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Governance of *entrepreneurial universities* in the context of *entrepreneurial ecosystems*. The perspective of the University Technology Transfer Offices

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Abstract

Governance of universities towards the *entrepreneurial university* and the link with the organisational role of University Technology Transfer Offices (UTTOs) are studied. A double novel approach is adopted. First, analysing the visibility of the entrepreneurial strategy followed by the different universities in the system, with a Web Content Analysis of all Spanish universities (seventy-six) and extracting data from official reports. Second, with a survey to UTTOs managers (sixteen valid answers). Key aspects of *entrepreneurial universities*, such as their organisational structure, links between entrepreneurship and research, entrepreneurship education, and the relationships with the ecosystem were analysed. In addition, the views of UTTOs' managers about the implementation of the *entrepreneurial university* in their own institution were studied. As results, it emerges how the

entrepreneurial university strategy is made visible in specific actions such as transversal initiatives, awards to entrepreneurship and initial support. In addition, it has been found that UTTOs managers think that the impact of the *entrepreneurial university* should be further assessed in order to know the real results of the implementation of such strategy.

Keywords: Entrepreneurial universities, governance, entrepreneurial university ecosystem.

Introduction

In the last decades, as a complement to the education and research missions of universities, the development of the so-called third mission of the university has been promoted (Miller, Cunningham, and Lehmann 2021; Nicotra, Del Giudice, and Romano 2021) and recently, new business models for universities have been proposed (Audretsch and Belitski 2021a), emerging the *entrepreneurial university* (Clark 1998; Etzkowitz 1983), as the solution to the problems facing contemporary Higher Education systems (Pinheiro and Stensaker 2014).

This development has led to different policies, such as the inclusion of entrepreneurship education as subject in degrees and master programmes and the development of projects to promote University *Spin-Offs* (USOs) (Boh, De-Haan, and Strom 2016). In this vein, the ecosystems' perspective (Abootorabi et al. 2021) came to highlight the role of the university as tractor of other agents, including SMEs, within the context of generating new knowledge in which they are immersed, developing the concept of the *university entrepreneurial ecosystem* (Graham 2014).

The *entrepreneurial university* (Guerrero et al. 2016), came from an institutional view in the study of *academic entrepreneurship* (Grimaldi et al. 2011) and USOs (Boh et al. 2016), as instruments of University Technology Transfer process (UTT). In this vein, Audretsch and Belitski (2021b) defined the *entrepreneurial university* as a system with three different levels: individual-organizational (internal) and external system. In this system, the staff and managers of University

Technology Transfer Offices (henceforth UTTOs) are organizational and individual members of the system.

It is recognised the role of UTTOs, as part of the innovation process in the regional innovation system in which they are embedded, and they have been considered as fundamental for the UTT at the institutional and organizational levels of universities (Etzkowitz 2017). However, it has been found how the supportive organizational effectiveness of these UTTOs is necessary but not sufficient to improve technology transfer effectiveness and other strategic choices made by universities managers affect (Horner et al. 2019). Additionally, it has been pointed out the paucity of studies that examine the governance of universities in relation to their engagement within the ecosystem (Meoli, Paleari, and Vismara 2019). For example, in a systematic literature review about the third mission of the university, Compagnucci and Spigarelli (2020) found that there is a lack of understanding regarding the strategic orientation of universities within knowledge transfer.

Consequently, it is time to link the organisational role of UTTOs and the governance of universities towards the *entrepreneurial university*. This article aims to respond to this Research Question (RQ): *What are the steps followed by universities to be an entrepreneurial university?*

Theoretical background

From the University technology transfer to the entrepreneurial university

In 1980, the *Bayh-Dole Act* was enacted in the USA allowing universities to own patents from federal research funds (Grimaldi et al. 2011). It gave birth to the UTT (Siegel and Wright 2015) due to the implementation of *academic entrepreneurship* activities, as a third mission (Clark 1998; Etzkowitz 1983). University patents were not the only mechanism used by academic researchers to transfer their results to the marketplace. Additionally, but less frequent, they also used other mechanisms including licensing of patents, the creation of USOs, collaborative research, contract research and consulting, as well as advice and networking with practitioners (Grimaldi et al. 2011).

After Etzkowitz (1983) first introduced the *entrepreneurial university* concept, in the last twenty years, legislators adopted policies to stimulate innovation by developing new ventures in the hope of producing economic growth, placing universities in the spotlight and emerging a general trend of universities adopting stronger entrepreneurship and innovation strategies (Graham 2014). Consequently, *academic entrepreneurship* activities have been increasingly focused on enhancing the role of the universities in fostering the entrepreneurship culture among faculty and students, and the creation of USOs (Siegel and Wright 2015). More stakeholders became involved in *academic entrepreneurship* activities (students, faculty and post-doctoral fellows, governmental agencies, and alumni) and new intermediaries emerged (e.g., accelerators) (Grimaldi et al. 2011). This interconnected network of academic and non-academic intermediaries *coevolves* working collectively and strategically to promote and support *entrepreneurship* activities and it is known as *university entrepreneurial ecosystem* (Graham 2014).

UTTOs as intermediary of knowledge

UTTOs are traditionally the organizations that bridge the university research results with the marketplace, and play an important role in ensuring that intellectual property was well defined and protected before attempting to attract commercial interest (Siegel and Wright 2015). Nowadays, UTTOs manage the commercial activities of academic researchers (contracts, consultancy, licencing and USOs) and should be understood as critical ecosystem intermediaries (O’Kane et al. 2021).

However, in the new perspective of the *entrepreneurial university*, there have been some criticisms about its limited effectiveness in the creation and development of new USOs (Grimaldi et al. 2011) and different aspects of UTTOs have being mentioned as barriers to knowledge transfer and, for extension, the *entrepreneurial university*, such as *UTTO’s personnel and lack of awareness of the existence of UTTOs*.

First, regarding *UTTO's personnel*, staff have been traditionally people with a legal background and they need specific entrepreneurial skills (Siegel and Wright 2015). As consequence, developing a university incentives model that would act to influence researcher motivation is needed, as well as building UTTO teams focused on entrepreneurship, while sharing and maintaining a common language with researchers (Faccin et al. 2021).

Second, concerning the *lack of awareness of the existence of UTTOs*, in some cases, only a minority of researchers are aware of the existence of a UTTO at their university, or researchers do not use their services if they possess experience as entrepreneurs or have industry partners (Huyghe et al. 2016). In this vein, Hayter et al. (2020) pointed out that new pathways, different to the traditional role of UTTOs have emerged, e.g., faculty starting companies after some years in industry or crowdsourcing. In addition, there have been found relations between the organizational characteristics of UTTOs and the *entrepreneurial university* manifestations. For example, Soares and Torkomian (2021) explored how UTTO officers with specific capabilities (research, marketing and legal-oriented) affect the early and late stages of the UTT. Additionally, in a study of the Italian case, Iacobucci, Micozzi and Piccaluga (2021) found a significant relationship between the size of UTTOs and the number of new USOs. Thus, it can be inferred the positive effects of an adequate dimension of UTTOs on the development of entrepreneurial ventures at the early stages.

Besides, Cunningham, Lehmann and Menter (2021) proposed different lines of research. Specifically, regarding the strategy of universities, one of the relevant proposed lines is the analysis of how *entrepreneurial universities* decide what organizational units to include as part of their entrepreneurial architecture, and how the establishment of new organizational units thereby reflect shortcomings and failures of well-established organizational units such as UTTOs. In addition, O'Kane et al. (2020) pointed out the lack of studies about how UTTOs managers perceive and manage the changes derived by the development of *entrepreneurial universities* and ecosystems. Taking all of this into account, this article aims to respond to this RQ: *What are the steps followed by universities to be an entrepreneurial university?*

Methodology

In order to address the proposed RQ, we conducted two empirical studies. First, we examined data obtained from a *Web Content Analysis* (WCA), publications and official reports (we will refer to this as Study 1). Second, we conducted a survey about how technology transfer officers perceive the implementation of the *entrepreneurial university* (Study 2).

Web content analysis and official data

Nowadays universities are monitored and evaluated by national and international external agencies, organizations and stakeholders, and the results of that process are university rankings and academic reputation and social recognition, national or globally. Therefore, universities need to communicate how they develop their different activities transforming webpages in primarily research resources about their behaviour (strategic/organisational). Following a WCA procedure, a useful method in terms of time and cost efficiency (e.g., Benassi, D'Angelo and Geenen 2012; Herring 2009; Navarro 2008), we measured items on a nominal “not present/present” (0/1) scale, eliminating the variability of qualitative assessments. We also used official data to analyse the entrepreneurial activity of universities.

Concerning the *instrument design*, we developed a list of items based on previous research on the topic (Talebzadehhosseini et al 2021) (see Table 1). We captured the information about the visibility of the *entrepreneurial university strategy orientation*, in each case, through a WCA of the universities, coding the different items from each institutional university webpage.

In order to measure the output of the entrepreneurial activity of each university, we used the official data from the national report of CRUE (Conference of Rectors of Spanish Universities) about the technology transfer activity in the Spanish universities, referred to 2019, the last period accessible. From this resource, we captured the output indicators, number of USOs created, revenues by

technology transfer activity and patents (entrepreneurial capital). In addition, we used a proxy variable to measure knowledge capital, and we look for the scientific production by university, in 2019, using the *Clarivate Web of Science Core Collection* (WOS), and looking for papers published by authors from each affiliated institution.

As for the *data selection*, we compiled one database which considered the population of all Spanish universities according to official databases from CRUE (76 webpages). For the *data collection*, to ensure the validity of the results, we cross-checked the results between multiple coders and used a formal coding scheme (Neuendorf 2002). Two researchers visited the websites, thus enhancing the validity of the data.

We conducted the *data analysis* taking into account that the validity was further improved by our use of other sources of information (a questionnaire addressed to the staff members of the UTTOs) as a means of triangulation (Patton 1990). In addition, we ensured that the WCA, and the data from the reports, were valid by thoroughly understanding the research objectives, previously reading a subset of relevant content and carefully selecting the content sample (in this case, institutional university webpages) to be analysed. The data extracted from the 76 institutional university webpages were recorded in an Excel file, analysed, and cross-compared, with the aim of identifying key patterns. To compare the different obtained data, we built a dataset with a normalised computing of the different indexes (*entrepreneurial university*, WOS publications, and UTT), from 0 to 1. Then, we ordered the universities according to the index *entrepreneurial university obtained*.

Survey from UTTOs' managers

To have the views of UTTOs managers (Study 2), we compiled a database using official databases from RedOTRI (<http://www.redotriuniversidades.net/>). From the total of 76 Spanish universities, according to the mentioned official information three private Universities and three public ones (oriented to international activities) did not have an official UTTO. Consequently, the total of UTTOs was 70. Concerning the *instrument design*, in order to measure the governance of the

universities and the perceptions of UTTOs, we developed an online questionnaire (based on *google forms*, 7-items Likert type questions) with 48 questions about leadership and governance, ecosystem, organizational capacity, teaching and learning in the field of entrepreneurship, development of entrepreneurial spirit, interchange and collaboration and impact. Sixteen Spanish UTTOs replied to the questionnaire (answer rate 22.85%). Given the nature of several questions and the fact that the perceptions of the UTTOs' managers were asked, anonymity was guaranteed, so no more specific information about each institution was collected.

Findings

From the WCA (see Table 1), only a 14.5% of the universities' websites have the term entrepreneurship in their homepage.

INSERT TABLE 1 ABOUT HERE

Regarding the *organisational structure*, a 23.7% of the universities have entrepreneurship included in their organizational chart with a Vice-President or Delegate from the President. A 17.1% of the universities have a Vice-President of Entrepreneurship.

Concerning *entrepreneurship and research*, only a 5.3% of the Vice-presidents of Entrepreneurship includes responsibilities on UTTOs. A 10.5% include an UTTO independent *microsite*. A 42.1% of the UTTOs manage entrepreneurship. Moreover, a 30.3% of the analysed webs present links between research and entrepreneurship, sometimes with actions of valorisation of research and direct promotion of USOs.

Regarding *actions to promote entrepreneurship*, a 30.3% have a devoted entrepreneurship *microsite*, a 73.7% a transversal initiative for the whole institution, a 21.1% an endowed chair (a company/institution financing specific activities for the promotion of entrepreneurship in the University), and a 34.2% have specific awards for promoting entrepreneurship, mostly for students.

In the majority of the cases, public institutions, government or financial institutions fund these awards.

About *entrepreneurship and education*, a 13.2% have links to specific entrepreneurship subjects in official studies, a 61.8% of them offer specific entrepreneurship subjects (no official studies), 19.7% organise official (approved from the Spanish government) postgraduate programme in entrepreneurship and a 9.2% organise university (approved only from the university) postgraduate programme in entrepreneurship.

About *entrepreneurship and relationships with the ecosystem*, a 46.1% have an entrepreneurship centre/coworking space for entrepreneurs, a 51.3% offers pre-incubation, incubation and accelerator advisory services and a 38.2% include information about the *entrepreneurial university ecosystem*.

With the information from this WCA, a classification of universities was conducted regarding the visibility of the entrepreneurial strategy followed by the different universities. For doing this, three levels of universities were formed according to the total scores in all the items: level 1 (*scores from 0 to 4*), level 2 (*5-9*) and level 3 (*10-15*). Including the information about WOS publications and data from UTT, these levels were named as three groups of universities: *laggers*, *followers* and *leaders*. The different indexes (*entrepreneurial university*, WOS publications ranking, and UTT ranking), were used to categorize these groups (see Figure 1). The entrepreneurial activity was used to describe the different categories.

Regarding the findings from the survey to technology transfer officers, the participants represent UTTOs from the different previously identified groups: six from the *leaders* universities, three *followers*, four from the *laggers*, and three anonymous (in the questionnaire). Regarding *leadership and governance*, it is highlighted that universities are somehow developing a strategy of promotion of entrepreneurship and there is a high-level commitment in the entrepreneurial agenda. Concerning the *ecosystem*, the UTTOs managers indicate the relevance of formal collaborations with public institutions and relations with a diversity of agents to knowledge transfer.

About the *organizational capacity*, they highlight the ability and culture to create new relationships and synergies across the organization. As problems for the development of USOs, they mostly mention bureaucracy and time management. About *teaching and learning in the field of entrepreneurship*, they indicate offer of non-official entrepreneurship courses. Regarding the *development of entrepreneurial spirit*, they signal access to incubators/accelerators. About the *interchange and collaboration*, they mention commitment to collaborate and strong links with business incubators/accelerators. Finally, the *evaluation of impact* receives the lesser values in general from the managers. They point out the need to conduct a better assessment of the specific personnel/resources involved in the entrepreneurial agenda and the general impact of the support to the USOs.

Discussion and Conclusion

The *entrepreneurial university* manifests in a variety of elements that are implemented at different speed, resulting in different groups of universities. It is clear that not all universities take their entrepreneurial orientation in strategic terms, as this term is not included in their homepage. Furthermore, regarding the changes in the organisational structure, less than a quarter of the analysed universities have entrepreneurship included in their organizational chart with a Vice-President or Delegate from the President, and less than 20% have a Vice-President of Entrepreneurship. This reflects that the majority of the universities are still far to be considered as *entrepreneurial universities* in strategic terms. Some universities have elements of entrepreneurship and some have a strategic commitment to be entrepreneurial, being the latter the less present one, according to this study.

In addition, it is clear the role of UTTOs as fundamental structures for the technology transfer process at the institutional and organizational levels of universities, confirming previous research (e.g., Soares and Torkomian 2021). However, this could be improved by a better promotion of its activities, using *microsites*. Another aspect here is that UTTOs manage entrepreneurship, but there is still not an integration of the Vice-Presidents of Entrepreneurship, which include responsibilities on

UTTOs in a very low percentage. It is clear that this is changing, with a third of analysed webs showing links between research and entrepreneurship (valorisation of research/direct promotion of USOs), but more is needed in this regard to see an integration among those areas.

In Figure 1 the three groups of universities, related with the *entrepreneurial university* orientation, together with the measure of knowledge capital (WOS publications ranking) and technology transfer activity (entrepreneurial capital), are shown.

INSERT FIGURE 1 ABOUT HERE

The *leaders* group is characterized by including entrepreneurship in the homepage, specific support programs of entrepreneurship, a UTTO *microsite*, the inclusion of entrepreneurship subjects in the official studies and the integration in the organization structure of the leadership in terms of entrepreneurship (as Vice-President). However, it is unexpected that these universities are not always the most entrepreneurial ones in output terms. They are working in strategic terms as *leaders* but did not show the most entrepreneurial values measured by USOs creation, patents and research contracts. This phenomenon is identified as the *entrepreneurial university paradox*, *entrepreneurial universities*, in order to be successful, need both knowledge and entrepreneurial capital (Audretsch and Belitski 2021b). Thus, *entrepreneurial universities* in this leader group can be considered as still developing their entrepreneurial capital. In the *followers* group, the main elements identified in the visualization of their strategy are the inclusion of entrepreneurship in the organizational chart, but not at the high level of the structure. In the *laggers* group the main elements are the entrepreneurship awards, specific entrepreneurship subject (no official studies) and advisory services. These universities are more teaching-oriented and their entrepreneurial activity is more limited.

In the conjoint analysis of the Study 1 and the findings, a generic path showing the evolution of the *entrepreneurial university* is proposed (see Figure 2).

INSERT FIGURE 2 ABOUT HERE

As conclusion, the *entrepreneurial university* manifests in a variety of elements that are implemented at different speed, resulting in different groups of universities. These groups reflect the different steps followed by universities, in order to reach an entrepreneurial orientation and be an *entrepreneurial university*, answering the RQ. The *leaders* group is characterized, among others, by the integration in the organization structure of the leadership in terms of entrepreneurship (as Vice-President). Interestingly, the majority of the universities have developed a transversal initiative for the whole institution to promote entrepreneurship in the university and organise specific awards for promoting entrepreneurship, mostly for students (funded by public institutions, government or financial institutions). However, the links between entrepreneurship and education are still scarce, with a relative low percentage of links of entrepreneurship with the official studies of universities. Regarding the role of UTTOs, as previous existing governance system of technology transfer, in general, managers, as active actors in the ecosystem, recognise the involvement of the universities in becoming entrepreneurial but also manifest a lack of assessment of the impact of this strategy.

This paper contributes to the literature on *entrepreneurial universities*, partially solving the paucity of studies that examine the governance of universities in relation to their engagement within the ecosystem and particularly mixing the analysis of the visibility of the *entrepreneurial university* strategy and the perspective of UTTOs. In addition, novel methods are applied in the area to explain this complex phenomenon.

As implications, universities should consider the *entrepreneurial university* should not consist only in the organisation of entrepreneurship awards and events. It should be visible in the organisational structure, in internal terms with consequent decisions (and support of whoever has the entrepreneurial spirit) and in external terms with better communication strategies (particularly using the widespread use of the universities' websites), making the *entrepreneurial university* strategy visible to the academic community and the society in general. In both cases, the impact should be assessed.

As limitations and further research, this is an exploratory study that investigates the steps of the universities towards the *entrepreneurial university*, which is centred in the meso level (University). Other levels, such as the macro (sector, geography, policy, regulation) and micro (researchers) (O’Kane et al. 2020) could be explored in order to progress the research. Additionally, the sample could be considered small, especially for the survey, so a quantitative study with a larger number of observations coming from more universities would improve the generalization of the results.

References

- Abootorabi, H., J. Wiklund, A. R. Johnson, and C. D. Miller. 2021. “A holistic approach to the evolution of an entrepreneurial ecosystem: An exploratory study of academic spin-offs”. *Journal of Business Venturing* 36 (5), 106143.
- Audretsch, D. B., and M. Belitski. 2021a. “Three-ring entrepreneurial university: in search of a new business model”. *Studies in Higher Education* 1-11.
- Audretsch, D. B., and M. Belitski. 2021b. “A strategic alignment framework for the entrepreneurial university”. *Industry and Innovation* 1-25.
- Benassi, M., A. D’Angelo, and G. Geenen. 2012. “IP intermediaries in Europe: A web content analysis”. *Industry and Innovation* 19 (4): 307-325.
- Boh, W. F., U. De-Haan, and R. Strom. 2016. “University Technology Transfer through entrepreneurship: faculty and students in spinoffs”. *Journal of Technology Transfer* 41 (4): 661–669.
- Clark, B. R. 1998. “Creating entrepreneurial universities: Organizational pathways of transformation”. Oxford: Pergamon.
- Compagnucci, L., & Spigarelli, F. 2020. “The Third Mission of the university: A systematic literature review on potentials and constraints”. *Technological Forecasting and Social Change*, 161, 120284.
- CRUE. 2019. “Encuesta I+TC+D del año 2019. Comisión Sectorial Crue - I+D+i”. Accessed 15 November 2021. <http://www.redotriuniversidades.net/index.php/353-publicacion-datos-informe-encuesta-i-tc-d-2019>
- Cunningham, J. A., E. E. Lehmann, and M. Menter. 2021. “The organizational architecture of entrepreneurial universities across the stages of entrepreneurship: a conceptual framework”. *Small Business Economics* 1-17.
- Etzkowitz, H. 1983. “Entrepreneurial Scientists and Entrepreneurial Universities in American Academic Science”. *Minerva* 21 (2-3): 198-233.
- Etzkowitz, H. 2017. “Innovation Lodestar: The entrepreneurial university in a stellar knowledge firmament”. *Technological Forecasting and Social Change* 123: 122-129.
- Faccin, K., C. De Beer, B. V. Martins, G. Zanandrea, N. Kela, and C. Schutte. 2021. “What really matters for TTOs efficiency? An analysis of TTOs in developed and developing economies”. *The Journal of Technology Transfer* 1-27.

- Graham, R. 2014. *Creating University-based Entrepreneurial Ecosystems: Evidence from Emerging World Leaders*. Cambridge: Massachusetts Institute of Technology.
- Grimaldi, R., M. Kenney, D. S. Siegel, and M. Wright. 2011. "30 years after Bayh–Dole: Reassessing academic entrepreneurship". *Research Policy* 40 (8): 1045-1057.
- Guerrero, M., D. Urbano, A. Fayolle, M. Klofsten, and S. Mian. 2016. "Entrepreneurial universities: emerging models in the new social and economic landscape". *Small Business Economics* 47 (3): 551-563.
- Hayter, C. S., E. Rasmussen, and J. H. Rooksby. 2020. "Beyond formal university technology transfer: innovative pathways for knowledge exchange". *The Journal of Technology Transfer* 45 (1): 1-8.
- Herring, S. C. (2009). *Web content analysis: Expanding the paradigm*. In International handbook of Internet research (233-249). Dordrecht: Springer.
- Horner, S., D. Jayawarna, B. Giordano, and O. Jones. 2019. "Strategic choice in universities: Managerial agency and effective technology transfer". *Research Policy* 48 (5): 1297-1309.
- Huyghe, A., M. Knockaert, E. Piva, and M. Wright. 2016. "Are researchers deliberately bypassing the technology transfer office? An analysis of TTO awareness". *Small Business Economics* 47 (3): 589-607.
- Iacobucci, D., A. Micozzi, and A. Piccaluga. 2021. "An empirical analysis of the relationship between university investments in Technology Transfer Offices and academic spin-offs". *R&D Management* 51 (1): 3-23.
- Meoli, M., S. Paleari, and S. Vismara. 2019. "The governance of universities and the establishment of academic spin-offs". *Small Business Economics* 52 (2): 485-504.
- Miller, K., J. Cunningham, and E. Lehmann. 2021. "Extending the university mission and business model: influences and implications". *Studies in Higher Education* 46 (5): 915-925.
- Navarro, P. (2008). "The MBA core curricula of top-ranked US business schools: a study in failure?". *Academy of Management Learning & Education* 7 (1): 108-123.
- Neuendorf, K. 2002. *The content analysis guidebook*. Thousand Oaks, CA: Sage Publications.
- Nicotra, M., M. Del Giudice, and M. Romano. 2021. "Fulfilling University third mission: towards an ecosystemic strategy of entrepreneurship education". *Studies in Higher Education*, 46 (5): 1000-1010.
- O’Kane, C., J. A. Cunningham, M. Menter, and S. Walton. 2020. "The brokering role of technology transfer offices within entrepreneurial ecosystems: an investigation of macro–meso–micro factors". *The Journal of Technology Transfer* 1-31.
- Patton, M. Q. 1990. *Qualitative evaluation methods*. Newbury Park, CA: Sage Publications.
- Pinheiro, R., and B. Stensaker. 2014. "Designing the Entrepreneurial University: The Interpretation of a Global Idea." *Public Organization Review* 14 (4): 497–516.
- Siegel, D. S., and M. Wright, M. 2015. "Academic entrepreneurship: time for a rethink?". *British Journal of Management* 26 (4): 582-595.
- Soares, T. J., and A. L. Torkomian. 2021. "TTO's staff and technology transfer: Examining the effect of employees' individual capabilities". *Technovation* 102, 102213.
- Talebzadehhosseini, S., I. Garibay, H. Keathley-Herring, Z. R. S. Al-Rawahi, O. O. Garibay, and J. K. Woodell. 2021. "Strategies to enhance university economic engagement: evidence from US universities". *Studies in Higher Education* 46 (6): 1112-1131.

Table 1. Summary of items (WCA)

	Total	%
Entrepreneurship (E) in homepage	11	14,5
E. in organizational chart	18	23,7
Vice-President of E.	13	17,1
Vice-President of E. including UTTO	4	5,3
UTTO microsite	8	10,5
UTTO manages E.	32	42,1
Link research and E.	23	30,3
E. microsite	23	30,3
Transversal initiative	56	73,7
E. endowed chair	16	21,1
Specific support for E.	26	34,2
E. award/s	47	61,8
Link to specific E. subjects in official studies	10	13,2
Specific E. subject (no official studies)	47	61,8
Official postgraduate programme in E.	15	19,7
University postgraduate programme in E.	7	9,2
E. centre/coworking space for E.	35	46,1
Pre-incubation, incubation, accelerator advisory services	39	51,3
Information about the entrepreneurial university ecosystem	29	38,2

Figure 1: Classification of *entrepreneurial universities*

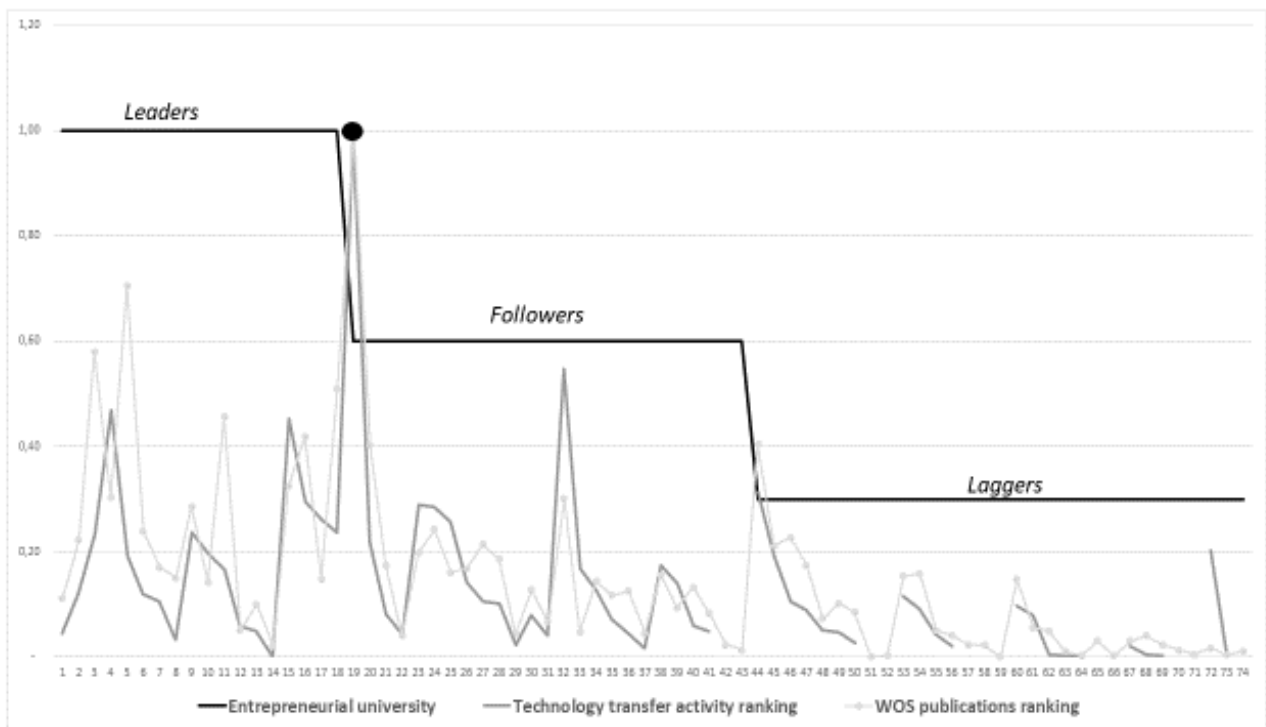


Figure 2. The evolution of the *entrepreneurial university*

