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Doctoral Dissertation  
Doctoral Program in Management, Production and Design (32<sup>nd</sup> Cycle)

# **The impact of entrepreneurship education and experience on entrepreneurial intentions and venture creation**

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# Summary

Nowadays universities are increasing their efforts to foster entrepreneurial intention and venture creation since these represent a mean for addressing the new economic challenges, creating jobs and fighting social and financial issues. In fact, policymakers are fostering the creation and the promotion of an entrepreneurial culture and ecosystem by involving universities in order to enhance students' and faculties' entrepreneurial intention and venture creation. In addition, students are asking for entrepreneurship courses. In line with this, the European Commission has included the “sense of initiative and entrepreneurship” as one of the eight key competences that all individuals need. Therefore, it is fundamental to analyse how universities can foster the entrepreneurial intentions and venture creation in order to monitor and improve them.

Entrepreneurship education can improve entrepreneurial intentions and venture creation. Therefore, a remarkable expansion in the number of entrepreneurship programs to all levels of education has been made. However, even if the current literature analysed entrepreneurship education, several aspects still remain to be tested. Some of these gaps are:

1. The impact of entrepreneurship education on the creation of academic spinoffs.
2. The impact of Student-Led Entrepreneurial Organizations on entrepreneurial intentions.

Moreover, this Ph.D. thesis presents an analysis of the strategic role of the Contamination Labs (CLabs) in Italy.

In addition to an Introduction and the literature review, to explore these gaps and the role of CLabs in Italy, this Ph.D. thesis analyses different contexts and applies different methodologies (qualitative and quantitative) in the development of six Chapters.

To analyse the impact of entrepreneurship education on the creation of academic spinoffs, Chapter 3 uses a new dataset built around 1,262 entrepreneurship courses offered between 2011 and 2014 by 80 US universities. Adopting a Poisson panel regression model, this Chapter shows that, in addition to the Technology Transfer Office (TTO) size and university research expenditures, entrepreneurship education favours the creation of academic spinoffs. Moreover, this Chapter finds that practical – rather than theoretical - entrepreneurship courses favour the creation of academic spinoffs.

To identify the impact of Student-Led Entrepreneurial Organizations on entrepreneurial intentions, Chapter 4 uses a survey that was conducted in 2016 by one of the largest Student-Led Entrepreneurial Organizations in the world: the European Confederation of Junior Enterprises (JADE). Adopting a Logit regression model, this Chapter shows that the more time students spent on JADE and the higher the number of events students attended, the greater their entrepreneurial intention was.

Finally, to explain the role of CLabs in fostering entrepreneurship education and activities in Italy, Chapter 5 uses a multi-case study of four Italian CLabs. Specifically, this Chapter investigates the strategic role of the Italian CLabs as innovative Laboratory aimed at developing an entrepreneurial mindset, creativity and innovation among the university's students enrolled in different programs.

In conclusion (Chapter 6), this Ph.D. thesis presents several theoretical and practical contributions for universities, students and scholars interested in entrepreneurship. Indeed, this Chapter explains how entrepreneurship education is able to overcome informational and cultural barriers, which may limit the development of entrepreneurial actions by both academic faculties and students.

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# Chapter 1

## Introduction

### 1.1 Introduction to the Ph.D. thesis

There is an increasing interest in the role that entrepreneurship can play as a catalyst to reach economic and social development purposes, including innovation, growth, employment, and equity (Wennekers and Thurik 1999; Shane and Venkataraman 2000; Wong et al. 2005; Van Praag and Versloot 2007; Valerio et al. 2014). Accordingly, there is a growing body of literature supporting the contributions of entrepreneurship to economic and social development – offering a complex picture of what constitutes entrepreneurship, the societal contributions of entrepreneurial success, and the factors driving or constraining the success of entrepreneurs (Kuratko 2005; Powers and McDougall 2005; Van Stel et al. 2005; Braunerhjelm et al. 2010). An increasing area of interest in this field is how a range of actors – including universities, governments and the private sector – can bolster entrepreneurs’ success and progress on broader socioeconomic goals (Rothaermel et al. 2007; Valerio et al. 2014). Moreover, universities represent a context particularly useful for entrepreneurship since universities are knowledge intensive, interact with several stakeholders, have the possibility to merge different mindsets (multi-and inter-disciplinary environment) and cultures. Based on the Knowledge Spillover Theory of Entrepreneurship (Acs et al. 2009; Acs et al. 2013), universities are a knowledge-intensive context where it is possible to generate more entrepreneurial activities (Audretsch et al. 2005; Civera et al 2019), since they contribute to the promotion of innovation, human capital training and knowledge generation (Audretsch et al. 2016). In fact, universities have a strong Human Capital (as knowledge, skills, habits, and social and personality attributes) asset for entrepreneurship since universities allow students, researchers, professors, entrepreneurs and managers to work together by generating new ventures. For instance, universities can collaborate with corporations to solve their challenges by creating new ventures. Therefore, universities represent an “ecosystem” where entrepreneurship can be learned and

developed in order to contributing to local economic development (Philpott et al. 2011). For instance, universities introduced a ‘Third Mission’ to address the growing societal and economic challenges by transfer the knowledge from research and teaching to impact for the society and economy. The ‘Third Mission’ is often linked to technology transfer activities, academic entrepreneurship and recently to student entrepreneurship. This also implies support and develop start-up from students, researchers and Professors such as academic spinoffs. Several studies (Di Gregorio and Shane 2003; O’Shea et al. 2005; Powers and McDougall 2005; D’Este et al. 2012; Fini et al. 2017) analysed how universities can foster the creation of academic spinoffs. For instance, the creation of a Technology Transfer Office (TTO) and its dimensions seem to have a positive impact on the creation of academic spinoffs (e.g., Powers and McDougall 2005). However, several aspects remain to analyse. Moreover, students can have a crucial role on the developed of universities entrepreneurship activities. Therefore, the university represent an interesting context to study the emergence of entrepreneurship. However, it is a complex contest.

The potential beneficial spillovers of entrepreneurship and the potential success of entrepreneurs have garnered attention provoking interest in interventions that stimulate individuals’ entrepreneurial competences<sup>1</sup> and intentions. As suggested by Kiggundu (2012), entrepreneurial competences are defined in this Ph.D. thesis as the total sum of entrepreneurs’ attributes such as attitudes, beliefs, knowledge, skills, abilities, personality, expertise and behavioral tendencies needed for successful and sustaining entrepreneurship. Moreover, according to Ajzen (1991) in psychology, intentions are assumed to capture the motivational factors. Furthermore, entrepreneurial intention is defined as a mental state (motivation) where an individual aspire to launch its own-business (Katz and Gartner 1988; Krueger and Carsrud 1993; Guerrero et al. 2008; Thompson, 2009).

People enriched with entrepreneurial competences can fight social economic challenges by stimulating the exploitation and commercialization of knowledge (Audretsch and Belitski 2013). In line with this, the European Commission included the “sense of initiative and entrepreneurship” as one of the eight key competences that all individuals need for personal fulfilment, social inclusion and employment in our economy (European Commission 2006). According to Bacigalupo et al. (2016), “sense of initiative and entrepreneurship can be broadly defined as the capacity to turn ideas into action, ideas that generate value for someone other than oneself. Sense of initiative and entrepreneurship is a transversal key competence, which every citizen needs for personal fulfilment and development, active citizenship, social inclusion and employment in the

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<sup>1</sup> In general, the term “competences” are defined as a combination of knowledge, abilities/skills and attitudes (MIUR, 2018). In this Ph.D. thesis the term “entrepreneurial competences” includes and it treads as a synonym of “entrepreneurial skills” and “entrepreneurial abilities”.



knowledge society” (Bacigalupo et al. 2016, pp. 7). Research suggests that several of these mindsets, knowledge and competences can be learned, thus situating educational institutions and training programs firmly within the broader discussions around entrepreneurship promotion. It has also been demonstrated – not only by social or cognitive psychology scholars, but also management researchers – that entrepreneurial intention is the most important and central determinant of entrepreneurial behaviour (Abraham et al. 1998; Bygrave 1989; Krueger 1993). Moreover, several studies (Peterman and Kennedy 2003; Souitaris et al. 2007; Athayde 2009; Sánchez 2011, 2013; Martin et al. 2013; Walter et al. 2013; Bae et al. 2014; Saeed et al. 2014; Gielnik et al. 2015) found that entrepreneurship education (EE) can stimulate entrepreneurial intention. This has resulted in an explosion in terms of public and private initiatives to promote entrepreneurial competences, intentions and venture creation propelled by the hope to accelerate innovation, technology development and job creation (Rasmussen and Sørheim 2006). In fact, governments are currently fostering the creation and promotion of an entrepreneurial culture and ecosystem by involving universities in order to enhance students’ entrepreneurial competences, intention and venture creation (O’Connor 2013).

Consequently, nowadays universities are expected to play a new role in society, in addition to research and teaching, by applying a ‘Third Mission’ of economic and social development (Etzkowitz et al. 2000; Etzkowitz 2003). This ‘Third Mission’ goes beyond the traditional, scientific dissemination mechanisms such as publications (Van Looy et al. 2011) and includes technology transfer activities (such as academic spinoffs and patenting activities), contract research and consulting (Abreu and Grinevich 2013; Wright et al. 2008). In addition to these activities, one of the main instruments that universities can apply to reach their ‘Third Mission’ is Entrepreneurship Education – EE (Rasmussen and Sørheim 2006; Souitaris et al. 2007; Rauch and Hulsink 2015; Siegel and Wright 2015). In fact, the European Council has stressed that EE should be a priority strategy for sustainable, inclusive and economic growth (Curth et al. 2015). For instance, the European Commission has already supported several projects focused on EE such as the Entrepreneurship Education Ecosystems in Engineering and Technology – E4T<sup>2</sup> (Varano et al. 2018) and the Listo Project<sup>3</sup> (Fiore et al. 2019 a, b). This is also due to the fact that EE is capable of stimulating the entrepreneurial competences of students (Peterman and Kennedy 2003; Wilson et al. 2007; Athayde 2009; Morris et al. 2013; Sánchez 2011, 2013; Hahn et al. 2019), their entrepreneurial intention (Peterman and Kennedy 2003; Souitaris et

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<sup>2</sup> The E4T Erasmus+ project is aimed at providing more engineering graduates with entrepreneurial ambition, culture and skills (Varano et al. 2018). More information is available on: <https://sites.google.com/view/entrepreneurship-e4t/home>.

<sup>3</sup> The LISTO Erasmus+ project is aimed at developing strategies that may be used to create a university-wide awareness of innovation and entrepreneurship. The project brings together 3 universities from Europe and 7 from Latin America. More information is available on: <http://listoproject.eu/>.

al. 2007; Athayde 2009; Sánchez 2011, 2013; Martin et al. 2013; Walter et al. 2013; Bae et al. 2014; Saeed et al. 2014; Gielnik et al. 2015) and more in general of offering students opportunities to engage in entrepreneurial learning (Hahn et al. 2017). Moreover, students have expressed a desire to participate in EE (Peterman and Kennedy 2003), which can foster entrepreneurial ecosystems (Cavallo et al. 2018 a, b). Consequently, since the first entrepreneurship course in the United States in 1947 at Harvard's Business School (Katz 2003), the number of entrepreneurship courses is increasing all over the world (Kuratko 2005; Solomon 2007; Katz 2008; Fretschner and Weber 2013). All this interest in EE also lead several organizations to develop programmes, surveys and frameworks to analyse and measure the impact of EE on the entrepreneurial competences and intentions of students, such as the Global University Entrepreneurial Spirit Students' Survey – GUESSS (Sieger et al. 2014, 2016), the National Survey of Entrepreneurship Education (Solomon 2007), the Entrepreneurship Education Project – EPP (Vanevenhoven and Liguori 2013), the Entrepreneurship Competence Framework – EntreComp (Bacigalupo et al. 2016), Assessment Tools and indicators for Entrepreneurship Education – ASTE (Moberg et al. 2014), the Innovation Cluster for Entrepreneurship Education – ICEE (Johansen 2018), the Framework for Innovation and Entrepreneurship Support in Open Higher Education – INNOENTRE (Kyrgidou et al. 2016) and the Student Entrepreneurship Making Innovation – SEMI<sup>4</sup>. All these activities have attracted the interest of a vibrant research stream aimed at evaluating EE's impact on entrepreneurial intentions and venture creation (e.g., Souitaris 2007; Rideout and Gray 2013). Finally, EE can be an instrument to merge the three missions of the universities by including education and technology transfer as well as research since some technology transfer activities are based on research too (e.g., academic spinoffs).

However, despite a global interest in EE the literature review shows that several aspects remain to be discussed. This Ph.D. thesis aims at filling some of these gaps.

Even if the literature shows that academic spinoffs are important regional economic growth actors (Bramwell and Wolfe 2008; Guerrero et al. 2015, 2016; Hayter 2016; Mariani et al. 2018), no attention has been paid to the role that EE plays on the creation of academic spinoffs (Lamine et al. 2018). In fact, in the last twenty years, the attention of universities toward the creation of academic spinoffs, academic and student entrepreneurship has increased, as part of their 'Third Mission', aimed at contributing to local economic development (Philpott et al. 2011). The relevance of academic spinoffs has led scholars to analyse the

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<sup>4</sup> The SEMI project aims at understanding the impact of EE on the entrepreneurial skills and intention of students. The SEMI project was created by the MIT Innovation Initiative and the Entrepreneurship and Innovation Center (EIC) at the Politecnico di Torino. More information is available on: <https://innovation.mit.edu/blog-post/mit-innovation-initiative-and-entrepreneurship-and-innovation-center-atpolitecnico-di-torino-launch-the-semi-project/>.

reasons for their emergence. Among the factors that have influenced the creation of academic spinoffs, literature has distinguished five key aspects: personal factors, such as faculty motivations (e.g., Hayter 2011); financial factors, such as the amount of money that universities invest in research activities (e.g., O’Shea et al. 2005); organizational factors, such as size and other characteristics of TTOs supporting spinoff creation (e.g., Di Gregorio and Shane 2003); cultural factors, such as the internal culture of universities (e.g., Feldman and Desrochers 2004); and policy and ecosystem factors (e.g., Fini et al. 2011). However, despite many different determinants have been identified, no attention has been paid to the role that EE plays on the creation of academic spinoffs. Moreover, several scholars (e.g., Nabi et al. 2017) suggest testing and providing empirical evidence about the different impact that different teaching models may have in the field of entrepreneurship.

In addition to this, as an indirect result of all these activities to support entrepreneurship, Student-Led Entrepreneurial Organizations (SLEOs) have started to emerge around the world. SLEOs leverage on students’ willingness and desire to carry out practical and real-world entrepreneurial experiences<sup>5</sup>, while continuing to study at university. Their aim is in fact to enhance the entrepreneurial competences of their members through learning by doing and experiential learning. Even though growing attention towards EE has recently emerged, few studies have been devoted to the analysis of extra-curricular entrepreneurial experiences and team entrepreneurship and to their role in fostering entrepreneurial competences and entrepreneurial intention (Pittaway et al. 2011, 2015; Padilla-Angulo 2017; Preedy and Jones 2017). The scarcity of research on how entrepreneurial attitudes are shaped by the participation of students in extra-curricular entrepreneurial experiences and team entrepreneurship calls for more evidence.

Lastly, some policies have been created in order to reach the university ‘Third Mission’ by improving the EE and the entrepreneurial culture of these universities. At this purpose, some Italian Universities have created different project for entrepreneurship development such as “Contamination Lab” (CLabs) financed by the MIUR (Italian Ministry of University and Research) in created in 2016, that is an innovative Laboratory aimed at developing an entrepreneurial mindset, creativity and innovation in the university’s students enrolled in different curricula through innovative entrepreneurial learning approaches based on action-learning and experiential learning. It is important to analyse this policy in order to explain how CLabs works and how there are improving the university ‘Third Mission’ by improving the EE and the entrepreneurial culture.

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<sup>5</sup> In this Ph.D. thesis, the term “entrepreneurial experiences” refers to all the activities bases on learning-by-doing linked to entrepreneurship. Some examples of entrepreneurial experiences are the participation in a SLEO, the creation and/or development of a start-up and the creation and/or development of an academic spinoffs.

## 1.2 Empirical settings

After a literature review of EE, this Ph.D. thesis adopts three studies to investigate the impact of EE and experience on entrepreneurial intentions and venture creation. The three studies apply different levels of analyses in order to better investigate and analyse the phenomenon of EE by studying different aspects, contexts, and points of view. The different levels of analyses of this Ph.D. thesis also derive from the fact that EE is a complex field of study that required several perspectives. Moreover, the different levels of analysis of this Ph.D. thesis allow the Ph.D. candidate to study, understand and apply different methods of analyses and acquire knowledge related to different approaches that can be applied in future studies. However, even if the three studies are adopting different lenses, all of them aim at analysing how universities can foster and support students' entrepreneurial intentions and universities' entrepreneurial venture creation.

The first empirical study uses a “macro” level of analysis: the university-level. This study is based on a new dataset built around a sample of 80 US universities included in the Licensing Survey by the Association of University Technology Managers (AUTM) completing with information about all the entrepreneurship courses offered by these 80 universities in years ranging from 2011 to 2014. This study categorized the entrepreneurship courses adopting Béchar and Grégoire's taxonomy, identifying and examining 1,262 entrepreneurship courses in a sample over a time span of 4 years. This first study analysed the impact of EE on academic spinoff creation – at the university level – adopting Poisson panel regression models.

The second empirical study uses a “micro” level of analysis: the individual level of analysis. This study is based on the responses of a survey that was administered to the European Confederation of Junior Enterprises (JADE) associates in 2016, which resulted in a total of 261 responses. This topic is connected to EE since it regards the universities' entrepreneurial activities. However, more than EE, this study analyses the entrepreneurial experiences of students in a SLEO. In fact, SLEOs are an important actor for the universities' entrepreneurial ecosystem. In more detail, this study investigated the factors that affect students' entrepreneurial intention by conducting a multivariate explorative analysis of one of the largest SLEOs in the world, JADE. Several logistic regression analyses were performed.

The third and last study uses a “macro” level of analysis: the university level of analysis. This study is based on a sample of Italian CLabs created in 2016 as innovative Laboratory in Italy. Out of sixteen CLabs in Italy, this study analysed four CLabs in 2017. The four cases are the CLab at Politecnico of Bari (DigiLab),

the CLab at University of Basilicata (CLab Unibas), the CLab at University of Salento (CLab@Salento) and the CLab at Politecnico di Torino and University of Turin (CLabTo). This forth study presents contamination processes activated with faculty, alumni and local entrepreneurs in these four CLabs. This study aims at presenting the the CLabs phenomenon and their strategic role in the university.

### **1.3 Ph.D. thesis structure**

In order to analyse the impact of EE and experience on entrepreneurial intentions and venture creation in universities, this Ph.D. thesis is organised as follows.

Chapter 2 offers a literature review of EE and aims at reviewing and organizing research contribution regarding EE. Therefore, Chapter 2 proposes future research challenges on this topic and justifies the following Chapters. A machine learning algorithm, namely Latent Dirichlet Allocation, was applied to the whole literature corpus on EE in order to understand its structure. This approach resulted in the definition of twelve distinct and representative themes able to deal adequately with the multidisciplinary of the subject and the definition of some literature gaps.

Based on one of the literature gaps, Chapter 3 investigates the role of EE in the creation of academic spinoffs with a “macro” level of analysis by using a new dataset built around 1,262 entrepreneurship courses offered between 2011 and 2014 by 80 US universities included in the Licensing Survey by the AUTM. Adopting a Poisson panel regression model, Chapter 3 shows that EE favours the creation of academic spinoffs. Moreover, Chapter 3 finds that practical – rather than theoretical - entrepreneurship courses favour the creation of academic spinoffs. Chapter 3 also includes the theoretical and practical implications, its limitations and suggestions for future research.

Based on another literature gap, Chapter 4 investigates the role played by SLEOs in shaping the entrepreneurial intention of their members with a “micro” level of analysis. The analysis is based on a survey that was conducted in 2016 on JADE. The main result of Chapter 4 is that the more time students spent on JADE and the higher the number of events students attended, the greater their entrepreneurial intention was. It was found that another important drivers also increase students’ entrepreneurial intention: the Science and Technology fields of study. These results confirm that SLEOs are able to foster students’ entrepreneurial intention by allowing them to network, share ideas, work in multidisciplinary and international teams and attend entrepreneurial events and workshops. Chapter 4 also includes several theoretical and practical implications, its limitations and suggestions for future research.

Moreover, Chapter 5 investigates the role of CLabs in Italy in order to develop an entrepreneurial mindset in university students through contamination processes activated with faculty, alumni and local entrepreneurs with a “macro” level of analysis. Chapter 5 is more a positing Chapter with the aims to present the CLabs phenomenon and their strategic role in the university rather than a research Chapter. The analysis is based on four CLabs in Italy in 2017. Chapter 5 presents the entrepreneurial learning processes in these CLabs. Chapter 5 also includes theoretical and practical implications, its limitations and suggestions for future research.

Finally, the last Chapter presents the overall conclusion, limitations and suggestions for future research based on this Ph.D. thesis. Chapter 6 summarizes major findings of the preceding Chapters as well as the theoretical and practical implication of the results. Chapter 6 also reports limitations of this Ph.D. thesis and future research direction that would advance EE strategy and studies.

# Chapter 2

## Literature review of Entrepreneurship Education

### 2.1 Introduction

One of the first papers on EE was provided by Clarke and Reavley who, already in 1981, stated that there is a “need to provide science and engineering university students with the necessary knowledge and skills to enable them to commercialize technical or scientific ideas” (Clarke and Reavley 1981, pp. 125). Since then, a remarkable expansion in the number of entrepreneurship programs at all levels of education has been realized (Katz 2003; Kuratko 2005; Solomon 2007; Katz 2008; Fretschner and Weber 2013). But how does the literature define EE? Sexton and Smilor, (1997), refer to EE as instructions that develop students’ competences relating to opportunity, recognition and the creation of new ventures. Moreover, Jones and English (2004) define EE as the process of providing individuals with the ability to recognize commercial opportunities and the knowledge, skills and attitudes to act on them. Lastly, Mauchi et al. (2011) refers to EE as transfer and facilitation of knowledge about how, by whom and with what effects opportunities to create future goods and services are discovered, evaluated and exploited. Therefore, EE is linked but not limited to venture creations only, but EE also aims at improving entrepreneurial competences and intentions of their students. On the contrary, EE cannot be a general innovation course based only on strategy and/or project management.

Several papers (see Nabi et al. 2017 for a recent literature review) explain that EE can stimulate students’ entrepreneurial competences as well as their entrepreneurial intentions. For instance, even if few papers find non-significant (Oosterbeek et al. 2010), mixed (Lyons and Zhang 2018) and even negative effects (Chang and Rieple 2013) of EE on students’ entrepreneurial competences as well as their entrepreneurial intention (see Bae et al. 2014 for a literature

review), several studies found a positive and significant impact of EE on entrepreneurial competences and entrepreneurial intention of the students (Peterman and Kennedy 2003; Souitaris et al. 2007; Wilson et al. 2007; Athayde 2009; Sánchez 2011, 2013; Morris et al. 2013; Walter et al. 2013; Zhang et al. 2014; Gielnik et al. 2015). In psychology, intention is the best predictor of planned behaviour, principally when that behaviour is hard to observe, rare, or includes volatile time lags; entrepreneurship is a typical example of such planned, intentional behaviour (Katz and Gartner, 1988; Krueger and Brazeal, 1994). Consequently, the intention to launch its own-business and the employment status choice models that emphasis on entrepreneurial intention have been studied in entrepreneurship research (Krueger and Carsrud, 1993; Kolvereid, 1996). Souitaris et al. (2007) found that EE has a positive and statistically significant impact on entrepreneurial attitudes and intention of science and engineering students. Simirly, Fayolle and Gailly (2015) pointed out EE has a positive impact on entrepreneurial attitudes and intention only when previous entrepreneurial exposure has been weak or inexistent. Moreover, applying the Theory of Planned Behavior, Maresch et al. (2016) found that EE has a positive effect on both business and science and engineering students. In more detail, Rauch and Hulsink (2015) discovered that students participating in EE show an increase in entrepreneurial attitudes and perceived behavioral control.

This field of research has produced a remarkable amount of scientific literature that analysed the EE concept and impact from a plurality of points of view. Even if some literature reviews on this already exists (e.g., Gorman et al. 1997; Martin et al. 2013; Rideout and Gray 2013; Bae et al. 2014; Baptista and Naia 2015; Nabi et al. 2017), it is important to analyse the literature in order to understand the most relevant theoretical and practical contributions of this field of research. Moreover, a literature review is required to understand the literature of EE and to justify this Ph.D. thesis and future studies by identifying the literature gaps. In fact, a review of prior and relevant literature is essential to build the foundations for advancing knowledge and guiding future research (Webster and Watson 2002). In addition to this, apply a machine learning algorithm to perform a literature review can be powerful since a literature review contains a lot of data and information (e.g., words, keywords, etc) and a machine learning algorithm can manage and analyse a lot of data and information in an efficient way. In fact, as explained by Antons and Breidbach (2018): “LDA help overcome the limited human capacity to identify complex relationships in large qualitative data sets”. Moreover, applying a machine learning algorithm is a novel methodology in the EE and it can develop interesting results and suggestions for future research on EE. In more detail, this Chapter aims at finding the main themes of EE research and some literature gaps of EE research in order to justify the next Chapters. In conclusion, this Chapter finds several literature gaps.

For instance, the literature review shows that no attention has been paid to the role that EE plays on the creation of academic spinoffs. In fact, Lamine et al.



(2018) recently required that evidence be provided on the role of EE to promote the creation of academic spinoffs. Moreover, several scholars (e.g., Nabi et al. 2017) suggest testing and providing empirical evidence about the different impact that different teaching models may have in the field of entrepreneurship.

In addition to this, the literature review shows that only few studies have been devoted to the analysis of extra-curricular entrepreneurial experiences and to their role in fostering entrepreneurial competences and entrepreneurial intention (Pittaway et al. 2011, 2015; Padilla-Angulo 2017; Preedy and Jones 2017). More in detail, very few studies analysed the impact of SLEOs on students' entrepreneurial intentions. Although there is still a need for a greater understanding of the factors that can shape the willingness of students to become entrepreneurs, there is also considerable debate surrounding which factors affect their entrepreneurial intention the most.

Lastly, the literature review shows that only few studies analysed EE in the Italian context even if there are some Italian policies that aim at fostering EE in Italian universities. Moreover, it can be useful to analyse Italian University's strategies (e.g., Italian Contamination Labs) in order to understand how this policy aims at developing an entrepreneurial mindset in university students through contamination processes activated with faculty, alumni and local entrepreneurs.

Therefore, this Ph.D. thesis aims at analysing these following gaps in the next Chapters:

1. The impact of entrepreneurship education on the creation of academic spinoffs.
2. The impact of Student-Led Entrepreneurial Organizations on entrepreneurial intentions.
3. The analysis of the strategic role of the Contamination Labs (CLabs) in Italy.

In order to perform this literature review of EE, a machine learning and text mining technique was applied. In more detail, this Chapter applied an analysis method based on the LDA, an efficient theme modelling algorithm (Blei et al. 2003; Schwarz 2018). LDA is an example of a topic model and belongs to the machine learning toolbox. In more detail, in machine learning, a topic model is a type of statistical model for discovering the abstract "themes" that occur in a collection of documents (e.g., Blei et al. 2003; Yang and Zhang, 2018). Topic modeling is a frequently used text-mining tool for discovery of hidden semantic structures in a text body. Therefore, LDA is a topic model tool that are method of machine learning for discovering the abstract "themes" that occur in a collection of documents (e.g., Blei et al. 2003; Yang and Zhang, 2018). In fact, several recent literature reviewers have applied the LDA algorithm (e.g., Sakata et al. 2013; Moro et al. 2015; Antons et al. 2016; Lee and Kang 2018; Barravecchia et

al. 2019). In total, 946 Journal papers on EE were used for the theme landscape. The LDA algorithm was applied to an initial dataset of 280 pages of raw text (185,178 words) concerning the abstracts of the 946 Journal papers on EE. These 946 papers were extrapolated with a query on the Scopus database<sup>6</sup> and limited on 1,584 Journals indexed on Academic Journal Guide (2018)<sup>7</sup> by Chartered ABS<sup>8</sup>. The goal of this Chapter is to produce a theme landscape – an overview of the major research themes concerning EE – and to present the literature gaps on this theme. Moreover, in the conclusions of this Chapter the three studies performed to fill some of these literature gaps are presented.

The rest of the Chapter is organised as follows. The methodology applied to produce the theme landscape and the LDA algorithm are presented in Section 2. Section 3 produces some descriptive analyses on the literature concerning EE research and its theme landscape. Then, Section 4 presents the limits of this Chapter and introduces the literature gaps that will be addressed in the next Chapters.

## 2.2 Methodology and LDA algorithm

This paragraph presents the methodology of this Chapter, where a theme modelling algorithm has been employed to better analyse the composition of the literature concerning EE. More in general, LDA is a generative statistical model that allows sets of observations to be explained by unobserved groups that explain why some parts of the data are similar. To do so, LDA discovers patterns of word use and connects patterns of similar use to establish a theme (Blei and Lafferty, 2009). LDA deals with main issues regarding a big dataset of papers such as detecting a limited number of themes that define a text corpus; (ii) correlate a set of keywords to each theme and (iii) identify a precise mixture of these themes for each paper (Blei et al. 2003). In more detail, to each paper, the LDA algorithm designates the probability that the paper refers to each theme. The theme with the highest probability to define the paper is considered as the paper's theme if that probability is higher than 20%. Theme modelling are unsupervised machine-learning algorithms that can find themes operating across a set of records and interpreting individual records with theme labels (Blei 2012; Müller et al. 2016). The operational theory which these algorithms are based on, is the calculation of the amount of specific words, simple changes of those words, and possibly simple phrases (Delen and Crossland 2008). According to Blei et al. (2003), LDA is an efficient theme modelling algorithm. In fact, Schwarz (2018) pointed out that the

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<sup>6</sup> More information on Scopus database are available here: <https://www.scopus.com/>.

<sup>7</sup> More information on Academic Journal Guide (2018) are available here: <https://charteredabs.org/academic-journal-guide-2018/>.

<sup>8</sup> The Academic Journal Guide (2018) by Chartered ABS is available here: <https://facultystaff.richmond.edu/~tmattson/AJG%202018%20Journal%20Guide.pdf>.

LDA algorithm is one of the most popular machine learning algorithms for theme modelling based on a big database. Therefore, in order to apply the LDA algorithm the following steps were applied:

1. Sample creation
  - a. Query on the Scopus database by the identification of keywords on EE.
  - b. Merge the sample from the Scopus database with the Academic Journal Guide (2018) by Chartered ABS.
  - c. Check of the availability of the abstracts of the selected papers.
2. Data processing
  - a. Pre-processing of the sample.
  - b. Theme extraction with LDA algorithm.
  - c. Theme creation.

The following subsections will describe all these steps.

### 2.2.1 Sample creation

To create the sample, a query on the Scopus database was applied. The Scopus database was selected because of its reliability for publications in the management field for several authors (e.g., Meho and Yang 2007; Bar-Ilan 2008). Then, based on keywords on EE literature, the following query was performed on the Scopus database: "entrepr\* education" OR "enterpr\* education". By using this query, it was possible to include several keywords such as entrepreneurial education, entrepreneurship education and enterprise education. This query was applied to the *Article title*, *Abstract*, *Keywords* presented on the Scopus database. Moreover, the research was limited only to Journals to avoid conference papers presented on Scopus database. The decision of limiting the research to Journal papers is simply due to the fact that conference papers can create redundancy into the sample as some authors write their Journal papers based on their conference papers. The research was also limited to English papers published up until the year 2018 since this literature review was performed at the beginning of 2019. At this stage, the following query on the Scopus database was performed:

```
TITLE-ABS-KEY ( "entrepr* education" OR "enterpr* education" ) AND (
LIMIT-TO ( SRCTYPE , "j" ) ) AND ( EXCLUDE ( PUBYEAR , 2020 ) OR
EXCLUDE ( PUBYEAR , 2019 ) ) AND ( LIMIT-TO ( LANGUAGE , "English" ) )
```

The result of this query was 1,861 Journals papers. However, some of these papers were published in low-quality Journals and in subject areas not related to the management field of study. In order to refine it, the search incorporated all the

1,584 ISSN codes<sup>9</sup> of the Journals ranking into the Academic Journal Guide (2018) by Chartered ABS in the query. At the end, the final query on the Scopus database is present in Annex A. At this stage, the sample consisted of 986 Journal papers. Since the LDA is performed on the abstracts of these Journal papers as suggested by other authors (e.g., Shah et al. 2003; Fang et al. 2018; Barravecchia et al 2019), all the abstracts of 986 Journal papers were checked. If an abstract was not present, the abstract was searched on the internet and, if it was found, it was added to the list. At the end, the abstracts were not available for 40 Journal papers<sup>10</sup>, which were mostly special issues. Thus, the final sample was composed of 946 Journal papers on EE. In other words, the final sample was based on 280 pages of raw text (185,178 words) concerning the abstracts of the 946 Journals papers on EE. To check the consistency of these Journal papers on the literature of EE, all the relevant and recent papers on EE (e.g., Katz 2003; Kuratko 2005; Souitaris et al. 2007; Nabi et al. 2017; Nabi et al. 2018) were checked.

Therefore, as suggested by the literature of big database analytics (Chen et al. 2012; George et al. 2014), the literature of EE presents all the attributes of a big database. Consequently, the use of instruments for big data analytics would be valuable for its evaluation (Basu and Davidson 2009; Antons and Breidbach 2018). Inside the massive big data analytic instruments, text mining methodologies are useful to generate clusters of similar items (Feldman and Sanger 2007, Aggarwal and Zhai 2012; Ordenes et al. 2014). In the next subsection, the data processing analysis is described.

### **2.2.2 Data processing**

LDA can be defined as a probabilistic model that can obtain significant intra-document statistical composition. Moreover, LDA manages several issues such as finding a set of themes that define a text corpus; associating a set of keywords to

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<sup>9</sup> The ISSN code of the Journal was used instead of the Journal Title since some Journal Title on the Academic Journal Guide (2018) by Chartered ABS are different on Scopus. For instance, the Journal Title “Journal of European Industrial Training” in the Scopus database is “European Journal of Training and Development” in the Academic Journal Guide (2018) by Chartered ABS. Moreover, the Journal Title “International Small Business Journal Researching Entrepreneurship” in the Scopus database is “International Small Business Journal” in the Academic Journal Guide (2018) by Chartered ABS. In addition, the Journal Title “Journal Of Entrepreneurial Behaviour And Research” in the Scopus database is “International Journal of Entrepreneurial Behavior and Research” in the Academic Journal Guide (2018) by Chartered ABS. Additionally, the Journal Title “Management Croatia” in the Scopus database is “M@n@gement” in the Academic Journal Guide (2018) by Chartered ABS. Moreover, there are several incongruities on the English stop conjunction (e.g., “and” “&”) and punctuation. The ISSN code surpasses these obstacles.

<sup>10</sup> Some of these Journal papers without the abstracts are “Douglas, D. (2008). Handbook of Research in Entrepreneurship Education, Volume 2 Contextual Perspectives. International Journal of Entrepreneurial Behavior & Research.”; “Kaplan, C. B., & McFarlane, C. (1981). A special issue on entrepreneurship education. Journal of Career Education, 8(2), 84-85.”; “Landström, H. (2018). PAUL HANNON—recipient of the European Entrepreneurship Education Award 2016. Entrepreneurship and Regional Development” and “Higgins, D., Galloway, L., Jones, P., & McGowan, P. (2018). Entrepreneurial education and learning—Critical perspectives and engaging conversations. Industry and Higher Education”.

each theme and identifying a precise combination of these themes for each paper (Blei et al. 2003). In more in detail, the LDA algorithm gives a multinomial distribution that explains the probability that the paper deals with each of the recognized themes. The theme with the highest probability to define the paper is considered as the paper's theme (Barravecchia et al. 2019). However, in order to apply the LDA algorithm's efficiency, the sample was pre-processed and unified as suggested by Meyer et al. (2008) and Barravecchia et al (2019).

The pre-processing of the sample included different actions. First, the whole text was switched to lowercase to eliminate ambiguity with uppercase words. Then, English conjunctions and stop words (e.g., “and”, “&”, “the”, “in”, “at”), punctuation and numbers were deleted since they do not add anything useful to the themes. Moreover, as suggested by Piepenbrink and Nurmammadov (2015), the copyright information of the publishers at the end of the abstract was removed too. Finally, the text was lemmatized: all the words with similar meaning but with different inflected forms were replaced with a unique lemma. For example, the words “sustainability”, and “sustainable” were replaced with the lemma “sustain-”. Words generally not related to topical content (such as: “paper”, “presents”, “problem”, “finding”) were removed. After this pre-processing, the LDA algorithm was applied to find the major themes of the literature of EE. At the end of the pre-processing, the sample consisted of 10,445 words from the 946 papers.

After the pre-processing of the sample, the LDA algorithm was applied to the text corpus to extrapolate the themes regarding the literature of EE. As suggested by Barravecchia et al. (2019), the KNIME Analytics Platform<sup>11</sup> was used to perform the LDA algorithm by using the package Topic Extractor (Parallel LDA). According to Blei et al. (2003), the LDA algorithm needs three parameters: the Dirichlet hyperparameters ( $\alpha$ ,  $\beta$ )<sup>12</sup> and the number of themes (T). This research applied  $\beta = 0.1$  and  $\alpha = 50/T$  as suggested by Griffiths & Steyvers (2004). The optimal number of themes from the sample was defined by applying the Collapsed variational Bayes (Foulds et al. 2013). This process led to the definition of an optimal number of themes (T) equal to 12. Therefore, based on  $\alpha$ ,  $\beta$  and T, the LDA algorithm produced a list of keywords describing each theme and, for each paper, its probability of fitting to each of the defined theme. The LDA algorithm recognizes sets of keywords related to each theme without generating a semantic label to describe them (Blei 2012). Therefore, human work is still required to define these themes. In more detail, the LDA algorithm generates the sets of 10

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<sup>11</sup> The KNIME Analytics Platform is an open source software (Berthold et al. 2009).

<sup>12</sup> LDA has two hyperparameters,  $\alpha$  and  $\beta$ , non-negative real numbers that govern the shape of the inferred topic model. The Dirichlet parameter  $\alpha$ , is the parameter of the Dirichlet over on the per-document topic distributions; it represents the document-topic density. Consequently, the higher the value of  $\alpha$ , the larger the number of topics that composes the document. The Dirichlet parameter  $\beta$  is the parameter of the Dirichlet over on the per-topic word distribution. It denotes the topic-word density, which means that the higher the value of  $\beta$ , the larger the set of words that describes a topic. According to Griffiths & Steyvers (2004) these two hyperparameters can be set as following:  $\beta = 0.1$  and  $\alpha = 50/T$ , where T is the number of themes.

keywords relate to each theme. In addition to this, the LDA algorithm presents a percentage to link each paper to each theme. However, the LDA algorithm does not create the name for each theme. The LDA algorithm generates only a list of 12 themes (named theme 1, theme 2, ... theme 12) correlate with 10 keywords and presents a percentage to each paper to each theme. Therefore, human work is still required to create a name for each theme. This Chapter used a list of the 10 most important keywords for each theme in order to create a label for each of these 12 themes. To do this, the LDA algorithm weighs how many times the keywords appears in a theme. Moreover, a validation check was performed by a randomly selected sample composed of one hundred papers to verify the link of that paper to the selected theme generated by the LDA algorithm. This check did not find significantly different results. At the end of this process, the following 12 different themes belonging to the literature of EE were defined based on a list of 10 keywords. Moreover, thanks to the LDA algorithm, it was possible to associate the large majority of the 946 papers to a theme.<sup>13</sup> In fact, the LDA algorithm linked each paper to each theme with a percentage. To do this, the LDA algorithm weighs how many times the keywords appears in a paper. If all the percentages of a paper associated to a theme were less than 20%, the paper was not associated with any theme. The papers excluded in this theme landscape are concerning to “minor” themes such as enterprise culture (e.g., Jack and Anderson 1999), studies in developing countries (e.g., Buli and Yesuf 2015), networking (e.g., Lans et al. 2015) and young entrepreneurship (Riese 2013).

In conclusion, Table 1 summarises the result of the theme landscape analyses performed by the LDA algorithm. The theme labels are ordered by the percentage of presence in the 946 papers. The keywords are ordered by the score generated by the LDA algorithm. It is important to explain that all the papers analysed are papers where EE is the main focus. Therefore, the themes present in Table 1 are ancillary/subordinated to EE.

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<sup>13</sup> Out of 946 papers, 21 papers (2%) were not linked to any theme since their percentage associate to that paper to one theme was less than 20%.

**Table 1 - EE theme landscape**

<b>Theme label</b>	<b>Short description of the theme</b>	<b>10 keywords from LDA algorithm</b>	<b>% papers</b>
Teaching entrepreneurship	Different methods, approaches, trends and challenges in EE	entrepreneur-, teach, programm-, model, compet-, train-, method-, trend-, promot-, challeng-	17%
Entrepreneurial competence	The impact of EE on entrepreneurial competences, skills, and abilities	enterpris-, entrepreneur-, compet-, skills, studi-, impact, abilit-, experi-, manag-, capa-	14%
Entrepreneurial intention	The impact of EE on entrepreneurial intention	intent-, impact, effect, particip-, student, program-, selfefficaci, attitude, gender, behavior	11%
Theories on EE	Analysing or developing theories in EE	theor-, attitud-, behavi-, model, perceiv-, influenc-, motiv-, framework, context, structure	9%
Policy on EE	The role of policy in EE and vice versa.	polic, econom, growth, culture, system, govern, region, innov, compet-, bureaucr-	8%
Student entrepreneurship	The role of EE in the startups or entrepreneurial projects created by university students	student-, cours-, univers-, studi-, busi-, teach-, effect, start-, undergradu-, project	8%
Academic entrepreneurship	The role of EE in the startups or entrepreneurial projects created by university faculty	academ-, univers-, technolog-, prof-, facult-, transf-, incub-, cultur-, acc-, stake-,	6%
Graduate entrepreneurship	The role of EE on workers and/or established startups and/or entrepreneurs and/or SMEs	career, work-, graduat-, employ, enterpris, curriculum, start-, support, sme, entre-	6%
Literature review	Literature reviewers and/or analyses of study on EE	literatur-, review, studi-, polici, conceptu-, practice-, context, empi-, model, contribut-	6%
Women entrepreneurship	Understand the role of gender/women in EE	women, female, male, ventur-, train, gender, investing-, knowledg-, start, new	5%
Social entrepreneurship	Understanding EE related to social entrepreneurship/intention/value	social, entrepreneur-, process, chang-, valu-, experi-, inno-, process, challeng-, intent-	4%
Team entrepreneurship	Understanding the team dynamic and learning in EE	team, process-, reflect-, experi-, project, dynamic, student, teacher, learn-, group	4%
N.D.			2%

## 2.3 Sample description and theme landscape of EE

### 2.3.1 Sample description

Before presenting the outcome of the theme landscape of EE, this section aims at introducing some descriptive analyses of the literature of EE based on the 946 papers. First, the top ten papers based on the number of citations from Scopus database with their related theme are presented in Table 2.

**Table 2 – Top 10 cited papers on EE**

Author	Year	Journal title	Cite by	Theme
Cooper et al.	1994	Journal of Business Venturing	1,074	Theories on EE
Kuratko	2005	Entrepreneurship: Theory and Practice	801	Teaching entrepreneurship
Souitaris et al.	2007	Journal of Business Venturing	709	Entrepreneurial intention
Wilson et al.	2007	Entrepreneurship: Theory and Practice	608	Women entrepreneurship
Katz	2003	Journal of Business Venturing	501	Teaching entrepreneurship
Baron	2006	Academy of Management Perspectives	491	Graduate entrepreneurship
Pittaway and Cope	2007	International Small Business Journal	467	Literature review
Gorman et al.	1997	International Small Business Journal	444	Literature review
Fayolle et al.	2006	Journal of European Industrial Training	415	Theories of entrepreneurship
Oosterbeek et al.	2010	European Economic Review	383	Entrepreneurial competence

Moreover, the top 10 scientific journals in terms of number of publications on EE extracted from Scopus database are presented in Table 3. Similarly to a recent literature review developed by Baptista and Naia (2015) based on 60 papers, Table 3 presents the journals Industry and Higher Education and International Entrepreneurship and Management Journal as two journals with several papers published on EE. However, Academy of Management Learning and Education and Journal of Business Venturing are not present in Table 3 while in the literature review of Baptista and Naia (2015) are two journals with a good number of papers in comparison to the other journals. Table 3 presents the same top 3 journals of the literature review of Matlay et al. (2014)<sup>14</sup>.

<sup>14</sup> Figure 3 of Matlay et al. (2014) at page 704 presents the following three journals: Education and Training, Industry and Higher Education and Journal of Small Business and Enterprise Development in the same order of Table 3 in this Ph.D. thesis.



**Table 3 – Top 10 journal on EE for number of publications**

<b>Journal Title</b>	<b>Journal ISSN</b>	<b>Number of papers</b>
Education and Training	0040-0912	219
Industry and Higher Education	0950-4222	117
Journal of Small Business and Enterprise Development	1462-6004	51
International Journal of Entrepreneurship and Small Business	1741-8054	42
International Journal of Entrepreneurial Behaviour and Research	1355-2554	32
International Journal of Management Education	1472-8117	29
Journal of Small Business Management	1540-627X	27
Entrepreneurship and Regional Development	1464-5114	23
International Entrepreneurship and Management Journal	1554-7191	20
Journal of Small Business and Entrepreneurship	0827-6331	17

Moreover, the top 10 scientific journals in terms of number of citations on EE extracted from Scopus database are presented in Table 4. It is interesting to notice how the ranking in Table 4 is different to Table 3. For instance, in Table 4 are presented high-qualified journals such as Journal of Business Venturing, Entrepreneurship: Theory and Practice and Academy of Management Learning and Education while these journals are not presented in Table 3. Table 4 is more in line with the literature review of Baptista and Naia (2015) than Table 3.

**Table 4 - Top 10 journals on EE based on numer of citations**

<b>Journal Title</b>	<b>Journal ISSN</b>	<b>Number of citations</b>
Education and Training	0040-0912	6,527
Journal of Business Venturing	0883-9026	4,121
Entrepreneurship: Theory and Practice	1042-2587	2,290
Journal of Small Business and Enterprise Development	1462-6004	2,004
Journal of Small Business Management	1540-627X	1,807
International Small Business Journal	0266-2426	1,534
Journal of European Industrial Training	0309-0590	1,406
Academy of Management Learning and Education	1537-260X	1,005
International Entrepreneurship and Management Journal	1554-7191	981
Industry and Higher Education	0950-4222	854

Finally, the top 10 scientific journals in terms of number citations per paper ( $\#citation_{journal_i} / \#papers_{journal_i}$ ) on EE extracted from Scopus database are presented in Table 5.

**Table 5 - Top 10 journals on EE based on number of citations per papers**

<b>Journal Title</b>	<b>Journal ISSN</b>	<b>Number of citations per papers</b>
International Journal of Management Reviews	1460-8545	365.00
Entrepreneurship: Theory and Practice	1042-2587	286.25
Journal of Business Venturing	0883-9026	257.56
Academy of Management Perspectives	1558-9080	255.50
European Economic Review	0014-2921	210.50
China Economic Review	1043-951X	151.00
Journal of Economic Behavior and Organization	0167-2681	145.50
Journal of European Industrial Training <sup>15</sup>	0309-0590	140.60
International Small Business Journal	0266-2426	139.45
Research Policy	0048-7333	110.50

In addition to this, this literature of EE based on the 946 papers finds 1578 different authors. The top 10 authors for the number of published papers are presented in Table 6.

**Table 6 - Top 10 authors on EE based on number of papers**

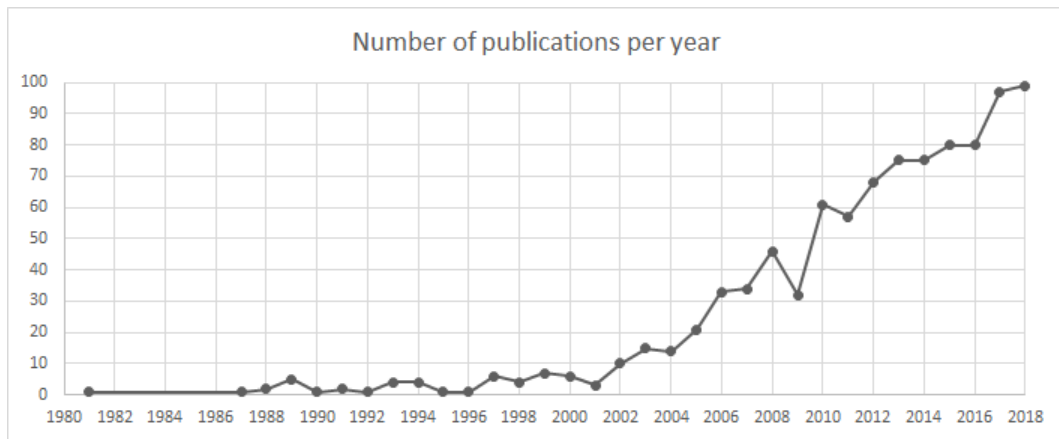
<b>Author</b>	<b>Number of papers</b>
Matlay H.	22
Jones C.	18
Rae D.	16
Fayolle A.	15
Katz J.	14
Pittaway L.A.	13
Liñán F.	12
Ferreira J.M.	11
Do Paço A.	10
Hannon P.D.	10

Moreover, the number of scientific publications from 1981 to 2018 on EE are presented in the next Figure 1

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<sup>15</sup> This journal changed its name in European Journal of Training and Development

**Figure 1 - Number of publications per year on EE**



From this Figure 1 it is possible to see a growing trend on publications regarding EE.

Moreover, according to the data from Scopus database, out of 946 papers, 72 papers (7.6%) declared one or more fund to carry out their research.

Lastly, Table 7 presents the Country for the first author. In comparison to the literature review of Matlay et al. (2014), this literature review found a higher percentage of first author from Europe (71% instead of 69%). On the country, this literature review found a lower percentage of first author from North America (12% instead of 14%). This result may derive from the fact that Europe is paying a lot of attention of EE since organizations and institutions (e.g. the European Commission) are fostering research and activities on this theme.

**Table 7 - Country for the first author**

Country	Percentage
Europe	71%
North America	12%
Asia	8%
Australia	5%
Africa	2%
South America	2%

### **2.3.2 Theme landscape on EE**

The application of the LDA algorithm generated twelve themes. These themes are briefly presented in this section with some suggestions for future research.

#### **Teaching entrepreneurship**

At the beginning of the 2000's, some papers (e.g., Henry et al. 2005a, b) discussed whether entrepreneurship could be taught or not. The discussion concluded with most researchers agreeing with the fact that at least some entrepreneurial competences can be taught through EE (San Tan and Ng 2006). Therefore, universities all around the world started to teach entrepreneurship (Katz 2003; Kuratko 2005; Solomon 2007; Katz 2008; Fretschner and Weber 2013). However, since entrepreneurship is different from other disciplines (e.g., math), it is important to understand how to teach it (Fiet 2001; Honig 2004; Kuratko 2005; Béchar and Grégoire 2005; Duval-Couetil 2013; Fayolle and Liñán 2014; Fayolle et al. 2016; Nabi et al. 2017; Lamine et al. 2018). A lot of papers on EE have analysed and introduced new teaching models or programmes to the literature (e.g., Béchar and Grégoire 2005; Fayolle and Gailly 2008). For instance, Neck and Greene (2011) introduced a portfolio of practice-based pedagogies on EE called starting business, serious games and simulation and designed-based learned. In more detail, Neck and Greene (2011) explained how the Babson College offered an undergraduate course focused on opportunity recognition, resource parsimony, team development, holistic thinking and value creation where the students are required to start a business. Similarly, Rasmussen and Sørheim (2006) presented several initiatives on EE related to practical-oriented teaching models in four different universities (Chalmers University of Technology, Norwegian University of Science and Technology, University of Oulu and Trinity College Dublin). For example, Rasmussen and Sørheim (2006) explained how the Chalmers University of Technology offered a one-and-a-half-year entrepreneurship program which brought together students, real-life projects, and teachers. Since 1997, thanks to this entrepreneurship program, the students created 12 companies with 131 new jobs. Moreover, Rasmussen and Sørheim (2006) suggested that EE is also increasing the involvement by students in universities' venture creation such as academic spinoffs. Moreover, based on a survey on 700 undergraduate students, Kassean et al. (2015) observed that students who participated in more practical entrepreneurship classes presented higher entrepreneurial intentions. Most of these studies suggest that EE requires practices based on real projects (e.g., Krueger 1993; Peterman and Kennedy 2003; Zhao et al. 2005) by including interdisciplinary and internationally teamwork and involving several stakeholders of the entrepreneurship ecosystem. Even if the literature of EE has analysed different teaching models of entrepreneurship, suggesting the use practical-oriented teaching models, several questions remain open. For instance, it is not clear how to change EE based on the target group. In more detail, it would be useful to explain if and how EE needs to change for high

school, undergraduate or graduate students. Moreover, it would be useful to better understand the role of the teacher in EE. In addition to this, as recently suggested by Nabi et al. (2017), it would be useful to understand the impact of different teaching models on the creation of new ventures such as academic spinoffs or startups. Finally, it is important to analyse the impact of EE on the creation of new ventures over a long time-span (Nabi et al. 2017).

### **Entrepreneurial competence**

As suggested by the European Commission (2006), entrepreneurial competences are important to all individuals (Oosterbeek et al. 2010). In fact, the European Commission also developed a framework to analyse it called EntreComp (Bacigalupo et al. 2016) based on three areas: i) ideas & opportunities, ii) resources and iii) into action (Bacigalupo et al. 2016). Therefore, universities started to perform several activities to foster entrepreneurial competences. One of the most promising activities in order to foster entrepreneurial competences is EE (Sánchez 2011, 2013). For instance, using pre- and post- quasi-experimental design of 864 university students (403 students attended EE and 460 students did not), Sánchez (2011) found that students who attended EE increased their entrepreneurial competences, whereas students in the control group – students who did not attend EE – did not. In order to measure entrepreneurial competences, Sánchez (2011) measured entrepreneurial self-efficacy<sup>16</sup>, proactiveness<sup>17</sup> and risk taking<sup>18</sup>. However, using a sample of 562 students in the Netherlands, Oosterbeek et al. (2010) found an insignificant effect of EE on entrepreneurial competences<sup>19</sup>. On the contrary, Karimi et al. (2016) showed that EE has a significant effect on students' entrepreneurial competences (such as the number and more innovative business ideas) since students' entrepreneurial competences increased in the experimental group while the control group presented no significant changes in their entrepreneurial abilities. Moreover, some papers (e.g., Honig 2004; Mueller and Anderson 2014) suggested that entrepreneurial competences are very difficult to teach unless the students actively take part in the entrepreneurial learning process. Despite this insight, the literature of EE is still lacking proof that investigates the heterogeneity of university students as a contingency that influences learning and obtains entrepreneurial competences from EE (Fayolle 2013; Nabi et al. 2017). Therefore, future research on EE needs to consider the heterogeneity of university students in their analyses. Moreover, it would be useful to test the EntreComp developed by

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<sup>16</sup> Entrepreneurial self-efficacy is defined as the perceived feasibility of starting a business (Krueger and Brazeal 1994; Krueger et al. 2000; Saeed et al. 2014).

<sup>17</sup> Proactiveness is defined as the tendency to start and preserve actions that directly change the surrounding context (Bateman and Crant 1993).

<sup>18</sup> Risk taking is defined as an individual personality with regard to risk (Rauch and Frese 2007).

<sup>19</sup> Based on the so-called Escan – a validated self-assessment test in the Netherlands based on 114 items – Oosterbeek et al. (2010) measured entrepreneurial competences with questions on market awareness, creativity and flexibility.

the European Commission in order to measure how EE improved the entrepreneurial competences presented in the EntreComp. In fact, thanks to these researches it would be possible to understand if EE improved entrepreneurial competences more than other entrepreneurial competences and under which conditions. For instance, different cultures, environment, teaching models and other variables can affect the impact of EE on entrepreneurial competences.

### **Entrepreneurial intention**

Entrepreneurial intention is usually defined as the career choice to become an entrepreneur and measured with a questionnaire (e.g., Franke and Lüthje 2004; Souitaris et al 2007; do Paço et al. 2011; Liñán et al. 2011; Zhang et al. 2014; Fayolle and Gailly 2015; Piperopoulos and Dimov 2015). However, the questions referring to entrepreneurial intention are different in the literature. For instance, Souitaris et al (2007) used three items with a 7-point scale to measure entrepreneurial intention.<sup>20</sup> Several papers based on the GUESSS database (e.g., Zellweger et al. 2011; Laspita et al. 2012; Sieger and Minola (2017) are using one question regarding the career path that the student intends to pursue 5 years after the completion of their studies.<sup>21</sup> Moreover, based on the Entrepreneurial Intention Questionnaire (Liñán and Chen 2009), Liñán et al. (2011) used both one single question and six items with a 7-point scale to measure entrepreneurial intention.<sup>22</sup> do Paço et al. (2011) used the same six items with a 7-point scale to measure entrepreneurial intention. In addition to this, several papers used other questions (e.g., Franke and Lüthje 2004; Zhang et al. 2014; Fayolle and Gailly 2015; Piperopoulos and Dimov 2015). Even if the literature presents different questions to measure entrepreneurial intention, the large majority of the studies (e.g., Souitaris et al. 2007; Zhang et al. 2014; Piperopoulos and Dimov 2015; Fayolle and Gailly 2015) found a positive impact of EE on entrepreneurial intention. More in detail, a pre- and post-test control group design was used to measure the change of attitudes and intentions of a group of science and

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<sup>20</sup> Souitaris et al (2007) used the following items to measure entrepreneurial intention: “If you were to choose between running your own business and being employed by someone, what would you prefer?” (1 = Would prefer to be employed by someone, to 7 = Would prefer to be self-employed); “How likely is it that you will pursue a career as self-employed?” (1 = unlikely, to 7 = likely); “How likely is it that you will pursue a career as employed in an organisation?” (1 = unlikely, to 7 = likely).

<sup>21</sup> GUESSS database uses the following question to measure entrepreneurial intention: “Which career path do you intend to pursue 5 years after the completion of your studies?” (an employee in a small business (1-49 employees); an employee in a medium-sized business (50-249 employees); an employee in a large business (250 or more employees); an employee in a non-profit organization; an employee in Academia (academic career path); an employee in public service; a founder (entrepreneur) working in my own business; a success in my parents’ / family business; a success in a business currently not controlled by my family).

<sup>22</sup> Liñán et al. (2011) use the following question to measure entrepreneurial intention: “Have you even seriously considered becoming an entrepreneur?” (Y/N) and six questions with a 7-point scale (from 1 = total disagreement to 7 = total agreement): “I am ready to do anything to be an entrepreneur”; “My professional goal is to become an entrepreneur”; “I will make every effort to start and run my own firm”; “I am determined to create a firm in the future”; “I have very seriously thought of starting a firm”; “I have the firm intention to start a firm some day”.

engineering students who attended an entrepreneurship course (232 students) and a group who did not (220 students) over a period of approximately 5 months in 2002, Souitaris et al. (2007) found a positive and significant impact of EE on entrepreneurial intention of students who attended an entrepreneurship course. Moreover, Fayolle and Gailly (2015) showed that EE has a positive effect on entrepreneurial intention when previous entrepreneurial exposure of the students has been weak or inexistent, while they did not find the same results for those students who had previously significantly been exposed to entrepreneurship. In addition to this, Piperopoulos and Dimov (2015) pointed out that theoretically-oriented entrepreneurship courses have a lower impact on students' entrepreneurial intention than practically-oriented entrepreneurship courses. Despite these results, the literature presents some gaps. For instance, in addition to EE, no one has analysed the impact of digital and coding knowledge and competences on entrepreneurial intentions yet. Moreover, it would be interesting to analyse the role of "finance literacy" on entrepreneurial intentions. Finally, there is no existing literature review of entrepreneurial intention.

### **Theories on EE**

The most used theory on EE is the Theory of Planned Behavior proposed by Ajzen (1991). The Theory of Planned Behavior was applied before to explain this mental process leading to firm creation (e.g., Kolvereid 1996; Krueger et al. 2000) and then to explain the impact of EE on entrepreneurial intention and competences (e.g., Fayolle et al. 2006; Liñán 2008). In more detail, the Theory of Planned Behavior consists of three components: i) personal attitude, ii) subjective norms and iii) the perceived behavioural control<sup>23</sup>. Personal attitude<sup>24</sup> refers to the attractiveness of the behavior or the degree to which the person considers a positive or negative personal valuation of entrepreneurship (Ajzen 1991). The subjective norms<sup>25</sup> refer to the perceived social pressure from family, friends, or significant others to entrepreneurship (Ajzen 1991). Finally, the perceived behavioural control<sup>26</sup> refers to the perception of situational competence and

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<sup>23</sup> The perceived behavioural control of the Theory of Planned Behavior is also called entrepreneurial self-efficacy (e.g. Bandura 1997).

<sup>24</sup> Personal attitude is usually measured with the following questions with a 7-point scale (from 1 = do not agree at all to 7 = very much agree): "I am ready to do anything to be an entrepreneur"; "My professional goal is to become an entrepreneur"; "I will make every effort to start and run my own business"; "I am determined to create a business in the future"; "I have very seriously thought of starting a business"; "I have a strong intention to start a business someday".

<sup>25</sup> Subjective norms are usually measured with the following questions with a 7-point scale (from 1 = very negatively to 7 = very positively) "If you decided to create a firm, would people in your close environment approve of that decision?" by referring to the close family, friends, and colleagues.

<sup>26</sup> The perceived behavioural control is measured with different questions in the literature of EE. However, some questions to measure the perceived behavioural control with a 7-point scale (from 1=very low competence to 7=very high competence) are the following ones: "Please indicate your level of competence in performing the following tasks: Identifying new business opportunities; Creating new products and services; Managing innovation within a firm; Being a

reflects the perceived ability to become an entrepreneur. Another theory used in the literature of EE is the Human Capital Theory (e.g., Pfeffer, 1994; Cooper et al. 1994). In fact, the Human Capital Theory (Becker 1964) is well suited to the examination of educational outcomes (Martin et al. 2013). Moreover, another theory found in the literature of EE is the Structuration Theory (e.g., Morris et al. 2013), which concerns the reciprocal interactions between individuals and their environment (Giddens 1984). In addition to this, other theories used in the literature of EE are the Social Cognitive Theory (e.g., Drnovšek et al. 2010), the Education Theory (e.g., Matlay and Hannon 2006), and the Learning Theory (e.g., Löbler et al. 2006). However, even if the literature of EE applied several theories, it would be interesting to understand if new theories are necessary for EE in social entrepreneurship or for EE in developing countries.

### **Policy on EE**

Several papers on EE have analysed the role of policy on EE (e.g., Karanassios et al. 2006; Cornwall and Dennis Jr 2012; Berglund and Holmgren 2013; Matlay and Henry 2013; O'Connor 2013; Hoppe 2016). For instance, analysing the policies of the Organization for Economic Cooperation and Development (OECD) in EE in the Greek higher education system, Karanassios et al. (2006) suggested some implication for EE in universities. Analysing the government policy to promote EE in the Australian policy context, O'Connor (2013) pointed out several recommendations for policymakers. For instance, in his proposition two, O'Connor (2013) pointed out that policymakers need to design EE policy that fosters the introduction of programs for entrepreneurship in the academic, corporate or social sectors to achieve economic development, productivity or utility respectively. In addition to this, Matlay and Henry (2013) analysed the EE policies in the UK. Matlay and Henry (2013) concluded their paper by suggesting a more realistic and measurable perspective on the expectations of EE. Moreover, they suggested the implementation of policies able to foster EE in non-traditional discipline areas. Hoppe (2016) presents a clear and comprehensive view of the policies on EE and then he discusses the role of this policy in the Swedish educational system. Similarly, it would be useful to understand the impact of policies on EE in other Countries too. For instance, it would be interested to analyses the role of some Italian policies to improve EE such as the CLabs. Moreover, even if several papers have analysed policies of EE, it may be useful to develop rigorous methods able to capture and account for entrepreneurship's socioeconomic contribution from these policies.

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leader and communicator; Building up a professional network; Commercializing a new idea or development; Successfully managing a business”.



## **Student entrepreneurship**

Student entrepreneurship refers to startup and/or entrepreneurial projects developed by university students and fresh graduates (Ferrante et al. 2018; Roman and Maxim 2017). Student entrepreneurship is a recent phenomenon (Beyhan and Findik, 2018). However, due to the fundamental role of universities in entrepreneurial activities (Minola et al. 2016) and students' interests in becoming entrepreneurs (Ferrante et al. 2018), it is important to understand and analyse how universities can improve their support on student entrepreneurship (Beyhan and Findik, 2018). In addition to the traditional methods for facilitating academic entrepreneurship (e.g., TTOs and Science park), one of the most widespread instruments in universities to stimulate student entrepreneurship is EE (Hills, 1988; Fiet, 2001). The idea is that EE is able to support universities to foster student entrepreneurship. In more detail, Léger-Jarniou (2012) analysed the role of 'Student Entrepreneurship Clusters' in French universities to foster student entrepreneurship in different fields of study and educational levels. Furthermore, Roman and Maxim (2017) found a positive impact of EE on student entrepreneurship. In addition to this, Bergmann et al. (2016) showed that individual and contextual factors influence students' propensity to create a startup. In more detail, Bergmann et al. (2016) found that individual factors are more important than contextual factors for student entrepreneurship. Moreover, Jansen et al. (2015) provided some examples on how universities can foster student entrepreneurship with EE. However, since student entrepreneurship is a recent phenomenon, it is important to perform more studies to better understand how universities can foster and support it. For instance, it would be useful to analyse what the activities carried out from universities to foster student entrepreneurship are and if these activities are successful. In more detail, since universities offer supports for entrepreneurship, such as communities, network, mentors, capital, industry and government collaborations as well as university incubators, maker labs, accelerators and research parks and TTOs, it would be useful to understand which supports are more useful for student entrepreneurship. Moreover, it would be useful to understand if there are differences between startups created by STEM students, non-STEM students and mixed.

## **Academic entrepreneurship**

Academic entrepreneurship refers to all the entrepreneurial activities concerning the "Third Mission" via patenting, licensing, startup and spinoff creation, and university-industry partnerships (see Rothaermel et al. 2007 for a literature review on academic entrepreneurship). These activities were mostly developed by the university faculty with the support of several university organizations (e.g., TTO, Research park, Incubator/Accelerator) and policies<sup>27</sup>.

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<sup>27</sup> For instance, see Chapter 3.2.1 for a literature review on the determination of academic spinoffs.

Moreover, several papers have analysed personal (e.g., Shane and Stuart 2002; Landry et al. 2006; Walter et al. 2006; Fini et al. 2009; Prodan and Drnovesk 2010; Hayter 2011; D'Este et al. 2012; Visintin and Pittino 2014; Diáñez-González and Camelo-Ordaz 2017; Huynh et al. 2017), financial (e.g., Di Gregorio and Shane 2003; Lockett and Wright 2005; O'Shea et al. 2005; Powers and McDougall 2005; Landry et al. 2006; Wright et al. 2006; Munari et al. 2016) and cultural (e.g., Siegel et al. 2003; Feldman and Desrochers 2004; Philpott et al. 2011; Berbegal-Mirabent et al. 2015; Gümüşay and Bohné 2018) factors affecting academic entrepreneurship. According to Etzkowitz (2010), academic entrepreneurship needs to be a part of the strategic policies of the Countries. In fact, Etzkowitz (2010) showed that, as a response to the economic crisis, the foundation of entrepreneurial universities is necessary. In more detail, Grünhagen and Volkmann (2014) suggested that universities might use EE to foster academic entrepreneurship. Lamine et al. (2018) suggested connecting the activities carried out by a Business Incubator with EE in order to improve academic entrepreneurship. However, as suggested by Lamine et al. (2018), there is a need to evidence the impact of EE on academic entrepreneurship such as academic spinoffs. In fact, Lamine et al. (2018) explain that it is important to understand how experiential knowledge from EE can be transferred to promote the creation and development of academic spinoffs.

### **Graduate entrepreneurship**

Graduate entrepreneurship refers to workers and/or established startups and/or entrepreneurs and/or SMEs. In the literature of EE, some papers have analysed the role of EE on workers and/or established startups and/or entrepreneurs and/or SMEs (e.g., Davies et al. 2002; Baron 2006; Manimala 2008; Ulvenblad et al. 2013; Williams and Fenton 2013; Bager et al. 2015; Martínez-Román and Romero 2017). For instance, based on 392 responding entrepreneurs in Sweden, Ulvenblad et al. (2013) showed that entrepreneurs with experience with EE have higher communicative skills (e.g., openness and adaptation) than those did not have experience with EE. Moreover, analysing the innovativeness in SMEs, Martínez-Román and Romero (2017) found that EE plays a more significant role in the core dimension of a firm's innovativeness than in its capabilities for technology adoption. Davies et al. (2002) also explained that EE can be used as an activity in universities to support SMEs and to improve entrepreneurial competencies of managers and employees of SMEs. Similar results were found by Manimala (2008) for the SMEs in India. However, Williams and Fenton (2013) explained that graduate entrepreneurs believe universities do not prepare students for entrepreneurship since universities focus on preparing students for employment and that EE fails to recognize the heterogeneity of learners' needs. Hannon et al. (2005) suggested that EE need to evolve in a collaborative co-learning approach that engages students from a range of disciplines, local entrepreneurs and faculty in the learning and development processes of entrepreneurship. In fact, future studies need to analyse how to include the local entrepreneurial ecosystem into EE

and what its effect on all the participants (students, faculty, entrepreneurs, managers of SMEs, managers of Corporations, venture capitalists, business angels and policymakers) is. Finally, the impact of EE on managers and employees of SMEs needs to be analysed in different Countries.

### **Literature review**

The literature of EE presents several literature reviews (e.g., Gorman et al. 1997; Pittaway and Cope 2007 a; Martin et al. 2013; Rideout and Gray 2013; Bae et al. 2014; Matlay et al. (2014); Baptista and Naia 2015; Nabi et al. 2017). In more detail, Rideout and Gray (2013) performed a literature review of EE and found very few robust studies. Moreover, analysing 73 studies with a total sample size of 37,285 individuals, Bae et al. (2014) discovered a small but significant correlation between EE and entrepreneurial intention. Based on a systematic literature review, Pittaway and Cope (2007 a) found that EE has an impact on students' entrepreneurial intention. In addition to this, analysing 159 papers from 2004 to 2016, Nabi et al. (2017) developed a teaching model framework in order to summarize the entrepreneurship teaching models used in the literature of EE and to understand its impact. Nabi et al. (2017) concluded the paper by suggesting future research on EE. For instance, Nabi et al. (2017) suggest testing and providing empirical evidence about the impact that different teaching models may have in the field of entrepreneurship. Finally, to my best knowledge, no one has performed a literature review of entrepreneurial intention.

### **Women entrepreneurship**

This Chapter refers to women entrepreneurship as the papers on understanding the role of gender/women in EE. The literature of EE presents some papers on this theme (e.g., Wilson et al. 2007; Rauth Bhardwaj 2014; Rao 2014; Bullough et al. 2015; Srivastava and Misra 2017). Interestingly, Wilson et al. (2007) discovered that EE is more important to women than to men in increasing entrepreneurial self-efficacy. This may derive from the fact that women are usually less self-confident than men and therefore EE has a higher impact on entrepreneurial self-efficacy for them. Similarly, Rauth Bhardwaj (2014) and Rao (2014) found that EE has a positive impact on women's entrepreneurial competences. In addition to this, analysing female undergraduate students in India, Srivastava and Misra (2017) discovered that EE has a positive impact on women's entrepreneurial intention. Moreover, based on real experiences from more than 20 developing countries and a literature review on women entrepreneurship, Bullough et al. (2015) suggested an EE for women interested in entrepreneurship. The entrepreneurship program developed by Bullough et al. (2015) is based on four elements: i) the elements of the program, ii) human factors, iii) the contextual environment, and iv) funding. However, the literature of EE on women entrepreneurship presents some gaps. For instance, it would be interesting to analyse if EE has a different impact on STEM female students and

non-STEM female students. Similarly, future studies could analyse if EE has a different impact between STEM female students and STEM male students as well as the other combinations (non-STEM female students versus non-STEM male students, STEM female students versus non-STEM male students).

### **Social entrepreneurship**

Some papers on EE have recently analysed the theme of social entrepreneurship (e.g., Tracey and Phillips 2007; Howorth et al. 2012; Nga and Shamuganathan 2010; Pache and Chowdhury 2012; Wu et al. 2013). With their special issues, Tracey and Phillips (2007) requested studies on how to teach social EE since it may require a distinctive set of competences than EE. In fact, according to Nga and Shamuganathan (2010), EE and EE for social entrepreneurship share certain similar characteristics such as affinity towards risk taking, creativity and opportunism. However, EE for social entrepreneurship needs to include ethics and sustainable practices (Nga and Shamuganathan 2010). Wu et al. (2013) showed that EE for social entrepreneurship also supported students in creating social startups. Furthermore, Howorth et al. (2012) offered a greater understanding on learning within EE for social entrepreneurship by analysing and comparing two EE for social entrepreneurship. In more detail, Pache and Chowdhury (2012) developed a framework on EE “about” social entrepreneurship and EE “for” social entrepreneurship. Pache and Chowdhury (2012) proposed that it is important to teach EE “for” social entrepreneurship with three distinct and sometimes competing institutional strategies: i) social-welfare, ii) commercial, and iii) public-sector. However, it is important to understand the impact of EE for social entrepreneurship on the creation of social startups referring to social student entrepreneurship, social academic entrepreneurship, social graduate entrepreneurship and women social entrepreneurship.

### **Team entrepreneurship**

The literature of EE presents some papers regarding the theme of team entrepreneurship defined as team dynamic and learning in EE (e.g., Pittaway et al. 2011; Rae et al. 2012; Hoogendoorn et al. 2013; Harms 2015; Pittaway et al. 2015; Preedy and Jones 2017). The majority of the papers on EE regarding this theme explain that learning-by-doing and working in interdisciplinary and multiculturally teams and with mentors is important (Pittaway et al. 2011; Harms 2015; Pittaway et al. 2015). In fact, Harms (2015) showed that team learning and dynamics are fundamental in EE. In addition to this, Hoogendoorn et al. (2013) explained that teams with an equal gender mix perform better than male-dominated teams. Moreover, some papers explained how SLEOs are important to support students’ entrepreneurial competences and universities’ entrepreneurial ecosystem thanks to their activities (Pittaway et al. 2011; Rae et al. 2012; Preedy and Jones 2017). However, it is important to study the impact of SLEOs on

entrepreneurial intention (Pittaway et al. 2011, 2015; Padilla-Angulo 2017; Preedy and Jones 2017).

## **2.4 Conclusion, limitations of this Chapter and introduction to the next Chapters**

### **2.4.1 Conclusion and limitations**

In conclusion, this first Chapter presents a literature review on EE based on LDA algorithm and it emerges some main and overarching gaps especially regarding in the theme of Student entrepreneurship, Women entrepreneurship, Social entrepreneurship and Graduate entrepreneurship. Moreover, the novelty of this Chapter regards the methodology and, therefore, the number of papers take into account in this analysis as opposed to many recent reviews on EE. In fact, the apply a machine learning algorithm to perform a literature review can be powerful since a literature review contains a lot of data and information (e.g., words, keywords, etc) and a machine learning algorithm can manage and analyse a lot of data and information in an efficient way. More in detail, thanks to the application of the LDA algorithm was possible to manage a dataset of 946 papers, give an overview of them (journals, authors, countries, etc) and divide them into six main themes.

This Chapter is not free of limitations. The main limitation of this theme landscape is that a paper can belong to more than one theme but is associated with one theme only. In more detail, a paper can evaluate the impact of EE on entrepreneurial competences and intention, but it is associated with one theme only (Entrepreneurial competence OR Entrepreneurial intention) based on the higher percentage generated by the LDA algorithm that associates a paper with one theme. Similarly, a paper on EE can analyse students and academic entrepreneurship but it is associated with one theme only. Moreover, even if the Scopus database is a reliable database for Journal papers, it is missing some papers.

### **2.4.1 Introduction to the next Chapters**

In conclusion, this Chapter presents the main themes in the literature of EE through a machine-learning algorithm. Moreover, this Chapter presents some literature gaps of EE. Based on the presented literature review, the next Chapters aim to analyse some of these gaps. The aims of these Chapters are presented in the next Table.

Table 8 - Chapters' aim based on the literature review of EE

<b>Chapter</b>	<b>Aim</b>	<b>Level of analysis</b>
3	Analysing the impact of EE on the creation of academic spinoffs	“macro” level of analysis: university.
4	Analysing the impact of SLEOs on participants’ entrepreneurial intentions	“micro” level of analysis: individual.
5	Analysing the role of CLabs in Italian Universities.	“macro” level of analysis: university.

These three gaps are based on different themes and are based on different contexts, but they are all linked to EE. In more detail, Chapter 3 is based on the US ecosystem and link EE with the creation of academic spinoffs. Chapter 4, instead, is based on a European SLEO in order to understand if the entrepreneurial experiences of the participants can impact on participants’ entrepreneurial intentions. Moreover, Chapter 5 is based on the Italian ecosystem and aims at analysing the strategic role of CLabs in Italian Universities.

In conclusion, the rest of this Ph.D. thesis is organised as follows. The next Chapter analyses the impact of EE on the creation of academic spinoffs. Chapter 3 uses a new dataset built around 1,262 entrepreneurship courses offered between 2011 and 2014 by 80 US universities included in the Licensing Survey by the AUTM to investigate the impact of EE on the creation of academic spinoffs. Then, Chapter 4 analyses the impact of SLEOs on participants’ entrepreneurial intention. Chapter 4 uses a survey that was conducted in 2016 on JADE to investigate the impact of SLEOs on participants’ entrepreneurial intention. Moreover, Chapter 5 analyses the role of CLabs in Italian Universities. Chapter 5 studies four CLabs in Italy in 2017 to investigate the role of CLabs in Italian Universities. Finally, Chapter 6 summarises the conclusions of this Ph.D. thesis, its limits and future research.

# Chapter 3

## Academic spinoffs: the role of Entrepreneurship Education

*This Chapter builds on two international conferences (Sansone et al. 2017 a, b) and a paper which is forthcoming in the International Entrepreneurship and Management Journal (Sansone et al. 2019).*

### 3.1 Introduction

Universities have a crucial role in our economy since they play an active role in fostering innovation and technological change (Bramwell and Wolfe 2008). In fact, according to the Knowledge Spillover Theory of Entrepreneurship (Acs et al. 2009; Acs et al. 2013), universities can foster entrepreneurship (Audretsch et al. 2005; Civera et al. 2019), since universities provide to the creation and development of innovation, human capital training and knowledge generation (Audretsch et al. 2016). In order to do this, the knowledge from the research and teaching needs to be transferred to society. As suggested from the literature, EE can facilitate technology transfer activities in universities (Lackéus and Middleton, 2015). One of the most prominent and analysed activity of university technology transfer is the creation of academic spinoffs (e.g., Di Gregorio and Shane 2003; Feldman and Desrochers 2004; O'Shea et al. 2005; Fini et al. 2011; Hayter 2011). Academic spinoffs are important regional economic growth actors (Bramwell and Wolfe 2008; Guerrero et al. 2015, 2016; Hayter 2016; Mariani et al. 2018) thanks their role in the entrepreneurial ecosystem (Stam 2015; Cavallo et al. 2018 a, b) by introducing innovations, increasing the productivity of regions and creating new jobs (Doutriaux 1987; Shane 2004; Van Praag and Versloot 2007; O'Shea et al. 2008; Vincett 2010; Hahn et al. 2018). In the last twenty years, the attention of universities toward the creation of academic

spinoffs, academic and student entrepreneurship has increased, as part of their ‘Third Mission’, aimed at contributing to local economic development (Philpott et al. 2011). The relevance of academic spinoffs has led scholars to analyse the reasons for their emergence. Among the factors that have influenced the creation of academic spinoffs, literature has distinguished five key aspects: personal factors, such as faculty motivations (e.g., Hayter 2011); financial factors, such as the amount of money that universities invest in research activities (e.g., O’Shea et al. 2005); organizational factors, such as size and other characteristics of TTOs supporting spinoff creation (e.g., Di Gregorio and Shane 2003); cultural factors, such as the internal culture of universities (e.g., Feldman and Desrochers 2004); and policy and ecosystem factors (e.g., Fini et al. 2011). However, despite many different determinants have been identified, as this Ph.D. thesis suggested in Chapter 2, no attention has been paid to the role that EE plays on the creation of academic spinoffs (Lamine et al. 2018). Moreover, since the creation of academic spinoffs is an important activity of the university technology transfers, it could be interesting to analysed if and under which condition EE can impact the creation of academic spinoffs at a “macro” level perspective. For instance, since entrepreneurial competences and culture are important assets for the creation of academic spinoffs (Gümüşay and Bohné 2018), academic spinoffs can represent an interesting context to study EE. In fact, EE also aims at fostering entrepreneurial competences and culture. Moreover, since there is an increasing demand for transferring knowledge from universities in society and economy and academic spinoffs represent an instrument to fulfil this demand, it is important for scholars to analyse how to foster the creation of academic spinoffs. Therefore, based on the literature review on Chapter 2, the aim of this Chapter is to study the impact of EE on the creation of academic spinoffs. In this vein, this Chapter explains the impact of university characteristics on academic spinoffs creation (Di Gregorio and Shane 2003; Fini et al. 2011).

There are several theoretical reasons that support the hypothesis that EE with a “macro” level of analyses can contribute to spinoff creation. In fact, at a general level, entrepreneurship courses raise the entrepreneurial competences and intentions of students (e.g., Peterman and Kennedy 2003; Souitaris et al. 2007; Sánchez 2011, 2013; Walter et al. 2013; Zhang et al. 2014; Gielnik et al. 2015; Muscio and Ramaciotti 2019), create an entrepreneurial culture which pervades the whole university (Bramwell and Wolfe 2008; Prodan and Drnovsek 2010; Guerrero and Urbano 2012; Fryges and Wright 2014; Marzocchi et al. 2018), and favour the development of entrepreneurial competences (Lee et al. 2005; Phan and Siegel 2006; Sánchez 2011; Morris et al. 2013; Sánchez 2013; Hayter 2016; Gümüşay and Bohné 2018; Hahn et al. 2019) which – in turn - may favour the creation of academic spinoffs. In fact, a positive entrepreneurial culture is a social state of mind where previous efforts made by pioneering professors, students, and university administrators led other professors and students to believe that entrepreneurship is a possible, acceptable and desirable activity within the university ecosystem (Bramwell and Wolfe 2008; Gilsing et al. 2010). These



efforts include the development of university policy and the creation of infrastructures (e.g., TTO, co-working space, facilities for “makers”, etc.), programmes (e.g., incubator, accelerator, EE, hackathon, business competition, mentorship) and organizations (e.g., student-led entrepreneurial club) facilitating the development of technology transfer activities, such as the commercialization of technology and university knowledge and the creation of companies. These efforts also improve relationships between the academic and business community. Moreover, universities may leverage their entrepreneurial courses to directly support the creation of academic spinoffs based on research activities (Müller 2010) as promotion of innovation and human capital training for entrepreneurship. For instance, universities may set these courses as mandatory for those students and faculty members who are willing to establish an academic spinoff (Etzkowitz 2004; Bramwell and Wolfe 2008). Although the relationship between EE and academic spinoff creation can seem straightforward, studying it is complicated by two main factors: (i) the unobservable direct impact of EE on the creation of new spinoffs; (ii) the heterogeneous nature of EE, which may take multiple and different forms under which it is taught within and between universities (Martin et al. 2013; Bae et al. 2014; Rideout and Gray 2013; Hahn et al. 2017; Nabi et al. 2017). At a “macro” level of analysis there is an unobservable direct impact of EE on the creation of new spinoffs, since not all the entrepreneurship course required the creation of academic spinoffs. Moreover, the heterogeneous nature of EE can matter for the creation of academic spinoffs as suggested by Nabi et al. (2017) and Lamine et al. (2018). Different entrepreneurship teaching models can have different outputs (Nabi et al. 2017). In order to overcome these issues, this Chapter takes two further steps to investigate the relationship that exists between EE and the creation of academic spinoffs. First, this Chapter analyses whether EE enhances the entrepreneurial culture at the university level not at the level of specific courses, controlling for organizational factors (e.g., the size of the TTO in the university) and financial factors (e.g., the amount of money spent on research by the university). Second, this Chapter observes the nature of the entrepreneurial courses offered by universities, adopting the taxonomy introduced by Béchar and Grégoire (2005). This latter step helps this study to identify whether more theoretical or more practical entrepreneurship courses have different impacts on the creation of academic spinoffs.

This research is based on a new dataset built around a sample of 80 US universities included in the Licensing Survey by the AUTM. This Chapter complemented the Licensing Survey by the AUTM dataset with information about all the entrepreneurship courses offered by these 80 universities in years ranging from 2011 to 2014. This Chapter has categorized the entrepreneurship courses adopting Béchar and Grégoire’s taxonomy. In total, this Chapter has identified and examined 1,262 entrepreneurship courses in a sample over a time span of 4 years. This Chapter has analysed their impact on academic spinoff creation – at the university level – adopting Poisson panel regression models. This Chapter has found that EE favours the creation of academic spinoffs. In other words, the

greater is the number of entrepreneurship courses offered by a university, the greater is the number of academic spinoffs created by a university. In addition, the analyses have shown practical - rather than theoretical - models of teaching entrepreneurship favour the creation of more academic spinoffs. The results mainly contribute to two streams of literature. First, this Chapter contributes to the academic and student entrepreneurship literature by identifying EE as another important factor in the creation of spinoffs. By doing this, this study answers a call from Lamine et al. (2018) to provide evidence on the role of EE to promote the creation of academic spinoffs. Second, this Chapter contributes to the EE literature, by testing and providing empirical evidence about the different impact that different teaching models may have in the field of entrepreneurship, thus responding to open points in the scientific literature (e.g., Nabi et al. 2017).

In the following section, this Chapter presents the relevant literature on the determinants of academic spinoffs and the importance of EE for the creation of academic spinoffs. At the end of this section, this Chapter presents the two hypotheses. In the third section, this Chapter presents the research design, the data selection process, the sample, the variables, and the methodology. In the fourth section, this Chapter presents the results. In the results, the descriptive analyses and the regression analyses to test the two hypotheses are presented. Finally, this Chapter concludes by discussing the findings and implications for researchers, deans, teachers, and university policy makers. In the conclusion, this Chapter also discusses the limitations of this Chapter and it suggests avenues for future researches.

## **3.2 Literature review and hypotheses development**

### **3.2.1 The determinants of academic spinoffs**

As specified by Di Gregorio and Shane (2003) an academic spinoff is defined as “[a] start-up created when the licensee of a university-assigned invention creates a new company to exploit it”. (Di Gregorio and Shane 2003, pp. 2010). Therefore, academic spinoffs have a key role on delivering value to the Society from the research and the knowledge of the academic world (Bramwell and Wolfe 2008; Vincett 2010; Hayter 2016; Fini et al. 2018) as required by the so called ‘Third Mission’ (Philpott et al. 2011). For instance, Bramwell and Wolfe (2008) highlighted how the academic spinoffs of the University of Waterloo, Canada, had a relevant role in the development of the local and regional economy. More in general, academic commercialization plays a role in generating societal impacts from new inventions and knowledge (Fini et al. 2018). Therefore, since academic spinoffs represent an important mechanism to transfer knowledge from the university to society (Civera et al. 2020), it is interesting to look at how to foster

the creation of academic spinoffs. For instance, several policies have been employed to foster their formation (Civera et al. 2020). Indeed, several papers analysed the impact of different factors on the number of academic spinoffs created (e.g., Di Gregorio and Shane 2003; O’Shea et al. 2005; Markman et al. 2005).

As a consequence, the determinants of the creation of academic spinoffs have been largely discussed in the literature (e.g., O’Shea et al. 2007; O’Shea et al. 2008) in order to understand how to increase their number and impact. At a macro level, five key factors have been identified as determinants of the creation of academic spinoffs: personal factors (i.e. related to the founder’s characteristics), financial factors (i.e. related to both the funding necessary for the creation of the technology at the basis of the spinoff, and to the spinoff’s funding), organizational factors (i.e. related to the parent university of the spinoff), cultural factors (i.e. the type of entrepreneurial culture in the spinoff’s parent university) and ecosystem and policy factors (i.e. related to the ecosystem in which the academic spinoff is incorporated and to the policies that support its creation).

Table 9 summarizes these five key aspects and detail each factor by presenting their second-order constructs and their main references in the literature. These factors refer to several levels of analysis and not all are pertinent to the research goal of this Chapter since this Chapter applies a “macro” level of analysis. However, these factors allow understanding of the current literature debate on academic spinoffs by presenting a literature review on this topic. In more detail, personal factors are usually referred to a “micro” level, while organization factors are usually referred to a “macro” level. This Chapter, therefore, discusses such factors in the light of EE to frame the complexity of the creation of academic spinoffs. Moreover, it explicit that this Chapter presents a “macro” level of analysis and justify why this level of analysis is interesting similarly similar papers (e.g., Di Gregorio and Shane 2003; O’Shea et al. 2005). Then, this Chapter introduces EE as a sixth factor that can contribute to the creation of academic spinoffs.

**Table 9 - First and second-order determinants of the creation of academic spinoffs**

<b>First-order factors</b>	<b>Second-order factors</b>	<b>Main References</b>
Personal	Faculty motivations	Fini et al. 2009
		Prodan and Drnovesk 2010
		Hayter 2011
	Social capital	Shane and Stuart 2002
		Walter et al. 2006
		Diáñez-González and Camelo-Ordaz 2017
		Huynh et al. 2017
	Experience	Landry et al. 2006
		D'Este et al. 2012
		Visintin and Pittino 2014
		Huynh et al. 2017
	Financial	Research expenditure
Lockett and Wright 2005		
Powers and McDougall 2005		
Government and private financial support		Di Gregorio and Shane 2003
		O'Shea et al. 2005
		Landry et al. 2006
Venture capital funding		Di Gregorio and Shane 2003
		Wright et al. 2006
Proof-of-concept	Munari et al. 2016	
Organizational	TTO	Di Gregorio and Shane 2003
		Friedman and Silberman 2003
		Lockett and Wright 2005
		Markman et al. 2005
		O'Shea et al. 2005
		Powers and McDougall 2005
		Clarysse et al. 2011
	Algieri et al. 2013	
	Research park	Link and Scott 2005
	Incubator	O'Shea et al. 2005
Soetanto and Jack 2016		
Cultural	University's culture	Siegel et al. 2003
		Feldman and Desrochers 2004
		Philpott et al. 2011
		Berbegal-Mirabent et al. 2015
		Gümüşay and Bohné 2018
Ecosystem and policy	Policy principles	Goldfarb and Henrekson 2003
		Gilsing et al. 2010
		Fini et al. 2017
		Meoli et al. 2017
	Local and regional ecosystem	Fini et al. 2011
		Casper 2013
		Sternberg 2014

**Personal factors.** As far as startups are concerned, the founder's characteristics and social networks are crucial in determining their creation (Smeltzer et al. 1991; Bonaccorsi et al. 2014), and the same holds true for academic spinoffs (Prodan and Drnovesk 2010). Prodan and Drnovesk (2010), for instance, suggest applying the theories that are used to understand the intentions of creating startups – such as the Theory of Planned Behavior (Ajzen 1991) – to study the entrepreneurial intentions of academics. However, Fini et al. (2009) found that academics' participation in generating academic spinoffs is not based on their attitude, but rather by the hope of creating outcomes which will improve their academic position. In order to explain why some faculty members and students create academic spinoffs, Hayter (2011) shows that their primary motivation is technology diffusion since faculty members generally wish to spread their theoretical knowledge to the community, thus creating value for the society. In this vein, by promoting entrepreneurial courses for students and faculty members university could engage students and faculty member in the creation of academic spinoffs. In fact, EE promotes entrepreneurial self-efficacy which – in turn – boosts the entrepreneurial intentions of both students and academics (Prodan and Drnovesk 2010). In addition to their motivation, another key feature is represented by social capital (Walter et al. 2006). Hayter (2011) pointed out that “motivating peers” as a social norm is an important lever to favour the creation of academic spinoffs. These “motivating peers” are often represented by people – who are closer to the business context than academics - who operate as gatekeepers between university and industry. However, Hayter (2011) also suggested that – apart from “motivating peers” - there are also “de-motivating peers”, who may create a negative environment for academic and student entrepreneurship inside a university, thus suggesting that peers, and social capital in general, have an impact on entrepreneurship intention. In fact, social norm is a fundamental construct of the Theory of Planned Behavior (Ajzen 1991) and networking is important for developing entrepreneurship intention (Krueger et al. 2000). In more detail, network ties increase the willingness to create academic spinoffs, since having direct and indirect relationships with external investors enhance the probability of faculty members creating an academic spinoff and of surviving (Shane and Stuart 2002). Moreover, Diáñez-González and Camelo-Ordaz (2017) have recently shown that university support networks have a positive influence on the enhancement of the entrepreneurial orientation of academic spinoffs. In addition, Huynh et al. (2017) recently found that the networks of a founding team of an academic spinoff have an indirect impact on their performance through the enhancement of a team's entrepreneurial capabilities. In line with this, Gümüşay and Bohné (2018) have recently shown that entrepreneurial competences are important for the creation of academic spinoffs. In this vein, both team's capabilities and its experience represent other relevant personal factors that can influence the willingness of students and academics to create an academic spinoff (Clarysse and Moray 2004; Nikiforou et al. 2018). Regarding their experiences, Landry et al. (2006) found that faculty members involved in consulting have a higher likelihood of creating academic

spinoffs than others. These results were confirmed by D'Este et al. (2012). However, Gras et al. (2008) do not find a statistically significant correlation between the academic staff involved in industry research and the spinoffs activity in European universities. In addition, Gras et al. (2008) find a strong statistically significant correlation between the number of professors and the number of university publications on spinoffs activity in European universities. Moreover, D'Este et al. (2012) also found that prior invention experience has a positive and significant impact on the creation of academic spinoffs. Lastly, Visintin and Pittino (2014) suggested that not only personal experience, but also team heterogeneity of experience pays off in enhancing the probability of creating academic spinoffs. In fact, Visintin and Pittino showed that the integration of academic and non-academic profiles in an academic spinoff team has a positive impact on their early performance. In the same line, Ferretti et al. (2018) find that academic spinoffs in the post-creation stage perform better if the board of the academic spinoffs is composed by academic individuals and representatives of non-academic organizations. In short, the motivation, the social capital and the previous experience of the faculty members and students are three key personal characteristics of academics that may influence their willingness to create spinoffs (Rasmussen et al. 2011).

***Financial factors.*** The existing literature recognizes the importance of personal factors for the creation of academic spinoffs and discusses how to incentivize and support them. Wright et al. (2006) showed a key element in enabling the creation and development of academic spinoffs is represented by their financial support (see Civera et al. 2017 for an extensive review). The benefits related to providing financial incentives and support to researchers have been pointed out clearly by Lockett and Wright (2005), who found a positive relationship between a university's research expenditures and the creation of academic spinoffs in the UK context. Similarly, Gras et al. (2008) find a statistically significant and positive correlation between the availability of financial support and spinoff activity in European universities. This suggests that providing financial resources for research enhances the likelihood of developing a technology with a higher potential impact on the market. In fact, since the technology exploited by academic spinoffs is usually discovered thanks to research subsidies, the number of research inputs and the number of created academic spinoffs are likely to be correlated (Di Gregorio and Shane 2003). More in general, researchers (e.g., Cavallo et al. 2019) showed that venture capital funds positively influence the development of digital new ventures. For this reason, significant indications may be obtained by analysing the sources of financial resources, in order to understand which source is more relevant for the creation of academic spinoffs. However, literature arrived at different conclusions about it. For instance, Di Gregorio and Shane (2003) found that a university's total sponsored research funding has a positive and statistically significant impact on the creation of spinoffs. However, Di Gregorio and Shane analysed the financial support to researchers from the US government, without finding any

significant impact on the creation of spinoffs. Nevertheless, O'Shea et al. (2005) found that both, government and private research funding have a positive impact on the creation of spinoffs. On the contrary, Landry et al. (2006) found that financial resources from private companies have a negative impact on the creation of academic spinoffs, and they proposed that financial support from private firms can stimulate academics to transfer their knowledge to the private sector rather than to create academic spinoffs. However, Landry and colleagues found that research grants from the federal funding agency have a positive impact on the creation of academic spinoffs. Finally, Powers and McDougall (2005) found a positive impact of university research expenditure on the creation of academic spinoffs. In conclusion, financial supports are important for the creation of academic spinoffs, but the sources of these financial supports can have different impacts on the creation of academic spinoffs.

***Organizational factors.*** The link between the organizational structure of universities and the academic spinoffs they created has been largely recognized in the literature. These organizational factors, in fact, play a key role in supporting the creation of new spinoffs, mainly through their unit that is dedicated to technology transfer: the TTO (e.g., Friedman and Silberman 2003; Markman et al. 2005). The development of TTOs has been shown to be beneficial for the creation of academic spinoffs, since the latter may benefit from the experience, network and business competences of the TTO staff, all of which are transferred to spinoffs under the form of business development consulting (Lockett and Wright 2005). Clarysse et al. (2011) suggested two important caveats: first, that the more a university invests in developing the TTO (that implies increasing its resources), the more it will benefit in terms of created academic spinoffs; second, that such a mechanism is not straightforward, but is subject to learning economies, thus implying that it may take some time to achieve results. However, Fini et al. (2010) found that a lot of activities of academic entrepreneurship occurs out the university intellectual property system. Nevertheless, Powers and McDougall (2005) pointed out that more developed and older TTOs seem to have better established competences to facilitate technology transfer activities. In line with this, analysing 870 academic spinoffs in UK, Prokop et al. (2019) found that the TTO is a core network actor for the academic spinoff survival. Moreover, Lockett and Wright (2005) showed that business development capabilities of TTOs have a positive impact on the creation of spinoffs, thus suggesting that universities need to improve their business competences, if they aim to increase the creation of valuable spinoffs. In addition, another key factor that seems to play a crucial role in explaining the positive correlation between the creation of academic spinoffs and TTOs is the size of such an office. Di Gregorio and Shane (2003), O'Shea et al. (2005) and Algieri et al. (2013) found that the greater the size of the TTO offices, the higher the number of academic spinoffs. Similarly, Gras et al. (2008) find a statistically significant and positive correlation between TTO staff dedicated to spinoffs support and the spinoffs activity in European universities. While this evidence might be driven by an endogenous factor (larger universities

tend to have larger TTOs but also have a higher probability of creating more spinoffs), it also seems to confirm that the more the capabilities included in TTOs, the higher the support they can offer to researchers, thus enhancing their probability of creating a new spinoff. Moreover, Ferretti et al. (2019) showed that the presence of the parent university on the board of the academic spinoffs – as well in its ownership structure – has an impact on academic spinoffs' revenues. Finally, TTOs may facilitate the access to funding methods, such as proof-of-concept (Kochenkova et al. 2016; Munari et al. 2016), thus allowing the founders of spinoffs to enhance the Technology Readiness Level of their technology and enhance the probability of creating an academic spinoff. The organizational structures that support the creation of academic spinoffs are not limited to those structures that are internal to universities. Although TTOs may not be strictly internal to universities (Brescia et al. 2016; Battaglia et al. 2017), external organizations that support entrepreneurial actions may also play a relevant role (Markman et al. 2008). Link and Scott (2005), for instance, suggested that the existence of a link between scientific parks and universities can be considered a significant predictor of the number of academic spinoffs created by universities. Similarly, Soetanto and Jack (2016) highlighted that incubators, thanks to their network, managerial education and their managerial support, enhance the probability of creating academic spinoffs. In more detail, Soetanto and Jack (2016) suggested that the incubators' supports overcomes the shortcomings that arise due to the lack of resources, entrepreneurial capabilities and experience needed to manage the tension that escalates when a researcher transfers his/her research from a technology to a market domain. However, O'Shea et al. (2005) did not find any impact of the presence of a university incubator on the creation of academic spinoffs. These results suggest that the presence alone of an external organization is not enough. Universities and these external organizations need to have a close connection and they need to interact in order to exploit their network capacity and social capital and to have a positive impact on the creation of academic spinoffs and thus to foster a local entrepreneurial ecosystem.

***Cultural factors.*** Although a “magic recipe” for the creation of academic spinoffs does not exist (Berbegal-Mirabent et al. 2015), an important activity for universities is to create not only the conditions for the market development of the technologies discovered by researchers (i.e. to financially promote their development or to establish supporting organizations for business development, such as TTOs), but also to operate at a more general level by applying strategies that foster a university's entrepreneurial culture and increase knowledge transfer (Berbegal-Mirabent et al. 2015; Gümüşay and Bohné 2018; Civera et al. 2019). For instance, the lack of entrepreneurial culture in universities could limit and cancel out all the efforts were undertaken to promote academic and student entrepreneurship and may also reduce any positive effects of investments and programmes on the creation of academic spinoffs (Berbegal-Mirabent et al. 2015; Gümüşay and Bohné 2018). For instance, Huyghe et al. (2016) found that just a minority of students and faculty members are aware of the existence of a TTO in



their university. In fact, using interviews with 88 founders of 47 academic spin-offs from 1999 and 2005, Fini et al (2009) suggested that the possibility to access university infrastructures and the personal benefits are the most important incentives for academics to create academic. Therefore, universities need to improve this awareness by developing entrepreneurial culture (Prodan and Drnovsek 2010). In addition, to foster academic and student entrepreneurship, universities need to improve their communication and educational programme regarding entrepreneurship (Philpott et al. 2011) in order to break down cultural barriers which are the main inhibitors to the development of academic and student entrepreneurship (Hayter 2011) and technology transfer (Siegel et al. 2003). A possible approach regards the growth of the commercial orientation of universities aimed at narrowing the existing gap between universities and firms (Feldman and Desrochers 2004).

***Policy and ecosystem factors.*** Finally, in order to foster the creation of academic spinoffs, universities develop and apply several policies (Meoli et al. 2017; Fini et al. 2017). Such policies may be an important instrument to favour the development of an entrepreneurial culture in universities (Gilsing et al. 2010), but they are also limited in fostering the academic and student venture creation, since they cannot deal with all the internal specificities characterizing each university (Philpott et al. 2011). However, some studies suggest that a support to the creation of spinoffs should come from universities according to a bottom-up approach rather than a top-down one (e.g., Goldfarb and Henrekson 2003). In fact, Fini et al. (2017) found that top-down policies to incentive academic spinoffs creation need to be complemented with bottom-up initiatives. Meoli et al. (2017) found that the university's board of directors has an important role in the creation and the type (technology or non-technology) of academic spinoffs. However, Gras et al. (2008) do not find a statistically significant correlation between tech transfer policy and spinoffs activities in European universities. In addition, policies need to consider the complexity of academic spinoff creation and the involvement of external factors, such as investors and local social-economic contexts (Lockett and Wright 2005; Fini et al. 2011; Sternberg 2014). In fact, previous research also acknowledged the important role of the ecosystem in which the universities are embedded, as well as the need for policies to sustain the development of academic spinoffs (Wright et al. 2006). For this reason, Fini et al. (2011) suggested considering the idiosyncrasies of the regional setting to develop effective policies in order to foster the creation of academic spinoffs, especially because the regional environment is often even more important than the government support for the creation of academic spinoffs (Sternberg 2014). Casper (2013) showed how the San Francisco entrepreneurial regional ecosystem, through the structure of its social networks, facilitates the creation of academic spinoffs for their universities.

In short, the literature on academic spinoff creation has suggested several factors (e.g., TTO size and university research expenditures) that can shape the

creation of academic spinoffs. These factors refer to several levels of analysis, both “micro” and “macro” levels of analysis. Since this Chapter aims at analysing the impact of EE on the creation of academic spinoffs at the university level, this Chapter uses a “macro” level of analysis. This level of analysis is particularly interesting since it can take into account different factors (e.g., financial and organization) at the same time as suggested by the Knowledge Spillover Theory of Entrepreneurship. Moreover, it has not been fully able to capture why there is such a huge heterogeneity in the number of academic spinoffs created by universities (O’Shea et al. 2007; Rothaermel et al. 2007; Djokovic and Souitaris 2008; Perkmann et al. 2013; Gümüşay and Bohné 2018), even in contexts characterized by the same institutional factors (e.g., universities in the same regions) or by a similar level of resource endowment (e.g., the same university over different years)<sup>28</sup>. Therefore, a “macro” level of analysis seems to be more appropriate in order to study this heterogeneity. This Chapter assumes that EE is a factor that can explain such a heterogeneity. In the next paragraph, this study explores and presents the reasons that support the hypotheses.

### **3.2.2 Hypotheses development**

EE may be considered as a sixth relevant determinant of the creation of academic spinoffs for several reasons. This assumption will be described by the generation of two hypotheses. These hypotheses are based on a “macro” level of analysis.

In the next sections, this Chapter present two hypotheses related to how EE and the entrepreneurship teaching models are related with spinoff creation.

#### **3.2.2.1 Entrepreneurship Education**

This section aims at justifying the mechanisms of how and why EE can be an important factor to foster the creation of academic spinoffs with a “macro” level of analysis. In order to do this, three theoretical reasons are developed and are linked with the Knowledge Spillover Theory of Entrepreneurship (Acs et al. 2009; Acs et al. 2013) and the theories presented in the framework of Béchard and Grégoire (2005).

EE may have a positive impact on the creation of academic spinoffs for the following three theoretical reasons: (i) entrepreneurship courses can provide direct support to entrepreneurs; (ii) entrepreneurship courses can raise the entrepreneurial competences and intentions of students; (iii) the presence of

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<sup>28</sup> For instance, despite their limited geographical distance and their belonging to a similar institutional environment, in the US context, the University of South Florida created approximately 38% fewer academic spinoffs than the University of Florida between 2011 and 2014 (data source: Licensing Survey by the AUTM).

entrepreneurship courses may improve entrepreneurial culture and networking opportunity in universities.

First, in the last twenty years, both entrepreneurship courses and academic spinoffs in universities increased (Di Gregorio and Shane 2003; Siegel et al. 2007; Clarysse et al. 2011; Martin et al. 2013; Rauch and Hulsink 2015; Siegel and Wright 2015; Lamine et al. 2018). Müller (2010) - using a sample of 20,000 German startups and academic spinoffs - put forward evidence that more than 6% of the sample had received direct support, prior to firm formation, from entrepreneurship courses offered by universities, thus implying that a possible correlation between spinoff creation and entrepreneurship courses may exist, as future entrepreneurs may receive support in the form of specific training. Moreover, EE has a fundamental role in the human capital training for entrepreneurship (e.g., Gümüşay and Bohné 2018). For instance, Criaco et al. (2014) found that academic spinoffs whose management teams had an entrepreneurial education, improved the survival rates. Moreover, entrepreneurship programmes can foster venture formation by students and faculty members thanks to their mentoring and financial support (O'Shea et al. 2007). Furthermore, in Sweden, several academic spinoffs originated from entrepreneurship teaching programmes which were linked to students and faculty members (Etzkowitz 2004; Bramwell and Wolfe 2008). Bramwell and Wolfe (2008) found that EE improves the university entrepreneurial culture, and this can have a positive effect on the creation of spinoffs (Gilsing et al. 2010).

Second, EE may make universities more successful in creating academic spinoffs thanks to a more active role of students exposed to EE in the creation and management of such ventures (Bramwell and Wolfe 2008; Rasmussen and Wright 2015; Muscio and Ramaciotti 2019). Similarly, O'Gorman et al. (2008) showed that academic spinoffs generally involved Ph.D. students in their initial phases. Hayter et al. (2017), employing a case study based on MIT academic spinoffs, found that students played comparable roles to those of faculty entrepreneurs in academic spinoffs. Bramwell and Wolfe (2008) indicate the importance of students in the commercialization process of technology transfer. Moreover, since entrepreneurial competence are important to create academic spinoffs (Gümüşay and Bohné 2018) and EE contributes to entrepreneurship competences (e.g., Hahn et al. 2019), EE can favour the creation of academic spinoffs. In fact, as suggested by McMullan and Long (1987), EE can be an integral component in academic entrepreneurship along with incubators, innovation centers, TTOs, science parks, and venture capital operations. Muscio and Ramaciotti (2019) have recently determined that availability of entrepreneurship classes as part of Ph.D. career increases the likelihood of Ph.D. creating a new venture. In addition, Åstebro et al. (2012) showed that students have a greater probability than faculty members of creating academic spinoffs, probably because students are younger, they have more time and they are more likely to take risks. Moreover, the founders of successful academic spinoffs usually work together with students (Rasmussen et

al. 2014). This is because, especially in technical or medical schools, graduate students are frequently engaged in research activities, and they usually maintain their efforts within the academic spinoffs they founded with the research team they collaborated with (Hayter 2016). Furthermore, Boh et al. (2016), by analysing eight US universities, recently showed that among 47 of the academic spinoffs included in their sample, Ph.D. students and postdocs were involved in 36 of them (77%), with at least 11 (23%) academic spinoffs having been established with no faculty involvement. Given the key role students can play in academic spinoffs, and due to the positive impact of EE on students' entrepreneurial competences (Souitaris et al. 2007; Piperopoulos and Dimov 2015), competences (Lee et al. 2005; Phan and Siegel 2006; Sánchez 2011; Morris et al. 2013; Sánchez 2013; Gümüşay and Bohné 2018; Hahn et al. 2019) and intention (Lee et al. 2005; Peterman and Kennedy 2003; Souitaris et al. 2007; Sánchez 2011, 2013; Vanevenhoven and Liguori 2013; Walter et al. 2013; Zhang et al. 2014; Gielnik et al. 2015; Karimi et al. 2016; Maresch et al. 2016; Gielnik et al. 2017), this Chapter hypothesizes that EE may have an important role in the creation of academic spinoffs. For instance, O'Shea et al. (2007) suggested that entrepreneurship programmes have a positive influence on the entrepreneurial intentions of students and faculty members, and this can have an impact on the entrepreneurial culture of a university.

Third, if a university offers several entrepreneurship courses, it may indicate that the university has a high knowledge in that field, based on the expertise of Professors and mentors in entrepreneurship. This may help the university to generate more spinoffs by leveraging on their know-how, experience, and networks. Furthermore, if a university develops a rich curriculum characterized by several entrepreneurship courses, it indirectly contributes to the creation of an entrepreneurial environment and culture connecting the students, the faculty and the local entrepreneurial ecosystem, which, in turn, will have a positive effect on the generation of academic spinoffs. This view is in line with what was suggested by Van Burg et al. (2008), who concluded their case study by pointing out that, to create more academic spinoffs, universities need to inspire the growth of entrepreneurial ideas with EE programmes targeted at students and academic faculty. EE, in fact, contributes to creating a vibrant entrepreneurial climate which enables the development of social capital and – in turn - favours the development of new academic spinoffs (Guerrero and Urbano 2012; Grünhagen and Volkmann 2014; Marzocchi et al. 2018). This phenomenon, which Borges and Filion (2013) called “preparation”, represents a phase in which the future entrepreneur develops social and business competences that are determinant in enhancing the intention to develop a business. In addition, the influence of education activities, such as entrepreneurship courses, is not limited to those who participate in the classes. In fact, entrepreneurship courses contribute to creating an entrepreneurial culture (Bramwell and Wolfe 2008; Prodan and Drnovsek 2010; Fryges and Wright 2014; Grünhagen and Volkmann 2014; Bergmann et al. 2016), which may also be contagious to those who do not participate in such activities. In other words, the

elements that affect the creation of academic spinoffs - which are in place when EE is considered - are analogous to those of boundary spanners that provide specific knowledge about the development of a business, but also enable the development of social capital, which could help the entrepreneur (Hayter 2016). In particular, the presence of entrepreneurship courses within a university facilitates the contamination of students and faculty members coming from different knowledge domains (e.g., engineering, business, law, etc.), educational level (bachelor, master, Ph.D., professors) and culture (national and international) enhances the possibility of getting in touch with people with substantial expertise (Fiore et al. 2019 a). Thanks to this contamination, it is possible to increase the likelihood of scholars and students of better understanding the market implications of the technology they developed and of getting feedback need to understand the entrepreneurial risk associated with the creation of an academic spinoff.

In sum, the literature suggested that several factors such as TTO size and university research expenditures have a positive impact on the creation of academic spinoffs. However, even if many different determinants have been identified, no attention has been paid to the impact of EE on the creation of academic spinoffs. In fact, even if the importance of EE for the development of entrepreneurial culture, competences and academic spinoffs has already been suggested (e.g., O'Shea et al. 2007; Grünhagen and Volkmann 2014, Hayter 2016; Gümüşay and Bohné 2018), this connection has mainly been explored through qualitative assessments. From a more theoretical viewpoint, EE is one of the main enablers for the development of entrepreneurial competences (Sánchez 2011; Morris et al. 2013; Sánchez 2013; Gümüşay and Bohné 2018) and entrepreneurial competences are important for the creation of academic spinoffs (Gümüşay and Bohné 2018). In addition, authors have also underlined the importance of tacit knowledge in the activities of technology transfer (Lowe 2006; Karnani 2013) and of the limited role played by patents. Moreover, based on the Knowledge Spillover Theory of Entrepreneurship (Acs et al. 2009; Acs et al. 2013), universities are a knowledge-intensive context where it is possible to generate more entrepreneurial activities (Audretsch et al. 2005; Civera et al 2019), since they contribute to the promotion of innovation, human capital training and knowledge generation (Audretsch et al. 2016). According to this theory and based on the previous discussion of literature, this Chapter believes that EE can contribute to the development of innovation and human capital for entrepreneurship, thus increasing the ability to generate academic spinoffs. Based on these considerations and the theoretical reasons described above based on previous studies, this Chapter advances that:

**H1.** EE favours the creation of academic spinoffs.

### 3.2.2.2 Entrepreneurship teaching models

Given the importance of EE, it is useful to identify the optimal way of teaching this subject (Fiet 2001 a, b; Honig 2004; Kuratko 2005; Béchard and Grégoire 2005; Fayolle and Liñán 2014; Fayolle et al. 2016; Nabi et al. 2017; Lamine et al. 2018). In fact, the offered entrepreneurship courses vary greatly from one university to another, and even inside the same university, in terms of content, target groups and teaching models. Therefore, entrepreneurship courses are seldom uniform (Solomon 2007; Rauch and Hulsink 2015) and are difficult to categorize. For this reason, Béchard and Grégoire (2005) identified three entrepreneurship teaching models to summarize and cluster all the differences that may arise between different ways of teaching entrepreneurship.<sup>29</sup> In more detail, Béchard and Grégoire identified Supply, Demand and Competence models. Table 10 presents a summary of these models.

**Table 10 - Three entrepreneurship teaching models according to Béchard and Grégoire (2005)**

	<b>Supply model</b>	<b>Demand model</b>	<b>Competence model</b>
<b>Teacher</b>	Teacher as presenter	Teacher as tutor and facilitator	Teacher as coach or developer
<b>Student</b>	Student as passive learner	Student as active participant, interactivity with teacher	Student as active participant, central role instead of teacher during lessons
<b>Content</b>	Content derived from scholarly research in the relevant discipline(s)	Content derived from student's needs	Content derived from student's projects, which rely on problems to be solved by competent players in real-life scenarios
<b>Knowledge</b>	Knowledge is theoretical	Knowledge is based on student's demand of topics	Knowledge is acquired in practical ways, student is the central driver of lessons
<b>Evaluation</b>	Summative	Formative and summative	Performance in authentic situations
<b>Goal</b>	Remember and apply: retrieve from memory and solve simple problems	Understand and analyse: give meaning to acquired information and organize it	Evaluate and create: reaching conclusions and critical thinking on tasks

The models advanced by Bechard and Gregoire (2005) suggest that there are one theoretically-oriented entrepreneurship teaching model (Supply model) and two practically-oriented entrepreneurship teaching models (Demand and Competence models). In other words, Bechard and Gregoire (2005) have already suggested in their work that the Supply model is a theoretically-oriented entrepreneurship teaching model while Demand and Competence models are two practically-oriented entrepreneurship teaching models. In fact, how it is possible

<sup>29</sup> Nabi et al. (2017) have recently also used the framework presented by Béchard and Grégoire (2005).

to see from Table 10, the Supply model applies a logic of communication mainly of “one way”: from the teachers to the students. More in detail, in the Supply model, students are usually passive learners. While, the Demand and Competence models apply a logic of communication of “two way”: from the teachers to the students and vice versa. This logic of communication of “two way” is stronger in the Competence models. Moreover, in the Demand and Competence models, students are active participants. However, the role played by the teacher is still important for EE (Rasmussen and Sorheim 2006). For instance, in the Demand and Competence models, the teacher acts as a mentor by guiding students along their learning path through a more nuanced process of interiorization of the presented concepts. In this vein, such teachers very often suggest possible entrepreneurship paths to their students and guide them in the development of an entrepreneurial idea. Conversely, teachers of the Supply model are more involved in transferring theoretical concepts to students, and thus of acting less as mentors.

The literature of EE has suggested to use practical – rather than theoretical - entrepreneurship teaching models to teach entrepreneurship (e.g., Honig 2004; Rasmussen and Sørheim 2006; Pittaway and Cope 2007 a, b; Neck and Greene 2011; Piperopoulos and Dimov 2015; Kassean et al. 2015; Campos et al. 2017; Fiore et al. 2019 a). For instance, since entrepreneurs work in a complex environment, Honig (2004) suggested to use practical entrepreneurship teaching models in order to allow students to work in complex situations. McMullen and Shepherd (2006) stated “Entrepreneurship requires action” (McMullen and Shepherd 2006, pp. 132). Moreover, teachers in practically-oriented entrepreneurship act as a mentor and several studies (e.g., Sullivan 2000; St-Jean and Audet 2012; Fiore et al. 2019 a) explained that mentors help students and entrepreneurs to increase their entrepreneurial competences. Furthermore, Rasmussen and Sørheim (2006) described that practically-oriented entrepreneurship teaching models offer students the opportunity to achieve a true entrepreneurship experience turning out more competent entrepreneurs with the competence of developing and running new ventures. However, the number of academic spinoffs created in a university is a result of several organizational factors of which the different entrepreneurship teaching models is just one of them. Kassean et al. (2015) observed that students who participate in more practical entrepreneurship classes have higher entrepreneurial intentions. These findings can derive from the fact that founding and developing a new venture requires entrepreneurial competences which are easier to be acquired through more practically-oriented training (Fiore et al. 2019 a, b). Moreover, testing and experimentation are crucial for the creation of new ventures (Ries 2011), and those aspects are mostly stressed within practically-oriented rather than on theoretically-oriented courses (Camuffo et al. 2019).

In sum, undertaking more practical courses offer future entrepreneurs a set of instruments which can be easily applied in real-world situations emerging while they manage their enterprise. For this reason, it is straightforward to expect that

entrepreneur's confidence and intention could be higher if they have participated in a practical – rather than theoretical- entrepreneurship course as it lowers the perceived risk of founding a new venture (Kassean et al. 2015). This suggested are based on a “macro” level of analysis: the university level. In fact, this Chapters proposes that a university of more practical – rather than theoretical – entrepreneurship courses favour the creation of academic spinoffs. This statement derives from the fact that EE favours the creation of academic spinoffs and that practical-teaching models are more effective than theoretical-teaching models for the creation of academic spinoffs. Thus, based on these considerations and the theoretical reasons described above, this Chapter advances that:

**H2.** The presence in a university of more practical – rather than theoretical – entrepreneurship courses favour the creation of academic spinoffs.

### **3.3 Research design**

#### **3.3.1 Research setting**

Consistently with previous research (e.g., O'Shea et al. 2005), this Chapter focused on academic spinoffs in line with the definition of Di Gregorio and Shane (2003). In addition, as in similar studies (e.g., Di Gregorio and Shane 2003; O'Shea et al. 2005), this Chapter focused the attention on one specific context, that is the US, to reduce the impact of other context variables (e.g., different legislations). In other words, this Chapter limited the empirical analyses to universities and academic spinoffs operating in the US. The US is a reliable setting for this study since it is characterized by a strong education system, and it has one of the most effective entrepreneurial ecosystems in the world (Graham 2014). According to Kauffman Foundation's data (Fairlie et al. 2019) the US is one of the most vibrant territory for pursuing entrepreneurship opportunities as the 0.33% of the population starts a new entrepreneurial business each year, giving, in the first year of activities, employment to almost six persons. More in detail, AUTM<sup>30</sup> reports that since 1995 more than 11,000 spinoffs have been created by universities, largely contributing to the 591 billion of dollars of contribution of technology transfer activities to US GDP. Moreover, entrepreneurship courses are widespread among US universities (Fiet 2001 a, b; Katz 2003; Kuratko 2005; Solomon 2007; Katz 2008; Siegel and Wright 2015).

#### **3.3.2 Empirical strategy**

In order to uncover the relationship between EE and the creation of academic spinoffs, this Chapter adopted the following empirical strategy. As a first step, this Chapter tested, at the university level, whether the number of entrepreneurship

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<sup>30</sup> <https://autm.net/>.



courses has a direct relationship with the number of created academic spinoffs. In the first hypothesis, this Chapter expects to find a positive relationship between the number of entrepreneurship courses in a given university and the number of academic spinoffs. As a second step, this Chapter explored the mechanism through which an entrepreneurship teaching model favours a higher creation of academic spinoffs in order to answer to the second hypothesis. In particular, being informed by literature (e.g., Bramwell and Wolfe 2008; Siegel and Wright 2015; Nabi et al. 2017), this Chapter uncovered the impact that EE has on the creation of academic spinoffs by investigating the specific contents of the entrepreneurship courses to highlight whether the direct relationship could be explained by the teaching entrepreneurship models adopted in the courses (Bécharde and Grégoire 2005). This analysis resorted to the idea that each way of teaching entrepreneurship is not equivalent to other ways (Honig 2004; Solomon 2007; Rauch and Hulsink 2015; Fayolle et al. 2016; Nabi et al. 2017; Lamine et al. 2018) and that some approaches may increase the likelihood of creating new ventures (Barr et al. 2009; Piperopoulos and Dimov 2015; Nabi et al. 2017). In more detail, this Chapter expects that practical – rather than theoretical - entrepreneurship courses favour the creation of a greater number of academic spinoffs

### **3.3.3 Sample and data collection**

The sample of this study comes from the integration of the Licensing Survey by the AUTM dataset with a proprietary dataset on EE and focuses on the time span between 2011 and 2014. This dataset is one of the most famous, complete and reliable regarding academic entrepreneurship (Rothaermel et al. 2007) and has been extensively used by previous studies investigating academic entrepreneurship (e.g., Di Gregorio and Shane 2003; O’Shea et al. 2005; Markman et al. 2005). AUTM develops a Licensing Survey each year, and more than 180 research institutions are used to answer to it. The Licensing Survey focuses on universities and other research institutions as research centres, technology investment firms, and US hospitals. As this Chapter is interested only in academic spinoff creation from universities, the other research institutions were discarded, thus reducing the numerosity of entries in the sample to approximately 150 each year. From this dataset, this Chapter collected data regarding the number of created academic spinoffs, the TTO size and the budget allocated to research by universities are among the key data collected in this survey. Survey data are usually released by the Association with a two-year lag. For this Chapter, therefore, the dataset was related to the newest data available when this research began (i.e. 2014).

This Chapter then proceeded to collect the information about the entrepreneurship courses offered by each university among the approximately 150 aforementioned universities. This study explored the online course catalogue of each university in each year. This process has been conducted backward

beginning from 2014. Thus, for each university and for each year, this study analysed the online course catalogue and the timetable containing all the offered courses to search for the entrepreneurship courses and for the specific contents of such courses. The entrepreneurship courses in these catalogues were selected through a key-word search of each course title and description. To perform this analysis, the following keywords to identify entrepreneurship courses were used: entrepreneurship<sup>31</sup>; start-up, startup or start up; new venture; venture creation; venture development; new business; business development and business plan. The courses returned by the key-word search were then checked by two researchers who, reading the full syllabus of each course, categorized it independently as an entrepreneurship course or not. These researchers then cross-validated the categorization and, when inconsistencies arose, the course was submitted to a third researcher for a final review. The same process was applied to categorize the teaching model of each course (according to Béchard and Grégoire’s taxonomy) in order to test the second hypothesis. In this latter case, the analyses encompassed the fact that a course may use more than one teaching model, thus offering the possibility of categorizing some courses as if they used several teaching models (however, never more than two out of three models). Table 11 presents some examples on how this Chapter coded the entrepreneurship courses in order to increase the transparency of EE coding.

**Table 11 - Examples of coding entrepreneurship courses**

<b>Title</b>	<b>Brief description</b>	<b>Teaching models</b>
Introduction to Innovation and Entrepreneurship	This short, non-credit course will introduce you to the fundamentals of innovation and entrepreneurship, providing you a blueprint for the ideas and strategies to build a successful venture. [...] This course is not a comprehensive introduction to innovation and entrepreneurship, but a valuable starting point based on some of our most popular material.	Supply model
Basics of entrepreneurship	How does a good idea become a viable business opportunity? What is entrepreneurship and who fits the profile of an entrepreneur? This introductory course is designed to introduce you to the foundational concepts of entrepreneurship, including the definition of entrepreneurship, the profile of the entrepreneur, the difference between entrepreneurship and entrepreneurial management, and the role of venture creation in society.	Supply model
Theory and concept of entrepreneurship	The course is based on a blended approach. It will involve theoretical lectures and on-line materials, case studies as well as presentations by practitioners and startup founders. [...] The course will have a strong emphasis on teamwork and discuss.	Supply and Demand model
High-tech start-up creation	Mentor-guided project focused on developing students’ start-up ideas, immersion in nuances of innovation and early stage entrepreneurship, research on the entrepreneurial process, and	Competence model

<sup>31</sup> The word “*entre*” was used as a keyword in order to display results containing such terms as *entrepreneurship*, *entrepreneur* and *entrepreneurial*.

	the opportunity to network with experts from the local entrepreneurial ecosystem (top entrepreneurs and venture capitalists).	
Entrepreneurship as a career	Do you want to become an entrepreneur? [...] This course allows students to discuss with the teachers on entrepreneurship as a career. [...] This course has some theory and activate classes (workshop) based on innovation and entrepreneurship	Supply and Demand model
Social innovation and entrepreneurship	What are the differences between a social start-up and a “traditional” start-up? [...] Introduction to the theories of social innovation and social entrepreneurship. [...] Definition of hybrid entrepreneurship such as B Corp.	Supply model
Entrepreneurship and start-up creation from University Research	[...] This entrepreneurship course provides a framework for understanding the entrepreneurial process. [...] After the presentation and discussion of some basics of entrepreneurship and innovation, students are divided in multi-disciplinary teams in order to create and develop a business idea. [...] At the end of the course, teams will present their business idea in front of a jury of investors, entrepreneurs, managers and Professors. [...] The best business ideas will be supported by the University Incubator.	Supply and Competence model
Business Accelerator for New Ventures	This course focuses on helping students who have a well-defined business idea and/or existing business to create and develop their business idea and/or existing business. Whenever possible, students will be connected with providers of needed services, financial resources, and mentors.	Competence model

Unfortunately, this Chapters does not check the validity of the screening approach by contacting some colleagues in these university in US. However, for 80 universities, this screening approach allows to reach approximately 150<sup>32</sup> entrepreneurship courses. This Chapter limited the collection of information to 2011 as the online catalogues available for 2010 were very few at the moment of the research.

Then, the process of enrichment of such a dataset involved the collection of information about the 80 universities surveyed by AUTM in the 2011-2014 time frame. To do so, this Chapter collected university information from the Times Higher Education ranking (THE), which is a recognized reliable ranking of universities (e.g., Brescia et al. 2016). From this ranking, this study has been able

<sup>32</sup> Several universities did not report at all the course catalogue, or they did not report enough information to categorize them in the three teaching models that this Chapter used. For instance, some universities just reported the course ID code and/or the name of the course, making not reliable a categorization about the kind of teaching model the course have adopted. To avoid bias in categorizing courses, such universities were discarded.

to collect data about university characteristics (e.g., the number of students) and to understand the overall value of the university in a global environment (university ranking). At the end of this match, a sample was obtained pertaining to eighty US universities with data from 2011 to 2014.

### 3.3.4 Statistical approach

In order to test the first hypothesis, the following model was used:

$$(1) \textit{Academic Spinoff}_{i,t} = f(\#entre. \textit{courses}_{i,t-1}, X1_{i,t}, X2_{i,t}, \dots, Xn_{i,t}, \gamma, \beta)$$

where:

- *Academic Spinoff*<sub>*i,t*</sub> represents university *i*'s number of academic spinoffs created at time *t*;
- *#entre. courses*<sub>*i,t-1*</sub> is the (1 year lagged)<sup>33</sup> number of entrepreneurship courses offered at university level *i*;
- *X1<sub>*i,t*</sub>, X2<sub>*i,t*</sub>, ..., Xn<sub>*i,t*</sub>* is a vector of control variables that could influence the creation of academic spinoffs in university *i* at time *t*;
- $\gamma$  and  $\beta$  are vectors of parameters that have to be estimated.

The vector of the control variables includes several relevant variables that were usually included in previous literature. This study included the logarithm of research expenditures (*Research expenditures*) undertaken by university *i*, since higher academic spinoff creation is likely to be linked to the amount of money invested in research by the university (Lockett and Wright 2005; O'Shea et al. 2005; Powers and McDougall 2005). Then, this study controlled for the *TTO size* that it is the number of FTE<sup>34</sup>s employed in the TTO of university *i*. This study controlled for this variable since the development of more academic spinoffs might be influenced by a higher support from the TTO staff (Di Gregorio and Shane 2003; O'Shea et al. 2005; Algieri et al. 2013). This study also included controls for the age of the TTO (*TTO age*) to control for the positive effect that a TTO's experience might have on favouring the creation of academic spinoffs (Lockett and Wright 2005; Powers and McDougall 2005; Clarysse et al. 2011). This study also controlled for the level at which entrepreneurship courses are offered at the university *i* level (*Undergraduate, Graduate, PhD entre. courses*) and the different ecosystems in which universities are embedded (which might be munificent in favouring the creation of academic spinoffs), proxying them with the real Gross Domestic Production (GDP) per capita of the US State where university *i* is located (*GDP per capita*). This study then included controls for the presence of a medical school (*Medical school*) inside university *i* (Lockett and Wright 2005; O'Shea et al. 2005; Meoli et al. 2017) and for the value and reputation of university *i* (*University ranking*) as was done in similar works

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<sup>33</sup> In addition to 1 year lagged, as a robustness check, this Chapter ran this regression also with 2 year lagged for the variable *#entre. courses*.

<sup>34</sup> Full-time equivalent (FTE) is the hours worked by one employee on a full-time basis.

(O'Shea et al. 2005; Powers and McDougall 2005; Civera and Meoli 2018). In addition, this study controlled for the total number of students at university  $i$  (*University size*) as was done in similar works (e.g., Meoli et al. 2017). Finally, this study included a year dummy vector to control for the macroeconomic effect, as this study expected the creation of academic spinoffs to vary over time (e.g., Di Gregorio and Shane 2003).

Next, in order to test the second hypothesis, this Chapter used a model that links the creation of academic spinoffs to the entrepreneurship teaching models. This study adopted the following model:

$$(2) \text{ Academic Spinoff}_{i,t} = f(\#entre. \text{ courses}_{i,t-1}, \text{ Supply model}_{i,t-1}, \text{ Demand model}_{i,t-1}, \text{ Competence model}_{i,t-1}, X1_{i,t}, X2_{i,t}, \dots, Xn_{i,t}, \gamma, \beta)$$

In this specification, this study used three variables (*Supply model* <sub>$i,t-1$</sub> , *Demand model* <sub>$i,t-1$</sub> , *Competence model* <sub>$i,t-1$</sub> ) that measure the percentage of courses offered in university  $i$  at  $t-1$ ,<sup>35</sup> according to a specific entrepreneurship teaching model. The three variables may take on a value of between zero and one. In other words, each variable is equal to zero if university  $i$  does not adopt the specific entrepreneurship teaching model for any of the entrepreneurship courses offered in year  $t$ , while it takes on the value of one if university  $i$  only uses that model for all its entrepreneurship courses offered in year  $t$ . Therefore, the values of *Supply model* <sub>$i,t-1$</sub> , *Demand model* <sub>$i,t-1$</sub> , *Competence model* <sub>$i,t-1$</sub>  indicate, on average, how in aggregate a university  $i$  at time  $t-1$  applies a specific entrepreneurship teaching model. In order to test the second hypothesis, this Chapter considers the Supply model as a theoretically-oriented entrepreneurship teaching model and the Demand and Competence models as two practically-oriented entrepreneurship teaching models. The control variables are the same as those of the previous regression model.

The description of all the variables included in the analyses, the way they have been computed, and their sources are reported in Table 12.

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<sup>35</sup> In addition to 1 year lagged, as a robustness check, this Chapter ran this regression also with 2 year lagged for the variables *#entre.courses*, *Supply model*, *Demand model* and *Competence model*.

**Table 12 - Definition of the variables on the impact of EE on the creation of academic spinoff**

Name	Definition	Data source
Academic spinoff	Counts the number of academic spinoffs generated by university $i$ at time $t$ .	Licensing Survey by the AUTM
#entre. courses	One-year lagged variable. Number of entrepreneurship courses offered by university $i$ at time $t-1$ .	Universities' online course catalogue
Supply model	One-year lagged variable. Value that varies between 0 and 1, which indicates the percentage of how many entrepreneurship courses offered by university $i$ at $t-1$ use the Supply entrepreneurship teaching model.	Universities' online course catalogue
Demand model	One-year lagged variable. Value that varies between 0 and 1, which indicates the percentage of how many entrepreneurship courses offered by university $i$ at $t-1$ use the Demand entrepreneurship teaching model.	Universities' online course catalogue
Competence model	One-year lagged variable. Value that varies between 0 and 1, which indicates the percentage of how many entrepreneurship courses offered by university $i$ at $t-1$ time use the Competence entrepreneurship teaching model.	Universities' online course catalogue
Research expenditures	The logarithm of the total research expenditure for university $i$ at time $t$ .	Licensing Survey by the AUTM
TTO size	Number of professional technology transfer staff for university $i$ at time $t$ .	Licensing Survey by the AUTM
TTO age	The age of TTO for university $i$ at time $t$ .	Licensing Survey by the AUTM
Undergraduate entre. courses	Value that varies between 0 and 1, which indicates how many entrepreneurship courses offered by university $i$ at time $t$ are for undergraduate students.	Universities' online course catalogue
Graduate entre. courses	Value that varies between 0 and 1, which indicates how many entrepreneurship courses offered by university $i$ at time $t$ are for graduate students.	Universities' online course catalogue
PhD entre. courses	Value that varies between 0 and 1, which indicates how many entrepreneurship courses offered by university $i$ at time $t$ are for Ph.D. students.	Universities' online course catalogue
GDP per capita	The real GDP per capita of the US State where university $i$ is located at time $t$ .	BEA <sup>36</sup>
Medical school	Presence of a medical school (1 = yes) in university $i$ at time $t$ .	Licensing Survey by the AUTM
University ranking	The ranking of university $i$ at time $t$ .	THE university ranking
University size	Number of students of university $i$ at time $t$ .	THE university ranking

The nature of the dependent variable (*Academic spinoff*) used in both models made it relevant to adopt a specific econometric technique for the count data. According to Hausman et al. (1984) and Cameron and Trivedi (2013), there are two ways of dealing with the discrete nature of count data: the Poisson regression model or the negative binomial model. This Chapter analysed the 4-year panel of

<sup>36</sup> <https://www.bea.gov/index.htm>.

this study using Poisson models with random effects, since the use of a negative binomial model would have involved a high frequency of zeros in the data regarding the dependent variable (Cameron and Trivedi 2005, 2013) and this assumption is violated in this case. In addition, this Chapter preferred random to fixed effects since, as also shown by Di Gregorio and Shane (2003) and O’Shea et al. (2005), the unobserved heterogeneity is randomly distributed in such samples as the one this study adopted.

### 3.4 Results

#### 3.4.1 Descriptive analyses

Table 13 reports the descriptive statistics for the variables included in this study.

**Table 13 - Summary statistics of 80 US universities for the 2011-2014 period**

Variable	Mean	Median	S.D.	Minimum	Maximum
Academic spinoff	7.20	5	8.40	0	75
#entre. courses	12.64	10	8.73	0	60
Supply model	0.46	0.47	0.20	0	1
Demand model	0.10	0.08	0.10	0	0.5
Competence model	0.37	0.36	0.17	0	1
Research expenditures (US million dollars)	570.34	390.50	692.29	21.52	5,695
TTO size	8.96	6	9.42	1	69
TTO age	29.21	26	14.74	6	89
Undergraduate entre. courses	0.64	0.67	0.25	0	1
Graduate entre. courses	0.50	0.50	0.25	0	1
PhD entre. courses	0.01	0	0.04	0	0.25
GDP per capita	50,584.91	49,050.50	14,456.30	35,359	166,908
Medical school	0.74	1	0.44	0	1
University size	25,557.68	24,079	14,864.04	2,243	83,236
University ranking	145.98	114.50	117.30	1	475.5

Table 13 shows a high heterogeneity for the 80 US universities included in the sample. For instance, the variable TTO size has a standard deviation of more than 9 FTEs employees and the TTO age varies from 1 to 89 years. However, the variables University ranking and University size can capture the heterogeneity of the sample. In addition, although the number of academic spinoffs varies from 0 to 75 per university, this study has noted an increase in the number of academic spinoffs created by the universities between 2011 and 2014 (from 486 in 2011 to 657 in 2014). Furthermore, the mean of the number of academic spinoffs in the US increased from 2 at the end of the 90’ (Di Gregorio and Shane 2003; O’Shea et al. 2005) to more than 7 in the time window this study investigated. Reflecting evidence present in the scientific literature (e.g., Siegel and Wright 2015), the number of entrepreneurship courses offered by the 80 universities in the sample increased from 755 to 1,209 between 2011 and 2014. In addition, it is interesting to note that the most frequently used entrepreneurship teaching model is the

Supply model. This result is in line with the literature of EE (e.g., Solomon 2007), where it is shown that most entrepreneurship courses are still theoretical since theoretical entrepreneurship courses are easier to teach. In this vein, since the Supply model is a theoretically-oriented entrepreneurship teaching model, it does not require a hard-entrepreneurial experience by the teachers and can be taught carrying over competences gained in previous business courses as -for instance- strategy. However, this trend seems to have changed between 2011 and 2014 in the sample. For instance, in this sample, the use of the Supply model slightly decreased from 2011 onwards, while the use of the Demand model remained almost the same and the use of the Competence model slightly increased over the time span.

### 3.4.2 Regression analyses

The results of the random-effect negative binomial estimations for university spinoff creation are presented in Table 14. This Chapter used a hierarchical regression that resulted in three models: (a) a baseline model with only control variables; (b) a second model that includes the number of entrepreneurship courses as an independent variable; (c) a third model that considers the number of entrepreneurship courses and the entrepreneurship teaching models as independent variables.

**Table 14 - Random effects Poisson regression estimate of academic spinoff production (lag 1 year)**

	(1) Model 1		(2) Model 2		(3) Model 3	
#entre. courses <sub>(t-1)</sub>			0.014*	(0.008)	0.013*	(0.008)
Supply model <sub>(t-1)</sub>					-0.064	(0.444)
Demand model <sub>(t-1)</sub>					1.226*	(0.627)
Competence model <sub>(t-1)</sub>					0.777*	(0.457)
Research expenditures	0.323***	(0.102)	0.257**	(0.104)	0.272***	(0.101)
TTO size	0.021***	(0.007)	0.019**	(0.008)	0.015**	(0.007)
TTO age	0.001	(0.005)	0.002	(0.005)	-0.001	(0.004)
Undergraduate entre. courses	-0.263	(0.213)	0.014	(0.269)	0.138	(0.256)
Graduate entre. Courses	-0.124	(0.227)	-0.020	(0.269)	0.052	(0.252)
PhD entre. Courses	0.102	(1.165)	0.370	(1.266)	0.960	(1.160)
Medical school	-0.039	(0.142)	0.032	(0.151)	-0.038	(0.142)
University size	0.008*	(0.004)	0.007	(0.005)	0.005	(0.004)
University ranking	-0.002***	(0.001)	-0.002***	(0.001)	-0.001*	(0.001)
GDP per capita	-0.000	(0.000)	-0.001	(0.000)	-0.001	(0.000)
Constant	-4.405**	(2.040)	-3.443	(2.099)	-4.103**	(2.047)
Observations	296		223		223	
Log likelihood	-695.08162		-531.39882		-525.94367	

Standard errors in parentheses. Dummy year variables are included in all the regressions.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



In more detail, this study used all the control variables as a baseline in Model 1. This study estimated the impact of a university's financial conditions (*Research expenditures*), organizational conditions (*TTO size* and *TTO age*), cultural conditions (*Undergraduate entre. courses*, *Graduate entre. courses*, *PhD entre. courses*) and other information (*Medical school*, *University size*, *University ranking*, *GDP per capita*) on the creation of academic spinoffs. Then, in Model 2, this study added the *#entre. courses* variable to support the first hypothesis. Finally, this study also included the three different entrepreneurship teaching models (*Supply model*, *Demand model* and *Competence model*) in Model 3 to support the second hypothesis.

Model 1 shows that, in agreement with previous literature, university research expenditures and the TTO size are positively correlated with the number of spinoffs created by a university, thus confirming that both the amount of money invested in research and having support in realizing spinoffs enhance the number of academic spinoffs, based on research results. Interestingly, this Chapter has also found that a size effect is in place (positive and significant university size effect) and that the quality effect of the university is negatively correlated with the number of created spinoffs<sup>37</sup>.

Model 2 highlights the first key finding of this Chapter, namely that EE favours the creation of academic spinoffs. This result points out the key role of EE in favouring the development of academic spinoffs and, interestingly, also absorbs the size effect of universities. This implies that the fact that, in Model 1, university size is positive and significant, is probably related to the fact that larger universities have a greater probability of offering entrepreneurship courses which, in turn, enhances the number of spinoffs created by universities. Moreover, as suggested by the literature, TTO size and university research expenditures have a positive impact on the creation of academic spinoffs. Therefore, the first hypothesis is accepted.

Model 3 shows a more nuanced picture of how EE has an impact on the creation of academic spinoffs. First, the number of entrepreneurship courses presents again a statistically significant and positive effect on the number of academic spinoffs created. Therefore, first hypothesis is accepted again. Moreover, as can be seen, in Model 3 the *Supply model* does not present a statistically significant effect on the creation of academic spinoffs. On the other hand, the *Demand model* and *Competence model* present a statistically significant and positive impact on the creation of academic spinoffs. These results indicate that the entrepreneurship teaching models adopted by a university matter, and that

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<sup>37</sup> The negative coefficients can be explained by the fact that better universities show a lower ranking, and this means that the lower the ranking of a university is, the better its quality and the more the spinoffs created.

the adoption of more practical courses (*Demand model* and *Competence model*) favours the development of more academic spinoffs more than the adoption of more theoretical courses (*Supply model*). Therefore, second hypothesis is accepted.

Moreover, regarding the control variable year, in all the regression model only the control variable of the year 2014 has a statistically ( $p < 0.05$ ) and positive coefficient ( $\beta=0.21$ ). Moreover, the correlation coefficients of the variables were never higher than 0.4. Therefore, there is not a high correlation between the variables. In addition, as a robustness and endogeneity check, this Chapter ran Model 2 and Model 3 regression analyses with a different time lag ( $t$  and  $t-2$ ) for the *#entre.courses*, *Supply model*, *Demand model* and *Competence model* predictive variables, provided similar results. More in detail, Table 15 present Model 2 and Model 3 regression analyses with a different time lag ( $t-2$ ) for the *#entre.courses*, *Supply model*, *Demand model* and *Competence model*.

**Table 15 - Random effects Poisson regression estimate of academic spinoff production (lag 2 year)**

	(2) Model 2		(3) Model 3	
#entre. courses $_{(t-2)}$	0.009*	(0.008)	0.012*	(0.009)
Supply model $_{(t-2)}$			0.731	(0.489)
Demand model $_{(t-2)}$			1.886**	(0.640)
Competence model $_{(t-2)}$			1.572**	(0.498)
Research expenditures	0.260*	(0.111)	0.263*	(0.104)
TTO size	0.020*	(0.009)	0.015*	(0.008)
TTO age	0.002	(0.005)	0.000	(0.004)
Undergraduate entre. courses	-0.046	(0.297)	0.077	(0.274)
Graduate entre. Courses	0.171	(0.304)	0.125	(0.279)
PhD entre. Courses	0.552	(1.364)	1.187	(1.202)
Medical school	0.024	(0.161)	-0.001	(0.147)
University size	0.009*	(0.005)	0.005	(0.004)
University ranking	-0.002*	(0.001)	-0.001*	(0.001)
GDP per capita	-0.001	(0.001)	-0.001	(0.000)
Constant	-3.501	(2.242)	-4.559*	(2.119)
Observations	149		149	
Log likelihood	-372.23672		-364.16133	

Standard errors in parentheses. Dummy year variables are included in all the regressions.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

As it is possible to notice, the results from Table 15 are in line with the results from Table 14. In fact, Table 15 shows again that EE has a positive and statistically significant impact on the creation of academic spinoff (Model 2 and Model 3). Moreover, in Model 3 the *Supply model* does not present a statistically

significant effect on the creation of academic spinoffs while the *Demand model* and *Competence model* present a statistically significant and positive impact on the creation of academic spinoffs.

Moreover, as other robustness checks, this Chapter offers some endogeneity check. More in detail, as suggest by Angrist and Pischke (2008), this Chapter ran Model 2 and Model 3 with linear regression analysis with panel data and 1 year of time lag for the variables *#entre.courses*, *Supply model*, *Demand model* and *Competence model*. Table 16 presents the results from the random effects with a linear regression with a time-lag of 1 year.

**Table 16 - Random effects Linear regression estimate of academic spinoff production (lag 1 year)**

	(2)		(3)	
	Model 2		Model 3	
#entre. courses <sub>(t-1)</sub>	0.287***	(0.066)	0.280***	(0.065)
Supply model <sub>(t-1)</sub>			0.171	(0.028)
Demand model <sub>(t-1)</sub>			0.228*	(0.116)
Competence model <sub>(t-1)</sub>			0.689*	(0.288)
Research expenditures	0.216*	(0.287)	0.207*	(0.289)
TTO size	0.574***	(0.009)	0.555***	(0.008)
TTO age	-0.032	(0.034)	-0.036	(0.032)
Undergraduate entre. courses	0.009	(1.725)	0.568	(1.731)
Graduate entre. Courses	-1.054	(1.931)	-0.886	(1.930)
PhD entre. Courses	-0.590	(1.364)	-1.587	(1.872)
Medical school	1.356	(1.086)	-1.621	(1.062)
University size	-0.019	(0.035)	-0.030	(0.034)
University ranking	-0.002*	(0.001)	-0.001*	(0.001)
GDP per capita	-0.003	(0.003)	-0.004	(0.003)
Constant	0.118	(6.249)	0.556	(6.477)
Observations	223		223	
R-sq (overall)	0.7511		0.7731	

Standard errors in parentheses. Dummy year variables are included in all the regressions.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The results from Tables 16 are in line with the previous regression analyses with Poisson. In fact, Model 2 shows that EE has a positive and statistically significant impact on the creation of academic spinoff. In the same line, Model 2 shows that EE has a positive and statistically significant impact on the creation of academic spinoff. Moreover, Model 3 shows that the *Supply model* does not present a statistically significant effect on the creation of academic spinoffs while the *Demand model* and *Competence model* present a statistically significant and positive impact on the creation of academic spinoffs.

### 3.5 Discussion and Conclusion

In this Chapter, the impact of EE on the creation of academic spinoffs was analysed. As suggested by Chapter 2, this impact was overlooked in previous literature analysing the effect of university characteristics on spinoffs creation (Di Gregorio and Shane 2003; Lamine et al. 2018), but which is of relevance given that EE can stimulate and sustain the creation of new ventures (e.g., Sánchez 2011, 2013). This Chapter tested this relationship on a panel sample of 80 universities in the US from 2011 to 2014, and found that: (i) EE is positively related to the number of new academic spinoffs; (ii) offering more practical courses – rather than more theoretical ones – favours the development of more academic spinoffs by a university.

The results of this Chapter are relevant to both literature and practice. First, the fact that EE is positively related to the creation of academic spinoffs confirms the usefulness of EE in providing entrepreneurial competences (Gümüşay and Bohné 2018), thus suggesting that entrepreneurial competences can be learned through EE (Sánchez 2011, 2013; Hahn et al. 2019). Therefore, this study answers a call from Lamine et al. (2018) to provide evidence on the role of EE to promote the creation of academic spinoffs. A second contribution of this Chapter is related to the understanding of the impact of different entrepreneurship teaching models (Bécharde and Grégoire 2005) on the creation of academic spinoffs. This Chapter, in fact, answers a call from Nabi et al. (2017) to provide evidence on the impact of different entrepreneurship teaching models. The results of this Chapter show the importance of the development of action-based entrepreneurship training, rather than theoretical training (e.g., Gielnik et al. 2015; Hahn et al. 2017). These results are derived from the fact that EE has a positive impact on the entrepreneurship intention of students (e.g., Maresch et al. 2016), and that students are an important asset for the creation of academic spinoffs (Pirnay and Surlemont 2003; Van Burg et al. 2008; Rasmussen and Borch 2010; Åstebro et al. 2012; Boh et al. 2016; Hayter 2016; Hayter et al. 2017). An important result is related to the fact that the theoretically-oriented entrepreneurship teaching model (Supply model), although is the most widespread teaching model among universities, has no impact on the creation of academic spinoff. This suggests that pure theoretical courses do not contribute to increase the attitude competences and intention of students as much as more practical courses. This is in line with previous literature suggesting that more practical teaching methodologies are more suited for entrepreneurship courses, in particular in shaping students' intentions and attitudes (e.g., Honig 2004; Rasmussen and Sørheim 2006; Pittaway and Cope 2007 b, c; Kassean et al. 2015; Campos et al. 2017; Fiore et al. 2019 a, b). However, the Supply model does not present a negative impact on the creation of academic spinoff. This may derive to the fact, that theoretically-oriented entrepreneurship teaching model may generate awareness on the students and, therefore, the Supply model is not useless. In fact, the practically-oriented entrepreneurship teaching models (Demand and Competence models) may need a theoretically-oriented

entrepreneurship teaching model since it may generate awareness on the students and increase the number of students interested on more practically-oriented entrepreneurship teaching models. Therefore, future studies can analyse the need of different teaching models in order to improve the overall entrepreneurship activities in a universities.

In conclusion, the analyses accepted the first hypothesis that EE favours the creation of academic spinoffs. Moreover, the analyses of this Chapter accepted the second hypothesis that the presence in a university of more practical – rather than theoretical – entrepreneurship courses favour the creation of a greater number of academic spinoffs.

The results of this Chapter have implications for university policy makers (such as deans), entrepreneurship teachers and students. First, the relationship between EE and academic spinoffs suggests that universities need to provide more EE under the form of new courses to overcome informational and cultural barriers, which may limit the development of entrepreneurial actions by both academic faculties and students (Siegel et al. 2003; Hahn et al. 2018). Second, teaching entrepreneurship, by means of more practically-oriented teaching models, allows universities to create more academic spinoffs and to better valorise the results obtained from research. In fact, although this Chapter is unable to clearly identify the mechanism through which this process occurs, it is possible to speculate that the provision of entrepreneurship courses stimulates the creation of academic spinoffs through a greater involvement of both students and researchers in entrepreneurial experiences. In this vein, Boh et al. (2016) pointed out that students generally lack business knowledge and experience and it is possible to hypothesise that, thanks to a more practical EE – which encompasses cooperation between scholars who are willing to develop an academic spinoff from a research result and students who are enrolled in an entrepreneurship course – students and scholars may gain the competences, knowledge and networks required to accelerate academic spinoff development (Hayter 2016). For doing this, deans and other key decision makers in universities should stimulate entrepreneurship professors to invest in practical entrepreneurial competences, introducing also incentives aimed at an active participation directly in university spinoffs and/or collaborate with the local entrepreneurship ecosystem (e.g., incubators/accelerators, science parks and SLEOs). In this vein, this Chapter supports the suggestion of Gilsing et al. (2010), namely, that stimulating universities to build more entrepreneurial-oriented Ph.D. programmes as well as building a socially supportive entrepreneurial climate would lead to an increase in the number of academic spinoffs. In line with this, offering more entrepreneurship course – especially practically-oriented – can help students, researchers and professors to work together on their research and technology and to receive feedbacks which may favour the creation of an academic spinoff (Hahn et al. 2017). Entrepreneurship courses offered to different fields of study, educational levels and cultures can be able to combine different knowledge and experiences in

order to stimulate the university entrepreneurial culture. Finally, offering many entrepreneurial courses may require the collaboration with several mentors and entrepreneurs which may enhance the local entrepreneurial ecosystem.

This Chapter is not free of limitations. One shortcoming of this work concerns the fact that this study has not been able to analyse the direct impact of EE on the creation of academic spinoffs, since this study did not have access to any information about who created the academic spinoffs. In fact, the number of academic spinoffs created in a university is a result of several organizational factors of which the different entrepreneurship teaching models is just one of them. Although this limit has made the analysis of this Chapter more stylized, the results of this Chapter should still be considered valuable since they show the existence of a relationship at the university level, thus suggesting that EE may be responsible for a change not only in the specific competences of the people employed in the spinoffs, but also in the overall culture of the university, of academic faculty and of students. In fact, this Chapter did not analyse the impact of EE on individual-level but it analysed the impact of EE on university-level. The second limitation of this Chapter is related to the fact that although this Chapter has been able to determine whether EE favours the creation of more spinoffs, this Chapter has been limited in controlling for their value (Powers and McDougall 2005; Gras et al. 2008; Van Looy et al. 2011; Cho and Sohn 2017). The fact that more academic spinoffs are created, does not imply that their quality is higher. This, in fact, is a relevant feature that deserves to be studied in the future. In addition to this, this Chapters does not check the validity of the screening approach by contacting some colleagues in the sample in order to understand if all EE courses there were captured by the research methodology of this Chapter. However, the research methodology implemented allow this Chapter to reach approximately 150<sup>38</sup> entrepreneurship courses in the US. Moreover, this Chapter analysed the academic spinoffs therefore it did not include the new venture created by academics outside the universities. However, Fini et al. (2010) found that about 2/3 of new ventures created by academics are not based on disclosed and patented inventions. Future researches may consider both new ventures – from inside and from outside the university intellectual property system – created by academics. Moreover, future research could also analyse the impact of the characteristics of entrepreneurship teachers on the creation of academic spinoffs and the entrepreneurship teaching model applied to their entrepreneurship courses. It would be possible for an entrepreneurship professor to apply an entrepreneurship teaching model based on their experiences. Therefore, this Chapter suggests analysing if and how different experiences of an entrepreneurship professor can impact the entrepreneurship teaching model used

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<sup>38</sup> Several universities did not report at all the course catalogue, or they did not report enough information to categorize them in the three teaching models that this Chapter used. For instance, some universities just reported the course ID code and/or the name of the course, making not reliable a categorization about the kind of teaching model the course have adopted. To avoid bias in categorizing courses, such universities were discarded.

in his/her entrepreneurship course. This Chapter hypothesizes that a professor with a practical experience will be more likely to apply a practically-oriented entrepreneurship teaching model compared to a professor without a practical experience. A practical experience of a professor can be analysed on the basis of his/her entrepreneurial experience (e.g., the professor has created and/or has worked in a startup or academic spinoffs) or a work experience (e.g., the professor has worked in the board of directors of a corporation) by using a survey and/or a database such as LinkedIn. In fact, Bercovitz and Feldman (2008) suggested the existence of a training effect. Therefore, the different characteristics of teachers may play different roles in the creation of academic spinoffs. Additionally, since new ventures created by students are increasing (e.g., Barr et al. 2009; Rasmussen and Borch 2010; Åstebro et al. 2012; Bergmann et al. 2016; Boh et al. 2016), this Chapter suggests the need to analyse their role and how universities can support them. For instance, future studies can analyse the difference between academic spinoffs created by students and academic spinoffs not created by students. Moreover, since the studies on social entrepreneurship are increasing (e.g., Leborgne-Bonassié et al. 2019; Rawhouser et al. 2019; Saebi et al. 2019), it would be interesting to analyse social academic spinoffs. These social academic spinoffs are academic spinoffs aim at solving social and/or environmental issues such as the seventeen Social Development Goals created by the United Nations in 2015. In addition, since entrepreneurial intentions and dispositions as well as the impact of entrepreneurial experiences on the economy of nations may differ by country (Giacomin et al. 2011; Díaz-Casero et al. 2012; García-Rodríguez et al. 2015), future researches could also analyse the impact of EE on academic spinoffs in different nations. Additionally, this Chapter recognises that other sources of heterogeneity in the impact of EE on academic spinoff creation may arise due to the incorporation of universities in different States. Finally, as suggested by Fini et al. (2019), it is necessary to perform more theory-development work to complement empirical analyses of science in society and its commercialisation. For this reason, this Chapter encourages further research to investigate this issue.





# Chapter 4

## An analysis of the role of Student-Led Entrepreneurial Organizations on participants' entrepreneurial intentions

*This Chapter builds on a paper which is in the second round of revision for an international journal.*

### 4.1 Introduction

As suggested by Chapter 2, EE represents a significant policy intervention, since it improves entrepreneurial competences (EC 2006), has an impact on students' entrepreneurial intention (Peterman and Kennedy 2003; Souitaris et al. 2007; Pruett et al. 2009; Engle et al. 2010; Sánchez 2011, 2013; Saeed et al. 2014), produces benefits to students' employability competences (Etzkowitz et al. 2000) and, more generally, propels economic growth (Abreu and Grinevich 2013). As an indirect result of all these activities to support entrepreneurship, SLEOs have started to emerge around the world. SLEOs are linked to EE since SLEOs regard to the universities' entrepreneurial activities. However, more than EE, this study analysis the entrepreneurial experiences of students in a SLEO. For instance, SLEOs are a fundamental part of several universities' entrepreneurial ecosystem.<sup>39</sup> In fact, SLEOs represent an opportunity for students to perform

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<sup>39</sup> For instance, the Berkeley Entrepreneurship Ecosystem contains SLEOs as one of one of the five actors in its Entrepreneurship Ecosystem. More information are available here: <https://ipira.berkeley.edu/entrepreneurship-ecosystem>. Similarly, a study from Rissola et al. (2017) explained how the SLEOs created and developed the University Entrepreneurship Ecosystem in Finland

entrepreneurial experiences. These organizations leverage on students' willingness and desire to carry out practical and real-world experiences of entrepreneurship, while continuing to study at university. Their aim is in fact to enhance the entrepreneurial competences of their members through learning by doing and experiential learning. Some important SLEOs are JADE, Enactus, Collegiate Entrepreneurs Organization (CEO) and the National Association of College and University Entrepreneurs (NACUE) (Pittaway et al. 2011, 2015; Preedy and Jones 2017). In comparison to other Student-led Organizations, SLEOs are focusing on entrepreneurial experiences for their associates by supporting entrepreneurial activities inside and outside the university. In other words, SLEOs aim at nurturing the next generation of entrepreneurs by supporting the creation of new business ideas and the development of start-ups.

SLEOs allow students to work in multidisciplinary and international teams, to attend entrepreneurship events and workshops, to network, and to share ideas. All these activities promote an entrepreneurial environment and culture that is deemed to foster entrepreneurship (Pittaway et al. 2015). Today, SLEOs have links with several universities, both in Europe and in the US (Pittaway et al. 2011; Rae et al. 2012; Preedy and Jones 2017) and are increasingly becoming an important component of the entrepreneurial university ecosystem (Siegel and Wright 2015; Rissola et al. 2017). In addition, the number of SLEOs is constantly growing (some SLEOs have recently been created, e.g., Altoes and the London Business School Entrepreneurship Club, among others).

Even though growing attention towards EE has recently emerged, as suggested in Chapter 2, few studies have been devoted to the analysis of extra-curricular entrepreneurial experiences and team entrepreneurship and to their role in fostering entrepreneurial competences and entrepreneurial intention (Pittaway et al. 2011, 2015; Padilla-Angulo 2017; Preedy and Jones 2017). In fact, only a limited number of works have analysed to what extent extra-curricular entrepreneurial experiences and team entrepreneurship affect students' entrepreneurial intention (Pittaway et al. 2011, 2015; Padilla-Angulo 2017; Preedy and Jones 2017). The scarcity of research on how entrepreneurial attitudes are shaped by the participation of students in extra-curricular entrepreneurial experiences and team entrepreneurship calls for more evidence. The present study aims at addressing this gap, by examining the factors that are associated with students' entrepreneurial intention in the context of SLEOs. In other words, this Chapter wants to test if the entrepreneurial experiences in a SLEO can have an impact on the entrepreneurial intentions of SLEOs' participants by using a "micro" level of analysis. In fact,

Therefore, as suggested in Chapter 2, this Chapter aims at analysing the impact of SLEO on participants' entrepreneurial intentions

This Chapter adds to the extant literature in two main ways. First, it augments and complements the current research on SLEOs by examining the domain of entrepreneurial intention formation. In fact, the role played by SLEOs in this process has not been taken into consideration so far. By doing this, the study also discusses how SLEOs help foster an entrepreneurial culture and ecosystem. Second, the present study examines what affects students' entrepreneurial intention from one of the larger SLEO in the world.

This Chapter empirically has investigated the factors that affect students' entrepreneurial intention by conducting a multivariate explorative analysis of one of the largest SLEOs in the world, JADE by using a "micro" level of analysis. It has analysed the responses of a survey that was administered to JADE associates in 2016, which resulted in a total of 261 responses. The findings indicate that the more time students spent in JADE and the higher the number of events students attended, the greater their entrepreneurial intention was. This result suggests that SLEOs have a positive and statistically significant impact on the entrepreneurial intention of their members and, as such, they constitute an important component of the entrepreneurial university ecosystem that is able to foster an entrepreneurial culture. Additionally, it has been found that when the study field of a student is Science and Technology, there is a higher probability of developing entrepreneurial intention.

The Chapter is organized as follows. Next section summarizes the extant research on the role played by SLEOs in the formation of entrepreneurial intention. Then, the activities of JADE are presented. After that, this Chapter presents the research design. Then, this Chapter presents the empirical results, which are based on the survey sent to the JADE associates in 2016. In the end, this Chapter discusses the theoretical and practical implications of the results, the limitations and avenues for future research.

## **4.2 Background**

### **4.2.1 The formation of entrepreneurial intention: the role of SLEOs**

The emergence of SLEOs in Europe dates back to the end of the sixties, when the first SLEO was founded in France (Junior École Supérieure des Sciences Économiques et Commerciales - ESSEC). SLEOs are organizations that are created and managed by students, with the explicit aim of providing a learning by doing experience to those students who are interested in entrepreneurship. SLEOs bring together students from different countries, different fields of study and different educational levels.

The mission of SLEOs is to enhance entrepreneurial competences and raise the awareness, aspirations and knowledge about the entrepreneurial experiences of students (Clark et al. 2008). Therefore, SLEOs respond to the European Union's call for the need to stimulate entrepreneurial competences of all future workers (JADE 2017).

In these organizations, students work in teams, stimulate their creativity by getting in touch with other students from different backgrounds and of different nationality and gain soft skills that can ultimately affect their business success (Rubin et al. 2002; Heckman and Kautz 2012). The activities of SLEOs are structured through learning by doing programs and advice from other associates. These organizations form the basis of experiential learning and create a supportive environment within which one can take risks, network and attend several entrepreneurial events. SLEOs in fact allow their members to take part in multidisciplinary and international entrepreneurial events and experiences.

Participation in a SLEO allows students to learn how to work in multidisciplinary and international teams, to improve their networking abilities, to interact with entrepreneurs, professors, industry experts and companies, to speak in public and to attend entrepreneurial events. Students can also participate in consultancy activities, organize events, and develop their own projects. These are all situations that echo entrepreneurial contexts (Fayolle and Gailly 2009) and are aimed at forging students' minds, values, attitudes and self-understanding. Therefore, SLEOs are an important instrument to foster students' entrepreneurial competences and to better prepare them for the uncertainties of modern, market driven societies.

Although these organizations are present in almost all universities in Europe (Preedy and Jones 2017), SLEOs are still a somewhat under-studied phenomenon in the field of entrepreneurship and managerial education. A few researchers have recently started to investigate the activities performed by SLEOs and their role in stimulating entrepreneurial competences and entrepreneurial intention (Pittaway et al. 2011; Gibcus et al. 2012; Pittaway et al. 2015; Padilla-Angulo 2017; Preedy and Jones 2017). Pittaway et al. (2011), on the basis of 10 unstructured interviews, a series of telephone interviews and e-mail postcards sent to different kinds of student clubs, showed that students' engagement in entrepreneurship clubs and societies provides enhanced opportunities for learning by doing. In a follow-up work, Pittaway et al. (2015) investigated the nature of the learning process that students encounter when they are members of clubs. They pointed out several learning benefits, such as learning through mistakes, learning by doing and learning from entrepreneurs, that simulate important aspects of entrepreneurial intention. Pittaway et al. (2015) also found that students want to get in contact with entrepreneurs in order to approach the domain of entrepreneurship and therefore learn from their experiences. Additionally, complementing data based on 20 UK universities with face-to-face interviews,

Preedy and Jones (2015) showed that SLEOs are widely diffused in many universities and act as important links among universities in the provision of entrepreneurial support. The authors found that SLEOs in fact foster students' entrepreneurial competences, thanks to such activities as networking. The correlation between entrepreneurial intention and participation in SLEOs of different types has been investigated in a few recent works. Padilla-Angulo (2017) examined the role of general student associations in developing students' entrepreneurial intention at early educational stages. The results of a survey on 237 first-year undergraduate business school students revealed that student associations increase the entrepreneurial intention of first-year students. Padilla-Angulo (2017) also pointed out that student organizations include many activities that stimulate entrepreneurial competences, such as searching for sponsors and raising money, networking, public speaking and working in a team. Gibcus et al. (2012), on the basis of a survey of 2,621 alumni of European higher education institutions (of which 288 were JADE alumni), pointed out that JADE members had higher scores on entrepreneurship competences and were more eager to become entrepreneurs than the other students. According to Gibcus et al. (2012), these results derive from the fact that JADE members have the opportunity of developing entrepreneurial competences as a result of their taking part in practical projects, such as running professional studies for companies and managing the JADE organization themselves. Moreover, Preedy and Jones (2017) showed that SLEOs improve students' networking and leadership abilities and stimulate entrepreneurial experiences, but also prepare students for the job market. In the same way, Fayolle (1996) and Fayolle and Gailly (2015) found a link between the formation of entrepreneurial intention and participation in or contribution to setting up and managing a SLEO. Even if some studies analysed SLEOs, there is still a need to understand if and how the entrepreneurial experiences in a SLEO can impact the entrepreneurial intention of their participants. This Chapter aims at filling this gap in the extant literature.

### **4.3 An example of SLEO: JADE**

JADE is a Brussels-based, non-profit, non-governmental organization that is affiliated with the European Commission and the European Parliament, which was established and is managed solely by students (EC 2006; Gibcus et al. 2012). According to the motto "learning-by-doing", their associates bridge the gap between academia and the real business world, thus stimulating students' entrepreneurial competences (JADE 2017). Today, the students involved in JADE, through running enterprises, have a turnover of 16 million euros per year.

The JADE student network is aimed at helping all students develop their entrepreneurial competences (JADE 2017). Students from different fields of study, educational levels and nationalities work together to test and implement theoretical insights from university courses by learning and developing an entrepreneurial attitude through the concept of learning by doing. Therefore,

JADE is also aimed at changing the personal environment and social norm of students, which in turn can enhance their entrepreneurial competences and intention. JADE has recently attracted a great deal of attention from political leaders, who have expressed interest in its activities (JADE 2017). This is due to the fact that policymakers want to foster an entrepreneurial culture and to increase students' entrepreneurial competences (Lewis and Llewellyn 2004; OECD 2009; O'Connor 2013). Entrepreneurial competences have in fact been recognized as being useful for personal, professional and/or business activities, but also for the opportunities and challenges that an employer or an organization has to face (EC 2006). Consequently, the presence of JADE has increased in several universities, not only in the Europe Union, but also outside. The antecedent of JADE appeared in France in 1967, when the first SLEO was founded at the ESSEC Business School in Paris (Pittaway et al. 2015). Some other SLEOs were then created around Europe and elsewhere. In 1992, some of these organizations formed National Confederations and took the decision to create a larger-scale organization, thus giving rise to JADE. In 1988, JADE went beyond the bounds of Europe and created a sister confederation in Brazil. Brazil Jùnior today has almost 20,000 participants. Additionally, in 2013, JET – Junior Enterprises of Tunisia - was founded, and this was followed by the Canadian Confederation of Junior Enterprises (JC3) in 2015. Under an international cooperation agreement, the confederations continue to move the organization forward to reach new countries and continents. Today, with the first organization in the USA, China, Malaysia and Morocco, and new Junior Initiatives in Turkey, Russia and Australia, they are present in 14 countries in Europe and in over 40 countries around the world, with a network of 22,000 students in Europe and over 40,000 students around the globe. In addition, the confederations work closely with universities to foster an entrepreneurial culture and ecosystem. Therefore, JADE can be defined as global and it is continuously attempting to enlarge its boundaries. JADE carries out many activities, ranging from lobbying, support to consulting/entrepreneurial projects and the organization of events (to stimulate the dialogue between students, policy makers, experienced professionals and entrepreneurs, and to create a bridge with the job market). Table 17 illustrates JADE's main activities.

**Table 17 - JADE's main figures**

Date of foundation	1992
European partners	Austria, Belgium, Croatia, France, Germany, Italy, Netherlands, Poland, Portugal, Romania, Spain, Sweden, Switzerland, UK
Extra-European partners	Australia, Brazil, Canada, China, Malaysia, Morocco, Russia, Tunisia, Turkey, USA
Institution partners	European Parliament, European Commission, Council of the European Union, UNIDO, UNESCO, World Bank, OECD, European Business Summit, European Policy Centre, Eurochambres
Associates	22,000 students in Europe; 40,000 around the globe.
Revenue	The total revenue of all students' associations which are part of JADE (Junior Enterprises) amounts to 16 M€
JADE's goals	<ul style="list-style-type: none"> <li>• Improving local economic and social growth;</li> <li>• Providing a learning by doing experience for students;</li> <li>• Fostering entrepreneurial competences;</li> <li>• Connecting academic knowledge and the business world;</li> <li>• Enhancing students' employability.</li> </ul>
JADE's activities	<ul style="list-style-type: none"> <li>• Events: it organizes several workshops for its members to improve their competences, extend their network and enhance their entrepreneurial intentions;</li> <li>• Projects: it supports its members' entrepreneurial projects and is involved into expert groups on entrepreneurship education and student entrepreneurship;</li> <li>• Lobbying: it presents position papers and reports on student entrepreneurship and entrepreneurial education to policy makers and European institutions.</li> </ul>

In terms of its organizational structure, JADE appears as a bottom-up organization: the participants (called Junior Entrepreneurs) are at the base of the organizational pyramid, and they, in turn, choose the leaders of their local SLEOs (called Junior Enterprises). These leaders represent and guide the local organizations, and manage the relationship with clients, suppliers and partners and in general with all the external stakeholders. Local SLEOs select their country representatives at the national level, and these representatives work in the national confederation to promote the goals and answer the needs of each SLEO at a country level. Each country elects its International Manager, the person responsible for maintaining contact and ensuring effective communication between the national and the European level, namely JADE. Moreover, all national representatives, gathered together in the General Assembly, elect the JADE Executive Board, which, living and working in Brussels, represents the organization at the European level and maintains relationships with the partners, institutions and the other confederations throughout the world. JADE plays an important role in these organizations at a European level by connecting them with European Institutions and the opportunities offered by these institutions.

## **4.4 Research design**

### **4.4.1 Sample and data collection**

The empirical data used to investigate the drivers of students' entrepreneurial intention were obtained from an on-line survey conducted in 2016 among the members of the European and Tunisian JADE networks. The authors developed the survey, which is presented in the Appendix, together with the JADE board of directors. In addition, OECD provided advice on how to structure the survey and suggested some key questions that needed to be addressed. Unfortunately, this Chapter did not use any theory to perform the research and the survey.

The survey was sent first to the International Manager of each JADE confederation, who then passed it on to the Presidents of the Junior Enterprises (henceforth JEs) belonging to the confederations. All the members of the JEs were invited to fill in the survey. The survey was written in both French (to address the French and Tunisian confederations) and English (to address the remaining JADE members).

Out of 420 associates who had received the survey, a total of 261 members answered the survey, thus yielding an effective response rate of 62%. A check on non-response bias was made with respect to all the survey items (Armstrong and Overton 1977) and it was found to be minimal. Therefore, the sample is representative of the population of the JADE associates.

### **4.4.2 Descriptive statistics**

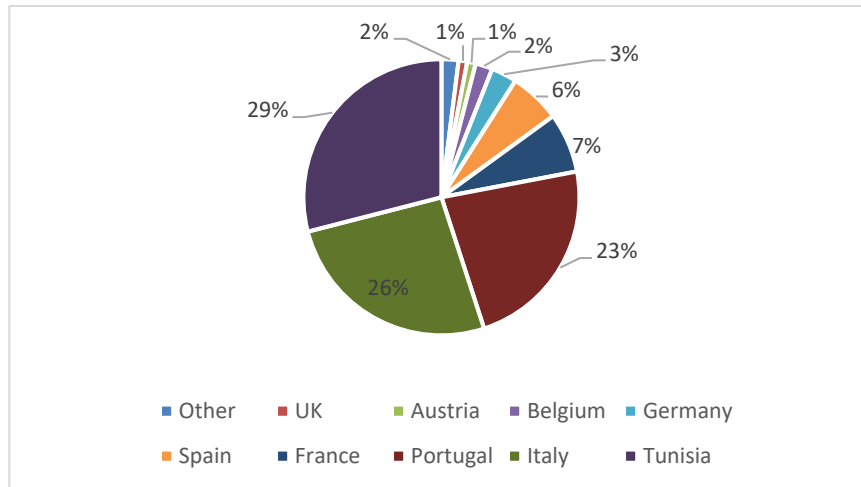
The survey<sup>40</sup> presented 33 questions covering the general data of the students, the international mindset, the educational and work background, their involvement in JEs and future career scenarios. On average, the respondents were 22 years old and were thus still undergraduate students. Out of the 261 respondents, 54% were women. This is an interesting data, given that previous studies showed that men are generally more inclined toward entrepreneurship (Shinnar et al. 2012), although gender does not always play a determinant role in startup activities (Verheul and Thurik 2001). Figures 2 and 3 illustrate the distribution of the respondents according to their nationality and field of study.

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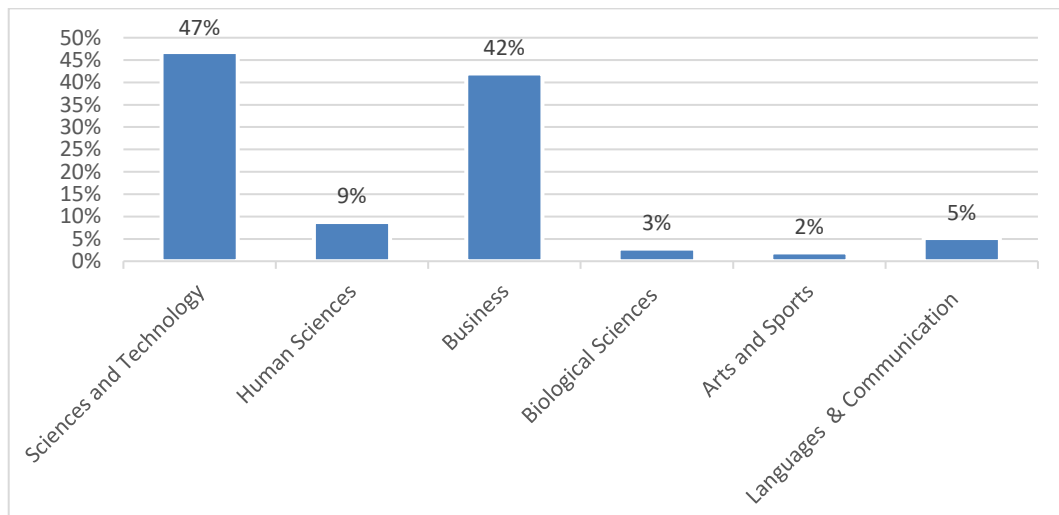
<sup>40</sup> Annex B presents the survey.



**Figure 2 - Distribution of respondents of Chapter 4 by nationality**



**Figure 3 - Distribution of respondents of Chapter 4 by field of study**



Note: The total is not 100% because respondents could have chosen multiple answers

A non-trivial fragmentation regarding the respondents' nationality appears: the higher percentages of respondents are Tunisian (29%), Italian (26%) and Portuguese (23%), followed by French (7%), Spanish (5%), German (3%), Belgian (2%), Austrian (1%) and British (1%). Other nationalities (Croatian, Dutch, Polish, Swedish and Swiss) overall account for 2%. As far as the field of study is concerned, most students are enrolled in Sciences & Technology (47%) and Business (42%), while only a few students study Human Sciences (9%). Only a few respondents are enrolled in Languages & Communication (5%), Art & Sport (2%) and Biological Sciences (3%). In addition, the JADE members are also from different educational levels. In fact, the respondents are either in their first (13%), second (24%), third (23%), fourth (24%), fifth (13%) or later (2%) years

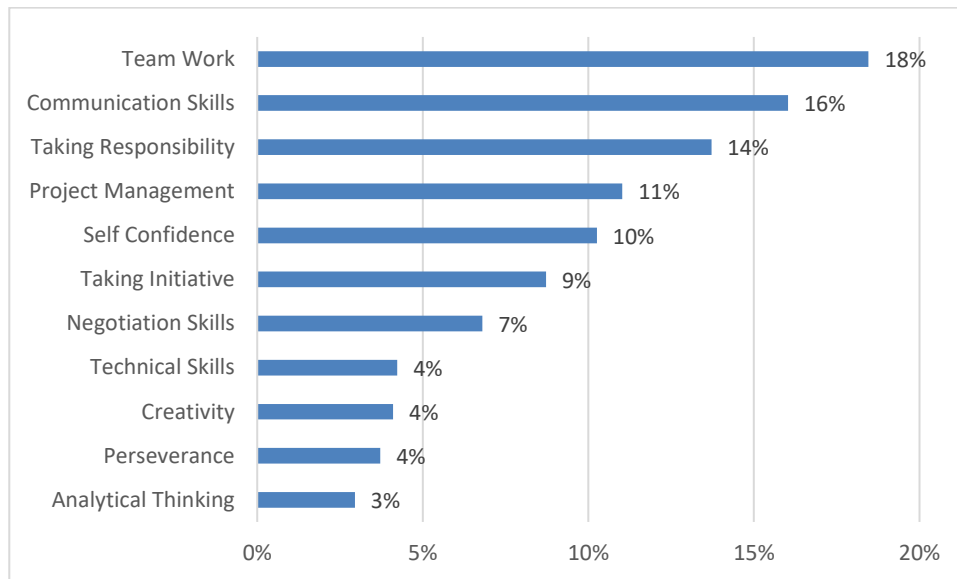
of university. The following universities show a higher frequency (more than 5%): Universidade Católica Portuguesa (8%), Université de Monastir École Nationale d'Ingénieurs de Monastir (7%), École de Traduction, d'Interpretation de Conference (7%), Politecnico di Milano (7%), Universidade do Minho (7%), Université de Tunis el Manar Ecole Nationale d'Ingénieurs de Tunis (7%), Università degli Studi di Milano (6%) and Université de la Manouba Ecole Nationale des Sciences de l'informatique (5%). The JADE members come from 48 different universities. Since the JADE members come from several universities, the regression analyses of this Chapter do not apply a multilevel modeling analysis at university level. However, the regression analyses of this Chapter consider the logarithm of the GDP of the student's country of study as a proxy for the Country level. This indicates that JADE involves students from different countries, different fields of study and different educational levels.

Since JADE is international, their associates actively develop an international mindset. In fact, out of the 261 respondents, 65% speak more than two foreign languages. Almost all students speak English (97%). Most of them speak French (53%), and fewer speak Spanish (28%), Italian (27%), Arabic (24%), Portuguese (24%), German (20%), Chinese (4%), Catalan (2%), Dutch (2%), Russian (2%) and Polish (1%). It should be noted that, when added together, the total is not 100%, because the respondents had the possibility of choosing several answers. In addition, 39% of the students reported that they had lived abroad and 25% declared they had participated in exchange programs (most of which were in Europe, 63%).

As far as their work experience is concerned, almost half of the associates reported they had worked as volunteers in another organization and that they had work experience (48% and 45%, respectively).

In addition, it is interesting to note what are the skills that JADE helps its members develop. Figure 4 illustrates that participation in JADE activities helped associates develop teamwork (18%) and communication skills (16%), and learn to take responsibility (14%). In fact, when students were asked the reasons that drove them to take part in the organization, most of them reported that the main reason was to improve their skills (87%) and their networking (65%). Additionally, 83 associates (32%) answered they were driven to have a positive impact on society and a total of 60 associates (23%) answered that they entered the organization in order to learn how to start a business. Only 40 students (15%) indicated that they joined JADE for leisure purposes.

**Figure 4 - Skills learned thanks to JADE's experience**



Note: The total is not 100% because respondents could have chosen multiple answers

### 4.4.3 Variables

The dependent variable (entrepreneurial intention) was derived from the answers to a specific question in the survey: “How do you see yourself when you finish your current studies?”. The respondents could answer by choosing among five different options: i) becoming an employee in the public sector; ii) becoming an employee in the private field; iii) starting their own company; iv) starting a new study program; or v) other. This question and its answers derive from the study of Krueger (1993). In more detail, Krueger (1993) explained that entrepreneurial intention depends on perceptions and experiences. Moreover, according to Krueger (1993), entrepreneurial intention emerges much earlier than the real creation of a business. Therefore, Krueger (1993) suggested that entrepreneurial intention can emerge very early but even very strong entrepreneurial intention may not reach the actual creation. However, entrepreneurial intention can be stimulated. Therefore, the dependent variable is therefore a binary variable that is equal to 1, if the respondents answered they wanted to start their own company, and 0 otherwise, as has been done in similar works (e.g., Laspita et al. 2012; Zhang et al. 2014; Criaco et al. 2017).

The independent variables refer to different entrepreneurial experiences that affect students’ entrepreneurial intention. In other words, this study has used three different entrepreneurial experiences. First, it considers the number of hours per week that, on average, an associate spends working for JADE. This variable reflects the effort that students put into working for the organization. Since SLEOs can stimulate entrepreneurial competences through their activities (Pittaway et al. 2011, 2015), it was expected that this variable could influence

students' entrepreneurial intention. In fact, the more hours students work for the organization, the more activities they are able to attend, organize and accomplish and hence, the higher the likelihood is that they will increase their entrepreneurial intention. During the hours spent in the association, members can have the opportunity to learn by doing, to add practical experience to their theoretical skills and to develop entrepreneurship competences (Padilla-Angulo 2017). In other words, SLEOs help students improve their entrepreneurial competences and intention through different mechanisms: by shaping the social norms, such as students' personal relationships, that influence the process of entrepreneurial learning (Cope 2005; Pittaway and Cope 2007 a, b) and by emulating entrepreneurial experiences (Fayolle and Gailly 2015), thus stimulating students' problem-solving abilities, as well as their communication, leadership and team work skills (Preedy and Jones 2017).

Second, another independent variable is the number of projects that students have carried out within JADE. The involvement in a greater number of projects can lead students to enhance their experience, improve their technical and soft skills (e.g., project management, communication, leadership and teamwork) and develop a network of contacts from industry and service professionals, thereby influencing their entrepreneurial intention. Networking is in fact a key component for entrepreneurship (e.g., Zimmer and Aldrich 1987; Sandhu et al. 2011), since it reduces the perceived risk of action (Brüderl and Preisendörfer 1998) and increases determination and perseverance in a process (Gimeno et al. 1997). In addition, students can foster their entrepreneurial competences by running real-projects (Pittaway et al. 2011; Gibcus et al. 2012; Preedy and Jones 2017). In fact, consulting projects can also have an impact on students' entrepreneurial intention (Kassean et al. 2015). In other words, by taking part in real experiences, students can play the role of a real entrepreneur (Corbett 2005; Clark et al. 2008) since they need to manage people and money, work in a team and negotiate (EC 2016).

Third, the last independent variable is the number of events that students have attended. This variable concerns the events organized both by JADE itself and by local JEs, aimed at improving students' competences, extending their networks and enhancing their entrepreneurial intention. During these events, students can meet other peers with similar interests and can work on new ideas.

In addition to the independent variables, there are some control variables. The control variables include: the respondent's field of study, their international mindset (knowledge of foreign languages and participation in exchange programs) and their work experience. As outlined in prior works, a student's field of study can have an impact on entrepreneurial intention (Sieger et al. 2014; Edelman et al. 2016; Criaco et al. 2017; Laskovaia et al. 2017; Morris et al. 2017). It has been found that students enrolled in Business studies have greater entrepreneurial intention than their colleagues (Wang and Verzat 2011; Sieger et al. 2014; Edelman et al. 2016; Morris et al. 2017). Nevertheless, Fayolle (1996) and Criaco

et al. (2017) also found a positive correlation between Engineering students and entrepreneurial attitudes. Similarly, Souitaris et al. (2007) pointed out that entrepreneurship programs raise the entrepreneurial intention of Science and Engineering students. Therefore, this study has also analysed whether different fields of studies can affect students' entrepreneurial intention. In other words, the analyses included Science & Technology as a dummy variable that was equal to 1 if the student's field of study was Sciences & Technology, and 0 otherwise.

In addition, the international mindset of the students was proxied by means of two variables: the number of foreign languages spoken and whether they had completed an exchange program. Mastering more than two foreign languages is important for business purposes (e.g., to facilitate interactions with people from different cultures). In fact, language ability is an important source for entrepreneurship since it allows entrepreneurs to successfully create market entry and new foreign market choice strategies more easily (Johnstone et al. 2018). Moreover, several studies (see Adesope et al. 2010 for a review) have also shown that individuals who speak two languages are endowed with better problem-solving skills and creativity. In addition, Ellis (2011) indicated linguistic distance as a major barrier to the communication of information about new opportunities. Therefore, it was expected that speaking more than two foreign languages would be positively correlated with developing entrepreneurial intention. The variable of interest was a dummy variable that was equal to 1 if the student spoke more than two foreign languages, and 0 otherwise. In other words, the variable was equal to 1 only if a student knew the language of his/her country of origin, plus two more languages. For instance, if a French student knew French, English and Spanish, the language variable was equal to 1.

In addition, having completed an exchange program can also have an impact on students' entrepreneurial intention (Brandenburg et al. 2014). As Brandenburg et al. (2014) pointed out, almost one out of ten Erasmus students start their own company, and more than three out of four plan to do so. This is because exchange programs allow students to create an international network, improve their soft skills and get in touch with different cultures, thus obtaining a better understanding of the international market. In fact, these programs can have an impact on the social norm of an individual. For instance, in the French context, Fayolle (1996) found a significant correlation between French engineering students' entrepreneurial intention and living abroad for at least six months. The same intuition was confirmed in Fayolle and Gailly (2015). This study has therefore included the exchange program variable as a dummy variable equal to 1 for students who have been on an exchange program, and 0 for those who have not.

Another control variable is students' work experience (e.g., Carr and Sequeira 2007; Laskovaia et al. 2017). Prior family business exposure has been found to correlate with the formation of entrepreneurial intent (Carr and Sequeira 2007). In

addition, experience in industry has been shown to have a positive impact on entrepreneurial performance (Cassar 2014; Smolka et al. 2016). Similarly, Edelman et al. (2016) showed that students' previous work experience is positively associated with a greater scope of venture activities. Laskovaia et al. (2017) pointed out that the experience of students in industry positively impacts their new venture performance. However, Sandhu et al. (2011) found no significant relationship between work experience and entrepreneurial intention. Therefore, this study has included a dummy variable equal to 1, if a student had a prior work experience, and 0 otherwise.

Moreover, this study has included other control variables in the model specification. One of these other controls is gender. Even though Verheul and Thurik (2001) showed that gender does not play an important role for startup activities, it is generally accepted that men have more entrepreneurial intention than women (Mathews and Moser 1995; Harada 2003; Wilson et al. 2007; Yordanova and Tarrazon 2010; Shinnar et al. 2012; Criaco et al. 2017; Morris et al. 2017). Research indicates that women have both lower entrepreneurial self-efficacy and lower entrepreneurial intention (Chen et al. 1998; Kourilsky and Walstad 1998; Criaco et al. 2017). Mazzarol et al. (1999) found that women are less likely to be founders than men. However, as suggested by Bandura et al. (2001), women may be influenced more by any perceived skill deficiency in the entrepreneurial field than men. Yousafzai et al. (2015) explain that the contextual and institutional pillars influence women's entrepreneurship. In their study, Kourilsky and Walstad (1998) compared perceptions of knowledge with actual knowledge of entrepreneurial competences and showed that while the competence levels of men and women were comparable, the latter were more likely to feel unprepared. Minniti et al. (2005) reported that these patterns emerge globally among adult women (i.e. women show lower levels of confidence and preparedness in their ability to succeed as entrepreneurs). Nevertheless, Smolka et al. (2016) found that being female is not significantly related to startup performance. Empirical evidence also indicates that, despite the growth in female entrepreneurship, men entrepreneurs are still almost twice as many as women entrepreneurs (Bosma and Levie 2009). In addition, as in previous studies, students' age has also been included as an additional control (Barber 2015; Minola et al. 2016 a; Smolka et al. 2016; Criaco et al. 2017; Laskovaia et al. 2017; Morris et al. 2017). Students' age can be correlated with entrepreneurial risk taking (Barber 2015). Previous works have shown that age is correlated with entrepreneurial intention (Hatten and Ruhland 1995; Harada 2003; Smolka et al. 2016; Criaco et al. 2017). Most studies have highlighted that younger people have a higher intention of starting new firms (Edelman et al. 2016; Smolka et al. 2016; Criaco et al. 2017), while only a few have pointed out the opposite (Cressy 1996). Since the JADE members come from several universities (48), the regression analyses of this Chapter do not apply a multilevel modeling analysis at university level. However, the regression analyses of this Chapter consider the logarithm of the GDP of the student's country of study as a proxy for the Country level.

Therefore, the GDP of the student's country of study has been included as a control (Laskovaia et al. 2017). Information on GDP has been derived from the World Bank dataset for the year 2015. It has been pointed out that countries with a lower GDP are generally associated with higher entrepreneurship rates (Wennekers et al. 2005; Uhlaner and Thurik 2007; Stephan and Uhlaner 2010). This is due to the lack of steady jobs, a fact that stimulates people to become entrepreneurs (Audretsch and Thurik 2001; GEM 2002). The most recent Global Entrepreneurship Monitor report (GEM 2017) has in fact shown Guatemala as the country where becoming an entrepreneur is the best career choice, Burkina Faso as the country with the highest status for successful entrepreneurs, and Jamaica as the country with the highest attention towards entrepreneurship. Moreover, Laskovaia et al. (2017) found that GDP has a negative effect on new venture performance. Furthermore, Sambharya and Musteen (2014) found a curvilinear relationship between per capita GDP and opportunity-driven entrepreneurship.

Table 18 illustrates the definitions of the variables used in the empirical analysis, as well as the main descriptive statistics. The Appendix B reports the correlation matrix of the variables (Annex C). The Table shows that the value for the correlation between two regressors is never higher than 0.40<sup>41</sup>. The exception is the expected correlation between N\_events and Time\_spent (0.42). Therefore, these two variables are not in the same regression analysis.

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<sup>41</sup> Correlation coefficients whose magnitude are between 0.4 and 0.7 indicate variables which can be considered moderately correlated. Therefore, it is better to avoid the variables with a correlation coefficient whose magnitude is higher than 0.4 in the same regression analysis to avoid problem of multicollinearity.

**Table 18 - Variables definition of Chapter 4**

	<b>Variable</b>	<b>Definition</b>	<b>Mean</b>	<b>Median</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
Dependent	Entrepreneurial Intention	Dummy variable that is equal to 1 if the student wants to start his/her own company and 0 otherwise.	0.14	0	0.35	0	1
Independent	Time_spent	The number of hours, on average, that a student works per week for the JADE organization.	12.32	12	6.07	7	25
	N_projects	The number of projects that the student has carried out in JADE.	2.89	2	2.75	0	11
	N_events	The number of events that the student has attended.	5.67	3	8.40	0	58
Controls	Science & Technology	Dummy variable that is equal to 1 if the student studies in the field of Science & Technology and 0 otherwise.	0.47	0	0.50	0	1
	Foreign_Languages	Dummy variable that is equal to 1 if the student speaks more than two foreign languages and 0 otherwise.	0.65	1	0.48	0	1
	Exchange_Program	Dummy variable that is equal to 1 if the student has participated to an exchange program and 0 otherwise.	0.25	0	0.44	0	1
	Work_Experience	Dummy variable that is equal to 1 if the student had a previous work experience job and 0 otherwise.	0.45	0	0.50	0	1
	Male	Dummy variable that is equal to 1 if the student is male and 0 otherwise.	0.46	0	0.50	0	1
	Age	Student's age.	21.70	22	1.71	18	26
	GDP	GDP of the student's country of study (logarithm).	12.76	12.20	1.63	10.67	15.03



## 4.5 Empirical results

In order to investigate which factors shape the willingness of students belonging to SLEOs to become entrepreneurs, a logistic regression analysis has been performed. Since two predictor variables are highly correlated (*N\_events* and *Time\_spent*), this study has reported the results separately in two different Tables.

Table 19 reports the logit estimates, in which the variable *Time\_spent* is included among the regressors. Model 1 is the baseline model. Model 2 adds the student's education field. Model 3 includes the variables that reflect the student's foreign experience. The student's work experience is introduced in Model 4.

**Table 19 - Logit regression. Dependent variable: Entrepreneurial Intention**

	Model (1)		Model (2)		Model (3)		Model (4)	
<i>Time_spent</i>	0.086**	(0.038)	0.079**	(0.039)	0.089**	(0.040)	0.084**	(0.040)
<i>N_projects</i>	-0.182	(0.113)	-0.128	(0.119)	-0.165	(0.125)	-0.172	(0.128)
Science & Technology			1.582**	(0.582)	1.818**	(0.637)	1.686**	(0.655)
Foreign Languages					1.154*	(0.624)	1.177*	(0.635)
Exchange Program					1.138	(0.859)	1.112	(0.856)
<i>Work_Experience</i>							-0.236	(0.530)
Male	-0.370	(0.442)	-0.665	(0.469)	-0.492	(0.486)	-0.436	(0.491)
Age	0.227	(0.138)	0.235	(0.155)	0.249	(0.157)	0.265	(0.163)
GDP	-0.675***	(0.161)	-0.505**	(0.165)	-0.555**	(0.209)	-0.532**	(0.210)
Constant	0.874	(3.575)	-2.234	(3.884)	-3.370	(4.266)	-3.800	(4.357)
Observations	228		224		223		221	
Log likelihood	-71.03991		-66.27188		-62.33723		-61.60880	
Pseudo R2	0.2163		0.2641		0.2921		0.2828	

The Table reports the logit estimates in which this study includes the variable *Time\_spent* among the regressors. Model 1 is the baseline model. Model 2 adds the student's education field. Model 3 includes the variables reflecting the student's foreign experience. Model 4 introduces the student's work experience. Standard errors are in parentheses. Prob > chi2 = 0.000 for all models. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.001

In all the model specifications, the *Time\_spent* variable presents a statistically significant and positive impact on students' entrepreneurial intention. This result indicates that the time that students spend in JADE positively shapes their subsequent willingness to start a new business. In fact, the higher the time devoted to the activities organized by JADE is, the higher the likelihood that students will increase their entrepreneurial competences that will ultimately affect the development of their entrepreneurial intention. Surprisingly, the analyses have not revealed a statistically significant impact of the number of projects that students have carried out in this organization on their entrepreneurial intention. An explanation of this result could be related to the consultancy-based nature of some of these projects. Although no information on the contents of the projects is available, informal talks with some JADE members have revealed that, in many cases, projects have opened the door to contacts (and subsequent hiring) with

consultancy companies. The mere number of projects alone may not be sufficient to explain the members' entrepreneurial intention, as the content of the project probably would have. The estimates of the marginal effects show that when the *Time\_spent* variable moves from zero to its mean value, the probability of having entrepreneurial intention increases by 0.5 percentage points.

As far as individual-level factors are concerned, the Sciences & Technology field of study has a statistically significant and positive impact on students' entrepreneurial intention, as found by Criaco et al. (2017). This effect is significant at a 5% level in all the model specifications. Owing to the fact that the two variables concerning the field of study (Science & Technology and Business) together present a high correlation (-0.6520), Business was not included in the analyses. However, this study has also run the same regressions controlling for Business instead of Science & Technology, without finding any significant effect of the Business field of study. In terms of marginal effects, being enrolled in the Sciences & Technology field of study significantly increases the probability of developing entrepreneurial intention by 13.17%.

The estimates show that students who speak more than two foreign languages are more likely to develop entrepreneurial intention than their peers. Here again, the magnitude of the effect is high. The probability of having entrepreneurial intention is, on average, about 10 percentage points higher for students who speak more than two foreign languages. However, this variable is not statistically significant in a robustness check.

Additionally, the GDP of the country of study was found to be negatively and significantly associated with students' entrepreneurial intention. This result is interesting, because it indicates that students from lower income countries are more willing to create new businesses than their peers, despite their country's poor growth perspectives. Laskovaia et al. (2017) found the same result.

Table 20 reports the logit estimates where the N\_events variable is included among the regressors. Model 1 is the baseline model. Model 2 adds the student's education field. Model 3 includes the variables that reflect the student's experience abroad. Student's work experience is introduced in Model 4.

**Table 20 - Logit regression. Dependent variable: Entrepreneurial Intention**

	Model (1)		Model (2)		Model (3)		Model (4)	
N_events	0.072**	(0.027)	0.060**	(0.027)	0.072**	(0.030)	0.072**	(0.030)
N_projects	-0.163	(0.114)	-0.107	(0.118)	-0.144	(0.125)	-0.164	(0.131)
Science & Technology			1.318**	(0.596)	1.552**	(0.643)	1.421**	(0.663)
Foreign Languages					1.107*	(0.647)	1.095*	(0.657)
Exchange Program					1.281	(0.884)	1.281	(0.882)
Work_Experience							-0.118	(0.566)
Male	-0.606	(0.495)	-0.834	(0.514)	-0.693	(0.534)	-0.599	(0.540)
Age	0.154	(0.142)	0.180	(0.161)	0.178	(0.165)	0.181	(0.172)
GDP	-0.630***	(0.168)	-0.516**	(0.171)	-0.591**	(0.221)	-0.570**	(0.223)
Constant	2.504	(3.710)	-0.158	(3.956)	-0.553	(4.454)	-0.749	(4.591)
Observations	221		217		216		214	
Log likelihood	-64.39230		-60.51257		-57.01402		-55.93382	
Pseudo R2	0.1956		0.2392		0.2634		0.2553	

The Table reports the logit estimates in which this study includes the variable N\_events among the regressors. Model 1 is the baseline model. Model 2 adds the student's education field. Model 3 includes the variables reflecting the student's foreign experience. Model 4 introduces the student's work experience. Standard errors are in parentheses. Prob > chi2 = 0.000 for all models. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.001

The N\_events variable displays a statistically significant and positive sign in all the model specifications (at a 5% significant level). A unit change in the N\_events variable increases the probability of having entrepreneurial intention by 0.004. This result reinforces the expectation that the higher the effort that students put into JADE activities is, the higher the likelihood of developing entrepreneurial intention is. All the results presented previously have been confirmed when the N\_events variable was substituted with the Time\_spent variable in the regression analyses.

In addition, as a robustness and endogeneity check, this Chapter ran the two regressions models presented in the previous two Tables with a linear regression model as suggested by Angrist and Pischke (2008). In more detail, Table 21 and Table 22 present the linear regressions.

**Table 21 - Linear regression. Dependent variable: Entrepreneurial Intention**

	Model (1)		Model (2)		Model (3)		Model (4)	
Time_spent	0.009**	(0.004)	0.008**	(0.004)	0.007**	(0.004)	0.007**	(0.004)
N_projects	-0.013	(0.009)	-0.012	(0.009)	-0.013	(0.009)	-0.013	(0.009)
Science & Technology			1.582**	(0.582)	1.818**	(0.637)	1.686**	(0.655)
Foreign Languages					1.154*	(0.624)	1.177*	(0.635)
Exchange Program					1.138	(0.859)	1.112	(0.856)
Work_Experience							-0.236	(0.530)
Male	-0.025	(0.043)	-0.059	(0.044)	-0.037	(0.046)	-0.033	(0.046)
Age	0.027**	(0.013)	0.022	(0.013)	0.020	(0.013)	0.021	(0.014)
GDP	-0.071***	(0.014)	-0.058**	(0.015)	-0.055**	(0.016)	-0.052**	(0.016)
Constant	0.402	(0.314)	0.306	(0.313)	0.247	(0.320)	0.198	(0.337)
Observations	228		224		223		221	
Log likelihood	-58.94302		-54.17617		-50.42550		-48.81877	
Pseudo R2	0.1453		0.1815		0.1800		0.1670	

The Table reports the linear estimates in which this study includes the variable *Time\_spent* among the regressors. Model 1 is the baseline model. Model 2 adds the student's education field. Model 3 includes the variables reflecting the student's foreign experience. Model 4 introduces the student's work experience. Standard errors are in parentheses. Prob > F = 0.000 for all models. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.001

The results from Table 21 are in line with the results of Table 19. The only different regards the variable *Age* that is statistically significant for the linear regressions in the Model 1. However, similarly to Table 19, Table 21 shows that the variable *Age* is not statistically significant in Model 2, Model 3 and Model 4. However, all the *Pseudo R2* are lower in Table 21 than in Table 19. It may indicate that the logit regression is better than linear regression for these analyses.

**Table 22 - Linear regression. Dependent variable: Entrepreneurial Intention**

	Model (1)		Model (2)		Model (3)		Model (4)	
N_events	0.007**	(0.003)	0.006**	(0.027)	0.006**	(0.003)	0.006**	(0.003)
N_projects	-0.010	(0.008)	-0.010	(0.008)	-0.011	(0.008)	-0.012	(0.008)
Science & Technology			0.119**	(0.046)	0.121**	(0.045)	0.111**	(0.046)
Foreign Languages					0.067	(0.043)	0.066	(0.043)
Exchange Program					0.046	(0.054)	0.048	(0.054)
Work_Experience							-0.011	(0.045)
Male	-0.039	(0.042)	-0.067	(0.043)	-0.043	(0.045)	-0.036	(0.045)
Age	0.021	(0.013)	0.017	(0.013)	0.015	(0.013)	0.015	(0.013)
GDP	-0.059***	(0.014)	-0.049**	(0.014)	-0.048**	(0.015)	-0.046**	(0.016)
Constant	0.436	(0.302)	0.352	(0.302)	0.311	(0.310)	0.288	(0.325)
Observations	221		217		216		214	
Log likelihood	-46.94371		-43.27227		-39.63361		-37.29484	
Pseudo R2	0.1174		0.1491		0.1424		0.1300	

The Table reports the linear estimates in which this study includes the variable N\_events among the regressors. Model 1 is the baseline model. Model 2 adds the student's education field. Model 3 includes the variables reflecting the student's foreign experience. Model 4 introduces the student's work experience. Standard errors are in parentheses. Prob > F = 0.000 for all models. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.001

The results from Table 22 are in line with the results of Table 20. The only different regards the variable *Foreign Languages* that is not statistically significant for the linear regressions. However, all the *Pseudo R2* are lower in Table 22 than in Table 20. It may indicate that the logit regression is better than linear regression for these analyses.

In conclusion, the results show how students' participation in JADE positively affects their entrepreneurial intention. In fact, the findings show that the more effort students put into this organization and the more events they follow, the higher the probability of increasing their entrepreneurial intention is. The Science and Technology field of study is another important driver of entrepreneurial intention. Therefore, the results confirm the results from Souitaris et al. (2007) that entrepreneurship is also interesting for technical students.

## 4.6 Discussion and conclusion

Developing and promoting entrepreneurship is one of the key policy objectives of many countries around the world (e.g., Lewis and Llewellyn 2004; OECD 2009; O'Connor 2013; Valerio et al. 2014). Therefore, several researchers (e.g., Fonseca et al. 2001; Mustar 2009; Hoppe 2016) have started to study which activities are able to stimulate entrepreneurship. Numerous studies have examined

the role played by specific EE programs in influencing students' entrepreneurial intention (Peterman and Kennedy 2003; Souitaris et al. 2007; Pruett et al. 2009; Engle et al. 2010; Oosterbeek et al. 2010; Lanero et al. 2011; Sánchez 2011, 2013; Saeed et al. 2014), but this Chapter has focused on how the participation of students in SLEOs affects their entrepreneurial intention. It has been pointed out that SLEO members have the opportunity of networking, sharing ideas, working in multidisciplinary and international teams and attending entrepreneurial events and workshops. As suggested by Fayolle and Gailly (2009), SLEOs allow students to work in a similar environment as the one faced by entrepreneurs. Therefore, SLEOs are considered as important actors in promoting an entrepreneurial environment and culture that can foster entrepreneurship at university (Siegel and Wright 2015; Rissola et al. 2017). However, despite being an important and growing phenomenon, only a few studies have so far analysed SLEOs (Pittaway et al. 2011, 2015; Padilla-Angulo 2017; Preedy and Jones 2017).

In order to study the impact of SLEOs on students' entrepreneurial intention, this research developed a survey in 2016 in collaboration with one of the most famous SLEOs in the world: JADE. The answers to a survey distributed to JADE members have revealed that the more time spent in JADE and the higher the number of events students attended are, the higher their entrepreneurial intention was. This indicates that JADE plays an important role in driving students' entrepreneurial intention and in fostering the entrepreneurial culture and ecosystem inside a university. For instance, by being members of JADE, students can develop their entrepreneurial intention through learning through mistakes, learning by doing and learning from entrepreneurs (Pittaway et al. 2015). Moreover, they can create multidisciplinary and international teams, share their experiences with other peers interested in becoming entrepreneurs, enlarge their network and meet entrepreneurs (Padilla-Angulo 2017). Furthermore, thanks to the sharing of ideas, students can receive feedbacks on their entrepreneurial ideas (Pittaway et al. 2011, 2015).

The findings indicate that SLEOs need to be considered in future research on entrepreneurial intention and competences. For instance, it could be interesting to understand whether students' experiences in SLEOs have a greater impact on students' entrepreneurial intention and competences than entrepreneurship courses. In this way, it will be possible to analyse the combined effect of SLEOs and EE on entrepreneurial intention and competences. In addition, since SLEOs are important actors in the entrepreneurial ecosystem, they should be included in future studies on the entrepreneurial culture and ecosystem of universities. It could be interesting to understand the effect of the collaboration of SLEOs with other local actors, inside and outside the university, in order to offer EE (e.g., events, workshops, business competitions, hackathons) with the ultimate aim of fostering the entrepreneurial culture of students at universities.

The results also show that when the field of study of a student is Science and Technology, there is a higher probability of their developing entrepreneurial intention. A more scientific background allows students to have a greater knowledge of technology than students from other backgrounds and this knowledge can be turned into real entrepreneurial projects, thus affecting the probability of starting a new business. Therefore, it is also important to stimulate entrepreneurial intention in technical students (Souitaris et al. 2007). In conclusion, the results indicate that, in addition to experiences in SLEOs, other individual-specific attributes and the curriculum are also important factors that lead to shaping the willingness of students to become entrepreneurs. However, this study has not found any difference according to the gender of students. This may be due to the fact that females who choose to be part of SLEOs have a greater self-efficacy than the average student. This aspect deserves to be investigated in future research.

The findings offer several theoretical and practical implications for SLEOs, universities and policy makers. SLEOs are encouraged to enhance their visibility and lobbying, both at a local and an international level, in order to be better recognized as drivers of student entrepreneurship. Given the usefulness of these organizations in developing students' entrepreneurial intention, it is advisable for universities to support and help students interact with them. Furthermore, universities could strengthen their technology transfer and entrepreneurial experiences by including SLEOs in consultations, and foster SLEO interactions with other actors who promote entrepreneurship and technology transfer activities. They could, for instance, favor interactions with universities, entrepreneurship professors, incubators, entrepreneurship research centers and TTOs. Universities that excel in offering these opportunities could thus differentiate themselves from other universities and attract a higher number of students. Moreover, policy makers could sustain SLEOs financially and foster their interactions with other entrepreneurial system actors (e.g., private incubators, venture capitalists, entrepreneurship associations). SLEOs could in fact play an important role within the entrepreneurial ecosystem (Rissola et al. 2017). For instance, they could support the development of an entrepreneurial culture, by organizing events and public initiatives and by allowing students from different backgrounds, different education levels and different countries to work in groups to enhance their entrepreneurial competences. Furthermore, SLEOs could connect like-minded individuals within the community and create a link between different local actors. Many universities have in fact started to recognize this role (for example UC Berkeley and Aalto University) and to consider SLEOs as part of the entrepreneurial ecosystem in which the university is involved. Moreover, as Pittaway et al. (2015) suggested, students tend to join these SLEOs in order to improve their networking, learning through mistakes and learning by doing skills, and to acquire soft skills and experiences.

This study is not without limitations. The main limitation is that the survey has only been addressed to the members of one SLEO (albeit the largest one) and a control sample is lacking. Furthermore, the sample has a population of diversified nationalities, with certain countries being present with a higher percentage than others in the sample. Additionally, the analysis was only conducted in Europe. Moreover, this Chapter did not control for family background of the students that some studies (e.g., Saeed et al. 2014) found relevant. In addition, this Chapter did not include any theories on entrepreneurship. Moreover, the analyses of this Chapter may present reverse causality since a student can become an associate of a SLEO because he/she has already entrepreneurial intentions. Another limitation is that it is not possible to know whether the students that responded to the survey will continue on their path toward entrepreneurship. One way of enhancing the analysis would be to keep trace of the students' career progress. In this way, it would be possible to verify whether the students have actually become entrepreneurs and whether, and how, the SLEO experience served as a steppingstone venture creation. Future research could therefore study which types of startups have been founded by SLEO associates and how the founders evaluate their experience in the SLEO. Moreover, it could be interesting to focus on students enrolled not only in Europe but also outside Europe (such as in the US, China or in developing countries) in order to understand whether and how the impact of SLEOs changes across countries and to measure how the cultural differences of different countries impact entrepreneurial intention (Farashah 2015; Paul et al. 2017). In addition, taking part in a SLEO is probably not the only factor of influence on entrepreneurial intention. It could interact with other factors, such as the use of social media (and who students follow on social media), the role played by their professors and mentors and the societal appraisal of entrepreneurship, to mention just a few. Moreover, it would be intriguing to assess the impact of SLEOs on the entrepreneurial ecosystem and society as a whole.



# Chapter 5

## Encouraging Entrepreneurial Competences development in Italian Universities' students: insights from the “Contamination Lab” cases

*This Chapter builds on two international conferences (Fiore et al. 2019 b; Secundo et al. 2019) and a Book Chapter which is under review for a book within the Springer's International Studies in Entrepreneurship series.*

### 5.1 Introduction

The EE enables students to absorb and combine the new knowledge acquired and sustain them in their process of opportunity recognition and translation of idea in action (Bae et al. 2014). In fact, EE is central to student entrepreneurship (Lüthje and Franke 2003; Saeed et al. 2015). The EE goals' achievement requires the university to be engaged in partnerships, networks and business activities with companies and other external stakeholder, to enrich the knowledge contamination process among them. In order to create an environment able to foster entrepreneurial competences is also necessary to involve a large community of stakeholder belonging to the local entrepreneurial ecosystem (Bischoff et al. 2018) and students with different degree's programmes (Fiore et al. 2019 a, b). This requires the need to understand more in depth of the mechanism of entrepreneurial mindset and awareness creation and knowledge transfer among the stakeholders belonging to the local ecosystem activating in an EE programmes. At this purpose, some Italian Universities have created different

project for entrepreneurship development such as “Contamination Lab” (CLabs) financed by the MIUR (Italian Ministry of University and Research) in created in 2016, that is an innovative Laboratory aimed at developing an entrepreneurial mindset, creativity and innovation in the university’s students enrolled in the different curricula through innovative entrepreneurial learning approaches based on action-learning and experiential learning. Consequently, these CLabs also aim at supporting universities to reach their ‘Third Mission’ by improving the EE and the entrepreneurial culture of these universities.

Framed in the above premises and with the aim to cover the mentioned gap, the Chapter aims to contribute on the debate related to the EE through the analysis of the Italian Contamination Labs (CLabs) whose aim is to develop an entrepreneurial mindset in university’s students through contamination processes activated with faculty, alumni and local entrepreneurs. In more detail, as suggested in Chapter 2, this Chapter aims at analysing the strategic role of CLabs in Italian Universities in order to explain how CLabs work and how CLabs are supporting university to foster their ‘Third Mission’. Therefore, this Chapter is based on a qualitative method of analysis with a “macro” level of analysis: university level. At this aim this Chapter adopts a cross case study methodology for the analysis of a contemporary phenomenon in its natural setting (Yin 2003). In fact, a qualitative approach provides broader information than quantitative approaches and helps understand the environment where organizations operate and identify cause–effect relations (Myers 2009). The research context is a sample composed by four CLabs among the 22 created in Italy. The four cases chosen, CLab at Politecnico of Bari (DigiLab), CLab at University of Basilicata (CLab Unibas), CLab at University of Salento (CLab@Salento) and CLab at Politecnico di Torino and University of Turin (CLabTo), represents a successful examples of Italian CLabs supporting the development of an entrepreneurial awareness and innovative projects in young talent. The originality of this Chapter is that this Chapter analysis a new instrument for fostering entrepreneurial mindset in university’s students in Italy.

Findings highlight the common and distinctive features of each CLabs in terms of mission, target students, selection procedures and entrepreneurial learning processes in the Italian CLabs. In addition to this, this Chapter explains how Italian Universities thanks to these CLabs are integrating the local entrepreneurial ecosystem in their EE to favour the virtuous connection between Industry and University. Furthermore, the CLabs represent the ideal locus for the promotion of open and diffused innovation supported by the creativity of young and motivated talents that interacting with a plurality of local stakeholders can become the “ambassadors” for the development of their local entrepreneurial ecosystem. Therefore, CLabs are Laboratories able to help universities to reach their ‘Third Mission’. Moreover, thanks to the activities performed at CLabs, these Laboratories represent a place where universities can foster student entrepreneurship. In other words, the overall contribution of this Chapter is to

present and understand an important instrument to reach the universities 'Third Mission' in Italy.

The remaining of the Chapter is organized as follows: next section introduces the research method and the 4 case studies. Then, this Chapter highlights the main findings from each case study. Finally, last section concludes the Chapter illustrating implication for theory, implications for practices, limits and future research agenda.

## **5.2 Research method**

Given the main aim of this Chapter, the case study methodology (Yin 2013) is appropriate to analyses events that cannot be controlled and to support researchers to collect qualitative data and to derive theory from phenome in real life, since it has demonstrated to be a powerful mean for building theory (Eisenhardt 1989). This methodological approach requires not only a simple observation of the social phenomena but also an interpretation by the researchers (Ryan et al. 2002) with the consequence that different possibilities are generated according to the different perspectives of the researchers (Glaser and Strauss 1967; Wacker 1998). Specifically, with the aim to make a novel comparison among the phenomenon of the Italian Contamination Lab, this Chapter adopted a cross case comparison of four Italian Contamination labs located in north and South Italy within Public Universities having also different focalization (Polytechnics and generalist Universities).

### **5.2.1 Research Context**

The research context is the CLab created inside some Italian Universities and financed by the MIUR created as innovative Laboratory aimed at developing an entrepreneurial mindset, creativity and innovation in the university's students enrolled in the different curricula though innovative entrepreneurial learning approaches based on action-learning and experiential learning. Therefore, CLabs aim to foster student entrepreneurship and to reach the 'Third Mission'

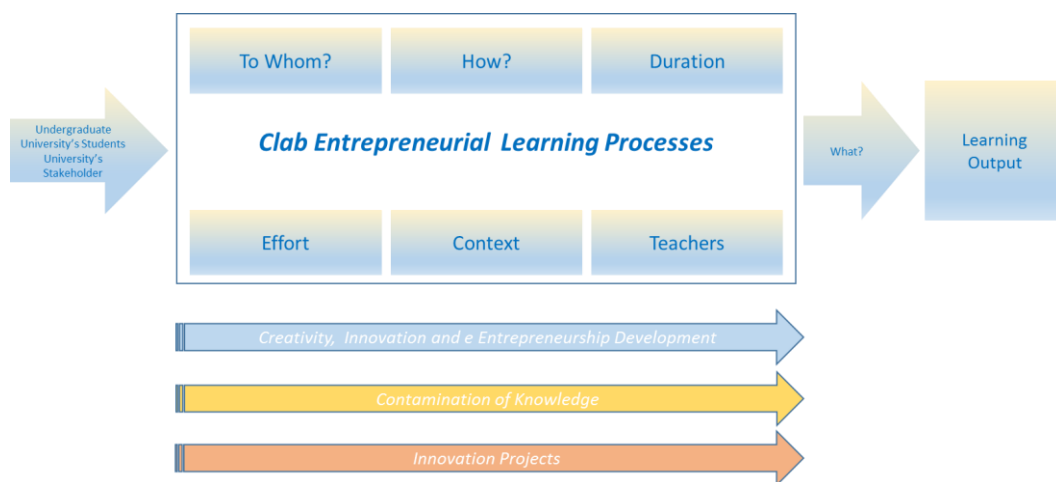
The students selected for participating to CLab extra-curricular experiences, have the possibility to define a business idea, to develop the business models and to write a final business plan, thanks to the process of contamination with mentor/tutor, managers and entrepreneurs supporting them in all the phases. This has been achieved using innovative learning methodologies based on the contamination of different background, interdisciplinary teams, project-based learning activities guided by different local and international stakeholders.

For the purpose of this study, four cases of Contamination Labs have been selected according to a convenience sample: Contamination Lab at Polytechnic of Bari (DigiLab), Contamination Lab at University of Basilicata and Contamination Lab at University of Salento (CLab@Salento), Contamination Lab at Politecnico di Torino and University of Turin (CLabTo). This choice is also justified from the need to compare the different features of the CLabs between the Universities and the Polytechnic.

## 5.2.2 Data Collection and Analysis

Multiple data collection methods have been used to exploit the synergistic effects of combining them via triangulation (Eisenhardt 1989) consisting in the combination of investigative techniques to reduce the bias of a single observation in comparison of multiple data. The analysis of data followed an inductive and iterative process (Strauss and Corbin 1998). The data collection process covered a period of two years, starting from October 2017.

Figure 5 - The research framework of Chapter 5



Next section aims to describe more in depth the distinctive features of the Contamination Lab (CLab) in the Universities of the study in terms of target students, methodologies and approaches, duration of the programme, effort required, main context of application and the teachers involved in the learning process.

## 5.3 Research Findings

### 5.3.1 The distinctive features of the Italian Contamination Labs

The CLabs analysed have the same mission and vision regarding the development of entrepreneurial mind-set, innovation and sustain academic

entrepreneurship among all the students, but they organize their activities in different way and duration.

This section describes the different features of each CLab analysed according to the same template of analysis containing the following information of comparison: CLab web site and social web page; Promoter of the CLab; Duration of the programme; CLab's aim, CLabs's area, Clabs' timeline, Target students, Modality of Selection, Stakeholders, Value for participants, Learning approach, CLab's Learning phases, CLab's Learning contents, Evaluation Scientific Committee, Class composition, Final Award.

Table 23 focuses on the main entrepreneurial learning process realized within the 6 months program at DigiLab at Polytechnic of Bari.

**Table 23 -The Contamination Lab at Glance: the DigiLab at Polytechnic di Bari**

<b>CLab Name</b>	<b>DigiLab</b>
CLab web site and social web page	<a href="http://digilab.poliba.it/">http://digilab.poliba.it/</a> Facebook: <a href="https://www.facebook.com/digilab.poliba.it/">https://www.facebook.com/digilab.poliba.it/</a> Instagram: <a href="https://www.instagram.com/digilab_poliba/">https://www.instagram.com/digilab_poliba/</a> LinkedIn: <a href="https://www.linkedin.com/in/digilab-619578173/">https://www.linkedin.com/in/digilab-619578173/</a>
Promoter	Polytechnic of Bari, Italy
Duration	6 months
Aim	DigiLab was born as a place for the promotion of entrepreneurial culture through the contamination of competences of young people and experts from various contexts, thus enriching the traditional university education with original methods and applied to the current needs of the contemporary world.
Area	Particular focus is the digital economy and its vast applications in all the business industries and third sector, such as the green economy, agribusiness, industry, commerce, health, public administration, tourism and entertainment, but also volunteering, social assistance, research, etc.
Timeline	From November to June of each Academic year.
Target students	University's students and Ph.D.'s students from all the educational level and all the departments of Polytechnic of Bari and University of Bari.
Modality of Selection	Competition Announcement followed by CV evaluation and motivational interviews.
Stakeholders	Professors and researchers, entrepreneurs, managers of the local entrepreneurial ecosystem, incubators, coworking places, investors, experts in entrepreneurship and innovation, local and international institutions.
Value for participants	Develop "spirit of initiative and entrepreneurship", ability to work in an interdisciplinarity team, integrate engineering, humanities and entrepreneurial competences to develop business ideas.
Learning approach	Develop soft skills together with technological approaches,

	especially in the area of digital economy, and managerial/entrepreneurial methodologies, such as business planning, business canvas, design thinking.
Learning Phases	Four different learning phases: creativity development and soft skills, digital technologies, entrepreneurship and management, and new business project development.
Learning Contents	Entrepreneurs are born or made; Business Pillars; Entrepreneurship Creativity and Creative Problem solving; Creativity development Techniques; Surfing complexity; Business Model; Business Plan; Design Thinking; Digital opportunities; AI technology and Big Data; Smart Manufacturing; IoT and Industry 4.0; Agile Methodologies; Communication and marketing; Operational Marketing; Social Media Marketing; Negotiations Techniques; Funding sources ; Funding for startup.
Evaluation committee	Made of professors from Polytechnic of Bari, company managers, professionals, stratuppers, experts in the field of new business development and investors.
Class composition	Students from different background and different level of education in order to guarantee an interdisciplinary composition.
Award	Teams are evaluated according to specific criteria and awarded in different ways, according to the committee decision. Some examples of awards are grant for startup development, mentorship, and participation to national startup competitions.

Table 24 focuses on the main entrepreneurial learning process realized within the 9 months program at CLab UniBas.

**Table 24 - The Contamination Lab at Glance: the CLab at Unibas**

<b>CLab Name</b>	<b>Contamination Lab at Unibas</b>
CLab web site and social web page	<a href="http://www.clabunibas.it/">http://www.clabunibas.it/</a> Facebook: <a href="https://www.facebook.com/clabunibas/">https://www.facebook.com/clabunibas/</a> Twitter: <a href="https://twitter.com/CLabUnibas">https://twitter.com/CLabUnibas</a> Instagram: <a href="https://www.instagram.com/clabunibas/">https://www.instagram.com/clabunibas/</a> LinkedIn: <a href="https://www.linkedin.com/company/contamination-lab-unibas/">https://www.linkedin.com/company/contamination-lab-unibas/</a>
Promoter	University of Basilicata, Italy
Duration	9 months per edition
Aim	CLab Unibas aims to be an open competence laboratory with a physical, virtual and relational nature. It, through an interdisciplinary approach and innovative models of engagement, learning, experimentation and communication, fulfills a function of catalyst, breeder and promoter of culture and knowledge for entrepreneurship and innovation.
Area	Particular focus is the Smart Specialization Strategy (S3) of Basilicata and its related areas of specialization: aerospace, automotive, bio economy, energy, cultural and creative industry,

	Digital Agenda and ICT.
Timeline	From November to July of each Academic year.
Target students	<ul style="list-style-type: none"> <li>• Unibas students enrolled in bachelor and master degree courses in all disciplines, Ph.D. students, post-graduates and spinoff founders</li> <li>• Students and foreign graduates in mobility at Unibas and students and recent graduates of universities that fall within a radius of influence from the city of Potenza of 200 km</li> <li>• Unibas university students not directly involved in the training course, but who will be contaminated through open initiatives; students and teachers of upper secondary schools; entrepreneurs and managers of public and private organization (both profit and no profit); employees of organizations.</li> </ul>
Modality of Selection	Competition Announcement followed by soft skills evaluation and motivational interviews.
Stakeholders	Professors and researchers, entrepreneurs, managers of the local entrepreneurial ecosystem, incubators, coworking spaces, investors, experts in entrepreneurship and innovation, local and international institutions.
Value for participants	Develop “ <i>entrepreneurability</i> ” competences, a proactive behavior and the mindset of an innovator.
Learning approach	The learning strategy is that of Flipped learning where the teacher become a mentor or coach, and where students collaborate according to the logic of peer learning. In this regard, lectures are replaced by technical seminars and facilitated interactive workshop. The learning methodology is that of action-based learning that favor experimentation, prototyping and act. This in order to create attitudes, behaviors and entrepreneurial competences together with the ability to combine and integrate the specialized skills that characterize the strategic areas of CLab Unibas.
Learning Phases	4 different learning phases: awareness, attitude, capacity and challenge.
Learning Contents	Building an enterprise culture; Team building and public speaking; Idea Generation; Smart Specialization Strategy (S3) Big Trends; Digital Trasformation; Developing Business Opportunities in the space economy: the role of new technologies; Innovation and Sustainability: Creative and Cultural industries, local development; Brainstorming & Idea Generation Session; Lean Startup; Product Market FIT & Product Management; Business Model Workshop: Business Model Canvas, Business Modeling; Public Speaking and elevator Pitch; Customer Discovery & Customer Validation: tools and approaches; “The leaders that change”; Business Plan & Project Financing.
Evaluation committee	Made of professors from University of Basilicata, company managers, professionals, stratuppers, experts in the field of new business development and investors.
Class composition	Students from different background in order to guarantee an

	interdisciplinary composition.
Award	Teams are evaluated according to specific criteria and awarded in different ways, according to the committee decision. Some examples of awards are mentorship, and participation to national startup competitions or international startup schools and/or bootcamp.

Table 25 focuses on the main entrepreneurial learning process realized within the 6 months program at CLab@Salento.

**Table 25 - The Contamination Lab at Glance: the CLab@Salento at University of Salento**

<b>CLab Name</b>	<b>CLab@Salento</b>
CLab web site and social web page	<a href="http://www.unisalento.it/clab">www.unisalento.it/clab</a> Facebook: <a href="https://www.facebook.com/clabsalento/">https://www.facebook.com/clabsalento/</a>
Promoter	University of Salento, Lecce, Italy
Duration	6 months per edition
Aim	Developing entrepreneurial mindset, creativity and innovation among students.
Area	Smart Technologies, Bio-economy, Creative and Cultural Industry.
Timeline	Three editions with a duration of six months, 150 hours per edition <ul style="list-style-type: none"> <li>• 1°edition: January- July 2018</li> <li>• 2°edition: December 2018 –June 2019</li> <li>• 3°edition: December 2019 –June 2020</li> </ul>
Target students	University's Students from different undergraduate courses, Ph.D.'s students and students from secondary schools.
Modality of Selection	Competition Announcement to evaluate the students' Curriculum and personal experiences followed by a motivational interview during which the participants could presents the personal business idea (if existing).
Stakeholders	Professors and tutors of University of Salento (Lecce, Italy), mentors from external Italian University, entrepreneurs, managers and Employee, enterprises, incubator and accelerator, association of categories, investors such as business angles and venture capitalists, experts in the entrepreneurship and innovation, local and international institutions, banks and foundations, Institutions, Banks belonging to the Apulia Region Local ecosystem.
Value for participants	Develop "spirit of initiative and entrepreneurship", ability to translate ideas into actions; integrate managerial and scientific skills for the analysis of business opportunities; develop team building skills and profitable contamination between different scientific areas.
Learning approach	Innovative methodologies based on the integration of seminars, case study, simulations with contamination workshop, meeting



	with entrepreneurs, project works, business plan competition, business game, students@abroad initiatives.
Learning phases	The learning content are organized in two phases: <ul style="list-style-type: none"> <li>• Phase 1: Inspiring &amp; Engaging for developing entrepreneurial awareness and generate new business ideas:</li> <li>• Phase 2: Experimenting &amp; Developing for translation of ideas into innovation projects.</li> </ul>
Learning Contents	Business idea Generation, Business Strategy and future trends; Impresa 4.0; Plan; Design thinking: from meaning to solution; Business model canvas; Technology trends in Cultural Industries, Tourism and Digital Technologies; Financing the startup; Innovation Management; Technology Entrepreneurship; Technology foresight and roadmapping; Business Pitch; The future of the Enterprise; Open innovation and innovation management; Copyright and Intellectual Property right; Digital Business: values and approaches; Business Plan, Family Business; Academic entrepreneurs; Employability and empowerment, Organizational Forms for startup; Open innovation workshop with companies.
Evaluation committee	Two kind of evaluation committee: <ul style="list-style-type: none"> <li>• Scientific Committee composed by mentors and university professors that provide guidance for the projects developed by students</li> <li>• Advisory Board composed by experts, managers, institution, university professor, external consultants that provides feedback and suggestion to the team.</li> </ul>
Class composition	Students from different background in order to guarantee an interdisciplinary composition
Award	Team are evaluated according to specific criteria and are awarded in different way according to the committee decision. The awards assigned are: the best Business Plan, The most Innovative Project and the best Research project.

Table 26 focuses on the main entrepreneurial learning process realized within the program at CLabTo.

**Table 26 - The Contamination Lab at Glance: the CLabTo at Politecnico di Torino and University of Torino**

<b>CLab Name</b>	<b>Contamination Lab of Torino - CLabTo</b>
CLab web site and social web page	<a href="https://www.clabto.it/">https://www.clabto.it/</a> Facebook: <a href="https://www.facebook.com/CLabTorino/">https://www.facebook.com/CLabTorino/</a> Twitter: <a href="https://twitter.com/CLabTO1">https://twitter.com/CLabTO1</a> Instagram: <a href="https://www.instagram.com/clabtorino/">https://www.instagram.com/clabtorino/</a> LinkedIn: <a href="https://www.linkedin.com/in/clab-torino-ab6035155/">https://www.linkedin.com/in/clab-torino-ab6035155/</a>
Promoter	Politecnico di Torino and University of Torino
Duration	CLab Workshop: 1 week or 2 weeks CLab Sprint: 2 weeks – 4 weeks CLab Master: 2 months – 6+ months

Aim	Developing students' innovative and entrepreneurial mindset in an interdisciplinary and informal environment
Area	Sustainable mobility, Food, AgriTech, Innovation, Entrepreneurship, Strategy
Timeline	Five challenges with a duration on average of 1 months: <ul style="list-style-type: none"> <li>• 1°challenge: July 2018 – July 2018</li> <li>• 2°challenge: October 2018 – October 2018</li> <li>• 3°challenge: October 2018 – December 2018</li> <li>• 4°challenge: April 2019 – April 2019</li> <li>• 5°challenge: May 2019 – June 2019</li> </ul>
Target students	University's students and Ph.D.'s students from all the educational level and all the departments of Politecnico di Torino and University of Turin. CLabTo is planning to create challenges for high school students too.
Modality of Selection	Competition Announcement followed by CV evaluation and motivational interviews.
Stakeholders	Professors and researchers of Politecnico di Torino and University of Turin, entrepreneurs, managers and employee of corporations in the local entrepreneurial ecosystem, corporations, incubators, accelerators, science parks, coworking places, maker places, SLEOs, investors such as business angles and venture capitalists, experts in the entrepreneurship and innovation, local and international institutions, banks and foundations.
Value for participants	Develop "spirit of initiative and entrepreneurship", ability to work in an interdisciplinarity team, translate theories into practices, integrate engineering, humanities and entrepreneurial competences to develop ideas or prototypes.
Learning approach	Innovative methodologies from the integration of theories and practices such as design thinking and EE from Professors and researchers of different departments of Politecnico di Torino and University of Turin.
Learning Phases	There are differences on the project learning phases based on the type of challenge. However, in general all the challenges are two phases. The first phase is more theoretical-based to explain the tools to generate ideas/prototypes and to create entrepreneurial awareness. The second phase is more practical-oriented where the students work in interdisciplinary teams to develop an idea/prototype.
Learning Contents	Business idea generation; Design thinking; Social and/or environmental sustainability; Business model canvas; Technology trends such as smart city, smart mobility, smart house, Internet of Things (IoT), AgriTech; Digital transformation; Business Pitch; Open innovation.
Evaluation committee	The evaluation committee is composed by Professors of Politecnico di Torino and University of Turin, staff of the TTO of Politecnico di Torino and experts from partners.
Class composition	Students from different background and different level of education in order to guarantee an interdisciplinary composition

Award	Team are evaluated according to specific criteria of the challenge and are awarded in different way according to the committee decision. Some examples of awards are grant for research or grant for mentorship to develop their idea/prototype.
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The next section will analyse the main entrepreneurial learning processes at the basis of the contamination process for business idea creation within each Contamination Lab.

### 5.3.2 Entrepreneurial Learning processes in the Contamination Labs: insights and evidences

What lead the Contamination lab process of “contamination” of experiences, background and knowledge is the entrepreneurial Learning process. Here a detailed analysis and comparison of the main processes used within the 4 CLabs cases is proposed. In all the Contamination Labs the entrepreneurial ecosystem is invited to exchange knowledge about the challenges of growing an innovative venture and the presence of many entrepreneurs in a region helps build up a support structure such as networks of investors, advisors, and mentors. The advantages of an entrepreneurial ecosystem are related to resources specific to the entrepreneurship process such as startup culture and financing rather than other types of industrial benefits found in clusters that accrue to firms of all sizes and ages (Spigel 2018). Moreover, all the CLabs want to foster student entrepreneurship thank to their activities. Contamination workshop around selected topic of interest for the clabbers are organized.

Figure 6 - The Entrepreneurial Learning Strategies in Italian Contamination Labs



*Entrepreneurial learning @ DigiLab:* At DigiLab the program includes a series of activities that will allow participants to develop distinctive skills, generate ideas and create new business opportunities. To achieve these goals is

required to understand the technologies opportunities, to be able to solve problems, to have a creative approach and interact with the territory and network. Some activities include team-building and generation of ideas; development of ideas directly with local companies; collaboration with the most active incubators in Italy; visits to innovative companies and startups; pitch session and meetings with investors. All DigiLab activities are part of a dynamic learning path, in which each topic/object of learning is connected in this vision and reinforced by contamination, through group work and comparison with experts and with entrepreneurs to discuss, discover, investigate and reflect. In this way, the path of the idea transformation will take form until the development of innovative business projects and the presentation to potential venture capital or business angels.

*Entrepreneurial learning @ Contamination Lab at Unibas:* The learning strategy is that of Flipped learning where the teacher become a mentor or coach, and where students collaborate according to the logic of peer learning. In this regard, lectures are replaced by technical seminars and facilitated interactive workshop. The learning methodology is that of action-based learning that favour experimentation, prototyping and act. This in order to create attitudes, behaviors and entrepreneurial competences together with the ability to combine and integrate the specialized skills that characterize the strategic areas of CLab Unibas. Seminars, and workshop are organized to contaminate the participants with a plurality of faculty belonging to university and Business context.

*Entrepreneurial learning @ CLab@Salento.* The learning strategy at CLab@Salento includes different processes. Business Plan competition (BPC) encourages and facilitates interaction between the participant and other competition stakeholders, namely, entrepreneurs, business professionals, researchers, enterprise support agencies, institutional representatives and investors (Russell et al. 2008). Such interaction is facilitated through the inclusion of expert-led training workshops, mentoring, coaching and awards ceremonies as common features of the BPC competition program. Typically, business plans allow to develop knowledge in action through the Acting and experimenting starting from idea generation and moving till the project development realized in collaboration with the main stakeholders of the entrepreneurial ecosystem. Within the program of CLab@Salento external stakeholders, such a venture capital, entrepreneurs and managers provide guide and assistance during all the various phases of idea development, starting from the idea generation till the elevator pitch to support the business launch in the form of startup or spinoffs or other. Others interesting entrepreneurial initiatives are Entrepreneurs in residence and Students@abroad, the first is a program in which experienced entrepreneurs give advice and share their knowledge with CLab's students during a CLab's session, the second have the objective to sustain the creation of collaboration and network with external actors, through the students' participation in conference, workshop, exhibition related to the themes of entrepreneurship and innovation.

*Entrepreneurial learning @ CLabTO.* Students' entrepreneurial learning at CLabTO is based on experiential learning through a challenged-based entrepreneurial course where students working in interdisciplinary teams in an informal environment need to develop solutions for a challenge (Fiore et al. 2019 a, b). These challenges are usually organised in collaboration with the entrepreneurial ecosystem (e.g., open innovation challenge with corporations). In order to let them develop their ideas, the Professors, coming from different departments (from Humanities to Management), play a role as mentor and tutor to assist and give useful feedback to the teams. Moreover, Professors and mentors of CLabTo help students to develop ideas. Usually at CLabTo, students need to develop ideas/solution for the challenge. It is not necessary to develop a startup. However, CLabTo also indirectly supports the students into the startup creation phase by connecting them with incubators, investors and corporation. For instance, thank CLabTo, students have the opportunity to receive support from the university incubators for Start CUP Piemonte & Valle d'Aosta. Moreover, CLabTo promotes the relationship with corporations that want to develop the ideas of CLabTo's students. In other words, the general aim of CLabTo is the contamination and fostering entrepreneurial competences to all the students of Politecnico di Torino and University of Turin with the idea generation phase. However, if some ideas are promising, CLabTo supports these ideas to the next phases with its staff and with its partners.

## **5.4 Discussion and Conclusions**

The CLabs developed and launched in different Italian universities are increasing their efforts in supporting entrepreneurship (Audretsch 2014; Guerrero and Urbano 2012; Fiore et al. 2019 a, b) so contributing to the economic development of the Regions. Moreover, CLabs represent within Italian Universities the favourable environment for the development of students' entrepreneurship capabilities enabling the development of scientific breakthroughs and allowing skilled students to collaborate with researchers, faculty, managers and local entrepreneurs. Therefore, CLabs help universities to reach their 'Third Mission' with several activities carried out with the local entrepreneurial ecosystem and represent a place where universities foster student entrepreneurship.

Through the CLabs the Italian Universities are start to move ahead with the EE, with different learning strategies that includes innovation entrepreneurial learning approaches, including business idea development with companies, open innovation workshop, hackathon and elevator pitch to develop in students their entrepreneurial traits, attitudes and competences (Bae et al. 2014; Fayolle et al. 2006). In this way, the EE represents a set of actions adopted by educational institutions and strongly encouraged by policy makers in response to the fact that

entrepreneurship is considered an engine for economic prosperity and growth (Shah and Pahnke 2014). The CLabs represents a place where is diffused the contamination of the culture of entrepreneurship, innovation and new learning methodologies. The contamination happens among students with different educational background and with faculty coming from other universities or with other stakeholders such as companies, institutions or banks. They could be seen as the place where students generate ideas and where innovative projects are realized. These activities help universities to foster student entrepreneurship.

Through the deep analysis and the cross cases comparison elements of similarities and differences emerge and can contribute to move forward the practices of EE in Italian Universities. The promotion of entrepreneurial capabilities and attitudes and the interdisciplinary are the two common characteristics to all the 4 cases. In fact, the aim of CLabTo is to create an interdisciplinary environment in which entrepreneurship is taught to students from different educational levels. The intention of CLabTo is in fact to promote the entrepreneurial competences and intention of young Italian students looking especially to “technology intensive” projects and open innovation projects. Moving from the North to the South of Italy, from more innovative territory to less innovative regions, it’s possible to highlight that coherently with the University vision, the CLab@Salento contributes to the achievement of the ‘Third Mission’ through the creation of a permanent laboratory for the diffusion of innovation at local level. Students and companies develop innovative projects in the strategic fields of smart technologies, bio-economy, cultural and creative industries in the form of new product, services and processes, aligned with the smart specialization strategy of the Apulia Region. In a similar way, the CLab Unibas aims to be an open competence laboratory with a physical, virtual and relational nature. It, through an interdisciplinary approach and innovative models of engagement, learning, experimentation and communication, fulfils a function of catalyst and promoter of culture and knowledge for entrepreneurship and innovation. The CLab Unibas is an inter-departmental and interdisciplinary university laboratory for entrepreneurship and innovation, for the development of extracurricular study and training activities through an innovative and experimental learning ecosystem. It is a regional hub for training, research and promotion and development of culture, and competences for entrepreneurship and innovation. A conjunction ring in a network of regional actors interested in developing and catalysing the creativity and talent of young innovators and entrepreneurs. Moving to DigiLab it’s possible to observe that University’s students and graduated people with different backgrounds meet together, exchange ideas and experiences with experts, entrepreneurs, stakeholders and investors, work in groups in order to generate new business ideas and inventions especially in the field of Digital Technologies. This is coherent with the mission of the Polytechnic of Bari where the strategic fields are Digital economy and its applications in business and in the third sector; green economy, agribusiness,

industry, commerce, health, public administration, tourism, entertainment, volunteering, cultural heritage, research.

Carefully analysing the four cases, it is possible to observe that they operate with similar teaching models (challenge-based), similar aims (improving students' entrepreneurial knowledge and competences), and similar relationship with stakeholders and local entrepreneurial ecosystem (knowledge sharing, open innovation and contamination workshop) but with different duration. Coherently with the 'Third Mission' of Entrepreneurial University, the programs are organized as extra-curricular course with a duration that ranges from one week in CLabTo (CLabTo workshop) to 9 months in CLab Unibas. DigiLab and CLab@salento have 6 months duration. Another point to highlight is the fact that in CLabTo the students are encouraged to develop innovative startups during the enhanced phase of CLab. In the other case the creation of students' startups is a consequence of the activities in which they are involved in.

The duration of the programs of course has a relevant impact on the knowledge and competences achievement of students that move from a simple entrepreneurial awareness about the field of entrepreneurship, till the capacity to create a business plan for developing an innovative startup. For sure, these different levels of students' achievement are based on different entrepreneurial strategies requiring different engagement with the local entrepreneurial ecosystem.

All the CLabs are supported in their activities by different partnerships and stakeholders of the entrepreneurial ecosystem in order to sustain the process of contamination and the knowledge-sharing. The stakeholders' engagement starts with the involvement in specialized seminars and arrives to the joint innovative projects and Prototypes development, starting from the challenge presented by companies.

The target of Contamination Lab programme differs in some peculiarities: all of them involve students enrolled in the same university, but only CLab@Salento and CLab Unibas include within the participants also the students of high schools. CLabTo are planning to create challenges for high school students too. Moreover, CLabUnibas and CLab@Salento, in addition to the students enrolled in their own courses, are targeted to recent graduates of other universities.

Finally, the cross cases comparison allowed to contribute to EE in Italy presenting the innovative extra-curricular programs of knowledge contamination among students with different background and enrolled to graduate and undergraduate courses, Ph.D. and master' degree courses. The Entrepreneurship contents range from Idea generation techniques for stimulating student's creativity and curiosity to a contamination process with companies and startupper and entrepreneurs belonging to the local entrepreneurial ecosystem.

### **5.4.1 Limitations and future research**

The focus of this study is only on 4 Contamination Labs in Italy even if actually there are more than 21 Contamination Labs in different Universities. The selection of the cases has been based on a convenience sample since all the Chief and Project managers started working together in the initial design phase of their activities to take into account the insights received during the brainstorming sessions organized by the Italian Network of Contamination Labs. Future researches will be the replication of the analysis in other CLab of Italian Universities and the evaluation of the impacts on the student's entrepreneurship. The compared with the international experiences represent another future research, even if Italian CLabs are adherent to the international standard learning methodologies typical of the EE. Moreover, future Research will analyse and create more interdisciplinary and transnational entrepreneurship programs in order to bring different cultures and, therefore, knowledge in the same entrepreneurship course (Varano et al. 2018). Since teach entrepreneurship is complex (Rauch and Hulsink 2015), there is a need to develop and analyse courses offered to professors, young researchers as well as Ph.D. students in order to allow them to teach effectively entrepreneurship (Varano et al. 2018). In addition, due to the global attention on social issues, future studies may suggest how EE can integrate some social challenges such as the 17 Sustainable Development Goals (SDGs) from the United Nation. Finally, since university internationalization favours student entrepreneurship activities (Minola et al. 2016 b), it is important to open these CLabs to international collaborations.



# Chapter 6

## Conclusions of the Ph.D. thesis

Universities need to foster entrepreneurship in general, and commercialisation of knowledge and research in particular in order to fill their new role as active provider to regional economic development included in their ‘Third Mission’ (Rasmussen and Sørheim, 2006). A natural role for universities to performance this new role is to provide EE since EE seeks to provide seeks to provide students with the competences to encourage entrepreneurial success in a variety of settings. In fact, the number of entrepreneurship courses is increasing all over the world (Katz 2003; Kuratko 2005; Solomon 2007; Katz 2008; Fretschner and Weber 2013). Moreover, students have expressed a desire to participate in EE (Peterman and Kennedy 2003). In addition to this, developing and promoting EE has been one of the key policy objectives for the EU and Member States for many years (Valerio et al. 2014; European Commission 2016) since EE is essential not only to shape the mindsets of people but also to provide the competence that are central to developing entrepreneurial intentions and culture. In fact, in a communication from the European Commission to the European Parliament in 2013, the European Commission developed the Entrepreneurship 2020 Action Plan identified EE as one of three areas for immediate intervention.<sup>42</sup> However, despite a global interest in EE, several aspects remain to be discussed (Lüthje and Franke 2003; Pittaway et al. 2015; Nabi et al. 2017; Lamine et al. 2018).

This Ph.D. thesis analyses the role of universities in improving their entrepreneurial support by analysing the impact of EE and experience on entrepreneurial intentions and venture creation through different lenses and methodologies. In doing this, a specific object of the Ph.D. years was to receive feedbacks on my work from the academic community. For this reason, the

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<sup>42</sup> Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions on Entrepreneurship 2020 Action Plan: Reigniting the entrepreneurial spirit in Europe. COM/2012/0795 final.

contents presented in this Ph.D. thesis were discussed and presented to the academic community during the Ph.D. years. In particular, Chapter 3 was presented at two international conferences<sup>43</sup> and incorporated in a paper which is forthcoming in the *International Entrepreneurship and Management Journal*<sup>44</sup>. Chapter 4 is currently in the second round of revision for an international journal. Moreover, part of Chapter 5 was presented at two international conferences<sup>45</sup> and evolved into an article which is currently under review for a Book Chapter within the Springer's International Studies in Entrepreneurship series.

After the introduction in Chapter 1, this Ph.D. thesis presents a literature review of EE in order to find some gaps, some of which are then analysed. In fact, Chapter 3 analyses the impact of EE on the creation of academic spinoffs. Chapter 4 analyses the impact of SLEOs on participants' entrepreneurial intention. Lastly, Chapter 4 analyses the role of CLabs in Italian Universities. The conclusions of these Chapters are summarised here.

Using a machine learning algorithm (LDA) to the whole literature corpus on EE, Chapter 2 points out twelve themes regarding the literature of EE and explains some literature gaps. These twelve themes are Teaching entrepreneurship, Entrepreneurial competence, Entrepreneurial intention, Theories on EE, Policy on EE, Student entrepreneurship, Academic entrepreneurship, Graduate entrepreneurship, Literature review, Women entrepreneurship, Social entrepreneurship, Team entrepreneurship. Chapter 2 concludes by introducing some literature gaps and the Chapters 3, 4 and 5.

Analysing a sample of 80 US universities included in the Licensing Survey by the AUTM with information about all the entrepreneurship courses offered by these universities in years ranging from 2011 to 2014, Chapter 3 points out that EE favours the creation of academic spinoffs. Moreover, this study categorized

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<sup>43</sup> The two international conferences were “Sansone, G., Battaglia, D., Paolucci, E., and Landoni, P., (2017 b). Empirical analysis of entrepreneurial education in US universities. 18th International CINet Conference, Potsdam, Germany, 10-12 September 2017.” and “Sansone, G., Battaglia, D., Landoni, P., Paolucci, E., (2017 a). Entrepreneurship Education: the impact of different teaching models on the development of new ventures. How to foster innovative entrepreneurship? Trends, challenges, and policy implications, Milan, Italy, 23-24 November 2017.”.

<sup>44</sup> Sansone, G., Battaglia, D., Landoni, P., and Paolucci, E., (2019), “Academic spinoffs: the role of entrepreneurship education”, *International Entrepreneurship and Management Journal*, <https://doi.org/10.1007/s11365-019-00601-9>.

<sup>45</sup> The two international conferences were “Fiore, E., Sansone, G., Remondino, C., and Tamborrini, P., (2019 b). Contamination Lab of Turin (CLabTo): how to teach entrepreneurship education to all kinds of university students. ADIM2019 - Academy for Design Innovation Management, London, UK” and “Secundo, G., Mele, G., Sansone, G., Passiante, G., (2019). Moving Ahead Entrepreneurship Education in Italian Universities: insights from the “Contamination Lab” cases. AiIG XXX Riunione Scientifica Annuale (RSA), Turin, Italy, 17-18 October 2019.”.

the entrepreneurship courses adopting Béchard and Grégoire's taxonomy, identifying and examining 1,262 entrepreneurship courses. With this categorization, Chapter 3 finds that practical – rather than theoretical - entrepreneurship courses favour the creation of academic spinoffs. These results have both theoretical and practical implications. Chapter 3 answers a call from Lamine et al. (2018) to provide evidence on the role of EE in order to promote the creation of academic spinoffs. Moreover, Chapter 3 explains the impact of different entrepreneurship teaching models (Béchard and Grégoire 2005) on the creation of academic spinoffs. By answering a call from Nabi et al. (2017) to provide evidence on the impact of different entrepreneurship teaching models, Chapter 3 shows the importance of practical-oriented entrepreneurship teaching models. In fact, as suggested by McMullen and Shepherd (2006), entrepreneurship requires action. Therefore, Chapter 3 suggests that universities need to provide more EE under the form of new courses to overcome informational and cultural barriers, which may limit the development of entrepreneurial actions by both academic faculties and students (Siegel et al. 2003; Hahn et al. 2018). Moreover, offering practically-oriented teaching models may help students, researchers and professors to work together on their research and technology and to receive feedback which may favour the creation of an academic spinoff (Hahn et al. 2017).

In addition to this, based on a survey of JADE associates in 2016, Chapter 4 points out that SLEOs have a positive and significant impact on participants' entrepreneurial intention thanks to their activities such as the opportunity of networking, sharing ideas, working in multidisciplinary and international teams and attending entrepreneurial events and workshops. Chapter 4 also points out that when the study field of a student is Science and Technology, there is a higher probability of their developing entrepreneurial intention. These results have theoretical and practical implications. In fact, Chapter 4 suggests SLEOs enhance their visibility and lobbying, both at a local and an international level, in order to be better recognized as drivers of student entrepreneurship. Moreover, universities could strengthen their technology transfer and entrepreneurial experiences by including SLEOs in consultations, and foster SLEO interactions with other actors who promote entrepreneurship and technology transfer activities.

Finally, Chapter 5 analyses the role of CLabs in Italian Universities. This Chapter uses a sample of Italian CLabs created in 2016 as innovative Laboratory in Italy. Out of sixteen CLabs in Italy, this study analysed four CLabs in 2017. The four cases are the CLab at Politecnico of Bari, the CLab at University of Basilicata, the CLab at University of Salento and the CLab at Politecnico di Torino and University of Turin. Chapter 5 presents the activities performed by four CLabs and explains how the CLabs may have an important role to help Italian Universities reach their 'Third Mission' and foster student entrepreneurship. In fact, the CLabs offer several entrepreneurial experiences and support to students from different fields of study and educational level that allow

students to improve their entrepreneurial competences. Moreover, these activities allow students to work with professors, researchers, entrepreneurs and managers from the local entrepreneurial ecosystem.

In conclusion, this Ph.D. thesis suggests that universities are putting an effort on EE (Chapter 3 and 5), that students are interested in participating in EE (Chapter 4 and 5) and that faculty, students and the local entrepreneurial ecosystem may work together in order to improve EE (Chapter 3, 4 and 5). Finally, this Ph.D. thesis suggests how EE may integrate the three university missions: educate, do quality research and contribute to society. In fact, EE concerns the university education system since it refers to university courses. In this regard, this Ph.D. thesis suggests teaching entrepreneurship with practical-oriented teaching models with innovative education methodologies. Moreover, EE may include research since faculty, students and other stakeholders may work together in order to improve university research thanks to feedback and tests. For instance, EE may be a real case study of open innovation or incubation/acceleration. Moreover, during the lectures, Professors may present university research activities in order to receive feedback from the students and maybe ask them to work in teams in order to improve these research activities and to create patents or academic spinoffs. Finally, EE may include the 'Third Mission' too by supporting student entrepreneurship and academic entrepreneurship. In this vein, EE represents a complex but powerful instrument that universities may apply in order to improve their value and contribution for all three university missions.

## **6.1 Limitations and future research**

Working on this Ph.D. thesis allowed me to grow as a person and as a student, improving my research competences. In particular, this work allowed me to work with several Professors, Researchers and students interested in entrepreneurship from universities around the world. Moreover, this Ph.D. thesis gave me the opportunity to interact with other actors of the entrepreneurship domain such as SLEOs, Incubators, Accelerators and Foundations. With all its limitations, this Ph.D. thesis represents the end of an amazing experience as a student, and I hope a good start for a future as Researcher and, maybe, Professor in the entrepreneurship field.

Finally, in addition to the Chapters presented in this Ph.D. thesis, I am working on two working papers related to entrepreneurship research with other researchers and Professors. For instance, my co-authors and I submitted a paper regarding incubators to an international Journal. More in detail, this first working paper defines and analyses incubators that mainly support startups with a significant social impact based on a survey of the 162 incubators active in Italy in

2016. In total, 88 incubators answered. The analysis of the literature and of this dataset led to the identification of three types of incubators: i) Business Incubators do not support startups that are aimed at introducing a positive social impact; ii) Mixed Incubators support from 1 to 50% of startups that are aimed at introducing a positive social impact; iii) Social Incubators support more than 50% of startups that are aimed at introducing a positive social impact. Moreover, 30 of the 88 incubators sent information on their tenants. Thanks to the data regarding the 247 tenants of these incubators, this study analysed the impact of the three different types of incubators (Business, Mixed, and Social) on the tenants' growth through OLS regression analyses. The results show that Social Incubators are as efficient as other incubators in terms of tenants' economic growth, notwithstanding the focus of these incubators on startups that do not have only economic objectives. In addition to this first working paper, my co-authors and I are working on a paper regarding the impact of digital and coding competences and experiences on students' entrepreneurial intention based on a dataset of 2661 Italian university students from an online survey developed by University 2 Business<sup>46</sup>. More in detail, this study wants to test the hypotheses that digital and coding competences and experiences have a positive impact on students' entrepreneurial intention.

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<sup>46</sup> More information on University 2 Business are available here: <https://www.university2business.it/>.



# References

- Abraham, C., Sheeran, P., & Johnston, M. (1998). From health beliefs to self-regulation: theoretical advances in the psychology of action control. *Psychology and Health*, 13(4), 569-591.
- Abreu, M., & Grinevich, V. (2013). The nature of academic entrepreneurship in the UK: Widening the focus on entrepreneurial activities. *Research Policy*, 42(2), 408-422.
- Acs, Z. J., Audretsch, D. B., & Lehmann, E. E. (2013). The knowledge spillover theory of entrepreneurship. *Small Business Economics*, 41(4), 757-774.
- Acs, Z. J., Braunerhjelm, P., Audretsch, D. B., & Carlsson, B. (2009). The knowledge spillover theory of entrepreneurship. *Small Business Economics*, 32(1), 15-30.
- Adesope, O. O., Lavin, T., Thompson, T., & Ungerleider, C. (2010). A systematic review and meta-analysis of the cognitive correlates of bilingualism. *Review of Educational Research*, 80(2), 207-245.
- Aggarwal, C. C., & Zhai, C. (2012). *Mining text data*, Springer-Verlag New York.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211.
- Algeri, B., Aquino, A., & Succurro, M. (2013). Technology transfer offices and academic spin-off creation: the case of Italy. *The Journal of Technology Transfer*, 38(4), 382-400.
- Angrist, J. D., & Pischke, J. S. (2008). *Mostly harmless econometrics: An empiricist's companion*. Princeton university press.
- Antons, D., & Breidbach, C. F. (2018). Big data, big insights? Advancing service innovation and design with machine learning. *Journal of Service Research*, 21(1), 17-39.
- Antons, D., Kleer, R., & Salge, T. O. (2016). Mapping the Topic landscape of JPIM, 1984-2013: In search of hidden structures and development trajectories. *Journal of Product Innovation Management*, 33(6), 726-749.
- Armstrong, J. S., & Overton, T. S. (1977). Estimating nonresponse bias in mail surveys. *Journal of marketing research*, 14(3), 396-402.
- Åstebro, T., Bazzazian, N., & Braguinsky, S. (2012). Startups by recent university graduates and their faculty: Implications for university entrepreneurship policy. *Research policy*, 41(4), 663-677.
- Athayde, R. (2009). Measuring enterprise potential in young people. *Entrepreneurship theory and practice*, 33(2), 481-500.
- Audretsch, D. B. (2014). From the Entrepreneurial University to the University for the Entrepreneurial Society. *The Journal of Technology Transfer*, 39(3), 313-321.
- Audretsch, D. B., & Belitski, M. (2013). The missing pillar: The creativity theory of knowledge spillover entrepreneurship. *Small Business Economics*, 41(4), 819-836.

- Audretsch, D. B., & Thurik, A. R. (2001). What's new about the new economy? Sources of growth in the managed and entrepreneurial economies. *Industrial and corporate change*, 10(1), 267-315.
- Audretsch, D. B., Keilbach, M., & Lehmann, E. (2005). The knowledge spillover theory of entrepreneurship and technological diffusion. In G. D. Libecap (Ed.), *University entrepreneurship and technology transfer* (pp. 69–91). Bingley: Emerald Group Publishing Limited.
- Audretsch, D. B., Lehmann, E. E., Paleari, S., & Vismara, S. (2016). Entrepreneurial finance and technology transfer. *Journal of Technology Transfer*, 41(1), 1–9.
- Bacigalupo, M., Kamylyis, P., Punie, Y., and Van den Brande, G. (2016) *EntreComp: The entrepreneurship competence framework*. Luxembourg: Publication Office of the European Union
- Bae, T. J., Qian, S., Miao, C., & Fiet, J. O. (2014). The relationship between entrepreneurship education and entrepreneurial intentions: A meta-analytic review. *Entrepreneurship Theory and Practice*, 38(2), 217-254.
- Bager, T. E., Jensen, K. W., Nielsen, P. S., & Larsen, T. A. (2015). Enrollment of SME managers to growth-oriented training programs. *International Journal of Entrepreneurial Behavior & Research*, 21(4), 578-599.
- Bandura, A. (1997). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A., Barbaranelli, C., Caprara, G. V., & Pastorelli, C. (2001). Self-efficacy beliefs as shapers of children's aspirations and career trajectories. *Child development*, 72(1), 187-206.
- Baptista, R., & Naia, A. (2015). Entrepreneurship education: A selective examination of the literature. *Foundations and Trends® in Entrepreneurship*, 11(5), 337-426.
- Barber, D. (2015). An experimental analysis of risk and entrepreneurial attitudes of university students in the USA and Brazil. *Journal of International Entrepreneurship*, 13(4), 370-389.
- Bar-Ilan, J. (2008). Which h-index? - A comparison of WoS, Scopus and Google Scholar. *Scientometrics*, 74(2), 257-271.
- Baron, R. A. (2006). Opportunity recognition as pattern recognition: How entrepreneurs “connect the dots” to identify new business opportunities. *Academy of management perspectives*, 20(1), 104-119.
- Barr, S., Baker, T., Markham, S., & Kingon, A. (2009). Bridging the valley of death: Lessons learned from 14 years of commercialization of technology education. *Academy of Management Learning & Education*, 8(3), 370–388.
- Barravecchia, F., Franceschini, F., Mastrogiacomo, L., Zaki, M., 2019. Twenty years of research (1999-2018) on Product-Service Systems: topic landscape, state-of-the-art and future challenges. Politecnico di Torino. Working paper.
- Basu, S., & Davidson, I. (2009). Constrained Partitional Clustering of Text Data: An Overview. In *Text Mining*, Chapman and Hall/CRC, pp. 101–124.
- Bateman, T. S., & Crant, J. M. (1993). The proactive component of organizational behavior. *Journal of Organizational Behavior*, 14, 103–118.
- Battaglia, D., Landoni, P., & Rizzitelli, F. (2017). Organizational structures for external growth of university technology transfer offices: an explorative analysis. *Technological Forecasting and Social Change*, 123, 45-56.
- Béchar, J. P., & Grégoire. (2005). Understanding teaching models in entrepreneurship for higher education. In D., Kyrö, P., & Carrier, C. (Eds.), *The dynamics of learning entrepreneurship in a cross-cultural university*



- context. (pp. 104–134). Tampere, Finland: Faculty of Education, University of Tampere
- Becker, G. (1964) Human capital. New York: Columbia University Press.
- Berbegal-Mirabent, J., Ribeiro-Soriano, D. E., & García, J. L. S. (2015). Can a magic recipe foster university spin-off creation?. *Journal of Business Research*, 68(11), 2272-2278.
- Bercovitz, J., Feldman, M. (2008). Academic entrepreneurs: organizational change at the individual level. *Organization Science*, 19, 69–89.
- Berglund, K., & Holmgren, C. (2013). Entrepreneurship education in policy and practice. *International Journal of Entrepreneurial Venturing*, 5(1), 9-27.
- Bergmann, H., Hundt, C., & Sternberg, R. (2016). What makes student entrepreneurs? On the relevance (and irrelevance) of the university and the regional context for student start-ups. *Small Business Economics*, 47(1), 53-76.
- Berthold, M. R., Cebon, N., Dill, F., ... Wiswedel, B. (2009). KNIME-the Konstanz information miner: version 2.0 and beyond. *AcM SIGKDD Explorations Newsletter*, 11(1), 26–31.
- Bischoff, K., Volkmann, C. K., & Audretsch, D. B. (2018). Stakeholder collaboration in entrepreneurship education: An analysis of the entrepreneurial ecosystems of European higher educational institutions. *The Journal of Technology Transfer*, 43(1), 20-46.
- Blei, D. M. (2012). Probabilistic topic models. *Communications of the ACM*, 55(4), 77–84.
- Blei, D. M., and J. D. Lafferty. 2009. Topic models. In *Text mining: Classification, clustering, and applications*, ed. A. Srivastava and M. Sahami, 1–24. London: Chapman and Hall.
- Blei, D. M., Ng, A. Y., & Jordan, M. I. (2003). Latent dirichlet allocation. *Journal of Machine Learning Research*, 3, 993–1022.
- Boh, W. F., De-Haan, U., & Strom, R. (2016). University technology transfer through entrepreneurship: faculty and students in spinoffs. *The Journal of Technology Transfer*, 41(4), 661-669.
- Bonaccorsi, A., Colombo, M. G., Guerini, M., & Rossi-Lamastra, C. (2014). The impact of local and external university knowledge on the creation of knowledge-intensive firms: Evidence from the Italian case. *Small Business Economics*, 43(2), 261-287.
- Borges, C., & Jacques Fillion, L. (2013). Spin-off process and the development of academic entrepreneur's social capital. *Journal of Technology Management & Innovation*, 8(1), 21-34.
- Bosma, N. and Levie, J. (2009) Global entrepreneurship monitor: 2009 executive report. Available at <http://www.gemconsortium.org>
- Bramwell, A., & Wolfe, D. A. (2008). Universities and regional economic development: The entrepreneurial University of Waterloo. *Research policy*, 37(8), 1175-1187.
- Brandenburg, U., Berghoff, S., and Taboadela, O. (2014) The Erasmus impact study: Effects of mobility on the skills and employability of students and the internationalisation of higher education institutions. Publications Office of the European Union, Luxembourg
- Braunerhjelm, P., Acs, Z. J., Audretsch, D. B., & Carlsson, B. (2010). The missing link: knowledge diffusion and entrepreneurship in endogenous growth. *Small Business Economics*, 34(2), 105-125.

- Brescia, F., Colombo, G., & Landoni, P. (2016). Organizational structures of Knowledge Transfer Offices: an analysis of the world's top-ranked universities. *The Journal of Technology Transfer*, 41(1), 132-151.
- Brüderl, J., & Preisendörfer, P. (1998). Network support and the success of newly founded business. *Small business economics*, 10(3), 213-225.
- Buli, B. M., & Yesuf, W. M. (2015). Determinants of entrepreneurial intentions: Technical-vocational education and training students in Ethiopia. *Education+ Training*, 57(8/9), 891-907.
- Bullough, A., De Luque, M. S., Abdelzaher, D., & Heim, W. (2015). Developing women leaders through entrepreneurship education and training. *Academy of Management Perspectives*, 29(2), 250-270.
- Bygrave, W. (1989). The entrepreneurship paradigm (I): a philosophical look at its research methodologies. *Entrepreneurship Theory and Practice*, 14(1), 7-26.
- Cameron, A. C., & Trivedi, P. K. (2005). *Microeconometrics: methods and applications*. Cambridge university press.
- Cameron, A. C., & Trivedi, P. K. (2013). *Regression analysis of count data (Vol. 53)*. Cambridge university press.
- Campos, F., Frese, M., Goldstein, M., Iacovone, L., Johnson, H. C., McKenzie, D., & Mensmann, M. (2017). Teaching personal initiative beats traditional training in boosting small business in West Africa. *Science*, 357(6357), 1287-1290.
- Camuffo, A., Cordova, A., Gambardella, A., & Spina, C. (2019). A scientific approach to entrepreneurial decision making: Evidence from a randomized control trial. *Management Science*.
- Casper, S. (2013). The spill-over theory reversed: The impact of regional economies on the commercialization of university science. *Research policy*, 42(8), 1313-1324.
- Cassar, G. (2014). Industry and startup experience on entrepreneur forecast performance in new firms. *Journal of Business Venturing*, 29(1), 137-151.
- Cavallo, A., Ghezzi, A., & Balocco, R. (2018a). Entrepreneurial ecosystem research: present debates and future directions. *International Entrepreneurship and Management Journal*, 1-31.
- Cavallo, A., Ghezzi, A., Colombelli, A., & Casali, G. L. (2018b). Agglomeration dynamics of innovative start-ups in Italy beyond the industrial district era. *International Entrepreneurship and Management Journal*, 1-24.
- Cavallo, A., Ghezzi, A., Dell'Era, C., & Pellizzoni, E. (2019). Fostering digital entrepreneurship from startup to scaleup: The role of venture capital funds and angel groups. *Technological Forecasting and Social Change*, 145, 24-35.
- Chang, J., & Rieple, A. (2013). Assessing students' entrepreneurial skills development in live projects. *Journal of Small Business and Enterprise Development*, 20(1), 225-241
- Chen, C. C., Greene, P. G., & Crick, A. (1998). Does entrepreneurial self-efficacy distinguish entrepreneurs from managers?. *Journal of business venturing*, 13(4), 295-316.
- Chen, H., Chiang, R. H. L., & Storey, V. C. (2012). Business intelligence and analytics: from big data to big impact. *MIS Quarterly*, 36(4), 1165-1188.
- Civera, A., & Meoli, M. (2018). Does university prestige foster the initial growth of academic spin-offs?. *Economia e Politica Industriale*, 45(2), 111-142.
- Civera, A., Donina, D., Meoli, M., & Vismara, S. (2019). Fostering the creation of academic spinoffs: does the international mobility of the academic leader matter?. *International Entrepreneurship and Management Journal*, 1-27.

- Civera, A., Meoli, M., & Vismara, S. (2017). Policies for the Provision of Finance to Science-based Entrepreneurship. *Annals of Science and Technology Policy*, 1(4), 317-469
- Civera, A., Meoli, M., & Vismara, S. (2020). Engagement of academics in university technology transfer: Opportunity and necessity academic entrepreneurship. *European Economic Review*, 103376.
- Clark, G., Dawes, F., Heywood, A., & McLaughlin, T. (2008). Students as transferors of knowledge: the problem of measuring success. *International small business journal*, 26(6), 735-758.
- Clarke, T. E., & Reavley, J. (1981). Educating technical entrepreneurs and innovators for the 1980's. *Technovation*, 1(2), 125-134.
- Clarysse, B., & Moray, N. (2004). A process study of entrepreneurial team formation: the case of a research-based spin-off. *Journal of Business Venturing*, 19(1), 55-79.
- Clarysse, B., Wright, M., & Van de Velde, E. (2011). Entrepreneurial origin, technological knowledge, and the growth of spin-off companies. *Journal of Management Studies*, 48(6), 1420-1442.
- Cooper, A. C., Gimeno-Gascon, F. J., & Woo, C. Y. (1994). Initial human and financial capital as predictors of new venture performance. *Journal of business venturing*, 9(5), 371-395.
- Corbett, A. C. (2005). Experiential learning within the process of opportunity identification and exploitation. *Entrepreneurship Theory and Practice*, 29(4), 473-491.
- Cornwall, J. R., & Dennis Jr, W. J. (2012). Peeling the onion: public policy in entrepreneurship education. *Journal of Entrepreneurship and Public Policy*, 1(1), 12-21.
- Cressy, R. (1996) Are business startups debt-rationed?. *The Economic Journal*, 1253-1270
- Criaco, G., Minola, T., Migliorini, P., & Serarols-Tarrés, C. (2014). "To have and have not": founders' human capital and university start-up survival. *The Journal of Technology Transfer*, 39(4), 567-593.
- Criaco, G., Sieger, P., Wennberg, K., Chirico, F., & Minola, T. (2017). Parents' performance in entrepreneurship as a "double-edged sword" for the intergenerational transmission of entrepreneurship. *Small Business Economics*, 49(4), 841-864.
- Curth, A., Chatzichristou, S., Devaux, A., & Allinson, R. (2015). *Entrepreneurship Education: A road to success. A Compilation of Evidence on the Impact of Entrepreneurship Education Strategies and Measures*. Belgium: European Commission.
- Davies, J., Hides, M., & Powell, J. (2002). Defining the development needs of entrepreneurs in SMEs. *Education+ Training*, 44(8/9), 406-412.
- Delen, D., & Crossland, M. D. (2008). Seeding the survey and analysis of research literature with text mining. *Expert Systems with Applications*, 34(3), 1707-1720.
- D'Este, P., Mahdi, S., Neely, A., & Rentocchini, F. (2012). Inventors and entrepreneurs in academia: What types of skills and experience matter?. *Technovation*, 32(5), 293-303.
- Di Gregorio, D., & Shane, S. (2003). Why do some universities generate more start-ups than others?. *Research policy*, 32(2), 209-227.

- Diáñez-González, J. P., & Camelo-Ordaz, C. (2017). The influence of the structure of social networks on academic spin-offs' entrepreneurial orientation. *Industrial Marketing Management*.
- Díaz-Casero, J. C., Ferreira, J. J. M., Mogollón, R. H., & Raposo, M. L. B. (2012). Influence of institutional environment on entrepreneurial intention: a comparative study of two countries university students. *International Entrepreneurship and Management Journal*, 8(1), 55-74.
- Djokovic, D., & Souitaris, V. (2008). Spinouts from academic institutions: a literature review with suggestions for further research. *The Journal of Technology Transfer*, 33(3), 225-247.
- do Paço, A. M. F., Ferreira, J. M., Raposo, M., Rodrigues, R. G., & Dinis, A. (2011). Behaviours and entrepreneurial intention: Empirical findings about secondary students. *Journal of International Entrepreneurship*, 9(1), 20-38.
- Doutriaux, J. (1987). Growth pattern of academic entrepreneurial firms. *Journal of Business Venturing*, 2(4), 285-297.
- Drnovšek, M., Wincent, J., & Cardon, M. S. (2010). Entrepreneurial self-efficacy and business start-up: developing a multi-dimensional definition. *International journal of entrepreneurial behavior & research*, 16(4), 329-348.
- Duval-Couetil, N. (2013). Assessing the impact of entrepreneurship education programs: Challenges and approaches. *Journal of Small Business Management*, 51(3), 394-409.
- Edelman, L. F., Manolova, T., Shirokova, G., & Tsukanova, T. (2016). The impact of family support on young entrepreneurs' start-up activities. *Journal of Business Venturing*, 31(4), 428-448.
- Eisenhardt, K.M. (1989). Building theories from case study research. *Academy of Management Review*, 14 (4), 532-550.
- Ellis, P. D. (2011). Social ties and international entrepreneurship: Opportunities and constraints affecting firm internationalization. *Journal of International business studies*, 42(1), 99-127.
- Engle, R., Dimitriadi, N., Gavidia, J., Schlaegel, C., Delanoe, S., Alvarado, I., He, X., Baume, S. and Wolff, B. (2010) Entrepreneurial intent: A twelve-country evaluation of Ajzen's model of planned behaviour. *International Journal of Entrepreneurial Behavior & Research* 16(1):35-57
- Etzkowitz, H. (2003). Research groups as 'quasi-firms': the invention of the entrepreneurial university. *Research policy*, 32(1), 109-121.
- Etzkowitz, H. (2004). The evolution of the entrepreneurial university. *International Journal of Technology and Globalisation*, 1(1), 64-77.
- Etzkowitz, H. (2010). Entrepreneurial Universities for the UK: A 'Stanford University' at Bamburgh Castle?. *Industry and Higher Education*, 24(4), 251-256.
- Etzkowitz, H., Webster, A., Gebhardt, C., & Terra, B. R. C. (2000). The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm. *Research policy*, 29(2), 313-330.
- European Commission EC (2006). Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning. *Official Journal of the European Union* 30: L394/310. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:en:PDF>
- European Commission EC (2016). Entrepreneurship Education at School in Europe. Eurydice Report. Luxembourg: Publications Office of the European Union.

- Fairlie, R., Sameeksha D., & Herrmann A.J. (2019) 2017 National Report on Early-Stage Entrepreneurship, Kauffman Indicators of Entrepreneurship, Ewing Marion Kauffman Foundation: Kansas City
- Fang, D., Yang, H., Gao, B., & Li, X. (2018). Discovering research topics from library electronic references using latent Dirichlet allocation. *Library Hi Tech*, 36(3), 400–410.
- Farashah, A. D. (2015). The effects of demographic, cognitive and institutional factors on development of entrepreneurial intention: Toward a socio-cognitive model of entrepreneurial career. *Journal of International Entrepreneurship*, 13(4), 452-476.
- Fayolle, A. (1996) Contribution à l'étude des comportements entrepreneuriaux des ingénieurs français. Thèse de doctorat en sciences de gestion, Université Jean Moulin de Lyon
- Fayolle, A., & Gailly, B. (2015). The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence. *Journal of small business management*, 53(1), 75-93.
- Fayolle, A., & Liñán, F. (2014). The future of research on entrepreneurial intentions. *Journal of Business Research*, 67(5), 663–666.
- Fayolle, A., and Gailly, B. (2009) Assessing the Impact of Entrepreneurship Education: A Methodology and Three Experiments from French Engineering Schools. *Handbook of University-wide Entrepreneurship Education*, edited by G. P. West, E. J. Gatewood, and K. G. Shaver, pp. 203. Cheltenham: Edward Elgar
- Fayolle, A., Gailly, B., & Lassas-Clerc, N. (2006). Assessing the impact of entrepreneurship education programmes: a new methodology. *Journal of European industrial training*, 30(9), 701-720.
- Fayolle, A., Verzat, C., & Wapshott, R. (2016). In quest of legitimacy: The theoretical and methodological foundations of entrepreneurship education research. *International Small Business Journal*, 34(7), 895-904.
- Feldman, M. P., & Desrochers, P. (2004). Truth for its own sake: Academic culture and technology transfer at Johns Hopkins University. *Minerva*, 42(2), 105-126.
- Feldman, R., & Sanger, J. (2007). *The text mining handbook: advanced approaches in analyzing unstructured data*, New York City, United States: Cambridge University Press.
- Ferretti, M., Ferri, S., Fiorentino, R., Parmentola, A., & Sapió, A. (2018). What drives the growth of academic spin-offs? Matching academics, universities, and non-research organizations. *International Entrepreneurship and Management Journal*, 1-27.
- Ferretti, M., Ferri, S., Fiorentino, R., Parmentola, A., & Sapió, A. (2019). Neither absent nor too present: the effects of the engagement of parent universities on the performance of academic spin-offs. *Small Business Economics*, 52(1), 153-173.
- Fiet, J. O. (2001 a) The pedagogical side of entrepreneurship theory *Journal of business venturing*, 16(2), 101-117
- Fiet, J. O. (2001 b) The theoretical side of teaching entrepreneurship. *Journal of business venturing*, 16(1), 1-24
- Fini, R., Grimaldi, R., & Sobrero, M. (2009). Factors fostering academics to start up new ventures: an assessment of Italian founders' incentives. *The Journal of Technology Transfer*, 34(4), 380-402.

- Fini, R., Grimaldi, R., Santoni, S., & Sobrero, M. (2011). Complements or substitutes? The role of universities and local context in supporting the creation of academic spin-offs. *Research policy*, 40(8), 1113-1127.
- Fini, R., Lacetera, N., & Shane, S. (2010). Inside or outside the IP system? Business creation in academia. *Research Policy*, 39(8), 1060-1069.
- Fini, R., Rasmussen, E., Siegel, D., & Wiklund, J. (2018). Rethinking the commercialization of public science: From entrepreneurial outcomes to societal impacts. *Academy of Management Perspectives*, 32(1), 4-20.
- Fini, R., Rasmussen, E., Wiklund, J., & Wright, M. (2019). Theories from the lab: how research on science commercialization can contribute to management studies. *Journal of Management Studies*, 56(5), 865-894.
- Fiore, E., Sansone, G., & Paolucci, E. (2019 a). Entrepreneurship Education in a Multidisciplinary Environment: Evidence from an Entrepreneurship Programme Held in Turin. *Administrative Sciences*, 9(1), 28.
- Fiore, E., Sansone, G., Remondino, C., and Tamborrini, P., (2019 b). Contamination Lab of Turin (CLabTo): how to teach entrepreneurship education to all kinds of university students. ADIM2019 - Academy for Design Innovation Management, London, UK
- Foulds, J., Boyles, L., DuBois, C., Smyth, P., & Welling, M. (2013). Stochastic collapsed variational Bayesian inference for latent Dirichlet allocation. In *Proceedings of the 19th ACM SIGKDD international conference on Knowledge discovery and data mining*, ACM, pp. 446–454.
- Franke, N., & Lüthje, C. (2004). Entrepreneurial intentions of business students—A benchmarking study. *International Journal of Innovation and Technology Management*, 1(03), 269-288.
- Fretschner, M., & Weber, S. (2013). Measuring and understanding the effects of entrepreneurial awareness education. *Journal of small business management*, 51(3), 410-428.
- Friedman, J., & Silberman, J. (2003). University technology transfer: do incentives, management, and location matter?. *The Journal of Technology Transfer*, 28(1), 17-30.
- Fryges, H., & Wright, M. (2014). The origin of spin-offs: a typology of corporate and academic spin-offs. *Small Business Economics*, 43(2), 245-259.
- García-Rodríguez, F. J., Gil-Soto, E., Ruiz-Rosa, I., & Sene, P. M. (2015). Entrepreneurial intentions in diverse development contexts: A cross-cultural comparison between Senegal and Spain. *International Entrepreneurship and Management Journal*, 11(3), 511-527.
- GEM (2002) Global report. Reynolds PD, Bygrave WD, Autio E, Cox LW, Hay M. Founding and Sponsoring Institution: Babson College, Ewing Marion Kauffman Foundation, London Business School.
- GEM (2017) Global Report 2016 / 2017. Global Entrepreneurship Research Association (GERA) Available at: <http://www.gemconsortium.org/report>
- George, G., Haas, M. R., & Pentland, A. (2014). Big data and management. *Academy of Management Journal*, 57(2), 321–326.
- Giacomin, O., Janssen, F., Pruett, M., Shinnar, R. S., Llopis, F., & Toney, B. (2011). Entrepreneurial intentions, motivations and barriers: Differences among American, Asian and European students. *International Entrepreneurship and Management Journal*, 7(2), 219-238.
- Gibb, A. (2011). Concepts into practice: meeting the challenge of development of entrepreneurship educators around an innovative paradigm: The case of the

- International Entrepreneurship Educators' Programme (IEEP). *International Journal of Entrepreneurial Behavior & Research*, 17(2), 146-165.
- Gibb, A. A. (1993). Enterprise culture and education: understanding enterprise education and its links with small business, entrepreneurship and wider educational goals. *International small business journal*, 11(3), 11-34.
- Gibb, A., Haskins, G. and Robertson, I. (2009). *Leading the Entrepreneurial University*. r, Said Business School- University of Oxford.
- Gibcus, P., De Kok, J., Sniijders, J., Smit, L., and Van der Linden, B. (2012) Effects and impact of entrepreneurship programmes in higher education. Directorate-General for Enterprise and Industry, Brussels: European Commission
- Giddens, A. (1984). *The Constitution of Society*. Berkeley: University of California Press
- Gielnik, M., Frese, M., Kahara-Kawuki, A., Katono, I., Kyejjusa, S., Munene, J., et al. (2015). Action and action-regulation in entrepreneurship: Evaluating a student training for promoting entrepreneurship. *Academy of Management Learning & Education*, 14(1), 69–94.
- Gielnik, M.M., Uy, M.A., Funken, R. & Bischoff, K.M. (2017), Boosting and sustaining passion: A long-term perspective on the effects of entrepreneurship training. *Journal of Business Venturing*, 32(3), 334–53.
- Gilsing, V. A., Van Burg, E., & Romme, A. G. L. (2010). Policy principles for the creation and success of corporate and academic spin-offs. *Technovation*, 30(1), 12-23.
- Gimeno, J., Folta, T. B., Cooper, A. C., & Woo, C. Y. (1997). Survival of the fittest? Entrepreneurial human capital and the persistence of underperforming firms. *Administrative science quarterly*, 750-783.
- Glaser, B. and Strauss, A. (1967), *The Discovery Grounded Theory: Strategies for Qualitative Inquiry*, Aldin, Chicago, IL.
- Goldfarb, B., & Henrekson, M. (2003). Bottom-up versus top-down policies towards the commercialization of university intellectual property. *Research policy*, 32(4), 639-658.
- Gorman, G., Hanlon, D., & King, W. (1997). Some research perspectives on entrepreneurship education, enterprise education and education for small business management: a ten-year literature review. *International small business journal*, 15(3), 56-77.
- Graham, R. (2014). *Creating university-based entrepreneurial ecosystems: evidence from emerging world leaders*. Massachusetts Institute of Technology.
- Gras, J. M. G., Lopera, D. R. G., Soves, I. M., Jover, A. J. V., & Azuar, J. S. (2008). An empirical approach to the organisational determinants of spin-off creation in European universities. *International Entrepreneurship and Management Journal*, 4(2), 187-198.
- Griffiths, T. L., & Steyvers, M. (2004). Finding scientific topics. *Proceedings of the National Academy of Sciences*, 101(suppl 1), 5228–5235.
- Grünhagen, M., & Volkmann, C. K. (2014). Antecedents of academics' entrepreneurial intentions—developing a people-oriented model for university entrepreneurship. *International Journal of Entrepreneurial Venturing*, 6(2), 179-200.
- Guerrero, M., & Urbano, D. (2012). The development of an entrepreneurial university. *The Journal of Technology Transfer*, 37(1), 43-74.

- Guerrero, M., Cunningham, J. A., & Urbano, D. (2015). Economic impact of entrepreneurial universities' activities: An exploratory study of the United Kingdom. *Research policy*, 44(3), 748–764.
- Guerrero, M., Rialp, J., and Urbano, D. (2008). The impact of desirability and feasibility on entrepreneurial intentions: a structural equation model. *International Entrepreneurship and Management Journal*, 4(1), 35-50.
- Guerrero, M., Urbano, D., & Fayolle, A. (2016). Entrepreneurial activity and regional competitiveness: Evidence from European entrepreneurial universities. *The Journal of Technology Transfer*, 41(1), 105–131
- Gümüşay, A. A., & Bohné, T. M. (2018). Individual and organizational inhibitors to the development of entrepreneurial competencies in universities. *Research policy*, 47(2), 363-378.
- Hahn, D., Minola, T. & Eddleston, K. (2018). How do scientists contribute to the performance of innovative startups? An imprinting perspective on open innovation. *Journal of Management Studies*. <https://doi.org/10.1111/joms.12418>
- Hahn, D., Minola, T., Bosio, G., & Cassia, L. (2019). The impact of entrepreneurship education on university students' entrepreneurial skills: a family embeddedness perspective. *Small Business Economics*, 1-26.
- Hahn, D., Minola, T., Van Gils, A., & Huybrechts, J. (2017). Entrepreneurial education and learning at universities: exploring multilevel contingencies. *Entrepreneurship & Regional Development*, 29(9-10), 945-974.
- Harada, N. (2003). Who succeeds as an entrepreneur? An analysis of the post-entry performance of new firms in Japan. *Japan and the world economy*, 15(2), 211-222.
- Hatten, T. S., & Ruhland, S. K. (1995). Student attitude toward entrepreneurship as affected by participation in an SBI program. *Journal of Education for Business*, 70(4), 224-227.
- Hausman, J. A., Hall, B. H., & Griliches, Z. (1984). Econometric models for count data with an application to the patents-R&D relationship.
- Hayter, C. S. (2011). In search of the profit-maximizing actor: Motivations and definitions of success from nascent academic entrepreneurs. *The Journal of Technology Transfer*, 36(3), 340-352.
- Hayter, C. S. (2016). Constraining entrepreneurial development: A knowledge-based view of social networks among academic entrepreneurs. *Research policy*, 45(2), 475-490.
- Hayter, C. S., Lubynsky, R., & Maroulis, S. (2017). Who is the academic entrepreneur? The role of graduate students in the development of university spinoffs. *The Journal of Technology Transfer*, 42(6), 1237-1254.
- Heckman, J. J., & Kautz, T. (2012). Hard evidence on soft skills. *Labour economics*, 19(4), 451-464.
- Henry, C., Hill, F., & Leitch, C. (2005 a). Entrepreneurship education and training: can entrepreneurship be taught? Part I. *Education+ Training*, 47(2), 98-111.
- Henry, C., Hill, F., & Leitch, C. (2005 b). Entrepreneurship education and training: can entrepreneurship be taught? Part II. *Education+ Training*, 47(3), 158-169.
- Hills, G. E. (1988). Variations in university entrepreneurship education: An empirical study of an evolving field. *Journal of business venturing*, 3(2), 109-122.



- Honig, B. (2004). Entrepreneurship education: Toward a model of contingency-based business planning. *Academy of Management Learning & Education*, 3(3), 258-273
- Hoogendoorn, S., Oosterbeek, H., & Van Praag, M. (2013). The impact of gender diversity on the performance of business teams: Evidence from a field experiment. *Management Science*, 59(7), 1514-1528.
- Hoppe, M. (2016). Policy and entrepreneurship education. *Small Business Economics*, 46(1), 13-29.
- Howorth, C., Smith, S. M., & Parkinson, C. (2012). Social learning and social entrepreneurship education. *Academy of Management Learning & Education*, 11(3), 371-389.
- Huyghe, A., Knockaert, M., Piva, E., & Wright, M. (2016). Are researchers deliberately bypassing the technology transfer office? An analysis of TTO awareness. *Small Business Economics*, 47(3), 589-607.
- Huynh, T., Patton, D., Arias-Aranda, D., & Molina-Fernández, L. M. (2017). University spin-off's performance: Capabilities and networks of founding teams at creation phase. *Journal of Business Research*, 78, 10-22.
- Jack, S. L., & Anderson, A. R. (1999). Entrepreneurship education within the enterprise culture: producing reflective practitioners. *International Journal of Entrepreneurial Behavior & Research*, 5(3), 110-125.
- JADE (2017) Annual Report 2016/2017. Published in Brussels Belgium by JADE Available at: [http://www.jadenet.org/web/wp-content/uploads/2017/07/JADE\\_Annual\\_Report\\_2017.pdf](http://www.jadenet.org/web/wp-content/uploads/2017/07/JADE_Annual_Report_2017.pdf)
- Jansen, S., van de Zande, T., Brinkkemper, S., Stam, E., & Varma, V. (2015). How education, stimulation, and incubation encourage student entrepreneurship: Observations from MIT, IIT, and Utrecht University. *The International Journal of Management Education*, 13(2), 170-181.
- Johansen, V. (2018). Innovation Cluster for Entrepreneurship Education. Lillehammer, Norway, Østlandsforskning/Eastern Norway Research Institute. Available online: <http://icee-eu.eu/component/attachments/?task=download&id=623:ICEE-final-report> (accessed on 21 October 2019).
- Jones, C., & English, J. (2004). A contemporary approach to entrepreneurship education. *Education+ training*.
- Karanassios, N., Pazarskis, M., Mitsopoulos, K., & Christodoulou, P. (2006). EU strategies to encourage youth entrepreneurship: Evidence from higher education in Greece. *Industry and Higher Education*, 20(1), 43-50.
- Karimi, S., Biemans, H. J. A., Lans, T., Chizari, M., & Mulder, M. (2016). The impact of entrepreneurship education: A study of Iranian students' entrepreneurial intentions and opportunity identification. *Journal of Small Business Management*, 54(1), 187-209.
- Karnani, F. (2013). The university's unknown knowledge: Tacit knowledge, technology transfer and university spin-offs findings from an empirical study based on the theory of knowledge. *The Journal of Technology Transfer*, 38(3), 235-250.
- Kassean, H., Vanevenhoven, J., Liguori, E., & Winkel, D. E. (2015). Entrepreneurship education: a need for reflection, real-world experience and action. *International Journal of Entrepreneurial Behavior & Research* 21(5):690-708

- Katz, J. A. (2003). The chronology and intellectual trajectory of American entrepreneurship education: 1876–1999. *Journal of business venturing*, 18(2), 283-300.
- Katz, J. A. (2008). Fully mature but not fully legitimate: A different perspective on the state of entrepreneurship education. *Journal of Small Business Management*, 46(4), 550-566.
- Katz, J. A., and Gartner, W.B., (1988). Properties of Emerging Organizations. *Academy of Management Review*, 13(3), 429-441.
- Kochenkova, A., Grimaldi, R., & Munari, F. (2016). Public policy measures in support of knowledge transfer activities: a review of academic literature. *The Journal of Technology Transfer*, 41(3), 407–429.
- Kolvereid, L. (1996). Prediction of employment status choice intentions. *Entrepreneurship Theory and Practice*, 21(1), 47–57.
- Kourilsky, M. L., & Walstad, W. B. (1998). Entrepreneurship and female youth: Knowledge, attitudes, gender differences, and educational practices. *Journal of Business venturing*, 13(1), 77-88.
- Krueger, N. F. (1993). The impact of prior entrepreneurial exposure on perceptions of new venture feasibility and desirability. *Entrepreneurship Theory and Practice*, 18(1), 5-21.
- Krueger, N. F. (2000). The cognitive infrastructure of opportunity recognition. *Entrepreneurship Theory and Practice*, 24(3), 5–23
- Krueger, N. F., & Brazeal, D. V. (1994). Entrepreneurial potential and potential entrepreneurs. *Entrepreneurship theory and practice*, 18(3), 91-104.
- Krueger, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. *Journal of Business Venturing*, 15(5-6), 411-432.
- Kruger, N. F., & Carsrud, A.L. (1993). Entrepreneurial intentions: applying the theory of planned behavior. *Entrepreneurship and Regional Development*, 5, 316-323.
- Kuratko, D. F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship Theory and Practice*, 29(5), 577-598.
- Kyrgidou, L. P., Sapounidis, T., & Stamelos, I. (2016). Entrepreneurship and Education: The “InnoEntre” Project. In *Innovation and Entrepreneurship in Education* (pp. 131-146). Emerald Group Publishing Limited.
- Lackéus, M., & Middleton, K. W. (2015). Venture creation programs: bridging entrepreneurship education and technology transfer. *Education+ training*.
- Lamine, W., Mian, S., Fayolle, A., Wright, M., Klofsten, M., & Etzkowitz, H. (2018). Technology business incubation mechanisms and sustainable regional development. *The Journal of Technology Transfer*, 43(5), 1121-1141.
- Landry, R., Amara, N., & Rherrad, I. (2006). Why are some university researchers more likely to create spin-offs than others? Evidence from Canadian universities. *Research policy*, 35(10), 1599-1615.
- Lanero, A., Vázquez, J. L., Gutiérrez, P., and García, M. P. (2011) The impact of entrepreneurship education in European universities: an intention-based approach analyzed in the Spanish area. *International Review on Public and Nonprofit Marketing* 8(2):111-130
- Lans, T., Blok, V., & Gulikers, J. (2015). Show me your network and I'll tell you who you are: social competence and social capital of early-stage entrepreneurs. *Entrepreneurship & Regional Development*, 27(7-8), 458-473.

- Laskovaia, A., Shirokova, G., & Morris, M. H. (2017). National culture, effectuation, and new venture performance: global evidence from student entrepreneurs. *Small Business Economics*, 49(3), 687-709.
- Laspita, S., N. Breugst, S. Hebllich, and H. Patzelt (2012). "Intergenerational Transmission of Entrepreneurial Intentions," *Journal of Business Venturing* 27(4), 414-435.
- Leborgne-Bonassié, M., Coletti, M., & Sansone, G. (2019). What do venture philanthropy organisations seek in social enterprises?. *Business Strategy & Development*, in press. <https://doi.org/10.1002/bsd2.66>
- Lee, H., & Kang, P. (2018). Identifying core topics in technology and innovation management studies: A topic model approach. *The Journal of Technology Transfer*, 43(5), 1291-1317.
- Lee, S. M., Chang, D., & Lim, S. B. (2005). Impact of entrepreneurship education: A comparative study of the US and Korea. *The International Entrepreneurship and Management Journal*, 1(1), 27-43.
- Léger-Jarniou, C. (2012). Student entrepreneurship clusters: A new way for entrepreneurship education?. *Industry and Higher Education*, 26(3), 177-191.
- Liñán, F. (2008). Skill and value perceptions: how do they affect entrepreneurial intentions?. *International Entrepreneurship and Management Journal*, 4(3), 257-272.
- Liñán, F., & Chen, Y. W. (2009). Development and cross-cultural application of a specific instrument to measure entrepreneurial intentions. *Entrepreneurship Theory and Practice*, 33(3), 593-617.
- Liñán, F., Rodríguez-Cohard, J. C., & Rueda-Cantuche, J. M. (2011). Factors affecting entrepreneurial intention levels: a role for education. *International entrepreneurship and management Journal*, 7(2), 195-218.
- Link, A. N., & Scott, J. T. (2005). Opening the ivory tower's door: An analysis of the determinants of the formation of US university spin-off companies. *Research policy*, 34(7), 1106-1112.
- Löbler, H. (2006). Learning entrepreneurship from a constructivist perspective. *Technology Analysis & Strategic Management*, 18(1), 19-38.
- Lockett, A., & Wright, M. (2005). Resources, capabilities, risk capital and the creation of university spin-out companies. *Research policy*, 34(7), 1043-1057.
- Lowe, R. A. (2006). Who develops a university invention? The impact of tacit knowledge and licensing policies. *The Journal of Technology Transfer*, 31(4), 415-429.
- Lüthje, C., & Franke, N. (2003). The 'making' of an entrepreneur: testing a model of entrepreneurial intent among engineering students at MIT. *R&D Management*, 33(2), 135-147.
- Lyons, E., & Zhang, L. (2018). Who does (not) benefit from entrepreneurship programs?. *Strategic Management Journal*, 39(1), 85-112.
- Manimala, M. J. (2008). Entrepreneurship education in India: an assessment of SME training needs against current practices. *International Journal of Entrepreneurship and Innovation Management*, 8(6), 624-647.
- Maresch, D., Harms, R., Kailer, N., & Wimmer-Wurm, B. (2016). The impact of entrepreneurship education on the entrepreneurial intention of students in science and engineering versus business studies university programs. *Technological forecasting and social change*, 104, 172-179.
- Mariani, G., Carlesi, A., & Scarfö, A. A. (2018). Academic spinoffs as a value driver for intellectual capital: the case of the University of Pisa. *Journal of Intellectual Capital*, 19(1), 202-226.

- Markman, G. D., Gianiodis, P. T., Phan, P. H., & Balkin, D. B. (2005). Innovation speed: Transferring university technology to market. *Research policy*, 34(7), 1058-1075.
- Markman, G. D., Siegel, D. S., & Wright, M. (2008). Research and technology commercialization. *Journal of Management Studies*, 45(8), 1401-1423.
- Martin, B. C., McNally, J. J., & Kay, M. J. (2013). Examining the formation of human capital in entrepreneurship: A meta-analysis of entrepreneurship education outcomes. *Journal of business venturing*, 28(2), 211-224.
- Martínez-Román, J. A., & Romero, I. (2017). Determinants of innovativeness in SMEs: disentangling core innovation and technology adoption capabilities. *Review of Managerial Science*, 11(3), 543-569.
- Marzocchi, C., Kitagawa, F., & Sánchez-Barrioluengo, M. (2018). Evolving missions and university entrepreneurship: academic spin-offs and graduate start-ups in the entrepreneurial society. *The Journal of Technology Transfer*, 1-22.
- Mathews, C. H., & Moser, S. B. (1995). Family background and gender: Implications for interest in small firm ownership. *Entrepreneurship & Regional Development*, 7(4), 365-378.
- Matlay, H., & Hannon, P. D. (2006). Teaching pigeons to dance: sense and meaning in entrepreneurship education. *Education+ Training*.
- Matlay, H., & Henry, C. (2013). Entrepreneurship education in HE: are policy makers expecting too much?. *Education+ Training*.
- Matlay, H., Blenker, P., Elmholdt, S. T., Frederiksen, S. H., Korsgaard, S., & Wagner, K. (2014). Methods in entrepreneurship education research: a review and integrative framework. *Education+ Training*.
- Mauchi, F. N., Karambakuwa, R. T., Gopo, R. N., Njanike, K., Mangwende, S., & Gombarume, F. B. (2011). Entrepreneurship education lessons: a case of Zimbabwean tertiary education institutions.
- Mazzarol, T., Volery, T., Doss, N., & Thein, V. (1999) Factors influencing small business start-ups: a comparison with previous research. *International Journal of Entrepreneurial Behavior & Research* 5(2):48-63
- McMullan, W. E., & Long, W. A. (1987). Entrepreneurship education in the nineties. *Journal of Business Venturing*, 2(3), 261-275.
- McMullen, J. S., & Shepherd, D. A. (2006). Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. *Academy of Management review*, 31(1), 132-152.
- Meho, L. I., & Yang, K. (2007). Impact of data sources on citation counts and rankings of LIS faculty: Web of Science versus Scopus and Google Scholar. *Journal of the American Society for Information Science and Technology*, 58(13), 2105-2125.
- Meoli, M., Paleari, S., & Vismara, S. (2017). The governance of universities and the establishment of academic spin-offs. *Small Business Economics*, 1-20.
- Meyer, D., Hornik, K., & Feinerer, I. (2008). Text mining infrastructure in R. *Journal of Statistical Software*, 25(5), 1-54.
- Minniti, M., Arenius, P., and Langowitz, N. (2005) Report on women and entrepreneurship. In *Global Entrepreneurship Monitor Wellesley MA The Center for Women's Leadership at Babson College*
- Minola, T., Criaco, G., and Obschonka, M. (2016 a) Age, culture, and self-employment motivation. *Small Business Economics*, 46(2), 187-213

- Minola, T., Donina, D., & Meoli, M. (2016 b). Students climbing the entrepreneurial ladder: Does university internationalization pay off?. *Small Business Economics*, 47(3), 565-587.
- MIUR - Ministero dell'Istruzione, dell'Università e della Ricerca (2018). Percorsi per le competenze trasversali e per l'orientamento linee guida. Available at: <https://www.miur.gov.it/documents/20182/1306025/Linee+guida+PCTO+con+allegati.pdf/3e6b5514-c5e4-71de-8103-30250f17134a?version=1.0&t=1570548388496>
- Moberg, K., Vestergaard, L., Fayolle, A., Redford, D., Cooney, T., Singer, S., ... & Filip, D. (2014). How to assess and evaluate the influence of entrepreneurship education: A report of the ASTEE project with a user guide to the tools.
- Moro, S., Cortez, P., & Rita, P. (2015). Business intelligence in banking: A literature analysis from 2002 to 2013 using text mining and latent Dirichlet allocation. *Expert Systems with Applications*, 42(3), 1314–1324.
- Morris, M. H., Shirokova, G., & Tsukanova, T. (2017). Student entrepreneurship and the university ecosystem: A multi-country empirical exploration. *European Journal of International Management*, 11(1), 65-85.
- Morris, M. H., Webb, J. W., Fu, J., & Singhal, S. (2013). A competency-based perspective on entrepreneurship education: conceptual and empirical insights. *Journal of Small Business Management*, 51(3), 352-369.
- Müller, K. (2010). Academic spin-off's transfer speed - Analyzing the time from leaving university to venture. *Research policy*, 39(2), 189-199.
- Müller, O., Junglas, I., vom Brocke, J., & Debortoli, S. (2016). Utilizing big data analytics for information systems research: challenges, promises and guidelines. *European Journal of Information Systems*, 25(4), 289–302.
- Munari, F., Rasmussen, E., Toschi, L., & Villani, E. (2016). Determinants of the university technology transfer policy-mix: A cross-national analysis of gap-funding instruments. *The Journal of Technology Transfer*, 41(6), 1377-1405.
- Muscio, A., & Ramaciotti, L. (2019). How does academia influence Ph. D. entrepreneurship? New insights on the entrepreneurial university. *Technovation*.
- Myers, M. (2009). *Qualitative research in business and management*. London, UK: Sage Publications.
- Nabi, G., Liñán, F., Fayolle, A., Krueger, N., & Walmsley, A. (2017). The impact of entrepreneurship education in higher education: A systematic review and research agenda. *Academy of Management Learning & Education*, 16(2), 277-299.
- Nabi, G., Walmsley, A., Liñán, F., Akhtar, I., & Neame, C. (2018). Does entrepreneurship education in the first year of higher education develop entrepreneurial intentions? The role of learning and inspiration. *Studies in Higher Education*, 43(3), 452-467.
- Neck, H. M., & Greene, P. G. (2011). Entrepreneurship education: known worlds and new frontiers. *Journal of small business management*, 49(1), 55-70.
- Nga, J. K. H., & Shamuganathan, G. (2010). The influence of personality traits and demographic factors on social entrepreneurship start up intentions. *Journal of business ethics*, 95(2), 259-282.
- Nikiforou, A., Zabara, T., Clarysse, B., & Gruber, M. (2018). The Role of Teams in Academic Spin-Offs. *Academy of Management Perspectives*, 32(1), 78-103.

- O’Gorman, C., Byrne, O., & Pandya, D. (2008). How scientists commercialise new knowledge via entrepreneurship. *The Journal of Technology Transfer*, 33(1), 23-43.
- O’Shea, R. P., Allen, T. J., Chevalier, A., & Roche, F. (2005). Entrepreneurial orientation, technology transfer and spinoff performance of US universities. *Research policy*, 34(7), 994-1009.
- O’Shea, R. P., Allen, T. J., Morse, K. P., O’Gorman, C., & Roche, F. (2007). Delineating the anatomy of an entrepreneurial university: the Massachusetts Institute of Technology experience. *R&D Management*, 37(1), 1-16.
- O’Shea, R. P., Chugh, H., & Allen, T. J. (2008). Determinants and consequences of university spinoff activity: a conceptual framework. *The Journal of Technology Transfer*, 33(6), 653-666.
- O’Connor, A. (2013). A conceptual framework for entrepreneurship education policy: Meeting government and economic purposes. *Journal of Business Venturing*, 28(4), 546-563.
- OECD (2009) *The Missing Entrepreneurs: Policies for Inclusive Entrepreneurship in Europe*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264188167-en>.
- Oosterbeek, H., Van Praag, M., & Ijsselstein, A. (2010). The impact of entrepreneurship education on entrepreneurship skills and motivation. *European economic review*, 54(3), 442-454.
- Ordenes, F. V., Theodoulidis, B., Burton, J., Gruber, T., & Zaki, M. (2014). Analyzing Customer Experience Feedback Using Text Mining: A Linguistics-Based Approach. *Journal of Service Research*, 17(3), 278–295.
- Pache, A. C., & Chowdhury, I. (2012). Social entrepreneurs as institutionally embedded entrepreneurs: Toward a new model of social entrepreneurship education. *Academy of Management Learning & Education*, 11(3), 494-510.
- Padilla-Angulo, L. (2019). Student associations and entrepreneurial intentions. *Studies in Higher Education*, 44(1), 45-58.
- Paul, J., Hermel, P., & Srivatava, A. (2017). Entrepreneurial intentions—theory and evidence from Asia, America, and Europe. *Journal of International Entrepreneurship*, 15(3), 324-351.
- Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D’Este, P., ... & Krabel, S. (2013). Academic engagement and commercialisation: A review of the literature on university–industry relations. *Research policy*, 42(2), 423-442.
- Peterman, N. E., & Kennedy, J. (2003). Enterprise education: Influencing students’ perceptions of entrepreneurship. *Entrepreneurship Theory and Practice*, 28(2), 129-144.
- Pfeffer, J. (1994). *Competitive advantage through people: Unleashing the power of the workforce*. Boston, MA.: Harvard University Press.
- Phan, P. H., & Siegel, D. S. (2006). The effectiveness of university technology transfer. *Foundations and Trends® in Entrepreneurship*, 2(2), 77-144.
- Philpott, K., Dooley, L., O’Reilly, C., & Lupton, G. (2011). The entrepreneurial university: Examining the underlying academic tensions. *Technovation*, 31(4), 161-170.
- Piepenbrink, A., & Nurmammadov, E. (2015). Topics in the literature of transition economies and emerging markets. *Scientometrics*, 102(3), 2107–2130.

- Piperopoulos, P., & Dimov, D. (2015). Burst bubbles or build steam? Entrepreneurship education, entrepreneurial self-efficacy, and entrepreneurial intentions. *Journal of Small Business Management*, 53(4), 970-985.
- Pirnay, F., & Surlemont, B. (2003). Toward a typology of university spin-offs. *Small Business Economics*, 21(4), 355-369.
- Pittaway, L. A., Gazzard, J., Shore, A., & Williamson, T. (2015). Student clubs: experiences in entrepreneurial learning. *Entrepreneurship & Regional Development*, 27(3-4), 127-153.
- Pittaway, L., & Cope, J. (2007 a). Entrepreneurship education: A systematic review of the evidence. *International small business journal*, 25(5), 479-510.
- Pittaway, L., & Cope, J. (2007 b). Simulating entrepreneurial learning: Integrating experiential and collaborative approaches to learning. *Management learning*, 38(2), 211-233.
- Pittaway, L., & Cope, J. (2007 c). Entrepreneurship education: a systematic review of the evidence. *International Small Business Journal*, 25(5), 479-510.
- Pittaway, L., Rodriguez-Falcon, E., Aiyegbayo, O., & King, A. (2011). The role of entrepreneurship clubs and societies in entrepreneurial learning. *International Small Business Journal*, 29(1), 37-57.
- Powers, J. B., & McDougall, P. P. (2005). University start-up formation and technology licensing with firms that go public: a resource-based view of academic entrepreneurship. *Journal of Business Venturing*, 20(3), 291-311.
- Preedy, S., & Jones, P. (2017). Student-led enterprise groups and entrepreneurial learning: A UK perspective. *Industry and Higher Education*, 31(2), 101-112.
- Preedy, S., and Jones, P. (2015) An investigation into university extra-curricular enterprise support provision. *Education+ Training*, 57(8/9):992-1008
- Prodan, I., & Drnovsek, M. (2010). Conceptualizing academic-entrepreneurial intentions: An empirical test. *Technovation*, 30(5-6), 332-347.
- Prokop, D., Huggins, R., & Bristow, G. (2019). The survival of academic spinoff companies: An empirical study of key determinants. *International Small Business Journal: Researching Entrepreneurship*. <https://doi.org/10.1177/0266242619833540>.
- Pruett, M., Shinnar, R., Toney, B., Llopis, F., & Fox, J. (2009) Explaining entrepreneurial intentions of university students: a cross-cultural study. *International Journal of Entrepreneurial Behavior & Research* 15(6):571-594
- Rao, S. (2014). Nurturing entrepreneurial women: Insights from a developing country. *Journal of Entrepreneurship in Emerging Economies*, 6(3), 268-297.
- Rasmussen, E. A., & Sørheim, R. (2006). Action-based entrepreneurship education. *Technovation*, 26(2), 185-194.
- Rasmussen, E., & Borch, O. J. (2010). University capabilities in facilitating entrepreneurship: A longitudinal study of spin-off ventures at mid-range universities. *Research policy*, 39(5), 602-612.
- Rasmussen, E., & Wright, M. (2015). How can universities facilitate academic spin-offs? An entrepreneurial competency perspective. *The Journal of Technology Transfer*, 40(5), 782-799.
- Rasmussen, E., Mosey, S., & Wright, M. (2011). The evolution of entrepreneurial competencies: A longitudinal study of university spin-off venture emergence. *Journal of Management Studies*, 48(6), 1314-1345.
- Rasmussen, E., Mosey, S., & Wright, M. (2014). The influence of university departments on the evolution of entrepreneurial competencies in spin-off ventures. *Research policy*, 43(1), 92-106.

- Rauch, A., & Frese, M. (2007). Let's put the person back into entrepreneurship research: a meta-analysis of the relationship between business owners' personality characteristics and business creation and success. *European Journal of Work and Organizational Psychology*, 16(4), 353–385.
- Rauch, A., & Hulsink, W. (2015). Putting entrepreneurship education where the intention to act lies: An investigation into the impact of entrepreneurship education on entrepreneurial behavior. *Academy of Management Learning & Education*, 14(2), 187-204.
- Rauth Bhardwaj, B. (2014). Impact of education and training on performance of women entrepreneurs: a study in emerging market context. *Journal of Entrepreneurship in Emerging Economies*, 6(1), 38-52.
- Rawhouser, H., Cummings, M., & Newbert, S. L. (2019). Social impact measurement: Current approaches and future directions for social entrepreneurship research. *Entrepreneurship Theory and Practice*, 43(1), 82-115.
- Rideout, E. C., & Gray, D. O. (2013). Does entrepreneurship education really work? A review and methodological critique of the empirical literature on the effects of university-based entrepreneurship education. *Journal of Small Business Management*, 51(3), 329-351.
- Riese, H. (2013). Mini-enterprise projects: friendship, business and learning. *Journal of education and Work*, 26(4), 453-471.
- Rissola, G., Hervas F., Slavcheva M. and Jonkers K. (2017) Place-Based Innovation Ecosystems: Espoo Innovation Garden and Aalto University (Finland). No. JRC106122 Joint Research Centre (Seville site)
- Roman, T., & Maxim, A. (2017). National culture and higher education as pre-determining factors of student entrepreneurship. *Studies in Higher Education*, 42(6), 993-1014.
- Rothaermel, F. T., Agung, S. D., & Jiang, L. (2007). University entrepreneurship: a taxonomy of the literature. *Industrial and Corporate Change*, 16(4), 691-791.
- Rubin, R. S., Bommer, W. H., and Baldwin, T. T. (2002) Using extracurricular activity as an indicator of interpersonal skill: Prudent evaluation or recruiting malpractice?. *Human Resource Management* 41(4):441-454
- Russell, R., Atchison, M., & Brooks, R. (2008). Business plan competitions in tertiary institutions: encouraging entrepreneurship education. *Journal of Higher Education Policy and Management*, 30(2), 123-138.
- Ryan, B., Scapens, R.W. and Theobald, M. (2002), *Research Method and Methodology in Finance and Accounting*, Thomson, London.
- Saebi, T., Foss, N. J., & Linder, S. (2019). Social entrepreneurship research: Past achievements and future promises. *Journal of Management*, 45(1), 70-95.
- Saeed, S., Muffatto, M., & Yousafzai, S. (2014). A multi-level study of entrepreneurship education among Pakistani university students. *Entrepreneurship Research Journal*, 4(3), 297-321.
- Saeed, S., Muffatto, M., & Yousafzai, S. Y. (2014). Exploring intergenerational influence on entrepreneurial intention: the mediating role of perceived desirability and perceived feasibility. *International Journal of Entrepreneurship and Innovation Management*, 18(2/3), 134-153.
- Saeed, S., Yousafzai, S. Y., Yani-De-Soriano, M., & Muffatto, M. (2015). The role of perceived university support in the formation of students' entrepreneurial intention. *Journal of small business management*, 53(4), 1127-1145.



- Sakata, I., Sasaki, H., Akiyama, M., Sawatani, Y., Shibata, N., & Kajikawa, Y. (2013). Bibliometric analysis of service innovation research: Identifying knowledge domain and global network of knowledge. *Technological Forecasting and Social Change*, 80(6), 1085–1093.
- Sambharya, R., & Musteen, M. (2014). Institutional environment and entrepreneurship: An empirical study across countries. *Journal of International Entrepreneurship*, 12(4), 314-330.
- Sánchez, J. C. (2011). University training for entrepreneurial competencies: Its impact on intention of venture creation. *International Entrepreneurship and Management Journal*, 7, 239–254.
- Sánchez, J. C. (2013). The impact of an entrepreneurship education program on entrepreneurial competencies and intention. *Journal of Small Business Management*, 51(3), 447-465.
- Sandhu, M.S., Sidique, S.F. and Riaz, S. (2011) Entrepreneurship barriers and entrepreneurial inclination among Malaysian postgraduate students. *International Journal of Entrepreneurial Behaviour & Research* 17(4):428-449
- Sansone, G., Battaglia, D., Landoni, P., and Paolucci, E., (2019), “Academic spinoffs: the role of entrepreneurship education”, *International Entrepreneurship and Management Journal*, <https://doi.org/10.1007/s11365-019-00601-9>
- Sansone, G., Battaglia, D., Landoni, P., Paolucci, E., (2017 a). Entrepreneurship Education: the impact of different teaching models on the development of new ventures. How to foster innovative entrepreneurship? Trends, challenges, and policy implications, Milan, Italy, 23-24 November 2017.
- Sansone, G., Battaglia, D., Paolucci, E., and Landoni, P., (2017 b). Empirical analysis of entrepreneurial education in US universities. 18th International CINet Conference, Potsdam, Germany, 10-12 September 2017.
- Schwarz, C. (2018). *Idagibbs: A command for topic modeling in Stata using latent Dirichlet allocation*. *Stata Journal*, 18(1), 101–117.
- Secundo, G., Mele, G., Sansone, G., Passiante, G., (2019). Moving Ahead Entrepreneurship Education in Italian Universities: insights from the “Contamination Lab” cases. *AiIG XXX Riunione Scientifica Annuale (RSA)*, Turin, Italy, 17-18 October 2019.
- Sexton, D.I., Smilor, R.W., (1997). *Entrepreneurship*. Upstart Publishing Company. Chicago Illinois.
- Shah, P. K., Perez-Iratxeta, C., Bork, P., & Andrade, M. A. (2003). Information extraction from full text scientific articles: where are the keywords? *BMC Bioinformatics*, 4(1), 1–9.
- Shah, S. K., and Pahnke, E. C. (2014). Parting the ivory curtain: understanding how universities support a diverse set of startups. *The Journal of Technology Transfer*, 39(5), 780-792.
- Shane, S. A. (2004). *Academic entrepreneurship: University spinoffs and wealth creation*. Edward Elgar Publishing.
- Shane, S., & Stuart, T. (2002). Organizational endowments and the performance of university start-ups. *Management science*, 48(1), 154-170.
- Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of management review*, 25(1), 217-226.
- Shinnar, R. S., Giacomini, O., & Janssen, F. (2012). Entrepreneurial perceptions and intentions: The role of gender and culture. *Entrepreneurship Theory and Practice*, 36(3), 465-493.

- Siegel, D. S., & Wright, M. (2015). Academic entrepreneurship: time for a rethink?. *British Journal of Management*, 26(4), 582-595.
- Siegel, D. S., Waldman, D., & Link, A. (2003). Assessing the impact of organizational practices on the relative productivity of university technology transfer offices: an exploratory study. *Research policy*, 32(1), 27-48.
- Siegel, D. S., Wright, M., & Lockett, A. (2007). The rise of entrepreneurial activity at universities: organizational and societal implications. *Industrial and Corporate Change*, 16(4), 489-504.
- Sieger, P., & Minola, T. (2017). The family's financial support as a “poisoned gift”: A family embeddedness perspective on entrepreneurial intentions. *Journal of Small Business Management*, 55, 179-204.
- Sieger, P., Fueglistaller, U., & Zellweger, T. (2016). Student entrepreneurship 2016: Insights from 50 countries. International Report GUESSSS 2016
- Sieger, P., Fueglistaller, U., and Zellweger, T. (2014) Student entrepreneurship across the globe: A look at intentions and activities. International Report GUESSSS 2013/2014
- Smeltzer, L. R., Van Hook, B. L., & Hutt, R. W. (1991). Analysis of the use of advisors as information sources in venture startups. *Journal of Small Business Management*, 29(3), 10.
- Smolka, K. M., Verheul, I., Burmeister–Lamp, K., & Heugens, P. P. (2018). Get it together! Synergistic effects of causal and effectual decision–making logics on venture performance. *Entrepreneurship Theory and Practice*, 42(4), 571-604.
- Soetanto, D., & Jack, S. (2016). The impact of university-based incubation support on the innovation strategy of academic spin-offs. *Technovation*, 50, 25-40.
- Solomon, G. (2007). An examination of entrepreneurship education in the United States. *Journal of small business and enterprise development*, 14(2), 168-182.
- Souitaris, V., Zerbini, S., & Al-Laham, A. (2007). Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources. *Journal of Business Venturing*, 22(4), 566-591.
- Spigel, B. and Harrison, R. (2018). Toward a process theory of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal*, 12(1), 151-168.
- Srivastava, S., & Misra, R. (2017). Exploring antecedents of entrepreneurial intentions of young women in India: A multi-method analysis. *Journal of Entrepreneurship in Emerging Economies*, 9(2), 181-206.
- Stam, E. (2015). Entrepreneurial ecosystems and regional policy: a sympathetic critique. *European Planning Studies*, 23(9), 1759-1769.
- Stephan, U., & Uhlaner, L. M. (2010). Performance-based vs socially supportive culture: A cross-national study of descriptive norms and entrepreneurship. *Journal of International Business Studies*, 41(8), 1347-1364.
- Sternberg, R. (2014). Success factors of university-spin-offs: Regional government support programs versus regional environment. *Technovation*, 34(3), 137-148.
- St-Jean, E., & Audet, J. (2012). The role of mentoring in the learning development of the novice entrepreneur. *International Entrepreneurship and Management Journal*, 8(1), 119-140.
- Strauss, A. and Corbin, J. (1998) *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, Sage, Thousand Oaks, CA.
- Sullivan, R. (2000). Entrepreneurial learning and mentoring. *International Journal of Entrepreneurial Behaviour & Research*, 6(3), 160–175

- Thompson, E. R. (2009). Individual entrepreneurial intent: Construct clarification and development of an internationally reliable metric. *Entrepreneurship Theory and Practice*, 33(3), 669-694.
- Tracey, P., & Phillips, N. (2007). The distinctive challenge of educating social entrepreneurs: A postscript and rejoinder to the special issue on entrepreneurship education. *Academy of Management Learning & Education*, 6(2), 264-271.
- Uhlaner, L., and Thurik, R. (2007) Postmaterialism influencing total entrepreneurial activity across nations. *J Evol Econ* 17(2):161-185
- Ulvenblad, P., Berggren, E., & Winborg, J. (2013). The role of entrepreneurship education and start-up experience for handling communication and liability of newness. *International Journal of Entrepreneurial Behavior & Research*, 19(2), 187-209.
- Valerio, A., Parton, B., & Robb, A. (2014). Entrepreneurship education and training programs around the world: dimensions for success. The World Bank. doi: 10.1596/978-1-4648-0202-7
- Van Burg, E., Romme, A. G. L., Gilsing, V. A., & Reymen, I. M. (2008). Creating University Spin-Offs: A Science-Based Design Perspective. *Journal of Product Innovation Management*, 25(2), 114-128.
- Van Looy, B., Landoni, P., Callaert, J., van Pottelsberghe, B., Sapsalis, E., & Debackere, K. (2011). Entrepreneurial effectiveness of European universities: An empirical assessment of antecedents and trade-offs. *Research policy*, 40(4), 553–564.
- Van Praag, C. M., & Versloot, P. H. (2007). What is the value of entrepreneurship? A review of recent research. *Small Business Economics*, 29(4), 351-382.
- Van Stel, A., Carree, M., & Thurik, R. (2005). The effect of entrepreneurial activity on national economic growth. *Small business economics*, 24(3), 311-321.
- Vanevenhoven, J., & Liguori, E. (2013). The impact of entrepreneurship education: Introducing the entrepreneurship education project. *Journal of Small Business Management*, 51(3), 315-328.
- Varano, M., Kähkönen E., Aarnio H., Clavert M., Kaulio M., Thorén K., Haenen C., Van Petegem W., Colombelli A., Sansone G., et al. (2018). Entrepreneurship Education Ecosystems in Engineering and Technology (E4T). Paper presented at the SEFI Conference, Copenhagen, Denmark, September 17–21.
- Verheul, I., & Thurik, R. (2001). Start-up capital: " does gender matter?". *Small business economics*, 16(4), 329-346.
- Vincett, P. S. (2010). The economic impacts of academic spin-off companies, and their implications for public policy. *Research policy*, 39(6), 736-747.
- Visintin, F., & Pittino, D. (2014). Founding team composition and early performance of university—Based spin-off companies. *Technovation*, 34(1), 31-43.
- Wacker, J.G. (1998), A definition of theory: research guidelines for different theory-building research methods in operationsmanagement, *Journal of Operations Management*, 16(4), 361-385.
- Walter, A., Auer, M., & Ritter, T. (2006). The impact of network capabilities and entrepreneurial orientation on university spin-off performance. *Journal of Business Venturing*, 21(4), 541-567.

- Walter, S. G., Parboteeah, K. P., & Walter, A. (2013). University Departments and Self-Employment Intentions of Business Students: A Cross-Level Analysis. *Entrepreneurship Theory and Practice*, 37(2), 175-200.
- Webster, J., & Watson, R. T. (2002). Analyzing the Past to Prepare for the Future: Writing a Literature Review. *MIS Quarterly*, 26(2), xiii-xxiii.
- Wennekers, S., & Thurik, R. (1999). Linking entrepreneurship and economic growth. *Small business economics*, 13(1), 27-56.
- Wennekers, S., Van Wennekers, A., Thurik, R., & Reynolds, P. (2005). Nascent entrepreneurship and the level of economic development. *Small business economics*, 24(3), 293-309.
- Williams, P., & Fenton, M. (2013). Towards a Good Practice Model for an Entrepreneurial HEI: Perspectives of Academics, Enterprise Enablers and Graduate Entrepreneurs. *Industry and Higher Education*, 27(6), 499-506.
- Wilson, F., Kickul, J., & Marlino, D. (2007). Gender, entrepreneurial self-efficacy, and entrepreneurial career intentions: Implications for entrepreneurship education. *Entrepreneurship theory and practice*, 31(3), 387-406.
- Wong, P. K., Ho, Y. P., & Autio, E. (2005). Entrepreneurship, innovation and economic growth: Evidence from GEM data. *Small business economics*, 24(3), 335-350.
- Wright, M., Clarysse, B., Lockett, A., & Knockaert, M. (2008). Mid-range universities' linkages with industry: Knowledge types and the role of intermediaries. *Research policy*, 37(8), 1205-1223.
- Wright, M., Lockett, A., Clarysse, B., & Binks, M. (2006). University spin-out companies and venture capital. *Research policy*, 35(4), 481-501.
- Wu, Y. C. J., Kuo, T., & Shen, J. P. (2013). Exploring social entrepreneurship education from a Web-based pedagogical perspective. *Computers in Human Behavior*, 29(2), 329-334.
- Yang, S., & Zhang, H. (2018). Text mining of Twitter data using a latent Dirichlet allocation topic model and sentiment analysis. *Int. J. Comput. Inf. Eng.*, 12, 525-529.
- Yin, R. K. (2013). *Case study research: Design and Methods* 5th ed. Thousand Oaks, CA: Sage.
- Yordanova, D. I., & Tarrazon, M. A. (2010). Gender differences in entrepreneurial intentions: evidence from Bulgaria. *Journal of Developmental Entrepreneurship*, 15(03), 245-261.
- Yousafzai, S. Y., Saeed, S., & Muffatto, M. (2015). Institutional theory and contextual embeddedness of women's entrepreneurial leadership: Evidence from 92 countries. *Journal of Small Business Management*, 53(3), 587-604.
- Zellweger, T., P. Sieger, and F. Halter (2011). "Should I Stay or Should I Go?" Career Choice Intentions of Students with Family Business Background," *Journal of Business Venturing* 26(5), 521-536.
- Zhang, Y., Duysters, G., & Cloudt, M. (2014). The role of entrepreneurship education as a predictor of university students' entrepreneurial intention. *International entrepreneurship and management journal*, 10(3), 623-641.
- Zhao, H., Seibert, S. E., & Hills, G. E. (2005). The mediating role of self-efficacy in the development of entrepreneurial intentions. *Journal of applied psychology*, 90(6), 1265.
- Zimmer, C., and Aldrich, H. (1987) Resource mobilization through ethnic networks: Kinship and friendship ties of shopkeepers in England. *Sociol Perspect* 30(4):422-445

# Annex A

Final query on Literature review of EE on Scopus database:

*TITLE-ABS-KEY ( "entrepr\* education" OR "enterpr\* education") AND ( LIMIT-TO ( SRCTYPE , "j" ) ) AND ( EXCLUDE ( PUBYEAR , 2020 ) OR EXCLUDE ( PUBYEAR , 2019 ) ) AND ( LIMIT-TO ( LANGUAGE , "English" ) ) AND ( ISSN(0001-4826) OR ISSN(0361-3682) OR ISSN(0165-4101) OR ISSN(0021-8456) OR ISSN(0823-9150) OR ISSN(1380-6653) OR ISSN(0001-3072) OR ISSN(0001-4788) OR ISSN(0155-9982) OR ISSN(0888-7993) OR ISSN(0951-3574) OR ISSN(0278-0380) OR ISSN(1050-4753) OR ISSN(0890-8389) OR ISSN(0007-1870) OR ISSN(1045-2354) OR ISSN(0963-8180) OR ISSN(0267-4424) OR ISSN(1554-0642) OR ISSN(1094-4060) OR ISSN(0278-4254) OR ISSN(0737-4607) OR ISSN(0148-558X) OR ISSN(0306-686X) OR ISSN(1061-9518) OR ISSN(0198-9073) OR ISSN(1044-5005) OR ISSN(0810-5391) OR ISSN(1530-9320) OR ISSN(1744-9480) OR ISSN(1030-9616) OR ISSN(2152-2820) OR ISSN(0882-9073) OR ISSN(1475-1488) OR ISSN(1474-7871) OR ISSN(1058-7497) OR ISSN(1608-1625) OR ISSN(1321-7348) OR ISSN(1035-6908) OR ISSN(1755-3091) OR ISSN(1936-1270) OR 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ISSN(2164-3970) OR ISSN(1625-8312) OR ISSN(1754-2731) OR ISSN(0025-1909) OR ISSN(0030-364X) OR ISSN(0377-2217) OR ISSN(1089-778X) OR ISSN(0025-5610) OR ISSN(1083-4427) OR ISSN(1049-3301) OR ISSN(0254-5330) OR ISSN(0926-6003) OR ISSN(0305-0548) OR ISSN(0011-7315) OR ISSN(1063-6560) OR ISSN(1568-4539) OR ISSN(1094-6977) OR ISSN(0740-817X) OR ISSN(1091-9856) OR ISSN(0169-2070) OR ISSN(1381-1231) OR ISSN(0022-3239) OR ISSN(0160-5682) OR ISSN(0364-765X) OR ISSN(0894-069X) OR ISSN(0305-0483) OR ISSN(0171-6468) OR ISSN(0951-8320) OR ISSN(1052-6234) OR ISSN(0041-1655) OR ISSN(1619-4500) OR ISSN(0166-218X) OR ISSN(1572-5286) OR ISSN(0305-215X) OR ISSN(1751-5254) OR ISSN(0926-2644) OR ISSN(1471-678X) OR ISSN(0092-2102) OR ISSN(1382-6905) OR ISSN(0277-6693) OR ISSN(0167-6377) OR ISSN(0257-0130) OR ISSN(1569-190X) OR ISSN(0038-0121) OR ISSN(0883-7066) OR ISSN(1092-7026) OR ISSN(0040-5833) OR ISSN(0217-5959) OR ISSN(1435-246X) OR ISSN(1619-697X) OR ISSN(0196-9722) OR ISSN(1545-8490) OR ISSN(0315-5986) OR ISSN(0308-1079) OR ISSN(1745-7645) OR ISSN(1082-1910) OR ISSN(0969-6016) OR ISSN(1547-5816) OR ISSN(1057-9214) OR ISSN(1747-7778) OR ISSN(0368-492X) OR ISSN(1432-2994) OR ISSN(1109-2858) OR ISSN(0030-3887) OR ISSN(0233-1934) OR ISSN(1348-9151) OR ISSN(0101-7438) OR ISSN(0399-0559) OR ISSN(1134-5764) OR ISSN(1047-7039) OR ISSN(0018-7267) OR ISSN(1048-9843) OR ISSN(0170-8406) OR ISSN(1094-4281) OR ISSN(1059-6011) OR ISSN(1350-5084) OR ISSN(0191-3085) OR ISSN(0733-558X) OR ISSN(1475-9551) OR ISSN(1368-4302) OR ISSN(0021-8863) OR ISSN(1367-3270) OR ISSN(0160-8061) OR ISSN(0953-4814) OR ISSN(2051-8803) OR ISSN(1742-7150) OR ISSN(0893-3189) OR ISSN(0748-4526) OR ISSN(1086-0266) OR ISSN(0090-2616) OR ISSN(1533-8665) OR ISSN(1094-429X) OR ISSN(1476-7503) OR ISSN(1521-3250) OR ISSN(1473-2866) OR ISSN(1934-8835) OR ISSN(2046-6749) OR ISSN(0143-7739) OR ISSN(0969-6474) OR ISSN(1746-5648) OR ISSN(1532-5555) OR ISSN(0956-7976) OR ISSN(0066-4308) OR ISSN(0963-7214) OR ISSN(1076-898X) OR ISSN(0022-1031) OR ISSN(0022-3514) OR ISSN(0146-1672) OR ISSN(0033-2909) OR ISSN(0033-295X) OR ISSN(0007-1269) OR ISSN(0144-6665) OR ISSN(0046-2772) OR ISSN(0894-3257) OR ISSN(0022-0027) OR ISSN(0022-0221) OR ISSN(1930-2975) OR ISSN(0191-8869) OR ISSN(0340-0727) OR ISSN(0361-6843) OR ISSN(0033-3123) OR ISSN(1747-0218) OR ISSN(0002-9556) OR ISSN(0888-4080) OR ISSN(1040-0419) OR ISSN(0090-4392) OR ISSN(0167-4870) OR ISSN(0261-927X) OR ISSN(0022-2496) OR ISSN(0191-5886) OR ISSN(0036-5564) OR ISSN(1532-3005) OR ISSN(2190-8370) OR ISSN(0002-7642) OR ISSN(0004-9530) OR ISSN(0008-400X) OR ISSN(0708-5591) OR ISSN(1046-1310) OR ISSN(1016-9040) OR ISSN(0147-1767) OR ISSN(0020-7594) OR ISSN(0021-5368) OR ISSN(1072-0537) OR ISSN(1389-4978) OR ISSN(1834-4909) OR ISSN(1743-9760) OR ISSN(0022-3980) OR ISSN(0022-4545) OR ISSN(1901-2276) OR ISSN(0214-9915) OR ISSN(0048-5705) OR ISSN(0033-2941) OR ISSN(0952-8229) OR ISSN(0885-7466) OR ISSN(0081-2463) OR ISSN(1138-7416) OR ISSN(1421-0185) OR ISSN(0021-9010) OR ISSN(0963-1798) OR ISSN(1076-8998) OR ISSN(0894-3796) OR ISSN(0001-8791) OR ISSN(0749-5978) OR ISSN(0031-5826) OR ISSN(0001-4575) OR ISSN(0269-994X) OR ISSN(0014-0139) OR ISSN(1359-432X) OR ISSN(0018-7208) OR ISSN(0895-9285) OR ISSN(0342-5282) OR ISSN(0886-1528) OR ISSN(0268-3946) OR ISSN(0022-4405) OR ISSN(1351-0711) OR ISSN(0355-3140) OR ISSN(0267-8373) OR ISSN(0003-6870) OR ISSN(1758-0846) OR ISSN(0146-6216) OR ISSN(1362-0436) OR ISSN(0963-8288) OR ISSN(1089-2699) OR ISSN(0340-0131) OR ISSN(1072-5245) OR ISSN(0021-8863) OR ISSN(0021-9029) OR ISSN(0889-3268) OR ISSN(1069-0727) OR ISSN(1076-2752) OR ISSN(1053-0487) OR ISSN(1866-5888) OR ISSN(0748-7711) OR ISSN(0022-4375) OR ISSN(2041-3866) OR ISSN(1479-3555) OR ISSN(1046-4964) OR ISSN(0197-3533) OR ISSN(1435-5558) OR ISSN(1366-8803) OR ISSN(1162-9088) OR ISSN(1464-0643) OR ISSN(0921-5077) OR ISSN(1090-8471) OR ISSN(1754-9426) OR ISSN(0251-2513) OR ISSN(1050-8414) OR ISSN(0169-8141) OR ISSN(1077-3525) OR ISSN(1080-3548) OR ISSN(1382-340X) OR ISSN(0894-8453) OR ISSN(0022-0787) OR ISSN(0022-4154) OR ISSN(0899-5605) OR ISSN(0962-7480) OR ISSN(1420-2530) OR ISSN(0090-5550) OR ISSN(0034-3552) OR ISSN(0034-8910) OR ISSN(1937-1918) OR ISSN(0258-5200) OR ISSN(2157-3905) OR ISSN(1972-6325) OR ISSN(1051-9815) OR ISSN(0932-4089) OR ISSN(0033-3352) OR ISSN(1053-1858) OR ISSN(0033-3298) OR ISSN(0275-0740) OR ISSN(0263-774X) OR ISSN(0952-1895) OR ISSN(0017-9124) OR ISSN(0020-8523) OR ISSN(1350-1763) OR ISSN(0276-8739) OR ISSN(0887-378X) OR ISSN(0305-5736) OR ISSN(1471-9037) OR ISSN(1748-5983) OR ISSN(0095-3997) OR ISSN(0313-6647) OR ISSN(0361-6274) OR ISSN(0168-8510) OR ISSN(0190-0692) OR ISSN(1096-7494) OR ISSN(0300-3930) OR ISSN(1363-951X) OR ISSN(0144-2872) OR ISSN(0271-2075) OR ISSN(0954-0962) OR ISSN(1566-7170) OR ISSN(0952-0767) OR ISSN(0144-5596) OR ISSN(1741-1432) OR ISSN(1744-2648) OR ISSN(0966-0410) OR ISSN(1386-9620) OR ISSN(0951-4848) OR ISSN(0951-354X) OR ISSN(0952-6862) OR ISSN(1368-2156) OR ISSN(0951-3558) OR ISSN(1355-8196) OR ISSN(1477-7266) OR ISSN(0734-9149) OR ISSN(1530-9576) OR ISSN(0308-518X) OR ISSN(0263-7758) OR ISSN(0964-4733) OR ISSN(1752-1378) OR ISSN(1462-9011) OR ISSN(0013-936X) OR ISSN(0969-7764) OR ISSN(0959-3780) OR ISSN(0301-4797) OR ISSN(0022-4146) OR ISSN(0743-0167) OR ISSN(0166-0462) OR ISSN(0034-3404) OR ISSN(0042-0980) OR ISSN(0570-1864) OR ISSN(0264-2751) OR ISSN(0144-6193) OR ISSN(0965-4313) OR ISSN(1543-5075) OR ISSN(0309-1317) OR ISSN(1088-1980) OR ISSN(1753-8335) OR ISSN(0269-0942) OR ISSN(0041-0020) OR ISSN(1535-3958) OR ISSN(1753-9269) OR ISSN(1477-7835) OR ISSN(1359-7566) OR ISSN(2445-6004) OR ISSN(0160-7383) OR ISSN(1094-6705) OR ISSN(0047-2875) OR ISSN(0261-5177) OR ISSN(0191-2615) OR ISSN(0195-6574) OR ISSN(1618-4742) OR ISSN(0306-9192) OR ISSN(0959-6119) OR ISSN(0278-4319) OR ISSN(0966-9582) OR ISSN(0899-7640) OR ISSN(0965-8564) OR ISSN(1361-9209) OR ISSN(1366-5545) OR ISSN(1174-5398) OR ISSN(0961-3218) OR ISSN(1938-9655) OR ISSN(1368-3500) OR ISSN(0301-4215) OR ISSN(0364-



152X) OR ISSN(1525-9951) OR ISSN(2042-7913) OR ISSN(1648-715X) OR ISSN(1099-2340) OR ISSN(0959-6526) OR ISSN(0301-4797) OR ISSN(1096-3480) OR ISSN(0742-597X) OR ISSN(1757-5818) OR ISSN(0888-4773) OR ISSN(1527-0025) OR ISSN(0022-5258) OR ISSN(0966-6923) OR ISSN(1054-8408) OR ISSN(0149-0400) OR ISSN(0261-4367) OR ISSN(0308-597X) OR ISSN(0308-8839) OR ISSN(0260-4779) OR ISSN(1502-2250) OR ISSN(0264-2069) OR ISSN(1441-3523) OR ISSN(1083-5423) OR ISSN(1354-8166) OR ISSN(1461-6688) OR ISSN(2211-9736) OR ISSN(1479-053X) OR ISSN(0250-8281) OR ISSN(1468-7976) OR ISSN(0967-070X) OR ISSN(0144-1647) OR ISSN(0049-4488) OR ISSN(0957-8765) OR ISSN(1745-3542) OR ISSN(1303-2917) OR ISSN(1094-1665) OR ISSN(0007-070X) OR ISSN(0969-9988) OR ISSN(0263-2772) OR ISSN(0739-7011) OR ISSN(1463-6697) OR ISSN(1750-6182) OR ISSN(1758-2954) OR ISSN(1352-7258) OR ISSN(1525-6480) OR ISSN(2152-7857) OR ISSN(1558-6235) OR ISSN(1546-234X) OR ISSN(1740-2808) OR ISSN(1475-8962) OR ISSN(1940-6940) OR ISSN(1464-6668) OR ISSN(1938-8160) OR ISSN(1547-0148) OR ISSN(2212-571X) OR ISSN(1472-4049) OR ISSN(1537-8020) OR ISSN(1096-3758) OR ISSN(1447-6770) OR ISSN(1757-9880) OR ISSN(1936-8623) OR ISSN(1473-8376) OR ISSN(1533-2845) OR ISSN(1652-2354) OR ISSN(2213-0780) OR ISSN(1940-7963) OR ISSN(1528-008X) OR ISSN(1477-5085) OR ISSN(0040-5000) OR ISSN(1302-8545) OR ISSN(1356-7667) OR ISSN(1360-6719) OR ISSN(0738-1360) OR ISSN(1479-2931) OR ISSN(1048-6682) OR ISSN(0034-6659) OR ISSN(1695-7121) OR ISSN(0263-7472) OR ISSN(1061-6934) OR ISSN(2042-678X) OR ISSN(0308-5961) OR ISSN(1098-304x) OR ISSN(1660-5373) OR ISSN(1332-7461) OR ISSN(0957-1787) OR ISSN(1064-5578) OR ISSN(1607-8055) OR ISSN(1755-4217) OR ISSN(0002-9602) OR ISSN(0003-1224) OR ISSN(0360-0572) OR ISSN(0013-0095) OR ISSN(1468-2702) OR ISSN(0272-4332) OR ISSN(0277-9536) OR ISSN(0038-0385) OR ISSN(0141-9889) OR ISSN(0066-4812) OR ISSN(0007-1315) OR ISSN(0012-155X) OR ISSN(0308-5147) OR ISSN(0261-3794) OR ISSN(0266-7215) OR ISSN(1470-2266) OR ISSN(0960-6491) OR ISSN(0022-0388) OR ISSN(0958-9287) OR ISSN(0047-2794) OR ISSN(0964-1998) OR ISSN(0023-5962) OR ISSN(1356-3467) OR ISSN(0032-3292) OR ISSN(0309-1325) OR ISSN(0033-362X) OR ISSN(1554-0626) OR ISSN(0969-2290) OR ISSN(0037-7732) OR ISSN(1475-1461) OR ISSN(0081-1750) OR ISSN(0038-0261) OR ISSN(0040-1625) OR ISSN(0263-2764) OR ISSN(0140-2382) OR ISSN(0305-750X) OR ISSN(0002-9246) OR ISSN(0309-8168) OR ISSN(0261-0183) OR ISSN(0268-5809) OR ISSN(1356-3890) OR ISSN(0016-3287) OR ISSN(0016-7185) OR ISSN(0018-7259) OR ISSN(1369-118X) OR ISSN(1446-8956) OR ISSN(0011-3921) OR ISSN(0021-9460) OR ISSN(1753-0350) OR ISSN(0263-323X) OR ISSN(1366-9877) OR ISSN(0031-2290) OR ISSN(0032-3179) OR ISSN(0032-3217) OR ISSN(0958-2029) OR ISSN(0034-6764) OR ISSN(0036-8237) OR ISSN(0302-3427) OR ISSN(0971-7218) OR ISSN(0378-8733) OR ISSN(1746-5680) OR ISSN(0961-463X) OR ISSN(0144-333X) OR ISSN(0194-6595) OR ISSN(1948-1837) OR ISSN(1948-1837) OR ISSN(2151-5581) OR ISSN(0032-2687) OR ISSN(0143-2095) OR ISSN(2042-5791) OR ISSN(0024-6301) OR ISSN(1476-1270) OR ISSN(0742-3322) OR ISSN(0964-4733) OR ISSN(1058-6407) OR ISSN(1086-1718) OR ISSN(0953-7325) OR ISSN(0955-6419) OR ISSN(1463-6689) OR ISSN(1947-8569) OR ISSN(0275-6668) OR ISSN(1469-7017) OR ISSN(2055-5636) OR ISSN(1755-425X) OR ISSN(1331-0194) OR ISSN(1087-8572) )



# Annex B

Survey used in Chapter 4 - An analysis of the role of Student-Led Entrepreneurial Organizations

Student's general data	
1. What is your complete name?	
2. What is your gender?	
3. How old are you? (years)	
4. What is your e-mail?	
5. What is your National Confederation?	
6. What is the name of your JE?	

Student's international mindset	
7. Have you already lived in any other countries?	
8. Which languages do you speak? (multiple choice)	<ul style="list-style-type: none"> <li>• English</li> <li>• French</li> <li>• German</li> <li>• Spanish</li> <li>• Portuguese</li> <li>• Italian</li> <li>• Romanian</li> <li>• Polish</li> <li>• Dutch</li> <li>• Other (specify)</li> </ul>
9. Have you ever participated in any mobility exchange program (Erasmus, Leonardo Da Vinci, other)?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
10. Where have you been during your exchange? (multiple choice)	<ul style="list-style-type: none"> <li>• Africa</li> <li>• Asia</li> <li>• Europe</li> <li>• North America</li> <li>• Oceania</li> <li>• South America</li> </ul>

<b>Student's educational background</b>	
11. What is the name of your university?	
12. What is your field of study? (multiple choice)	<ul style="list-style-type: none"> <li>• Sciences and Technology (eg. Engineering, Mathematics, Physics, etc)</li> <li>• Human Sciences (eg. Law, Psychology, International Relations, etc)</li> <li>• Business (eg. Marketing, Finance, Management, Economics, etc)</li> <li>• Biological Sciences (eg. Medicine, Pharmacy, Biology, etc)</li> <li>• Arts and Sports</li> <li>• Other (specify)</li> </ul>
13. In which year of University are you?	

<b>Student's working background</b>	
14. In which other organization(s) have you been a volunteer? (multiple choice)	<ul style="list-style-type: none"> <li>• I didn't volunteer for another organization</li> <li>• AIESEC</li> <li>• Erasmus Students Network</li> <li>• MUN</li> <li>• Sports Association</li> <li>• Other (specify)</li> </ul>
15. Have you ever had a job?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
16. What kind of job did you have? (multiple choice)	<ul style="list-style-type: none"> <li>• Private Sector</li> <li>• Public Sector</li> <li>• Non-Profit organization</li> <li>• Start-up</li> <li>• Other (specify)</li> </ul>
17. Was the company that you worked for partner of:	
18. Please name the Company/ Companies	

<b>Student's involvement in JE</b>	
19. When did you join your JE? (month/year)	
20. Why did you join a JE? (multiple choice)	<ul style="list-style-type: none"> <li>• To improve my skills</li> <li>• To improve my network</li> <li>• To learn how to create my own company</li> <li>• To make use of my free time</li> <li>• To impact positively the society</li> </ul>
21. How did you get to know the JE Network? (multiple choice)	<ul style="list-style-type: none"> <li>• Internet</li> <li>• Promotion in the University</li> <li>• Clients of the JE</li> <li>• My friend was already in the JE</li> <li>• Other</li> </ul>
22. How many projects (core business) have you performed in your JE?	
23. How many different types of services were those projects that you performed? (single choice)	<ul style="list-style-type: none"> <li>• I have not performed projects</li> <li>• 1 type</li> <li>• 2 types</li> <li>• 3 types</li> <li>• 4 types</li> </ul>

	<ul style="list-style-type: none"> <li>• 5 types</li> <li>• More than 5 types</li> </ul>
24. Which positions have you already had in the JE Network? (Choose the position and how long have you performed it) (multiple choice)	
25. How many hours, on average, do you work per week for the JE Network? (single choice)	
26. From the skills/competences below, which ones have you developed since you entered the Junior Enterprise Network? Please choose the ones that you identify the most. (multiple choice)	<ul style="list-style-type: none"> <li>• Team Work</li> <li>• Project Management</li> <li>• Negotiation Skills</li> <li>• Technical Skills</li> <li>• Communication Skills</li> <li>• Analytical Thinking</li> <li>• Creativity</li> <li>• Self Confidence</li> <li>• Perseverance</li> <li>• Taking Responsibility</li> <li>• Taking Initiative</li> <li>• Other (specify)</li> </ul>
27. How many events, from the JE Network, have you attended already? (if not applicable, type 0)	
28. How much would you recommend the Network to a friend? (Please consider zero as the lowest rate and ten as the highest)	
29. How much would you recommend the Network to an organization? (Please consider zero as the lowest rate and ten as the highest)	
30. What is your BIG DREAM for the Network?	

<b>Student's future career</b>	
31. How do you see yourself when you finish your current studies? (single choice)	<ul style="list-style-type: none"> <li>• Employed in a public organization</li> <li>• Employed in the private sector</li> <li>• Starting a new degree/master/MBA</li> <li>• Starting your own-company</li> <li>• Other (specify)</li> </ul>
32. In what field/sector would you like to be working on? (single choice)	<ul style="list-style-type: none"> <li>• Arts and Sports</li> <li>• Biological Sciences (eg. Medicine, Pharmacy, Biology, etc)</li> <li>• Business (eg. Marketing, Finance, Management, Economics, etc)</li> <li>• Human Sciences (eg. Law, Psychology, International Relations, etc)</li> <li>• Sciences and Technology (eg. Engineering, Mathematics, Physics, etc)</li> <li>• Other (specify)</li> </ul>
33. Which is the company that you dream of working?	

# Annex C

## Correlation matrix of Chapter 4 - An analysis of the role of Student-Led Entrepreneurial Organizations

	Time spent	N. projects	N. events	Science & Technology	Foreign Languages	Exchange Program	Work Experience	Male	Age	GDP
Time spent	1									
N. projects	0.36	1								
N. events	0.42	0.28	1							
Science & Technology	0.06	-0.06	0.22	1						
Foreign Languages	0.08	-0.07	-0.01	0.02	1					
Exchange Program	0.05	0.19	-0.05	-0.24	0.02	1				
Worked Experience	0.08	0.03	-0.06	-0.19	0.09	0.09	1			
Male	0.02	0.11	0.15	0.22	-0.09	-0.23	-0.04	1		
Age	0.15	0.15	0.22	0.19	-0.03	0.04	0.24	0.19	1	
GDP	0.10	0.33	-0.01	-0.29	-0.20	0.39	0.25	0.11	0.12	1