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## Entrepreneurial intention among engineering students: The role of entrepreneurship education

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### ABSTRACT

Partly due to the current crisis and its high unemployment rates, the labor market increasingly requires multidisciplinary engineers with additional skills to their own. Engineering education therefore faces new challenges and these include equipping engineers with greater entrepreneurship. Although entrepreneurship education has consequently been integrated into the new engineering degrees, is this enough to boost entrepreneurship among engineers and on what does their level of entrepreneurship depend?

This research work aims to analyze the impact of entrepreneurial motivations on entrepreneurial intentions among future engineers and identify the role than entrepreneurship education plays in the development of the engineers' entrepreneurship. The results indicate that *the need for independence* is the key factor in the entrepreneurial intent of future engineers and confirm the positive contribution that entrepreneurship education has on their entrepreneurial intentions. Finally, recommendations are offered which could help the various agents involved increase the effectiveness of actions aimed at promoting firm creation in this area.

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### 1. Introduction

The current economic crisis has resulted in alarmingly high unemployment figures in Spain, with a rate exceeding 25% of the general working population and over 20% among graduates (INE, 2014). In this context, one of the measures being considered by both the Spanish Employment Strategy 2012–2014 (BOE, 2011) and the Europe 2020 Strategy for Employment and Growth (European Commission, 2010) is to promote entrepreneurship development, the reason being that the importance for governments of strengthening entrepreneurship mainly lies in the spillover of benefits which generate entrepreneurship activities (Oosterbeek, van Praag, & Ijsselstein, 2010). Gómez-Grass, Mira-Solves, and Martínez-Mateo (2010) pin these benefits on the positive effect that venture creation has on four macroeconomic variables: growth, employment, development and innovation.

One of the missions of the 21st century University is therefore to encourage the social and economic development of its

surroundings through venture creation training and entrepreneurship development; published work, however, offers conflicting opinions about whether or not entrepreneurship can be taught. Some researchers highlight the importance of motivation for running a business and therefore question whether teaching can enable this motivation to emerge (Colette, Hill, & Leitch, 2005); others, meanwhile, believe that this entrepreneurial motivation may be developed with specific entrepreneurship education (Souitaris, Zerbinati, & Al-Lahman, 2007).

According to the final report of the European Commission on the study of entrepreneurship in higher, non-university education, especially non-business studies, compiled by the expert group of the Directorate-General for Enterprise and Industry (European Commission, 2008: 67), the first of the final recommendations for action involves: "Creating a task force or steering group (including the Ministry of Education and other departments: Economy; Employment; Science and Research) to determine how entrepreneurship can be integrated into the education system across primary, secondary and higher education".

It has consequently been the European authorities themselves who have prioritized the integration of entrepreneurship education into primary, secondary and higher education. In this respect, Yemini and Haddad (2010) highlight the importance of this

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inclusive process in 21st century universities in order to become important engines of technological development and economic growth. However, the key to the success of this approach lies in developing entrepreneurship, the basis for the creation of new companies, which originates in an individual's personal motivation (Barba-Sánchez & Atienza-Sahuquillo, 2012).

In this context, various questions arise: What entrepreneurial intentions do university students have? Are they prepared to undertake a venture? What are the main motivational factors which attract or drive them in this respect? From this point of view, one of the main aims of this work is to analyze the impact of entrepreneurial motivations on entrepreneurial intentions among future engineers.

The second main aim of the paper is related to identify the role that entrepreneurship education plays in the development of the engineers' entrepreneurship, since this is one of the student profiles which is best suited to the development of new Technology-Based Companies (TBCs) which strengthen the current corporate fabric, mainly in the technological sector and innovation and therefore contribute to the creation of new jobs, thereby reducing the currently high unemployment rates (SCNEERC, 2006).

For this purpose, an empirical study was carried out among 423 engineering students following an optional course in the fields of business management and entrepreneurial skills. The outcomes of this research could be useful to policy makers to understand not only the pattern of relationships among intention antecedents, but also its implications for interventions and developing entrepreneurial intention.

The remainder of the paper contains five sections: a literature review section presenting a conceptual framework and reflecting on previous research to underpin the model and hypotheses; subsequently, we describe the purpose and hypothesis; a methodology section to explain the sample and measures used; after, the results are presented and discussed; Section 5 explains the conclusions and implications; and a final section to discuss limitations and future research.

## 2. Review of literature

The Global Entrepreneurship Monitor (GEM) study, meanwhile, demonstrates the importance that entrepreneurship has acquired, having become a basic tool, in the current context, for job creation and the generation of wealth, and highlighting the fact that growth and economic development are linked to entrepreneurship (Acs, Arenius, Hay, & Minniti, 2005; Gómez-Grass et al., 2010; Nabi, Holden, & Walmsley, 2010; Oosterbeek et al., 2010). In this respect, Thurik, Carree, van Stel, and Audretsch (2008) confirm the close relationship between self-employment and the reduction of unemployment rates, in general, and Rasmussen, Mosey, and Wright (2011) establish it more specifically for TBCs in times of economic recession.

There is, however, the important question of whether entrepreneurship can be encouraged through education. Moreover, the results of previous studies are inconsistent. Some of these studies reported a positive impact from entrepreneurship education (e.g., Block, Hoogerheide, & Thurik, 2013; Souitaris et al., 2007; Walter & Dohse, 2012), whereas others found evidence that the effects are statistically insignificant or even negative (e.g., Oosterbeek et al., 2010; von Graevenitz, Harhoff, & Weber, 2010).

Different researchers emphasize the difficulties of evaluating the benefits or importance of teaching entrepreneurship. Colette et al. (2005) point out that much of the entrepreneurial research to date has provided no empirical support for the affirmation that completion of formal entrepreneurial initiative and SME (Small and Medium Enterprises) management courses increases an

individual's probability of starting a business. In accordance with this line of thought, Matlay (2005) adds that the real contribution that these courses have on entrepreneurial activity remains unclear. Various authors such as Barringer, Jones, and Neubaum (2005), Fayolle, Gailly, and Lassas-Clerc (2006), Mueller (2011) or Packham, Jones, Miller, Pickernell, and Thomas (2010) have corroborated the positive contribution that entrepreneurship education can have on its participants in terms of skills, knowhow and better entrepreneurial attitude. There is no agreement on what would constitute a suitable conceptual model for assessing the effects of entrepreneurial education. According to Martin, McNally, and Kay (2013), understanding entrepreneurial intentions will enable the definition of this conceptual model.

Entrepreneurial action can be understood as any innovative action that, through an organized system of human relationships and the combination of resources, is directed towards the achievement of a specific goal (Liao & Gartner, 2006). According to Rekha, Ramesh, and Jaya-Bharathi (2015), coupled with innovative action is creativity, since the entrepreneurial mindset cannot exist without it; the entrepreneur draws conclusions from reality, identifies a problem and creates, innovates and invents. It is not simply a matter of doing things well: it is necessary to add something new (Townsend, Busenitz, & Arthurs, 2010).

According to Haynie, Shepherd, Mosakowski, and Earley (2010), entrepreneurial activity has its cognitive origin in individual motivation, and is understood to be the detonating factor which sparks behavior and obtains energy to support and steer it towards its objective. In this regard, the decision to create a business involves two levels (Barba-Sánchez & Atienza-Sahuquillo, 2017): the rational level and the motivational level. The first level revolves around the objective reasons for this conduct, which are to be found in the environmental conditions which reinforce or hinder this behavior (Ajzen, 1991; Bandura, 1977). The second level refers to subjective reasons arising from decision-maker expectations, i.e. motivations.

In brief, the dominant models of entrepreneurial intentions are: Shapero and Sokol's Entrepreneurial Event model (SEE) (1982), the Psychological-Economic model (MEP), whose precursors were Bird (1988) and Davidsson (1995), and Ajzen's Theory of Planned Behavior model (TPB) (1991); although this last one is not actually a model of entrepreneurial intent it has gained a place among these models since it is the conceptual

Although an important part of literature on entrepreneurial intention has opted for SEE (Fitzsimmons & Douglas, 2011), for TPB (Izquierdo & Buelens, 2011) or for a combination of both models (Krueger, Reilly, & Carsrud, 2000), the empirical results obtained have highlighted the gap between these theoretical models and the entrepreneurship reality in many current contexts. Authors such as Autio, Keelyey, Klofsten, and Ulfstedt (1997), Athayde (2009) or Lee, Wong, Foo, and Leung (2011) have proposed economic-psychological methods, providing alternative explanations for the entrepreneurial phenomenon and for the key variables which stimulate entrepreneurial intention. Our work is therefore in keeping with the sphere of these by considering both personal factors specific to entrepreneurial potential and situational factors related to our socio-economic surroundings.

This study therefore aims to contribute to the current debate by examining the effectiveness of entrepreneurship education in Spain.

## 3. Purpose and hypothesis

Additionally, following UNESCO recommendations (2010), Spanish universities are showing a growing interest in job placement and the promotion of entrepreneurial culture, since these matters are increasingly becoming a more important criterion

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