Third Mission Goings-On and Academic Entrepreneurs in Europe

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***Abstract*—Academic entrepreneurship and the process of establishing new firms are rooted in technologies and knowledge resulting from the research carried out at universities. Thus, they have served as engines of growth in the USA since the Bay-Dole Act, and presently Europe and China are trying to catch up.**

The article aims at recommending a research agenda at the intersection of the functions of knowledge transfer from universities from the perspective of academic entrepreneurship and the role of universities' third mission. Talent management teams are crucial to managing knowledge and technology transfer successfully in today's global world. Hence, research on this intersection should endeavor to find out antecedents, consequents and the processes of how the talented people clustered in detached teams, the human capital of spin-offs and born global organizations can become the source of competitive advantage as regards managing entrepreneurship within the university. The literature review search was conducted in SSCI-Web of Science Core Collection databases focusing on journal articles and review with the limitation that conference papers, books and other scientific contributions not abstracted there were not included.

I. Introduction

The concept of an entrepreneurial university has long been the focal point of discussions in the academic circles. Reference [10] thinks that the concept of an entrepreneurial university can provide the answer to the challenges within the educational context, but also within the broader social framework. Bearing in mind the opinions of different authors, the groundwork of this concept can be defined. The universities that consider new funding sources, such as patenting, contract research and partnership with private companies, can be regarded as entrepreneurial universities. Just like the universities prepare students for the business world, so does an entrepreneurial university exist as a natural incubator, providing the basic structure to professors and students during intellectual, commercial and mixed activities [15]. An entrepreneurial university uses an innovative approach to business, demands significant change of the organizational character and seeks to become independent [10].

Reference [47] presents a redefined role of a university in an interesting way: the new goal of a university is no longer to produce as many graduates set for a job hunt after graduation, but to create capable individuals who will be the creators of new businesses and who will push the economy forward, i.e. the new objective of a university is to create competent individuals who will be able to remove future obstacles. University should become the nucleus of new ideas and entrepreneurial climate, and not just be the publisher of various academic concepts, as has been the case. The literature on entrepreneurial universities started to appear at the beginning of the 1990s, and the surge has continued during the recent decade owing to a few special editions. Some of the most famous authors who have tried to define and outline this concept are listed below. For example, "entrepreneurial university", according to [9] implies that the university, professors, technical staff and students should embark on new business enterprises.

An entrepreneurial university is based on commercialization (adjusted lectures for further education, consulting and additional activities) and utilization (of the patents, licenses and setting up of companies by the students) [27]. Reference [45] opines that the character of an entrepreneurial university can mean three things: the university as an organization itself becomes entrepreneurial, the members of the university (professors, students, employees) become entrepreneurs, and the interaction with the environment, structural interconnection between the university and the region assumes an entrepreneurial character. The entrepreneurial spirit, the wish and the capability to start their own business can all be taken as the parameters for the evaluation of success.

An entrepreneurial university has been characterized by a closer collaboration with the business sector and greater responsibility towards achieving personal external objectives [55]. Reference [57] defines the concept of an entrepreneurial university as the university that is nothing more than a service provider in the educational sector. The description of what different authors believe the core of an entrepreneurial university is, can be outlined in several categories: acquiring new resources [15, 14, 10, 45, 55, 27, 57], creating companies by the university members [9, 14, 45, 16, 27], recognizing and creating new opportunities, and innovative approach in general [28, 45, 10]. At the core of the entrepreneurial culture, the most cherished features are the capability of making innovations, recognition and creation of opportunities, teamwork, taking on risks and accepting challenges [28]. Reference [16, 17] describes the process as the new university revolution, and expects the realization of three assignments:

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lecturing as guarding and dissemination of knowledge, research, and application of the research results to foster social and economic development.

In order to examine the scientific basis of these concepts, the empirical part this paper provides systematic literature overview, identifying the scope and importance of the selected research field in the Web of Science Core Collection available publications. The results display interconnected clusters of topics, as well as networks of authors. Additionally, the analysis has identified the most influential authors and journals in the chosen area of research. An impact criterion was based on the number of citations and the number of publications.

II. Sustainable Universities

A. Triple helix model

The concept of an entrepreneurial university is not solely the result of a reform that basically aims at the change from within the educational system. The mode interaction in the broader sense is redefined; the interaction of three major units is reinterpreted; the new role and expectations towards the government, the university and the economy are highlighted. The triple helix model implies a triple helix system network among the government, the university and the economic sector, and aims to promote economic development and academic entrepreneurship. Universities are going through a second academic revolution, wherein it accomplishes the mission to support socio-economic development, besides its mission of education and research, via commercializing the research results. The first revolution related to accepting the research mission and was a shift in relation to the mission of solely delivering lectures [16]. With the aim to increase the amount and the diversification of the funds, the changes in the environment are putting pressure on the universities to commercialize and cooperate more extensively with the private sector. In the framework of a triple helix model, the collaboration with the economy through the cooperation as a constitutional participant in the process of creating knowledge has intensified. Similarly, in the institutional and innovation context, the university is an asymmetric participant in the economic environment. The triple helix model of universities, economies and governments surpasses the previous models of institutional relations of the capitalist or socialist character in which the university plays the role of a subsidiary. Through diminishing the influence of the government, the triple helix model tries to explain the configuration of new institutional forces that arise from innovation systems. When knowledge becomes the basis for innovations, the university, being a place of production and dissemination of knowledge in its core, becomes the key element of the economy defined by a high level of innovation. Previously, the economic policy relied solely and exclusively on the relations with the government, and the government was expected to work on improving the economic conditions by lowering taxes or by influencing the resource allocation through stimulations and subsidies. In the triple helix concept the university strengthens its role as the starting point for new companies and human potential, highlighting innovative technologies and knowledge as the basis for innovation processes. In free market conditions the three institutional spheres, which have up until now experienced limited interaction and cooperation, are now interconnecting in all phases of the innovation process and the decision-making process on the industrial policy.

Reference [18] identified four basic changes in the process of production, exchange and utilization of knowledge. The first is the internal transformation inside each of the triple helix spheres (development of additional links among the companies based on strategic cooperation, or in the case of the university, which introduces a new goal as part of its mission). The second is the influence of one institutional sphere on another, as is the case in the USA and Sweden, where the regulations on transferring the intellectual rights ownership from an individual or the government to a university have been revised. The third is the creation of a network of three-lateral links and organizations at the intersection of the spheres, in the service of institutionalization and reproduction of the communication interface, stimulation of organizational creativity, and regional cohesion. An example of a relationship network is a successful model from the well-known Silicon Valley and the New York Academy of Sciences, and the results could hardly be achieved solely on individual spheres or bilateral relations. The fourth change relates to the recursive effect of the inter-sphere links among the university, the economy and the government according to their original characteristics. One of the recursive effects on science relates to the inner changes at the university as enforced by government policies.

B. European university reform

As a result of the social development in Europe, the need for adaptation/adjustment of the universities has been recognized. The expectations from higher education staff are mounting. The Bologna process (1999), the Brussels Declaration (2005) and the Spanish higher education reforms (2006) are all examples of national and supra-national reforms, with the aim to encourage the transformation and re-establish the balance between the market demands and the work force supply in the educational sector. The Bologna Process implies a higher education reform in 46 European countries participating today. The goal of the Process is to boost competitiveness and quality of European higher education in relation to other developed countries by creating the unique European Higher Education Area – EHEA.

The universities in the developed countries have been ever more assuming an entrepreneurial character [46]. The scientists have noticed that the process of creating an entrepreneurial university has been developing under the influence of external factors [16], legislations [27], economy [25] and regional circumstances [21]. [10, 52, 17] identify the basic elements crucial for transformation. The issue has been discussed in the renowned magazines: Research policy 2003, 2004 and 2005, Management Science 2002, Journal of Technology Transfer 2001 and 2003, Journal of Business

Venturing 2004 and 2005. These publications prompted further debates on the processes and factors influencing changes in the educational system and the development of its entrepreneurial character [56, 59] identifying two types of factors: formal and informal.

Reference [10] mentioned the first transformation model based on five European universities: Warwick (England) Twente (Netherlands), Strathclyde (Scotland), Chalmers (Sweden) and Joensuu (Finland), and detected a number of important determinants that are characteristic of the process of transformation. Firstly, there are three formal elements, such as the change of the management structure, the expansion of the periphery and the diversification of the funding sources, and two informal ones, like the acquired entrepreneurial culture and the stimulated inner academic circles. Then, [18] described the mechanisms and the structure for the development of an entrepreneurial university including the internal transformation that redefines the role of the university, a stabilizing effect via the projects which spread outside the institution, decentralization and the recursive effects of collaboration with other sectors.

Reference [52] concentrated on the structure of the university and the surroundings that influence the decisions made by the management and the administration, and concluded that there are six main formal elements of the structure at university: the mission and the goals, the structure, the management policy, leadership, and one informal factor: the organizational structure. He has also defined the moderating role of the environment that influences the change of the organizational structure.

Reference [17] also analyzed the character of the university image on three continents defining the factors he deems formal: capitalization of the knowledge, interdependency of the economy and the government, other institutional spheres, hybrid organizational models and renovation in the specific period.

According to [28] a strategic measure for the promotion of the entrepreneurial culture inside the university has been suggested with these formal factors: strategic actions connected to the organization, accepting the entrepreneurial concept, incorporation, implementation and communication. The informal factors comprise promotion, recognition, reward and acceptance. According to the authors, three basic formal common factors can be singled out: management, organizational structure and support; as well as two informal ones: reward and culture.

Since 1995, there has been a series of empirical research on the factors and determinants with entrepreneurial universities. Authors have used in-depth interviews, surveys, case studies, analyses of secondary data sources, observations and descriptions, but failed to produce the exact measure of the entrepreneurial character. However, they accepted some of the elements as relatively valid indicators of entrepreneurial orientation. References [29, 27, 61] think that the entrepreneurial character of a university is reflected in its entrepreneurial activities. The alternative approximation of the typology is based on the funding sources that may differentiate universities as entrepreneurial, transitional or financed from the budget [11].

The development strategy of a university is defined by all interested parties: the government, the business sector, the labor market, and students and employees. Organizational and management structures are expected to carry out the transformation that will enable flexibility and efficiency [52]. Reference [10] says that the vision of an entrepreneurial university is to strive to achieve quality, adaptation and entrepreneurial culture. The entrepreneurial culture is a prerequisite for innovations, individual responsibilities, changes and adequate rewards [52], and helps improve the quality of teaching and research [17]. A clear mission, which is the ground for decision-making, planning and the basis for orientation of all the participants, helps achieve the goals of the society, brings change inside the institutions and stimulates economic growth and long-term thinking [18].

Entrepreneurial culture facilitates making lectures, research and entrepreneurship more functional [17]. To achieve academic development the systems and processes stream towards designing strategy and structure. The transformation of organizational structure is a prerequisite for connecting all the university functions [18], because a common vision creates a synergistic environment [12]. Cross-disciplinary organizational forms, including heterogenic structures with interdisciplinary departments and hybrid organizations [17, 18], networks, strategic alliances with the economy, the government and other institutions [52, 18], are of huge importance. Organizational architecture has a strong influence on the formation and the incidence of entrepreneurial behavior that influences its strategic orientation [6]. During the transformation, unlike the self-management that has autonomy, the system has to change from being managed by the government to being managed by the university with the government's supervision [10]. At an entrepreneurial university there is no place for too much bureaucracy. With the assumption that there is adequate allocation of resources, horizontal structure is deemed superior.

The economy based on knowledge implies that university which has the role of educating, researching, and encouraging the environment will stimulate the production of new products, services and processes [33]. It is necessary to entice internal and external foundations of the new companies [24, 17]. It can be achieved through canters (services of providing knowledge and consultation), partnerships with the economy, research centers, quasi-companies, incubators and offices for technology transfer.

C. Entrepreneurial education course

One of the goals of an entrepreneurial university is to develop in students, professors and employees entrepreneurial intentions as they are considered the best predictions of future activities [2]. The same argument is used in the research on

the activities that foster their development. University spin-offs are believed to create significant external effects that overflow into regional economy [26]. In view of their influence, recognition and encouragement of potential entrepreneurs becomes the mission of the education sector. By implementing certain activities in the educational system and the universities, attempts are made to encourage the afore-mentioned entrepreneurial initiatives [32].

Within the context of entrepreneurial management and surpassing the classic management framework, encouragement is provided through entrepreneurial education. Thus, many research studies have been conducted to investigate the mechanism of influencing entrepreneurial education and programs. However, the attitudes on the influence of entrepreneurial education remain divided. Reference [51] states that there is a clear influence of entrepreneurial activities on the attractiveness of entrepreneurship and the perception of feasibility or founding a company, while [39] deems the effects are, in fact, negative. Reference [53] defines the academic spin-offs as companies founded by the university members which have chosen to work in the private sector (not necessarily full-time), and they work on the transfer of technology from the parent organization. This includes a form of intellectual ownership that is transferred from the parent organization to the new company.

The newly created spin-offs contribute to the transfer of technology through in phases: the first goes from the parent organization (the university) towards the company, while the second phase runs from the company to the consumers [41]. Many scientists have recognized the academic spin-off companies as the mechanism for technological transfer in the service of creation and support of the regional development [44, 18, 60]. The resulting newly created companies in academic ownership have become a significant economic phenomenon. These companies were the pathway for over 12% of academic innovations to implement the technology transfer to the private sector associations [4]. The authors in reference [13] base their definition of academic technology transfer exactly on the transfer of intellectual ownership (patents and licenses), while those in [42] state that academic technology transfer also implies informal methods of cooperation with the private sector. According to [50] a new company is an academic spin-off if the transfer of technology is accompanied with the engagement of university members, while [37] does not deem the transfer of human capital important and necessary.

Reference [23] concludes that the inconsistency of the assessment of the influence of entrepreneurial education is the result of methodological limitations of the conducted studies. The conducted studies often have no control sample [5], and the data of only the students who had been exposed to experimental actions were analyzed. Another issue is the absence of longitudinal studies that would confirm the changes in perception before and after the entrepreneurial programs are implemented. Furthermore, the end of the science project and financing may also be a reason for the small number of longitudinal studies. Finally, the quality of the studies may often be impaired due to the fact that, driven by self-promotion, scientists tend to rush to publish the primary results of their research.

The literature overview seems to show that there is a consensus on viewing the entrepreneurial programs that may result in reduced desire for entrepreneurship as absolutely negative. However, students can differ significantly: some see self-employment as less inviting and prefer less dynamic environments. Entrepreneurial education can help them avoid the negative consequences of wrong carrier choices and enable them to contribute to the society as employees more than as owners. Namely, the risk of failure and the costs connected with founding a new company can be a great financial and emotional burden. Nevertheless, without the argumentation of the methods and implications of entrepreneurial education by discussing its content and comparing the students and those who are not, it is hard to assess the economic effect [20] of entrepreneurial programs.

The methods of entrepreneurial education differ from classical methods, since they encourage developing creative thinking, critical judgment, innovativeness, and entrepreneurial characteristics [28, 22]. Reference [35] states that cultivation of entrepreneurial methods is one of the key elements of entrepreneurial education. Due to different styles of lecturing, which largely depend on the characteristics of the lecturer, motivation and the needs of the students, it is difficult to define the best methods for achieving the goals of entrepreneurial education [48]. References [56, 31, 8] point out the importance of the experience of successful entrepreneurs and think that their influence on the entrepreneurial intentions of the students who contemplate the realization of their business ideas can be identified. The literature highlights several dominant methods of entrepreneurial education: theoretical overview of small and medium-sized entrepreneurship, examples of good practices, and the experiences of the business community [20, 37].

Reference [39] researched the influence of entrepreneurial education, bearing in mind personal preferences of the students. They considered the possibility of a common characteristic in all the students that choose to study entrepreneurship. The sample included the universities where the entrepreneurship course was required. Such practices concerning the selection of the respondents is recognized as the enhancement of the methodological quality, but there is still a possibility that the choice of the university can be based on the curriculum it offers. The study [39] has shown that the influence on the self-perceived entrepreneurial capability remains negligible, and the influence on the entrepreneurial tendencies or intentions is slightly negative.

An enviable amount of literature has been published on the theme of entrepreneurship in higher education and its influence on the economy. The weaknesses of the methodology have been recognized (defining the hypotheses retrospectively, small samples, absence of control groups)

which bring the generalization of the results in the area outside the tested samples in question. Until additional studies are made, many scientists will express reservations concerning the hypothesis which evaluates the influence of entrepreneurial education on the perception and intentions of the students. The strategy for encouraging the entrepreneurship consists of many elements (material and immaterial) [28], and an entrepreneurial university has the mission to stimulate all the elements that support this concept.

D. Barriers to development of the entrepreneurial concept

By their nature universities are not entrepreneurial institutions. The assumption is that academic staff are intrinsically motivated [54], primarily concerned with academic freedom [1], and motivated principally by scientific promotion.

Due to the institutional features of universities, their size, different components, hierarchical decision-making and structure, decision making requires going through many levels. The arguments made by the opponents of the entrepreneurial concept highlight the importance of fundamental values of the university. Fundamental values imply the focus on understanding and learning [59]. University staff think that entrepreneurial orientation can jeopardize the traditional integrity of the university [40]. In order to preserve academic ethics and keep the role of the university as the critics of the society, [7, 30] state that entrepreneurship inside the academic circles should be opposed to, or at least limited. They think that publishing the results of the research and training of the higher educated staff is the most important and suitable role of institutions in service of the public good. Reference [34] says that, in the case of the USA, universities support the entrepreneurial initiative, but are sometimes reluctant to cooperate with the economic sector. He speaks of two basic reasons that can hinder the transfer of technology: the perception of the reduction in federal funding and its influence on the academic freedoms. While the creators of the policy and the broader public have been supporting the technological transfer initiatives, sceptics have pointed out additional issues: competition between the commercial and classical university activities in the scientists' working hours, the need for a higher level of secrecy and the shift in the research focus interests. The resource relocation has moved from the fundamental research to the applicative results, which may encourage the scientists to join the race for profit by setting up their own companies or by collaborating with the economic sector [49]. On the contrary, [36] claim that the substitution could be avoided if the innovations arise as one of the results of the research activities (for example, the instruments primarily designed for the researchers' personal use), or under the assumption that the results can be published and used commercially at the same time (like in the case of combining a patent and publishing a scientific paper). It can be concluded that the effects of commercialization on the scientists' work are stronger than the incentives for innovations for which there are no documented traces of the commercialization. Similarly to those who license technology through the already existing corporations, there are scientists who take leading roles in managing newly developed spin-off companies.

Furthermore, there is a fear of increasing the competition on the market if the academic community undertakes entrepreneurial activities. The concerns about the entrepreneurial behavior of the academics are also shared among some of the representatives of the economic sector. Considering the interests in the background of collaboration, they say that the classical form of interaction between the university and the economy via consulting is more acceptable than founding new companies based on the research activities [43]. The classical system of interaction between the economy and the university is based on informal relations. By adopting the entrepreneurial approach, the representatives of the economic sector encounter universities that demand contracts [19]. This creates tensions and entices the search for other forms of exploitation of academic knowledge [34]. A university's aspiration to apply commercial principles does not necessarily mean that it should become commercial at its core. Commercialization of academic research has produced a differentiating influence on informal relations. Many scientists have refused to develop formal relations, while those who had formed informal relations have found themselves in environments that are dominated by contract stipulated cooperation. An atmosphere has been created that feels like walking into a lawyer's office. The most controversial part of these agreements has been the negotiations concerning intellectual ownership and the rights of the parties. The representatives of the economic sector think that the academics overrate the right to intellectual ownership, while [43] think that the government's attitude has in fact been the incentive for the promotion, evaluation and exaggeration. Most academics have preferred flexible negotiations. There is insufficient evidence to claim that informal relations have been negatively influenced by commercialization. Accordingly, although informal relations have not been compromised, there has been a change in their characteristics [43].

Reference [3] claims that the professors' involvement in the entrepreneurial activities will be the result of the influence of internal policies, formal institutional regulations, collection of general beliefs on the support for the involvement in the business activities adopted by the university, the system of rewards, the relevant department's normative expectations and the beliefs, and, finally, the network of associates from the same discipline. The new paradigm is not just limited to the institutions that are characterized by new technology, or those that are extremely research-oriented (education, innovations in the educational program and the continuous education). Therein, a two-way channel of influence has been created between the university and the society as a consequence of reducing the distance between the afore-mentioned institutional spheres. The content and the form of education, as well as their connection, are also under the influence of the changes. The assumption of the participation in the economic

development leaves the traditional missions of the university unimpaired, but it is also an incentive to establish new means for achieving them.

II. Biblometric Results

One of the main goals in researching this topic of the university's third mission and academic entrepreneurs in Europe was to examine the relevant literature. The methods used for the literature review are based on the objective parameters and therefore avoiding any potential bias in selecting and analyzing this research field. Since there are many scientific databases and their overlapping records, the authors have chosen one of the most relevant databases for social sciences: Thomson Reuters Web of Science Core Collection using several indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC. The search in the database was performed on the January 1st 2018 by examining the title, abstract and authors' keywords. A search string was written as follows: TS=(((Academ* OR universit*) AND Entrepreneur*) OR "third mission") – to incorporate either an academy or a university and their function of knowledge transfer represented by third mission. The initial result was 6873 records which were further refined by selecting only those that deal with Education and Educational Research, arriving at total of 1, 619 records. This list was selected as the research sample in order to examine the literature dealing with this topic.

The first step in the literature review was to observe the most influential papers in this field of research. The most significant paper, that was cited 445 times, was authored by Olssen, M. and Peters, MA and published in 2005 in the Journal of Education Policy under the title "Neoliberalism, higher education and the knowledge economy: from the free market to knowledge capitalism". The paper deals with public resource management and essential shift in justifying universities' role in society. The previous paradigm of broad intellectual discourse and social criticism is replaced by much of the less tacit outputs such as strategic performance, financial indicators, quality measures and periodical audits with significant repercussions for those who do not comply. This shift was brought about Knowledge based economy that is believed to be the carrier of progress and therefore transforms the role of universities that become an important objective for every government striving to achieve more efficiency in managing public resources. Universities are seen as drivers of knowledge economy and expected to partner with the private sector as well as to promote entrepreneurial skills among their students.

Second most influential paper, entitled "Globalisation, New Managerialism, Academic Capitalism and Entrepreneurialism in Universities: is the local dimension still important?" (217 times cited), was published by Deem, R. (2001) in the Comparative Education journal, and discusses the differences in the development of universities in the western world. Most of the literature regarding the change of the university agenda aims at addressing the convergence and similarities of new management, capitalism and entrepreneurial behavior, while least is about the nature of the fundamental differences that result from the local university factors. Therefore, Deems' recommends emphasizing the "local global axis" in the future research of the universities' third mission.

The third most influential paper was published in 2008 in Higher Education with 150 citations. Authors, Jongbloed, B., Enders, J., and Salerno, C. wrote a paper on "Higher education and its communities: Interconnections, interdependencies and a research agenda" stating that universities need to reconsider their relationships with the stakeholders. They discuss the necessary tools for defining its key stakeholders in the external community, i.e. industrial and regional partners, and emphasize the importance of avoiding university overload and incorporating an adequate degree of differentiation.

In addition, "Academic Entrepreneurship in Europe", a book published in 2007, was one of the most cited and influential records in this field. The authors Wright, M., Clarysse, B., Mustar, P. and Lockett, A. discuss the lack of public funding for universities, which consequently creates the need for commercialization and academic entrepreneurship. Despite the considerable entrepreneurial activity, both national and international, many important aspects are still insufficiently understood.

Out of 20 most cited records, 6 of them were published in the Higher Education and 3 of them in the Journal of Education Policy. Other journals were: Comparative Education, Minerva, Academy of Management Learning & Education, Academic Medicine, Journal of Higher Education, Journal of Education Policy, Innovations in Education and Teaching International and Simulation & Gaming as shown in Table 1.

Observing the importance of journals according to the number of records dealing with this topic the Higher Education is the number one with 41 papers, following the International Journal of Engineering Education (38 papers), Education & Training (37 papers), Studies in Higher Education (24 papers) and Entrepreneurial Universities: Exploring the academic and innovative dimensions of entrepreneurship in higher education (20 papers). All of the records in table 2 of most relevant sources have more than 20 papers, which equals 0.1% of the total records.

TABLE II. MOST INFLUENTIAL PAPERS (HIGHEST NUMBER OF CITATIONS)

PAPER TYPE	AUTHOR(s)	TITLE	SOURCE	TOTAL COUNT	PER YEAR
JOURNAL	Olssen, M; Peters, MA	Neoliberalism, higher education and the knowledge economy: from the free market to knowledge capitalism	JOURNAL OF EDUCATION POLICY	445	2005
JOURNAL	Deem, R	Globalisation, New Managerialism, Academic Capitalism and Entrepreneurialism in Universities: is the local dimension still important?	COMPARATIVE EDUCATION	217	2001
BOOK	Wright, M; Clarysse, B; Mustar, P; Lockett, A	Academic Entrepreneurship In Europe	ACADEMIC ENTREPRENEURSHIP IN EUROPE	173	2007
JOURNAL	Jongbloed, B; Enders, J; Salerno, C	Higher education and its communities: Interconnections, interdependencies and a research agenda	HIGHER EDUCATION	150	2008
JOURNAL	Etzkowitz, H	Entrepreneurial scientists and entrepreneurial Universities in American Academic Science	MINERVA	145	1983
JOURNAL	Cruess, RL; Cruess, SR	Teaching medicine as a profession in the service of healing	ACADEMIC MEDICINE	136	1997
JOURNAL	Tracey, P; Phillips, N	The distinctive challenge of educating social entrepreneurs: A postscript and rejoinder to the special issue on entrepreneurship education	ACADEMY OF MANAGEMENT LEARNING & EDUCATION	106	2007
JOURNAL	Barnett, R	University knowledge in an age of supercomplexity	HIGHER EDUCATION	92	2000
JOURNAL	Ylijoki, OH	Entangled in academic capitalism? A case-study on changing ideals and practices of university research	HIGHER EDUCATION	82	2003
JOURNAL	Stromquist, NP	Internationalization as a response to globalization: Radical shifts in university environments	HIGHER EDUCATION	79	2007
JOURNAL	Mendoza, P	Academic capitalism and doctoral student socialization: A case study	JOURNAL OF HIGHER EDUCATION	52	2007
JOURNAL	Marginson, S	The impossibility of capitalist markets in higher education	JOURNAL OF EDUCATION POLICY	47	2013
JOURNAL	Subotzky, G	Alternatives to the entrepreneurial university: New modes of knowledge production in community service programs	HIGHER EDUCATION	44	1999
JOURNAL	Swick, HM	Academic medicine must deal with the clash of business and professional values	ACADEMIC MEDICINE	44	1998
JOURNAL	Suspitsyna, T	Accountability in American education as a rhetoric and a technology of governmentality	JOURNAL OF EDUCATION POLICY	43	2010
JOURNAL	Kleiman, P	Towards transformation: conceptions of creativity in higher education	INNOVATIONS IN EDUCATION AND TEACHING INTERNATIONAL	43	2008
JOURNAL	Hatcher, R	Privatization and sponsorship: the re-agenting of the school system in England	JOURNAL OF EDUCATION POLICY	43	2006
JOURNAL	Albert, M	Universities and the market economy: The differential impact on knowledge production in sociology and economics	HIGHER EDUCATION	43	2003
JOURNAL	Sidhu, R; Ho, KC; Yeoh, B	Emerging education hubs: the case of Singapore	HIGHER EDUCATION	40	2011
JOURNAL	Solomon, GT; Weaver, KM; Fernald, LW	A HISTORICAL EXAMINATION OF SMALL BUSINESS-MANAGEMENT AND ENTREPRENEURSHIP PEDAGOGY	SIMULATION & GAMING	38	1994

TABLE III. MOST INFLUENTIAL JOURNALS

JOURNAL	NUMBER OF PAPERS
HIGHER EDUCATION	41
INTERNATIONAL JOURNAL OF ENGINEERING EDUCATION	38
EDUCATION AND TRAINING	37
STUDIES IN HIGHER EDUCATION	24
ENTREPRENEURIAL UNIVERSITIES: EXPLORING THE ACADEMIC AND INNOVATIVE DIMENSIONS OF ENTREPRENEURSHIP IN HIGHER EDUCATION	20

Regarding the development of the field, Fig. 1 demonstrates two main periods of growth, first beginning in 2004 and second in 2010 reaching 304 papers in 2016. Only in 2017 there was significant drop in the number of papers published (175) reaching the level recorded in 2014. Otherwise, this topic is considered to be of growing importance.

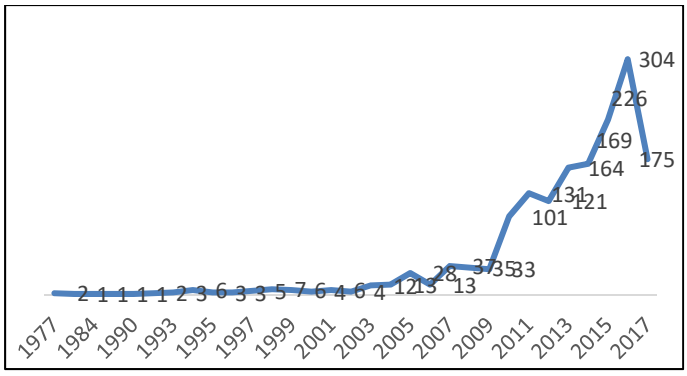

Figure 1. Number of publications per year

It is also interesting to observe the most influential authors of the field in Table III. Due to their most cited paper, Olssen, M. and Peters, MA., are undoubtedly the most influential ones with 445. Deem, R. is in the second place with only one paper and half of the citations (217). Clarysse, B. was the third most influential author signing two papers with 217 citations in total. Other most important authors were Lockett, A. (173) Mustar, P. (173) Wright, M. (173) Enders, J. (150) Jongbloed, B. (150), Salerno, C. (150), Etzkowitz, H. (145), Cruess, RL. (136), Cruess, SR. (136), Phillips, N. (106), Tracey, P. (106), Barnett, R. (92), Stromquist, NP. (86), Ylijoki, OH. (82), Mars, MM. (77) and Rhoades, G. (67).

By using the VosViewer software solution, a sample of the papers has been analyzed on the basis of the authors' keywords. This approach was used to derive the topic clusters that result from the number of joint appearances of most important topics in various records as seen in Fig. 2. The most dominant topics were entrepreneurship education, entrepreneurship, higher education, students, university, innovation, engineering education and technology transfer. Also, there are at least five evident topic clusters. The first one includes topics such as social entrepreneurship, evaluation, engagement, employability, social responsibility, curriculum and sustainability dealing with social aspect of third mission. The second includes topics like teaching, learning, training, decision-making, gender, leadership, self-employment, self-efficiency and entrepreneurship interconnecting all functions of the university. The third cluster focuses on entrepreneurs, entrepreneurial spirit, university students, Spain, and Portugal emphasizing the psychological elements of entrepreneurship highlighting the research conducted in Spain and Portugal. The fourth cluster deals with experiential learning, mentoring, business plan, collaborative learning and intellectual property focusing on methods of accomplishing third mission of the university.

TABLE IV. MOST INFLUENTIAL AUTHORS IN THE FIELD

Author	Number of papers	Times cited	Average citation
Olssen, M	1	*445*	445
Peters, MA	1	*445*	445
Deem, R	1	*217*	217
Clarysse, B	2	*192*	96
Lockett, A	1	*173*	173
Mustar, P	1	*173*	173
Wright, M	1	*173*	173
Enders, J	1	*150*	150
Jongbloed, B	1	*150*	150
Salerno, C	1	*150*	150
Etzkowitz, H	1	*145*	145
Cruess, RL	1	*136*	136
Cruess, SR	1	*136*	136
Phillips, N	1	*106*	106
Tracey, P	1	*106*	106
Barnett, R	1	*92*	92
Stromquist, NP	2	*86*	43
Ylijoki, OH	1	*82*	82
Mars, MM	4	*77*	19
Rhoades, G	3	*67*	22

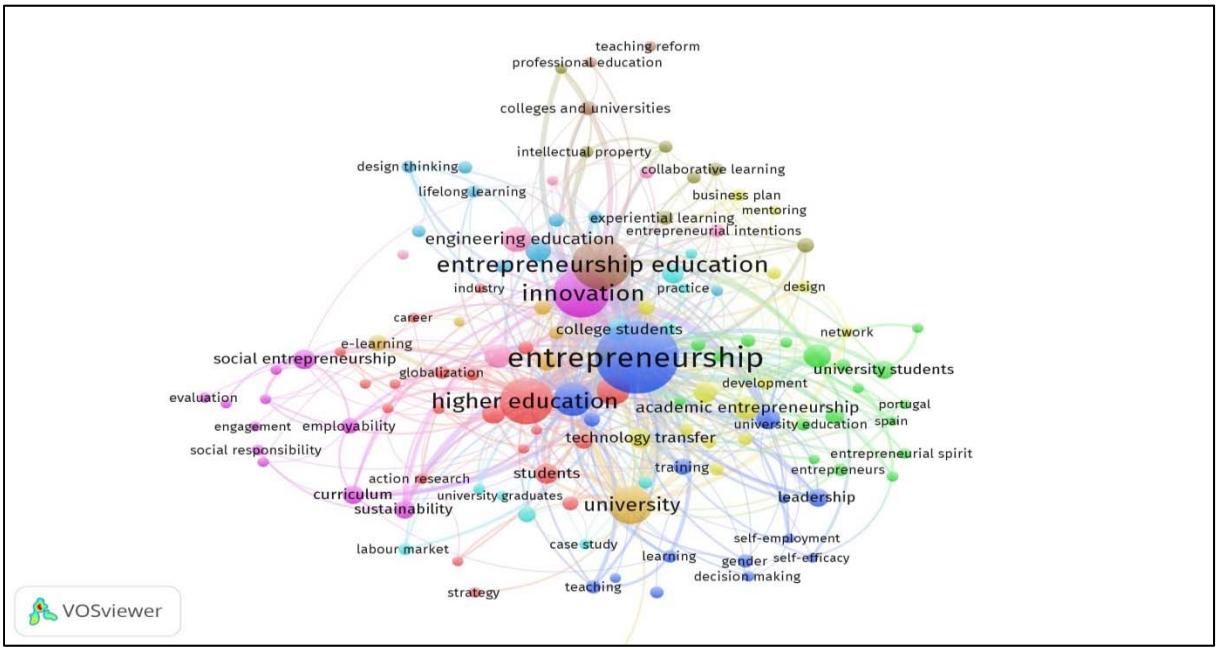

Figure 2. Topic clustering in the field of entrepreneurial university

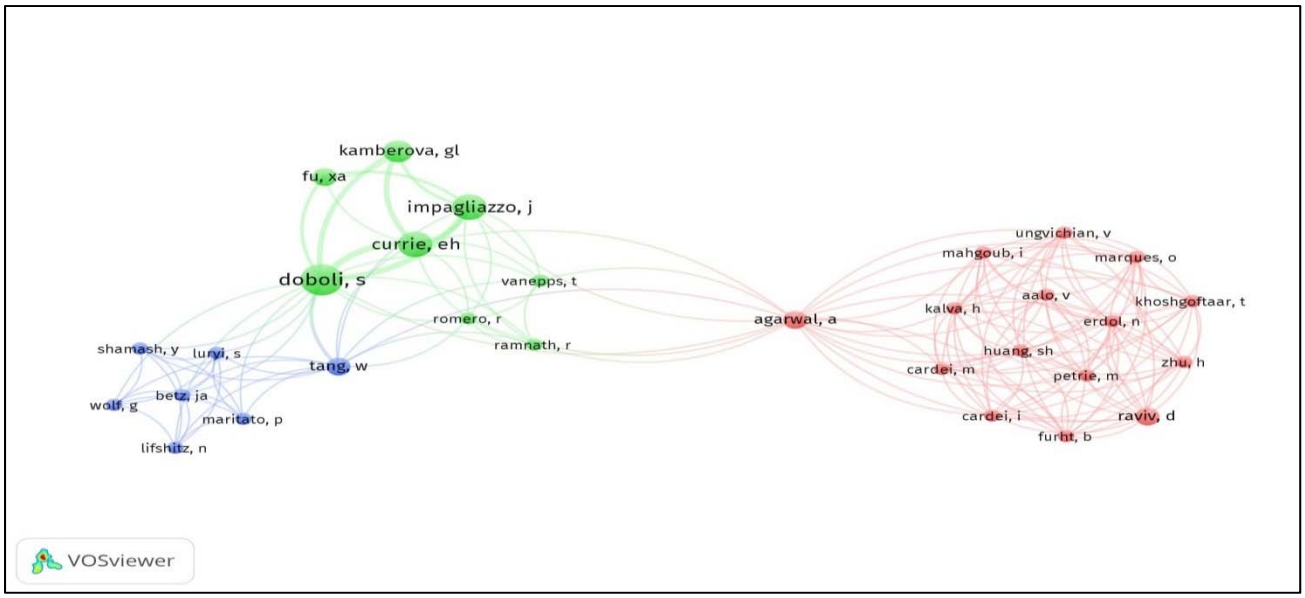

Figure 3. Interconnected cluster of authors

Next Fig. 3 is also derived by using the VosViewer software solution in order to demonstrate the networks of authors publishing in the chosen field of research. As a result of their publishing, the analysis extracted three interconnected cluster of authors. The first cluster includes Shamash Y., Wolf G., Betz JA., Luryi S., Maritato P. and Tang W. spreading into the second cluster with Doboli S., Currie EH., Fu Xa., Kamberova GL., Impagliazzo J., Wanepps T., Romero R. and Ramnath, R. and finally third cluster with Ungvichian V., Mahgoub I., Marque O., Aalo V., Khoshgoftaar T., Erdol N., Huang SH., Cardei M., Furht, B., Raviv D. and Petrie M.

III. Conclusion

In the past, the main strengths of the universities in the European Union were their ability to foster first-class thinkers, researchers, libraries, teachers in order to contribute to society and the economy. Nowadays the question is: how to effectively utilize, develop and leverage academic knowledge? The next step of applied innovation has become a concern for university leaders and faculty, firms and policy makers alike in all European countries according examples of most innovative: KU Leuven (Belgium) Imperial College London (the UK) University of Cambridge (the UK), Technical University of Munich (Germany) the Oxford University according [62] Routers list for 2017.

Growing scientification of society and mass education has dispersed the scientific approach, methods and highly educated staff outside of the scientific sphere into all pores of society and economy, but the simultaneously occurring phenomenon of deploying knowledge as a production factor has weakened the universities. For about 20 years, in most of the new EU states (the entire Central Europe) one feels „institutional inertia“ of universities related to the need for adjustment to the demands of the innovation society as a new techno-economic paradigm.

Universities are faced with an identity crisis that has emerged from the conflict between the traditional concept of the university as an autonomous and independent organization of scientists dominated by the idea of “scholar” and a new type of the university where technological and economic development becomes a part of its activities, culture and ethos. The withdrawal of the typical academic research due to “new knowledge production”, as well as the need for the university to participate in generating technological changes, has set new rules of the game in all aspects of the university behavior: from the choice of research to the evaluation of the results. Even the educational function, that has preserved the unchanged position of universities for centuries, has gained a new dimension within knowledge economy – the formation of intellectual capital. The appearance of „stagnating“ status in science in the EU versus the USA in some fields, as well as including developmental-economic purpose in the university's activity, is the result of the need to speed up technological change that enables technological and economic development by creating new technologies or their transfer and further creative development for personal needs.

Entrepreneurial universities in the EU are faced with challenges in the following areas: 1. Academic management that can formulate long run strategic mission, aims and vision and implement it; 2. Control of all sources (land, building, intellectual property and financial revenues gained based on research); 3. Organizational capacities that can transfer technology through: incubation, patents and licenses; 4. Stimulation and development of entrepreneurial spirit among students, professors and administrative staff; 5. Ability to create networks and cooperate with other universities, firms and clusters at the SMART specialization level; 6. Increased establishing of dialogue and understanding with the business sector; 7. Changing the traditional (educational and scientific) role, provided by the university, seeking for new cognitions, constant questioning and redesigning, stimulating curiosity,

and constant protection of ethical and scientific values and norms as the *conditio sine qua non*.

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