: (i) scarce financial capital resources; (ii) lack of qualifications in terms of management; and (iii) difficulties in obtaining the technological information and know-how necessary to innovate.

The growing recourse to information flows, and their applications represent an essential dimension to establishing the organisational capacities that lead to the emergence of the fundamental foundations for organisational success (Cohendet & Steinmueller, 2000; Long, Looijen, & Blok, 2018; Ramos, Man, Mustafa, & Ng, 2014; Segarra-Ciprés, Roca-Puig, & Bou-Llusar, 2014). In turn, Bughin and Jacques (1994) affirm that the major obstacle to innovation does not derive from companies

appearing to suffer from "myopia" but rather due to the fundamental incapacity of companies to adopt that which they designate "key management principles. In an increasingly competitive environment, innovation amounts to a critical factor for any company seeking dominant and competitive market positions as well as boosting their profitability levels (Hu & Hsu, 2008; Jonker et al., 2017; Kaminski et al., 2008; Nas & Kalaycioglu, 2016; Nuruzzaman, Singh, & Pattnaik, 2019).

5.3   Methodology

5.3.1   *Data and Measures*

The data used in this study were collected from the Eurostat Regional Statistics and refer to the 276 Nomenclature of Territorial Units for Statistics 2 regions (NUTS2) in the Member States of the European Union, and all available data were used (2005–2012). The NUTS classification is a hierarchical system that divides up the EU economic territory for the purpose of collecting, developing, and harmonising European regional statistics. The socio-economic analysis of the region is divided into NUT 1, which covers major socio-economic regions; NUTS2, which looks at the basic regions for the application of the relevant regional policies and NUTS3, which includes small regions for specific diagnoses (Eurostat, 2020).

5.3.2   *Dependent Variable*

In regional terms, competitiveness gets determined by the productivity with which the region applies both its human and natural resources and its capital (Garreton, 2017; Porter, 1990, 1998; Porter & Ketels, 2003; Rutkauskas, 2008). This study, thus, applies the labour productivity ratio stemming from the regional Gross Added Value versus the number of workers in the region as its variable for measuring competitiveness.

5.3.3   *Predictor Variables*

5.3.3.1   *Innovation*
There is empirical evidence suggesting that the number of patents registered provides a fairly robust measurement of the ongoing innovative activities (Acs et al., 2002; Allen, Berg, Markey-Towler, Novak, & Potts,

2020; Cacciolatti, Rosli, Ruiz-Alba, & Chang, 2020; Croes & Kubickova, 2013; Furman et al., 2002; Mendola & Volo, 2017; Stern, Porter, & Furman, 2000) and isolating mechanisms, such as patents helping sustain higher returns achieved from a new product innovation (Lawson, Samson, & Roden, 2012). Within this scope, one of the variables applied to measure innovation incorporates the annual number of patent requests by region per million of active inhabitants.

The registration of brands represents another indicator serving to capture relevant aspects of innovation and industrial dynamics (Aristei, Vecchi, & Venturini, 2016; Greenhalgh & Rogers, 2012; Huang, Yang, & Wong, 2016; Kamaruzzaman, Lou, Zainon, Mohamed Zaid, & Wong, 2016; Mendonça et al., 2004; Przychodzen et al., 2016), and like in patents, brands are an isolation mechanism which helps sustain high returns from a new product innovation (Lawson et al., 2012; Missimer, Robèrt, & Broman, 2017; Trachuk & Linder, 2018) and is associated with marketing innovation (Gupta et al., 2015). Thus, we correspondingly make recourse to the number of annual brand registrations per region and per million of active inhabitants to evaluate innovation.

5.3.3.2 *Entrepreneurship*

The measurement of regional entrepreneurship encapsulates the number of new firms being established and launched (Audretsch, Dohse, & Niebuhr, 2010; Cucculelli & Goffi, 2013; Elia, Margherita, & Passiante, 2020; Jonker et al., 2017; Khan, 2018; Lee, Florida, & Ács, 2004; Mahn, Kim, & Bae, 2020; Mei, Zhan, Fong, Liang, & Ma, 2016; Uyarra, Zabala-Iturriagagoitia, Flanagan, & Magro, 2020), and this study correspondingly applies the company birth rate ratio deriving from the new company launches against the number of active companies in business in each region.

The contribution of new companies to the generation of employment involves specific dynamics in keeping with how some companies generate a large number of new jobs in comparison with their peer companies (Decker, Haltiwanger, Jarmin, & Miranda, 2014; Henrekson & Johansson, 2010; Neutzling, dos Santos, de Barcellos, & Land, 2015). Thus, in order to measure the generation of employment by new companies, we study the average number of employees at new firms and businesses. Table 5.1 presents a summary of the range of variables applied in this study.

Table 5.1 Analytical variables applied

Variable	Units
Yearly competitiveness (COMP)	Thousands of euros
Patent applications to the EPO by priority year (PAT)	Number per million of active population
Community Trademarks applications by priority year (MARK)	Number per million of active population
Firms birth rate by year (BIRTH)	As a percentage of total firms
Persons employed in the population of new firms (EMPL)	Number of persons per new firm

5.3.4   Data Analysis

The econometric analysis applied to evaluate the influence of the variables portraying innovation and entrepreneurship incorporates panel-based regression models. The data correspond to a non-balanced panel given that not all of the values are available for all of the variables throughout the eight years under analysis for every one of the 276 NUTS2 regions. The effects on the competitiveness of the variables alluding to entrepreneurship and innovation not only impacts on one specific year but also carry over into the following years and, hence, requires the estimation of dynamic panels. The traditional means of estimating panel data, such as grouped OLS, fixed effects or random effects, return estimates with biased and inconsistent parameters, when applied to models incorporating dynamic panels and this study, therefore, made recourse to the generalised method of moments (GMM) estimator methodology by Arellano-Bover/Blundell-Bond (Arellano & Bover, 1995; Blundell & Bond, 1998) given that this acts to eliminate the aforementioned biases and inconsistencies in the estimates. The econometric models calculated were the following:

$$COMP_{i,t} = \alpha_0 + \alpha_1 COMP_{i,t-1} + \alpha_2 PAT_{i,t} + \alpha_3 PAT_{i,t-1} \\ + \alpha_4 MARK_{i,t} + \alpha_5 MARK_{i,t-1}$$

$$COMP_{i,t} = \alpha_0 + \alpha_1 COMP_{i,t-1} + \alpha_2 BIRTH_{i,t} + \alpha_3 BIRTH_{i,t-1} \\ + \alpha_4 EMPL_{i,t} + \alpha_5 EMPL_{i,t-1}$$

$$COMP_{i,t} = \alpha_0 + \alpha_1 COMP_{i,t-1} + \alpha_2 PAT_{i,t} + \alpha_3 PAT_{i,t-1} + \alpha_4 MARK_{i,t}$$
$$+ \alpha_5 MARK_{i,t-1} + \alpha_6 BIRTH_{i,t} + \alpha_7 BIRTH_{i,t-1}$$
$$+ \alpha_8 EMPL_{i,t} + \alpha_9 EMPL_{i,t-1}$$

i—region, t—year

The first estimate contains the objective of evaluating the way in which innovation impacts on competitiveness. The second model, in turn, aims to ascertain the effect of entrepreneurship on competitiveness while the third analyses the simultaneous impact of innovation and entrepreneurship on competitiveness. Several local, industry, and firm variables were not considered since competitiveness as an independent variable at the previous moment is not necessary to insert any other control variables. The data obtained were processed by STATA version 12.0 software (StataCorp LP, Texas, USA).

5.4   RESULTS

5.4.1   Descriptive Statistics

Table 5.2 presents the descriptive statistics and the correlation coefficients for the variables applied by the econometric model. We would observe that average annual regional labour productivity stood at 452,500 euros, with an average annual level of 154.24 patents registered per million of active workers while there was an average total of 215.42 brands registered per million employees in each region. The average regional rate of new companies stood at 13.95% per year and with each new company, on average, generating 0.61 new companies.

Table 5.2 Correlation matrix for variables used in the empirical analyses

	Mean	SD	1	2	3	4	5
1 – COMP	46.25	20.22	1	–	–	–	–
2 – PAT	154.24	193.12	0.604**	1	–	–	–
3 - MARK	215.42	181.42	0.597**	0.564**	1	–	–
4 - BIRTH	13.95	4.79	−0.188**	−0.238**	−0.152**	1	–
5 - EMPL	0.61	0.47	−0.531**	−0.228**	−0.131**	−0.237**	1

$*p < 0.05$; $**p < 0.01$

5.4.2   Modelling

Table 5.3 presents the results of the estimated models. In terms of patents, the findings point to current patents generating a statistically positive effect on competitiveness (Model 1: β = 0.01; $p< 0.01$; Model 3: β = 0.01; $p <0.01$). Regarding brands, we observe a statistically positive effect on current competitiveness (Model 1: β = 0.02; $p< 0.01$; Model 3: β = 0.01; $p< 0.01$) and in the following year (Model 1: β = 0.02; $p <0.01$; Model 3: β = 0.01; $p< 0.01$). We thus conclude that innovation generates a positive impact on competitiveness. As regards entrepreneurship, we find that there is a statistically significant negative effect of the average of employees at new companies and their competitiveness in the following year (Model 2: β = 1.85; $p< 0.05$; Model 3: β = − 1.54; $p< 0.01$). These results demonstrate that the variables portraying regional innovation have a positive effect on regional competitiveness and that regional entrepreneurship negatively predicts this competitiveness. As regards entrepreneurship, we verify this holds an eventual effect on the competitiveness of developing or growing countries. In these countries, the rate of new company births is extremely high even while this does not provide for sustainable entrepreneurship and hence the failure rate also proves disproportionately high and hence inflicting a negative impact on competitiveness (Efrat, Hughes, Nemkova, Souchon, & Sy-Changco, 2018; Luh et al., 2016; Stanickova, 2015; Zhao, Pan, & Chen, 2018).

Table 5.3   Econometric models: regression coefficients (standard error)

	Model 1	Model 2	Model 3
Constant	18.28 (4.82)**	8.7 (3.32)*	16.48 (3.64)**
$COMP_{t-1}$	0.36 (0.11)**	0.90 (0.04)**	0.58 (0.06)**
PAT_t	0.01 (0.00)*	–	0.01 (0.00)**
PAT_{t-1}	0.01 (0.01)	–	0.01 (0.01)
$MARK_t$	0.02 (0.00)**	–	0.01 (0.00)**
$MARK_{t-1}$	0.02 (0.00)**	–	0.01 (0.00)**
$BIRTH_t$	–	−0.09 (0.07)	−0.15 (0.10)
$BIRTH_{t-1}$	–	−0.04 (0.06)	−0.07 (0.12)
$EMPL_t$	–	−1.09 (0.64)	−1.00 (0.60)
$EMPL_{t-1}$	–	−1.85 (0.85)*	−1.54 (0.75)*
N	961	961	961
Wald Chi-Squared	77.39**	90.44**	376.46**

$*p < 0.05$; $**p < 0.01$

5.5   Final Considerations

The concept of business competitiveness interrelates with the concept of competitive advantage that encapsulates the existence of a position of superiority in relation to competitors engaged in the same sector (Atherton, 2013; Feenstra, 2014; Sölvell, 2015; Wong, 2017). This superiority, in turn, is divided into two basic types; a lower cost base than the rivals, or the capacity to differentiate and determine a higher price in excess of the extra cost incurred in making that differentiation (Bhabra & Hossain, 2018; Ma, Huang, Lin, & Yang, 2019; Porter, 1990). Our research study sought to display the impact that entrepreneurship and innovation wield over competitiveness. We find that while innovation generates a positive impact, entrepreneurship returns a negative influence on competitiveness. Thus, we may conclude that public support measures for entrepreneurship are not proving especially efficient since this is not generating a positive impact on competitiveness. Furthermore, a large number of new companies are being launched; however, there is also a high rate of business failure, indicating the presence of unsustainable entrepreneurship in the region.

Thus, our contributions to the academic field are the conclusions in terms of the impact of innovation and entrepreneurship on competitiveness as well as how specific variables account for the greatest contributions towards competitiveness. This also provides a practical input into decision-making and effective policies able to foster sustainable entrepreneurship able in turn to nurture competitiveness in keeping with that theoretically defended. One limitation of the study is that a cost-oriented variable is used as a measure of competitiveness. For the future lines of research, we would propose a deeper study of the factors that leave the entrepreneurship construct weak and are responsible for the failure of entrepreneurship to make any contribution towards competitiveness. This might furthermore enable the finding of solutions to invert this conclusion. Studies with other variables related to competitiveness that do not only focus on costs, such as the attraction of Foreign Direct Investment or the variation of productivity, should also be carried out.

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