

An Entrepreneurial University Taxonomy Proposal



Leire Markuerkiaga, Nekane Errasti and Juan Ignacio Igartua

Abstract In the last decades the European higher education landscape has changed from only teaching to economic and social development of the regions (Bronstein and Reihlen in *Ind Higher Educ* 28(4):245–262, 2014; Maassen in *From governance to identity*. Springer, Berlin, pp 95–112, 2009; Pinheiro and Stensaker in *Public Organ Rev* 14(4):497–516, 2013; Vukasovi et al. in *Effects of higher education reforms: change dynamics*. Sense Publishers, Netherlands, 2012), turning the Entrepreneurial University into a potential solution to these changes (Clark in *Creating entrepreneurial universities: organizational pathways of transformation*. Pergamon, Kidlington (Oxford), 1998). Due to this fact, this paper shows an Entrepreneurial Universities taxonomy proposal exploring the nature of the Entrepreneurial University's results. Based on a cluster analysis, three distinct groups are identified, which are in different phases within the transformation into an Entrepreneurial University: (i) the first group of universities (Cluster 2) is in the first phase of the path, since they are not obtaining high Entrepreneurial University's results yet; (ii) the second group (Cluster 3) is in the second phase of the path, obtaining good results in hard entrepreneurial university results; and finally, (iii) the third group (Cluster 1) is composed by the most Entrepreneurial Universities. In addition, universities are not unmovable within a group, they can improve and move from one stage to the upper one or not continue that path and move down again to a lower stage. In fact, this paper shows which the main levers are in order to move from one stage to another.

Keywords Entrepreneurial university · Taxonomy · Academic entrepreneurship activities · Cluster analysis · Entrepreneurial university results · Academic entrepreneurship · Higher education · Internal entrepreneurship support factors · External entrepreneurship support factors

L. Markuerkiaga (✉) · N. Errasti · J. I. Igartua
Mondragon University, Arrasate, Spain
e-mail: lmarkuerkiaga@mondragon.edu

© Springer Nature Singapore Pte Ltd. 2019
T. Kliewe et al. (eds.), *Developing Engaged and Entrepreneurial Universities*, https://doi.org/10.1007/978-981-13-8130-0_10

Introduction

The European higher education landscape, over the past two decades, has been facing a period of changes in order to face social global challenges which extend well beyond the economy, innovation and entrepreneurship (Bronstein and Reihlen 2014; Maassen 2009; Pinheiro and Stensaker 2013; Vukasovi et al. 2012). To overcome these challenges, universities need to meet the needs of its environment and contribute to regional and national socioeconomic development (Peterka 2011); transforming into an Entrepreneurial University (Bronstein and Reihlen 2014; Clark 1998; Kirby 2006; Sporn 2001).

The appearance of the Entrepreneurial University is the result of internal development of the university and external influences on the university (Peterka 2011), due to differences in organisational culture and leadership, the process of working on entrepreneurial capacity differs from one university to the other (Peterka 2011). Therefore, not all Entrepreneurial Universities are equal, nor are they in the same stage within the path towards the Entrepreneurial University.

There is convincing evidence for seeking a valid and empirically justified means for classifying Entrepreneurial University stages (Moroz et al. 2011). Literature shows that some universities obtain better results than others at commercialising research, promoting entrepreneurial interactions with firms and/or setting up new ventures (Di Gregorio and Shane 2003; Etzkowitz 2002; Segal 1986).

In the same line, university's transformation into an Entrepreneurial University has been described as three consecutive phases: in the first phase, the university becomes more aware of the potential for commercialisation, the second phase is characterised by identifying opportunities for commercialisation, and the third phase by developing commercialisation opportunities (Tijssen 2006).

Nonetheless, there is little research on classifying the Entrepreneurial University (Moroz et al. 2011); showing a need to develop an empirically justified Entrepreneurial University taxonomy. In fact, universities are dynamic entities; they can improve and move from one stage to the upper one or not continue that path and move down again to a lower stage. A taxonomy would help universities to identify the main levers in order to move from one stage to the other. Hence, the main objective of this paper is to create a taxonomy of Entrepreneurial Universities based on "soft entrepreneurial university results" (onwards Soft EUR) and "hard entrepreneurial university results" (onwards Hard EUR), based on the external environmental and the internal organisational entrepreneurship supporting factors (Markuerkiaga et al. 2014).

The paper is organised as follows: in Section "[Entrepreneurial University Framework](#)" based on a review of the literature on the factors fostering the Entrepreneurial University an integrative conceptual framework is built, differentiating between external and internal entrepreneurship support factors. In Section "[Methodology](#)" the research design is introduced. Section "[Results](#)" presents the empirical analysis

and through Section “[Discussion](#)” the results are discussed. At last, Section “[Conclusions, Limitations and Future Research](#)” shows the main conclusions, limitations and future research.

Entrepreneurial University Framework

For the last two decades the topic of the entrepreneurial university has been discussed subject of discussion (Etzkowitz et al. 2000; Tuunainen 2005). Spila et al. (2011) define the entrepreneurial university is defined as having a tendency towards managerial models, and focusing its academic objectives on the transfer of knowledge to the business sector and organisations in general (Spila et al. 2011). This type of university shows a distinguished focus on the third mission, thus aiming to ensure that the university is engaging actively with the business sector and other organisations in its environment in order to enhance the social and economic value of the knowledge generated by university research (Etzkowitz 2003).

Despite the fact that there is no prevailing definition of the entrepreneurial university (Guerrero and Urbano 2010), a number of general characteristics common in this kind of university encompasses have been identified (Gibb 2012). These characteristics can also be described as factors that contribute to the success of the entrepreneurial university (Guerrero et al. 2011; Rothaermel et al. 2007). Figure 1 shows the different factors that are measured and analysed.

These different factors that are measured and analysed in this study are now being explained in more detail:

Institutional context: An essential factor in becoming an entrepreneurial university seems to be the local supportive mechanisms (Rasmussen et al. 2012). The dissemination of knowledge can be facilitated by governments through their laws and regulations that enable universities to transfer intellectual property and knowledge quickly to the wider community (Wood 2011). Financial incentives for entrepreneurship education (Guenther and Wagner 2008), and for the creation of university spin-offs (Fini et al. 2009) can also be provided by governments. Therefore they play a crucial role in creating financing mechanisms for developing programmes, activities and initiatives in the context of entrepreneurship education and spin-off creation (Volkman et al. 2009). Within the institutional context, an analysis of the extent to which government and public administrations become involved in and facilitate entrepreneurship is conducted, examining the approving legislation that promotes the dissemination and transfer of knowledge and creating financing mechanisms for entrepreneurship education, the creation of university spin-offs and the development of programmes, activities and initiatives related to entrepreneurship.

Industrial context: An important determinant in business and innovation opportunities can be the composition of the industry and service of a particular territory. Close interaction between the university and businesses and organisations in the area are likely to facilitate the creation of a social environment that offers support and encouragement for sharing knowledge and ideas (Fini et al. 2009). The extent

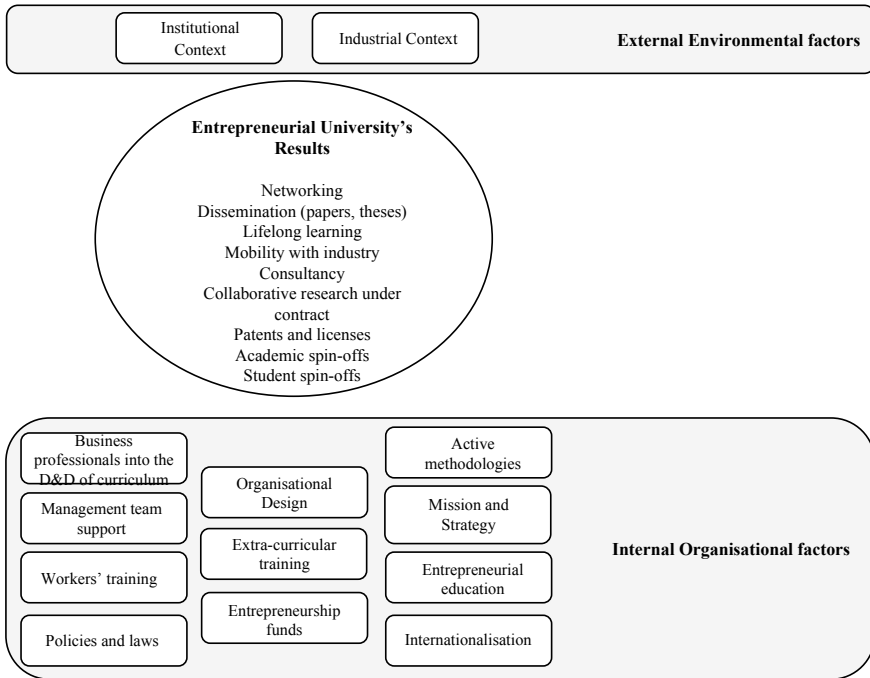


Fig. 1 Entrepreneurial university framework

to which nearby organisations and companies that operate in the same or a similar business sector interacted with the university by sharing the same field of research, knowledge and ideas through formal and informal networks is described in this factor.

Funds for entrepreneurship: A fundamental factor within an entrepreneurial university are financial resources, demonstrating the university's autonomy (Guerrero and Urbano 2010). As shown in Hu (2009), both public and private funding sources are important to support the development of an entrepreneurial university. When looking at this factor, a distinction between the funds for research and teaching in entrepreneurship and the funds for creating entrepreneurship projects and setting up companies and organisations.

Training in entrepreneurship for faculty staff: Even though there is an growing interest in entrepreneurship education, a lack of critical mass of lecturers in entrepreneurship is still very present and indicates that the current number of entrepreneurship lecturers needs to be increased (Volkman et al. 2009). According to Moroz et al. (2010), the coordination and work on entrepreneurship education should be conducted by academics from fields such as business management, rather than individuals with specific training in this area, or academics who have researched or practised in this field. The extent to which the university offers entrepreneurship training to its staff, emphasising knowledge transfer and spin-offs creation so that the staff can promote entrepreneurship among their students is analysed in this factor.

Including professionals from businesses and organisations into the development and delivery of the curriculum: The presence of experts from the business world is vital in the development and delivery of the curriculum facilitates a continuous university-business collaboration process. An effective tool is the use of guest lecturers and representatives of private and public organisations within bachelor, postgraduate and doctoral programmes (Davey et al. 2011). Organisations are in a position to contribute to the university curriculum, providing advice on the current needs and practices of businesses and organisations which helps students to develop appropriate skills (De Luca et al. (2014).

Mission and strategy: The importance of strategic decision-making in entrepreneurship at the organisational level has been emphasised in some research (Zahra 1993). Clark (1998) stated that having a clearly defined strategy is one of the key elements of an entrepreneurial university. Various authors come to the conclusion that any university mission statement and strategies must include the word 'Company/Organisation' or 'Entrepreneurship' (Etzkowitz 2004; Gibb 2012; Kirby 2006). The publication of the concepts of 'company/organisation' and 'entrepreneurship', this would generate acceptance of these concepts as part of the 'meaning' of the university, leading to each member of staff sharing a common vision for the creation of an entrepreneurial university (Peterka 2011). If we take the strategic entrepreneurial decision-making at the organisational level into account, this factor analyses the use of the words 'Company/Organisation' or 'Entrepreneurship' in any of its documents (mission, vision values, strategic plan).

University Policies: Academic entrepreneurship literature assesses the influence of university policies, procedures and practices in Academic Entrepreneurship Activities (O'Shea et al. 2005). Rothaermel et al. (2007) states that key factors in the success of university spin-offs are university policies on intellectual property, networking activities and resource provision. Di Gregorio and Shane (2003) agreed that more academic spin-offs are generated if universities adopt certain policies (such as incentives). This factor evaluates the existence and possible influence of university policies, procedures and practices on Academic Entrepreneurship Activities.

Support from the management team: The behaviours and actions within the university reflect the traits of the management team members, since they influence the strategy of the university through decision-making processes (Gibb 2012; Miller and Katz 2004; Visintin and Pittino 2010). According to Todorovic et al. (2005) the nature and strength of leadership in supporting entrepreneurial culture in the university are essential. Therefore, management team support to the entrepreneurial culture is necessary for an entrepreneurial university (Gibb 2012). This factor analyses the leadership, understanding and support of the management team regarding the entrepreneurial culture in the university, as shown in decision making, behaviours and actions that influence the university's strategy.

Organisational structure: Universities organisational structure should be designed as to promote and facilitate entrepreneurial behaviour (Gibb and Hannon 2005). In this line, there are same key factors associated with the organisational design that boost the entrepreneurial behaviour within the university, like: flexibility in the

integration of strategies, decentralised decision making and the degree to which individuals have the power to innovate, among others (Gibb 2012).

Formal education in entrepreneurship: Individual specific competences (behaviours, knowledge, skills and attitudes) should be developed within Entrepreneurship education, which might be on different levels throughout one's professional career and in the socioeconomic development, in the long-term (Bratianu and Stanciu 2010). Researchers show that the entrepreneurial competence could be acquired or learned (Kuratko 2005; van der Heide and van der Sijde 2008), hence it should be developed into all educational levels (Gibb 2006). Furthermore, for developing an entrepreneurial culture within the university it is essential to foster entrepreneurial competencies, skills and knowledge and for that entrepreneurship education is the key (European Commission 2012).

Extra-curricular training for academic entrepreneurship: Academic entrepreneurship is a continuous process that integrated a series of events (Friedman and Silberman 2003). Indeed, some authors described academic entrepreneurship as a multi-step process that identifies the actors, activities and key success factors associated with each stage of the process (Salamzadeh et al. 2011; Wood 2011). Due to this fact, an Entrepreneurial University should work on the different stages of the entrepreneurial process. As it is difficult to develop curricular activities on each of the stages, the extra-curricular training process for academic entrepreneurship refers to the training activities carried out outside the curriculum, such as awareness-raising, workshops for opportunity identification, courses for innovative project implementation, business plan development and spin-off launching, among others.

Active learning methodologies: Students from any education system should be prepared to work in a rapidly changing, dynamic, entrepreneurial and global environment (Volkman et al. 2009); consequently, both creative and critical thinking skills, attributes and behaviours need to be improved (Guerrero and Urbano 2010). This situation provokes a paradigm shift for the academic world that should worked on new teaching-learning methodologies (Moroz et al. 2010). Therefore, in order to facilitate students the confidence to take risks and learn from successes and failures an open environment should be created by entrepreneurship educators (Volkman et al. 2009), and active learning methodologies are main actors in this task. Among other, case studies, gamification, problem-based learning and participation in real projects are all active learning methodologies that can promote the entrepreneurial culture.

Internationalisation: Internationalisation and the Entrepreneurial University are closely related (Larionova 2012), such as that the Entrepreneurial University considers internationalisation as a key tool (Gibb 2012). Indeed, it is necessary to realise the value of international mobility of students, academics and business partners in the development and improvement of the Entrepreneurial University (Bramwell et al. 2012; Gibb 2012). In addition, remarkable that the internationalisation process also contributes to universities revenues, reputation, research opportunities, new partners and to a better cultural understanding (Gibb 2012). Therefore, international research

projects, joint degrees with universities abroad and mobility activities of students, academics and business partners are key activities of the Entrepreneurial University.

Methodology

Unit of Analysis

Relating to Entrepreneurial Universities literature and the usual units of analysis, Brennan and McGowan (2006) identified the following five levels of analysis:

- Individual: an academic recognised by the university as an entrepreneur.
- Community of practice: an informal social network.
- The academic school: the most basic unit of academic staff for the purpose of university administration.
- University: a grouping of academic schools coordinated through a central faculty structure.
- The entrepreneurship system: the individual and corporate actors who interact in a recognisable context to form the infrastructure for entrepreneurship.

Due to this classification and in order to achieve the main objective of the research, the unit of analyses is the university and the TTO Director the person to interact. The research is based on European universities.

Research Instrument

A questionnaire was constructed to collect data directly from universities undertaking the Entrepreneurial University path.

So as to encourage the TTO Directors to read and answer the questionnaire, the questionnaire's form was taken into account. A set of questions about the variables to be measured was developed, grouped into related blocks, given that the easiest way for the respondent for concept association. Besides, this questionnaire consisted of closed questions, dichotomous (true/false) and polytomous (a five-point Likert scale, with five being the most important and one the less important rating).

The next step was the pre-testing, getting the initial response and a subsequent interview with 6 experts from different positions and profiles, such as deans, TTO Directors, academic coordinators and entrepreneurship teachers, in order to identify areas where the questionnaire could have needed corrections (Fatoki and Asah 2011). In consequence, various suggestions were incorporated to make the final questionnaire for the study.

Sampling Design, Selection and Size

The sampling is composed by European universities that are promoting entrepreneurship within their organisations. Hence, due to the novelty of the subject, they are taking part in international conferences in order to disseminate their learning and best practices. Therefore, the universities and their respective respondents are selected due to their assistance in international conferences related to Entrepreneurial Universities and Entrepreneurial Education (such as FINPIN Conference, UIIN Conference, BCERC Conference, ECSB Entrepreneurship Education Conference and Global Entrepreneurship Monitor—GEM). In total, 361 European universities were contacted.

Data Collection Procedure

A self-administered e-mail questionnaire was applied to collect data for the survey from TTO Directors of the targeted universities. The online questionnaires collecting process lasted five months, with a monthly reminder during the first three months. Out of the 361 surveys mailed sixty-nine were returned (19.11%).

Descriptive Statistics

After data collection, the data analysing and interpreting stage started (Robson 1993). A quantitative research methodology is established for the correct development of the research.

Preceding the measurement scales assessment, validity and reliability of the instrument are explored by incorporating an exploratory factors analysis (Cronbach's alpha) (Parsian 2009). The analysis shows that the validity and reliability of the instrument is accepted. Besides, Skewness and Kurtosis are tested for normal data distribution and all variables are reasonably normally distributed. Then, descriptive statistics are conducted with the assistance of SPSS Version 20.0.

Regarding the variables that composed the research, every variable of the study is constructed based on a 5-point Likert scale. Table 1 shows the external and internal entrepreneurship support factors and the Entrepreneurial Universities results.

Cluster Analysis

In order to explore the patterns of European Entrepreneurial Universities, based on both soft and hard entrepreneurial university results, cluster analysis is used; therefore, information dissemination, networking, industry mobility, consulting, contract research, patent and license, and spin-off firm formation were the clustering variables.

Table 1 Descriptive statistics of all sample universities

	N	Minimum	Maximum	Mean	Std. deviation
INST_CONTEXT	69	1.50	4.80	3.1072	0.73491
INDUS_CONTEXT	69	1.40	4.80	3.0797	0.78151
STRATEGY	69	1.30	5.00	3.3826	0.88649
MANAG_SUPPORT	69	1.00	5.00	3.1883	0.79326
ORGANL_DESIGN	69	1.00	4.75	3.0430	0.75977
POLICIES	69	1.00	5.00	3.4616	0.96867
INDUS_CURRI	69	1.40	4.80	2.9968	0.75443
E_CURRI_ACTIVITIES	69	1.00	5.00	3.3387	0.92678
INTERNATIONALISATION	69	1.25	5.00	3.2843	0.83722
E_FUNDS	69	1.00	5.00	2.4254	0.89540
E_EDUCATION	69	1.00	5.00	3.0149	0.90754
E_STAFF	69	1.00	5.00	2.4248	1.00179
METHODS	69	1.00	5.00	3.0361	0.82034
INFO_DISSEMINATION	69	1.00	4.33	2.8761	0.62047
NETWORKING	69	1.33	4.33	3.2532	0.62159
I_TRAINING	69	1.00	5.00	3.0435	0.86492
IND_MOBILITY	69	1.00	4.33	2.5343	0.62410
CONSULTING	69	1.00	5.00	3.2319	0.80704
PR_RESEARCH	69	1.67	5.00	3.0530	0.72748
PATENT_LICENSE	69	1.00	4.00	2.5707	0.59232
ASO	69	1.40	4.20	2.5478	0.56532
SSO	69	1.25	4.25	2.7283	0.61198

As a result, the universities are clustered into three different groups: Cluster 1 composed by fourteen universities (high values in Soft EUR and on the mean in Hard EUR), Cluster 2 composed by ten universities (low values in all Entrepreneurial University's results) and Cluster 3 composed by forty-five universities (on the mean in all Entrepreneurial University's results) (see Fig. 2).

Subsequently, to confirm the difference between the three clusters regarding Entrepreneurial University's results an ANOVA analysis was developed. In this manner, through a comparison of means (see Table 2) the rejection of the null hypothesis of equal means is shown.

Once the differences between groups' means are demonstrated, each clusters' means are analysed. Cluster 2 obtains the less significant values on all Entrepreneurial University's results, except for Collaborative Research, variable that is in the same level of Cluster 3. Universities in Cluster 1 obtain the highest values on Soft EUR and are in the same level of Cluster 3 regarding Hard EUR. Finally, Cluster 3 is on the mean on all Entrepreneurial University's results.

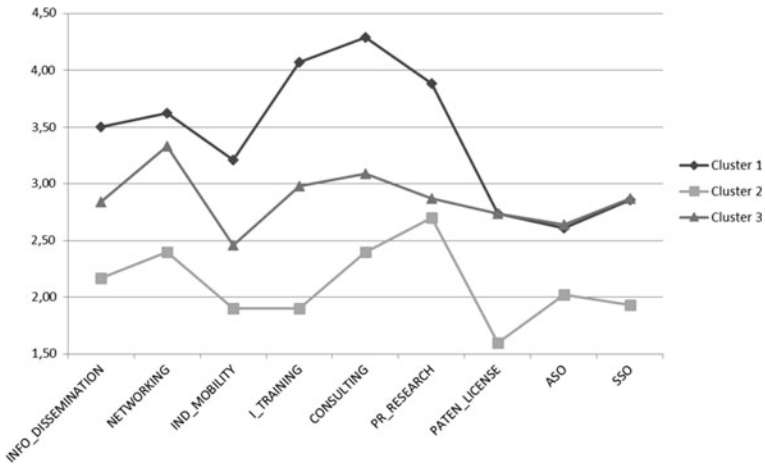


Fig. 2 Entrepreneurial University's results of the three clusters

Table 2 ANOVA analysis of Entrepreneurial University's results for the three clusters

		Sum of squares	df	Mean square	F	Sig.
INFO_DISSEMINATION	Between groups	10.525	2	5.262	22.187	0.000
	Within groups	15.654	66	0.237		
	Total	26.178	68			
NETWORKING	Between groups	9.421	2	4.710	18.447	0.000
	Within groups	16.853	66	0.255		
	Total	26.273	68			
I_TRAINING	Between groups	28.063	2	14.032	40.607	0.000
	Within groups	22.806	66	0.346		
	Total	50.870	68			
IND_MOBILITY	Between groups	10.691	2	5.345	22.335	0.000
	Within groups	15.795	66	0.239		
	Total	26.486	68			
CONSULTING	Between groups	23.388	2	11.694	36.926	0.000
	Within groups	20.902	66	0.317		
	Total	44.290	68			
PR_RESEARCH	Between groups	12.263	2	6.131	17.057	0.000
	Within groups	23.725	66	0.359		
	Total	35.987	68			

(continued)

Table 2 (continued)

		Sum of squares	df	Mean square	F	Sig.
PATENT_LICENSE	Between groups	11.066	2	5.533	28.547	0.000
	Within groups	12.792	66	0.194		
	Total	23.857	68			
ASO	Between Groups	3.268	2	1.634	5.841	0.005
	Within groups	18.464	66	0.280		
	Total	21.732	68			
SSO	Between groups	7.547	2	3.773	13.897	0.000
	Within groups	17.921	66	0.272		
	Total	25.467	68			

Table 3 ANOVA analysis of external entrepreneurship support factors for the three clusters

		Sum of squares	df	Mean square	F	Sig.
INDUS_CONTEXT	Between groups	9.388	2	4.694	11.332	0.000
	Within groups	27.338	66	0.414		
	Total	36.726	68			
INST_CONTEXT	Between groups	7.565	2	3.783	7.350	0.001
	Within groups	33.966	66	0.515		
	Total	41.532	68			

In order to identify the main mechanisms that leading universities had for Entrepreneurial University's results promotion, based on these three clusters, it was interesting to analyse their differences regarding external and internal entrepreneurship support factors. In order to accomplish this goal, an ANOVA was performed for both groups (see Tables 3 and 4); which shown all p -values under the threshold 0.005, falling to reject the null hypothesis.

After demonstrating the differences between groups' means, a means analysis of external and internal entrepreneurship support factors for each cluster was done (see Fig. 3). Indeed, Cluster 2 obtained the less significant values on all external and internal entrepreneurship support factors which agreed with the results on Entrepreneurial University's results, considering that this group of universities had the lower values on Entrepreneurial University's results. Concerning Cluster 1, the best universities as to Soft EUR, obtained the highest results on all external entrepreneurship support factors and the highest results on almost all internal entrepreneurship support factors, except for Extra-curricular training and Workers' Training. Finally, Cluster 3

Table 4 ANOVA analysis of internal entrepreneurship support factors for the three clusters

		Sum of squares	df	Mean square	F	Sig.
STRATEGY	Between groups	10.723	2	5.361	8.284	0.001
	Within groups	42.717	66	0.647		
	Total	53.439	68			
MANAG_SUPPORT	Between groups	10.497	2	5.249	10.727	0.000
	Within groups	32.292	66	0.489		
	Total	42.790	68			
ORGANI_DESIGN	Between groups	7.530	2	3.765	7.834	0.001
	Within groups	31.722	66	0.481		
	Total	39.253	68			
POLICIES	Between groups	23.753	2	11.876	19.570	0.000
	Within groups	40.053	66	0.607		
	Total	63.806	68			
INDUS_CURRI	Between groups	9.998	2	4.999	11.493	0.000
	Within groups	28.706	66	0.435		
	Total	38.704	68			
INTERNATIONAL.	Between groups	13.128	2	6.564	12.545	0.000
	Within groups	34.535	66	0.523		
	Total	47.663	68			
E_FUNDS	Between groups	5.213	2	2.607	3.489	0.036
	Within groups	49.305	66	0.747		
	Total	54.518	68			
E_EDUCATION	Between groups	7.058	2	3.529	4.758	0.012
	Within groups	48.950	66	0.742		

(continued)

Table 4 (continued)

		Sum of squares	df	Mean square	F	Sig.
METHODS	Total	56.007	68			
	Between groups	5.848	2	2.924	4.835	0.011
	Within groups	39.913	66	0.605		
E_CURRI_ACTIVITIES	Total	45.761	68			
	Between groups	15.155	2	7.578	11.563	0.000
	Within groups	43.251	66	0.655		
E_STAFF	Total	58.407	68			
	Between groups	12.013	2	6.007	7.050	0.002
	Within groups	56.230	66	0.852		
Total	68.243	68				

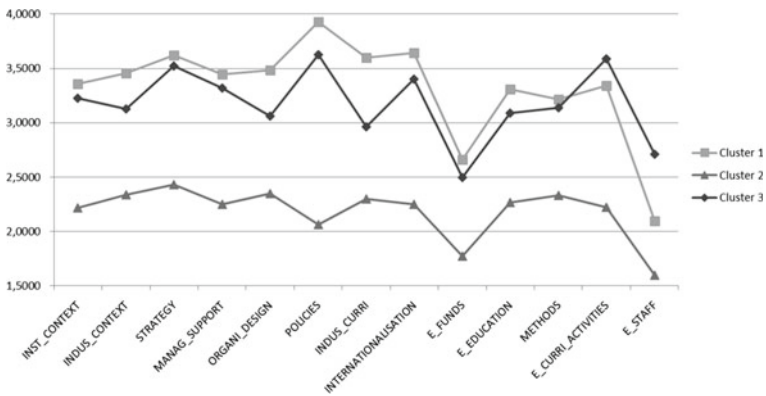


Fig. 3 Entrepreneurship support mechanisms level of the three clusters

showed better results on Extra-curricular training and Workers’ Training than Cluster 1 although their results on Soft EUR were worst.

Results

The analysis shows three different groups of universities depending on Entrepreneurial University's results: Cluster 1 composed by fourteen universities, Cluster 2 composed by ten universities and Cluster 3 composed by forty-five universities. Thereafter, an ANOVA analysis was developed in order to confirm the difference between the three clusters, and the present section gathers further details regarding each cluster.

Cluster 1

The fourteen Universities in Cluster 1 are the ones which stand out for their exceptional results on Lifelong Learning, Consultancy and Collaborative Research. These three results are directly related to knowledge transfer, therefore it suggest a higher university business collaboration. This fact could be as a result of the high support they have from industry (i.e. high values on Industrial Context). Besides, regarding internal organisational factors, first cluster universities obtain high values as to their organisational design, because they promote the decentralisation of decision making and empowered their employees to innovate (through a bottom-up flow) through a contemporary organisational design. This fact could also reinforce the promotion of Lifelong Learning, Consultancy and Collaborative Research, seeing that the decentralisation of decision making push academic and researcher into knowledge transfer activities. Although universities from this cluster also obtained good results in Dissemination, Networking and Mobility with Industry, they are similar to Cluster 3. Regarding Patents and Licenses, Academic spin-offs and Student spin-offs (or Hard EUR), these universities are in the same level as Cluster 3. Moving on to the entrepreneurship support mechanisms, these universities obtained high values on almost all entrepreneurship support mechanisms except on Extra-curricular training and Workers' Training. This fact reiterates previous results, ratifying that the support of Extra-curricular training and Workers' Training is unnecessary for improving on Soft Entrepreneurial University's results if there is a supportive industrial context (Industrial Context).

Cluster 2

The ten universities that obtained the worst values on all Entrepreneurial University's results (except for Collaborative Research, result that was in the same level of Cluster 3), are the ones that composed Cluster 2. Besides, these universities have neither a supportive external environment nor a supportive internal organisation; since all the values obtained within these factors are really low. These facts could be because these universities are still at the beginning of the Entrepreneurial Universities' path.

Cluster 3

The forty-five universities that composed Cluster 3 obtain average scores on almost all Entrepreneurial University's results, except on Patents and Licenses, Academic spin-offs and Student spin-offs; which are on the same level as Cluster 1. Therefore, universities from this cluster are good on Hard EUR development. In addition, it should be highlighted that this group of universities obtained the lowest values on Collaborative Research; fact that could be related to the high level of Hard EUR, since fostering direct mechanisms of knowledge transfer could reduce Collaborative Research. Moreover, the low Industrial Context that this group of universities have could be another reason for the low values on Collaborative Research. In the same line, the low presence of Professionals from businesses into the development and delivery of the curriculum is another characteristic of these universities; which could be also due to the low Industrial Context. With respect to the internal entrepreneurship support factors, Extra-curricular training and Workers' training stand out because of their high values; which could be directly related with the good values on Hard EUR.

Discussion

The cluster analysis and the subsequent statistical analysis show that universities are in different stages within the path towards the Entrepreneurial University. There is a first stage (Cluster 2) where universities do not have a supportive external environment and internally there are straggler on internal entrepreneurship support factors. Therefore, they are not obtaining high Entrepreneurial University's results yet. In the second stage (Cluster 3), universities start promoting entrepreneurship (through Extra-curricular training and Workers' training) within its collective and although they do not have a really supportive Industrial Context, they are obtaining good results in Hard EUR. And finally, the third stage (Cluster 1) is composed of the most Entrepreneurial Universities, which thanks to a supportive Industrial Context obtain really good values on Soft EUR; maintaining the same level as the second stage on Hard EUR. Besides, this cluster promotes less Extra-curricular training and Workers' training and obtains the same results on Hard EUR as Cluster 2, reinforcing the importance that a supportive industrial context has.

The cluster analysis showed that not all universities are in the same level regarding Entrepreneurial University's results. The analysis determine that universities are in different stages within the Entrepreneurial University path; in fact, they could be classified into three stages. First stage universities do not belong to a supportive external environment and internally, concerning internal entrepreneurship support factors, are still backward. Hence, this group of universities are not obtaining high Entrepreneurial University's results. Second stage universities are achieving good results on Hard EUR through two main activities: providing support within the whole entrepreneurship process and training its staff on entrepreneurship. Furthermore,

it has to be highlighted that these universities do not have a really supportive industrial context. Finally, universities from the third stage, owing to a supportive industrial context obtain really good results on Soft EUR; being at the same level as the second stage on Hard EUR. Moreover, universities from these group develop less internal entrepreneurship support factors, in particular the support within the whole entrepreneurship process and the training in entrepreneurship for its staff. Nevertheless, having a supportive industrial context is the main factor for staying in this stage.

Universities are not unmoving within a specific stage; they can improve and move from one stage to the upper one or not continue that path and move down again to a lower stage. In fact, an Entrepreneurial University has to work on specific factors depending on its objective. For example, if university's goal is to get better results on Hard EUR it has to promote the support within the whole entrepreneurship process and the internationalisation activity, and do not care about industries' presence on curriculum development and delivery. Therefore, with respect to the promotion of these two internal entrepreneurship support factors, universities should implement different activities.

Concerning university's support within the whole entrepreneurship process, academic entrepreneurship is not a single event, it is a multi-stage process model that identifies the key actors, activities, potential stakeholders and key success drivers associated with each stage of the innovation commercialisation process (Salamzadeh et al. 2011; Wood 2011). Therefore, the university should provide supportive activities within each phase of the entrepreneurship process; such as: talks with entrepreneurs in order to make aware of the entrepreneurship importance, innovation and creativity workshops in order to generate new possible business ideas, business model and business plan courses in order to become this business ideas into business project and finally, courses on new business venture launching.

On the contrary, if university's objective is to increase Soft EUR, industries' presence on curriculum development and delivery and developing policies and laws regarding entrepreneurial issues are the main factors to be worked on. Besides, training staff in entrepreneurship is not a factor to make any effort on.

The industry presence in curriculum development and delivery is the process of developing human resources relevant to the modern society and creating a learning environment. Hence, universities should include the following mechanisms: university business collaboration in the development of a fixed programme of courses, modules, planned experiences as well as guest lectures by delegates from private and public organisations within undergraduate, graduate, PhD programmes or through further professional education (Davey et al. 2011).

With respect to policies on both university-business cooperation and entrepreneurship, universities should develop some policies in order to establish a working framework. On the one hand, regarding university-business cooperation policies, universities should establish students' internships, knowledge transfer activities and the promotion of R&D, among other activities. And on the other hand, regarding entrepreneurship universities should establish the distribution of royalty rates between inventors and the university, the university's choice to take an equity stake in the spin-off firm and the use of internal venture capital funds.

Conclusions, Limitations and Future Research

This research showed that not all universities are in the same stage regarding Entrepreneurial University's results. The analysis reveal that universities are in different stages within the Entrepreneurial University path and they could be classified into three stages.

In addition, universities are not unmoving within a specific stage; they can improve and move from one stage to the upper one or not continue that path and move down again to a lower stage; and the performance-based taxonomy of Entrepreneurial Universities showed within this paper would help universities to identify the main levers in order to move from one stage to the other.

However, the research also presents some limitations. Firstly, the sample size used, which do not allow a more rigorous statistical analysis. Indeed, sixty-nine European universities answered the whole questionnaire out of the 361 surveys mailed. In like manner, the results' generalisability is unreal; since, although normality was achieved for all variables, the sample was not significant enough to extrapolate the results to the whole population. This makes that the findings of the previous section were applicable only to the sample tested. Secondly, another limitation dealt with the measures used in the research; since data was gathered throughout scales getting TTO Directors' self-perceptions on her/his university, and therefore these variables have a degree of subjectivity.

Regarding the future lines of the research, an analysis of more European universities, increasing the size and the homogeneity of the sample would be the next step. Furthermore, in order to achieve a global vision of the Entrepreneurial University, it could be interesting to survey different people within the university. Indeed, two different groups could be analysed: on the one hand, the management team, the TTO Director, etc. and on the other hand, the researchers, professors, etc. This large number of questionnaires could allow developing more complex models that include latent (unobserved) variables, formative variables, chains of effects (mediation), and multiple group comparisons (e.g. multilevel analysis) of these more complex relationships.

References

- Bramwell, A., Hepburn, N., & Wolfe, D. A. (2012). *Growing innovation ecosystems: University industry knowledge transfer and Regional Economic Development in Canada*. Toronto: University of Toronto.
- Bratianu, C., & Stanciu, S. (2010). An overview of present research related to entrepreneurial university. *Management & Marketing*, 5(2), 117–134.
- Brennan, M. C., & McGowan, P. (2006). Academic entrepreneurship: An exploratory case study. *International Journal of Entrepreneurial Behaviour and Research*, 12(3), 144–164.
- Bronstein, J., & Reihlen, M. (2014). Entrepreneurial university archetypes: A meta-synthesis of case study literature. *Industry and Higher Education*, 28(4), 245–262.

- Clark, B. R. (1998). *Creating entrepreneurial universities: Organizational pathways of transformation*. Kidlington (Oxford): Pergamon.
- Davey, T., Baaken, T., Galan Muros, V., & Meerman, A. (2011). *The state of European university-business cooperation*. European Commission, DG Education and Culture, Brussels.
- De Luca, D., Taylor, R., & Prigmore, M. (2014). Rules of engagement: Understanding the dynamics of social enterprise and business requirements on academic collaboration. In *University Industry Interaction Conference*, Barcelona.
- Di Gregorio, D., & Shane, S. (2003). Why do some universities generate more start-ups than others? *Research Policy*, 32(2), 209–227.
- Etzkowitz, H. (2002). Incubation of incubators: Innovation as a triple helix of university-industry-government networks. *Science and Public Policy*, 29(2), 115–128.
- 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., Webster, A., Gebhardt, C., & Cantisano, B. R. (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. (2012). Effects and impact of entrepreneurship programmes in higher education.
- Fatoki, O. O., & Asah, F. (2011). The impact of firm and entrepreneurial characteristics on access to debt finance by SMEs in King Williams’ town, South Africa. *International Journal of Business and Management*, 6(8), 170.
- 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.
- Friedman, J., & Silberman, J. (2003). University technology transfer: Do incentives, management, and location matter? *The Journal of Technology Transfer*, 28(1), 17–30.
- Gibb, A. (2006). Entrepreneurship/enterprise education in schools and colleges: Are we really building the onion or peeling it away? In *International Council for Small Business ICSB 51st World Conference*.
- Gibb, A. (2012). Exploring the synergistic potential in entrepreneurial university development: Towards the building of a strategic framework. *Annals of Innovation & Entrepreneurship* [Online]. <http://www.journals.co-action.net/index.php/aie/article/download/16742/pdf>. Accessed September 2, 2014.
- Gibb, A., & Hannon, P. (2005). Towards the entrepreneurial university. *International Journal of Entrepreneurship Education*, 4(1), 73–110.
- Guenther, J., & Wagner, K. (2008). Getting out of the ivory tower—new perspectives on the entrepreneurial university. *European Journal of International Management*, 2(4), 400–417.
- Guerrero, M., Toledano, N., & Urbano, D. (2011). Entrepreneurial universities and support mechanisms: A Spanish case study. *International Journal of Entrepreneurship and Innovation Management*, 13(2), 144–160.
- Guerrero, M., & Urbano, D. (2010). *The creation and development of entrepreneurial universities in Spain: An institutional approach*. New York: Nova Science Publishers.
- Hu, M. C. (2009). Developing entrepreneurial universities in Taiwan: The effects of research funding sources. *Science Technology & Society*, 14(1), 35–57.
- Kirby, D. (2006). Creating entrepreneurial universities in the UK: Applying entrepreneurship theory to practice. *The Journal of Technology Transfer*, 31(5), 599–603.
- Kuratko, D. F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship Theory and Practice*, 29(5), 577–598.
- Larionova, M. (2012). Published. Internationalisation and the entrepreneurial university: Mutual reinforcement for maximum results. In *Rethinking Education, Reshaping Economies: A Conversation Starter for the EAIE 2012 Annual Conference*.

- Maassen, P. (2009). The modernisation of European higher education. In *From governance to identity* (pp. 95–112). Berlin: Springer.
- Markuerkiaga, L., Errasti, N., & Igartua, J. I. (2014). Success factors for managing an entrepreneurial university: Developing an integrative framework. *Industry and Higher Education*, 28(4), 233–244.
- Miller, M., & Katz, M. (2004). *Effective shared governance: Academic governance as a win-win proposition*. The NEA Almanac of Higher Education, Washington.
- Moroz, P. W., Hindle, K., & Anderson, R. (2010). Collaboration with entrepreneurship education programmes: Building spinout capacity at universities. *International Journal of Innovation and Learning*, 7(3), 245–273.
- Moroz, P. W., Hindle, K., & Anderson, R. (2011). Formulating the differences between Entrepreneurial Universities: A performance based taxonomic approach. In *Annual ICSB World Conference*.
- Oshea, R. P., Allen, T. J., Chevalier, A., & Roche, F. (2005). Entrepreneurial orientation, technology transfer and spinoff performance of U.S. universities. *Research Policy*, 34(7), 994–1009.
- Parsian, N. (2009). Developing and validating a questionnaire to measure spirituality: A psychometric process. *Global Journal of Health Science*, 1(1), 2–11.
- Peterka, S. O. (2011). Published. Entrepreneurial university as the most important leverage in achieving knowledge-based society. In V. Š. Zlatan Reić (Ed.), *The Ninth International Conference: “Challenges of Europe: Growth and Competitiveness – Reversing the Trends”*, Split, Croatia.
- Pinheiro, R., & Stensaker, B. (2013). Designing the entrepreneurial university: The interpretation of a global idea. *Public Organization Review*, 14(4), 497–516.
- Rasmussen, E., Bulanova, O., Jensen, A., & Causen, T. (2012). *The impact of science-based entrepreneurial firms—A literature review and policy synthesis*. Nordlands Forskning - Nordland Research Institute, Norway.
- Robson, C. (1993). *Real world research: A resource for social scientists and practitioners-researchers*. Oxford: Blackwell Publishers Ltd.
- Rothaermel, F. T., Agung, S. D., & Jiang, L. (2007). University entrepreneurship: A taxonomy of the literature. *Industrial and Corporate Change*, 16(4), 691–791.
- Salamzadeh, A., Salamzadeh, Y., & Daraei, M. (2011). Toward a systematic framework for an entrepreneurial university: A study in Iranian context with an IPOO model. *Global Business and Management Research: An International Journal*, 3(1), 31–37.
- Segal, N. S. (1986). Universities and technological entrepreneurship in Britain: Some implications of the Cambridge phenomenon. *Technovation*, 4(3), 189–204.
- Spila, J. C., Barrenechea, J., and Ibarra, A. (2011). Entrepreneurial culture, innovation and competences in higher education the Gaze program case. *Cultura emprendedora, innovación y competencias en la educación superior el caso del programa gaze*, 187(3), 207–212.
- Sporn, B. (2001). Building adaptive universities: Emerging organisational forms based on experiences of European and US universities. *Tertiary Education and Management*, 7(2), 121–134.
- Tijssen, R. J. W. (2006). Universities and industrially relevant science: Towards measurement models and indicators of entrepreneurial orientation. *Research Policy*, 35(10), 1569–1585.
- Todorovic, W. Z., Mcnaughton, R. B., & Guild, P. D. (2005). Making university departments more entrepreneurial: The perspective from within. *The International Journal of Entrepreneurship and Innovation*, 6(2), 115–122.
- Tuunainen, J. (2005). Hybrid practices? Contributions to the debate on the mutation of science and university. *Higher Education*, 50(2), 275–298.
- Van Der Heide, S., & Van Der Sijde, P. (2008). The entrepreneurial university: The University of Twentes Concept for Innovation. In *Higher education institutions and innovation in the knowledge society* (pp. 37–44). Oy Nord Print Ab, Helsinki: Finland.
- Visintin, F., & Pittino, D. (2010). Successful technology transfer in uncertain contexts: The role of top management team diversity in university spin-off firms. In *XI Workshop dei Docenti e dei Ricercatori di Organizzazione Aziendale*, Bologna.
- Volkman, C., Wilson, K. E., Marlotti, S., Rabuzzi, D., Vyakarnam, S., & Sepulveda, A. (2009). *Educating the next wave of entrepreneurs: Unlocking entrepreneurial capabilities to meet the*

- global challenges of the 21st century*. World Economic Forum: A Report of the Global Education Initiative, Switzerland.
- Vukasovi, M., Maassen, P., Nerland, M., & Stensaker, B. (2012). *Effects of higher education reforms: Change dynamics*. Netherlands: Sense Publishers.
- Wood, M. S. (2011). A process model of academic entrepreneurship. *Business Horizons*, 54(2), 153–161.
- Zahra, S. A. (1993). A conceptual model of entrepreneurship as firm behavior: A critique and extension. *Entrepreneurship Theory and Practice*, 17(4), 5–21.