

1. ADVANCEMENTS IN CONCEPTUALISATION AND STUDIES ON ACADEMIC ENTREPRENEURSHIP PHENOMENON

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Abstract

Academic entrepreneurship is a specific type of entrepreneurship relating to science and knowledge, the role of universities and the commercialisation of research results. The aim of the chapter is to present the current state of advancement of research on this issue in international literature. In particular, the aim is to present the way of conceptualizing this phenomenon in scientific research, as well as the methods used and theoretical approaches taken by the authors. A review of the literature indicates the evolution of the concept of academic entrepreneurship and the expansion of the scope of its application in scientific works. In a narrow sense, this term is mainly used to describe activities undertaken by scientists based on academic knowledge and the technology obtained from university resources. The broader approach also covers the development of entrepreneurial attitudes among students through entrepreneurship education, support for the creation of start-ups and wider cooperation with stakeholders in order to build an ecosystem for the development of academic entrepreneurship. The effects of academic entrepreneurial activities in a new, wider perspective are assessed from the point of view of the value created for society and the economy.

Keywords: academic entrepreneurship, definitions, theoretical background, methodological issues.

Introduction

Entrepreneurship as a socio-economic phenomenon has a multifaceted nature, and this statement is also accurate when we consider the concept of academic entrepreneurship (AE). The existing stream of study on AE in international journals cannot be ignored, however, that scientific interest in the topic has been observed

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only relatively recently is manifested in the growing number of publications (Kobylińska, 2020). The scope of the concept is thus still evolving (Siegel & Wright, 2015). AE refers to the complete set of diverse research disciplines, perspectives and theories, and is not limited only to the field of entrepreneurship research (Balven, Fenters, Siegel, & Waldman, 2018). The concept of AE is especially closely related to the role of universities, education, university-industry collaboration, science commercialisation, technology transfer and innovation (Audretsch, Lehmann, & Paleari, 2015; Davey, Rossano, & Sijde, 2016; Wadhvani, Galvez-Behar, Mercelis, & Guagnini, 2017; Fischer, Schaeffer, Vonortas, & Queiroz, 2018).

What is really the nature and significance of AE and how to define and study this phenomenon, are still open questions. There is no doubt that this emerging field of studies is inspiring and could lead as to the better understanding of the connections between knowledge generation at the universities, its practical market application and its impact on the society and economic growth and development (Hayter, Nelson, Zayed, & O'Connor, 2018; Meek & Wood, 2016). There are also many factors affecting AE that can promote or constraint its development. Indeed, some contextual factors can be of the great importance for supporting the emergence of AE at universities in different countries. These include cultural norms, public policy at national and regional levels, as well as organisational conditions (e.g. university strategy and infrastructure) and the whole ecosystem supporting AE (Davey et al., 2016). There are also substantial differences in the stages of development of AE between US, Asia and Europe (Audretsch et al., 2015).

The aim of the chapter is to present the current stage of advancement in AE conceptualisation on the basis of international literature review, with special reference placed upon the theoretical concepts of entrepreneurship. Moreover, a comparison is made between traditional and new perspectives on AE research, as well as between the narrow and broader understanding of the concept.

In the following sections of the chapter, research method is described and AE as a subject of study in international research journals is presented, as well as definitions and theoretical perspectives taken by international scientists. In the next section, the evolving scope of AE concept is highlighted, followed by methodological issues and selected examples of findings from AE studies. The chapter ends with a summary and conclusions.

1.1. Research method

The main emphasis was placed on the concept of AE, its scope and evolution in international research. In order to present the current state of advancement of research on this issue, a traditional literature review was undertaken in terms

of both conceptual (definitions and theories) and empirical aspects (used methods and research results) (Li & Wang, 2018).

To achieve the aim of the study, the following specific questions, referring to AE as a subject of study, were focused: How is AE defined in international studies? What theoretical backgrounds and perspectives are taken? What research methods are used? What aspects of AE are studied and how are the results formulated?

Articles that referred directly to the AE term, definition or research framework were identified by searching the EBSCOhost databases and then the list was supplemented with public reports or other open access articles. Ultimately, 30 references were analysed in the chapter.

The research interests of AE as a socio-economic phenomenon, and the way the authors define and research this concept, are obviously related to the level and conditions of AE development in different countries and regions. However, these aspects were discussed to a limited extent in the chapter, as an auxiliary element in achieving the research goal.

1.2. Academic entrepreneurship as a subject of study

Academic entrepreneurship can be treated as a specific kind of entrepreneurship phenomenon with ‘distinctive features’ in comparison to “more traditional forms of entrepreneurship” (Siegel & Wright, 2015). However, the concept of AE is not taking first place as the most popular topic or subject in this research field. In some entrepreneurship handbooks, AE is only mentioned as one of several possible forms of entrepreneurial activities. Hayter and others (2018), for example, concluded that AE is a ‘niche topic’ within the fields of entrepreneurship and management. In their study, only 11 from a sample number of 53 journals, mostly included in the *Financial Times* ranking (May 2016) of the top 50 research journals (FT 50), had published articles on AE (see Table 1.1).

The findings of Hayter and others (2018) are in line with the results of the survey by Siegel and Wright (2015) that revealed that the concept of AE in the last years is mainly studied from the perspective of technology transfer from university to industry. The stage of AE development is thus related in different countries to their systems of higher education. This last depends on three different models of political and economic systems: that of Anglo-Saxon countries, Continental Europe and Asia (Audretsch et al., 2015). So far, a lot was said in the literature about the organisational changes in the higher education and science, as well as about challenges for universities and the new, third mission of that institutions, which is related to the entrepreneurial university model (Audretsch et al., 2015; Wadhvani et al. 2017). Some characteristics and differences between USA, Europe and Asia are presented in Table 1.2.

Table 1.1. Publication of articles on AE in the FT 50* journals from 2000 to 2017

Leading journals and frequency of publication (n = 209)	<i>Journal of Technology Transfer</i> (80); <i>Research Policy</i> (57); <i>Technovation</i> (19); <i>Small Business Economics</i> (13); <i>Journal of Business Venturing</i> (10); <i>Management Science</i> (9); <i>Entrepreneurship Theory and Practice</i> (6); <i>Organization Science</i> (5); <i>Journal of Management Studies</i> (4); <i>Strategic Management Journal</i> (3); <i>Strategic Entrepreneurship Journal</i> (3)
Author affiliation (n = 194)	USA (66); UK (26); Germany (17); Italy (15); Spain (10); Sweden (9); Norway (6); Ireland (6); Canada (6); Belgium (6); Netherlands (5); France (3); Israel (2); Singapore (2); Switzerland (2); Australia (1), Austria (1), Chile (1), China (1), Cyprus (1), Denmark (1), Greece (1), Hong Kong (1), Mexico (1), New Zealand (1), Portugal (1), Russia (1), Slovenia (1)
Country of study (n = 286)	US (80); UK (35); Germany (21); Italy (17); Sweden (16); Belgium (14); Spain (13); Canada (9); Netherlands (8); Ireland (8); Norway (7); France (6); Finland (5); China (4); Switzerland (3); Slovenia (3), Portugal (3); Austria (2), Croatia (2), Denmark (2), Georgia (2), Greece (2), Hungary (2), Luxembourg (2); Albania (1), Argentina (1), Bulgaria (1), Chile (1), Czech Republic (1), Estonia (1), Iceland (1), Israel (1), Japan (1), Latvia (1), Lithuania (1), Malta (1), New Zealand (1), Romania (1), Russia (1), Slovakia (1), Turkey (1), Venezuela (1)

Source: (Hayter et al., 2018; * FT 50 list supplemented by the *Journal of Technology Transfer*, *Technovation*, and *Small Business Economics*).

Table 1.2. Conditions and strategies for AE development based on different political and economic systems

	Anglo-Saxon countries	Continental Europe	Asia
Models of political and economic systems	market-based system	Greco-Christian model of democracy and equality; the welfare state model in some countries	centralized and governed system in most Asian countries
Important characteristics	<ul style="list-style-type: none"> • Bayh-Dole act (1980): the right to use the inventions developed with public funding at universities • strategic orientation on AE since the 1990s • fostering entrepreneurial spirit, seeking opportunities for ideas generation and commercialisation • a great number of academic spin-offs and new ventures created by universities • patent-revenue generation by universities 	<ul style="list-style-type: none"> • efforts in building a knowledge-based economy (the Bologna Process (since 1999) in the higher education system; the Lisbon Strategy (2000)) • lower culture of entrepreneurship • the lower capacity for market absorption of new technologies • diversity of experiences between the EU countries • barriers and the EU programs for supporting spin-offs creation • problems of intellectual property rights management and potential benefits sharing 	<ul style="list-style-type: none"> • the process of building an effective infrastructure to support academic entrepreneurship, innovations and technology transfer; intensive development of business incubators since 1997
Examples of pioneering countries	USA	Finland, Sweden	Japan, South Korea, Singapore

Source: Based on (Audretsch et al., 2015; Guliński & Zasiadły, 2005).

The level of AE in Europe is regarded as relatively low, although growing (Davey et al., 2016). Both the countries of author affiliation and the studied countries in Hayter and others (2018) show that scientific interests in AE can be found mainly in the US and UK. With regard to Continental Europe, the results reveal that studies regarding AE appear mainly in the west part of the continent. The contribution from CEE countries to the conceptualisation and studies of the AE phenomenon in the journals reviewed by Hayter and others (2018) is almost invisible. However, the number of publications on AE in international journals does not reflect the actual stage of development of this phenomenon in many countries. In case of Poland, as the example of CEE countries, two aspects should be highlighted when describing the situation regarding AE development. On the one hand, the authors interested in the phenomenon point to the lack of a tradition of strong scientific and economic ties in the Polish reality after World War II, as well as the lack of native mechanisms of technological progress (Matusiak & Zasiadły, 2005) and indicate that the changes in the higher education are still insufficient although in some cases they are characterized by increasing dynamics (Matusiak & Guliński, 2010). The Polish economy is rather on the initial stage of the implementation of AE model with still existing barriers for spin-offs creation (Poznańska, 2014). On the other hand, many positive changes in public policy and institutional environment are noticed. Step-by-step measures were taken to create a favourable climate for the development of AE, including the legal environment (Poznańska, 2014). The legal basis was created with the introduction in 2005 of the new act on higher education, which introduced the possibility of implementing new tools for technology transfer: academic business incubators and Technology Transfer Centres (Guliński & Zasiadły, 2005). In addition, along with the creation of institutional infrastructure, academic entities began to become more and more interested in the practical and legal aspects of the functioning of spin-off companies or the protection of intellectual property (Matusiak & Guliński, 2010). It is also worth mentioning that some forms of links between the sectors of science and economy in Poland already existed before the implementation of legal regulations regarding this phenomenon (Guliński & Zasiadły, 2005).

1.3. Definitions and theory embeddedness

The understanding of AE in international studies is not always related to the different concepts of entrepreneurship theory, however the nature of the phenomenon, as well as the research problems are similar as compared to other forms of entrepreneurship. Research in entrepreneurship has grown significantly since entrepreneurship emerged as a research field in 1970s and 1980s, but it is still regarded as being fragmented, with little knowledge accumulation and great theory building

difficulties (Lohrke & Landström, 2010). Similar to the entire entrepreneurship phenomenon, there is no one commonly used definition of AE, and according to Cantaragiu (2012), “the subject of academic entrepreneurship looks chaotic and the studies are hardly linked in order to provide a powerful theoretical framework, which would foster new researches” (s. 683). Pioneering definitions of AE in literature can be dated back to the late 1980s, but interest as reflected in the number of publications in the field has been mostly observed since 2011 (Kobylińska, 2020).

In the literature, both, narrow and broader definitions of AE are presented (Davey et al., 2016), but in the last years, some new tendencies regarding AE studies have appeared. First of all, some attempts have been made in order to shape the framework for AE studies, and certain authors stress the need for re-thinking the concept of AE (Crow, Whitman, & Anderson, 2019), as well as for “embracing greater variety in the extent and nature of AE” (Siegel & Wright, 2015). Over all, AE is an atypical example of commercial activity, because it is related to the area of science, education and universities, and it cannot be simply regarded as “the commercialisation of academic research” (Wadhvani et al., 2017). Cantaragiu (2012) classifies AE definitions into three categories:

- commercial definitions (for-profit business creation, spin-offs),
- knowledge transfer definitions (hard activities: patenting, licensing, spin-off formation and soft activities: academic publishing, grant seeking and contract research),
- value creation definitions (creation of societal value).

Siegel and Wright (2015) present the changing perspective on AE as a comparison between traditional and emerging views of the phenomenon. Within the traditional perspective, AE is considered as: “academic spin-offs, licensing and patents” of “academic faculty and post-docs”, whereas in the emerging perspective, the scope of AE is broader and embraces “student and alumni start-ups; entrepreneurially equipped students and job creation in the local region or state”. According to the first approach, the motivation for AE development is “to generate direct financial returns”, while in the second perspective—“to provide wider social and economic benefit to the university ecosystem”. Taking the categories of Cantaragiu (2012) into consideration, the traditional perspective covers commercial and knowledge transfer definitions, while the emerging perspective focuses on the value creation approach in broader social and economic contexts.

Table 1.3 presents the diverse definitions and perspectives put forward by authors of publications regarding AE concept.

From the above it can be concluded that scientists interested in AE phenomenon borrow theoretical backgrounds from many different disciplines and domains (e.g. resource-based theory, process theories, social cognition theory), what is also typical for the whole field of entrepreneurship research. However, direct

Table 1.3. AE definitions, theoretical assumptions and perspectives in international studies

Definitions, theoretical assumptions and perspectives	Author(s)/source
<ul style="list-style-type: none"> • process theories applied to understand the university <u>spin-off venture formation</u> (the stage model or life-cycle theory); from commercial opportunity recognition to the operation of a new venture • university spin-off defined as a new venture created inside the university with the use of technology developed at a university, which can then operate independently or with the university as operating partner 	Rasmussen, 2011
<p>“Academic entrepreneurship is a practice performed with the intention to <u>transfer knowledge</u> between the university and the external environment in order to <u>produce economic and social value</u> both for external actors and for members of the academia, and in which <u>at least a member of academia maintains a primary role</u>”</p>	Cantaragiu, 2012
<ul style="list-style-type: none"> • a multi-level framework <u>for re-thinking academic entrepreneurship</u> research • four dimensions: reasons for adopting AE strategies (why), new, emerging forms of AE (what), actors involved in AE (who), new forms of support for AE (how) 	Siegel and Wright, 2015
<ul style="list-style-type: none"> • the analysis of barriers and drivers of AE development taking the <u>narrow definition</u> of AE interpreted as university spin-off creation and academic start-ups • contribution to the literature of <u>resource-based theory</u> 	Davey and others, 2016
<p>“commercial application of academic research, type of <u>entrepreneurial activity undertaken</u>: patenting, licensing, spinouts and consultancy work”</p>	Abreu and Grinevich, 2017
<ul style="list-style-type: none"> • <u>university-industry collaboration</u> as a source of AE • academic knowledge intensive entrepreneurship: grants obtained by academic personnel (faculty and researchers) and temporary staff (students and post-docs), used as a proxy for KIE activity 	Fischer and others, 2018
<ul style="list-style-type: none"> • AE as the creation of spin-offs companies on the basis of university technology by faculty, postdocs, students or affiliated personnel • AE as a vehicle for economic and social development • “<u>the importance of context</u> to entrepreneurial innovation” • “<u>potential of ecosystems</u> to understand entrepreneurial performance” • “<u>the role of networks</u> and their ability to provide firms with resources and information” 	Hayter and others, 2018
<ul style="list-style-type: none"> • the research draws on <u>organizational behaviour literature</u> to study <u>micro processes</u>, which can help explain the involvement of scientists in AE (e.g. identity, motivation, leadership, education or work-life balance) • AE is understood as commercialisation of university-based research (an invention or discovery) in forms of patenting, licensing and start-up creation • ‘faculty member’ term embraces “all of the scientists and engineers, including post-docs, who engage in university research” 	Balven and others, 2018
<ul style="list-style-type: none"> • <u>Knight’s view of entrepreneurship</u>, which is closely related to <u>uncertainty</u> • entrepreneurs are individuals (past university employees involved in commercialisation of their invention), whose <u>own business is a principal employment</u> (it does not contain a part-time employer, paid or pro-bono consultant, if he or she continues to work in academia) 	Åstebro, Braguinsky, Braunerhjelm and Broström, 2019
<ul style="list-style-type: none"> • the gap identified in the study refers to “<u>the variety of ventures</u> generated by <u>different academic stakeholders</u>” (academic spin-offs and graduate start-ups) • entrepreneurial opportunities generated not only by academic staff (importance of research), but also by <u>students and alumni</u>, as <u>the impact of teaching</u> (role of education in start-ups formation) 	Marzocchi, Kitagawa and Sánchez-Barriolungo, 2019

Table 1.3 – cont.

Definitions, theoretical assumptions and perspectives	Author(s)/source
<ul style="list-style-type: none"> the role of <u>AE in business education</u> for the creation of “more entrepreneurial minded students (academic entrepreneurs)” AE “as the <u>process of creating</u> and/or engaging in <u>new academic opportunities</u>, endeavors, and possibilities while assuming the risks of those opportunities and possibilities” 	Powell and Rey, 2019
<ul style="list-style-type: none"> AE “as the process of setting up <u>technology companies</u> and as a <u>business activity</u> of persons professionally affiliated with a university (academics) as well as (...) students or doctoral students. It also includes the <u>promotion of entrepreneurship</u>, <u>entrepreneurship-related education</u>, and the activation of entrepreneurship” AE as “a specific type of entrepreneurship, focusing on the <u>creative attitudes</u> of the scientific community and the use of their effects <u>in economic practice</u>” 	Kobylińska, 2020
<ul style="list-style-type: none"> the research draws on <u>social cognition theory</u>, in order to explore the impact of individual and organisational determinants (such as: commercialisation experiences, organisational scientific reputation and entrepreneurial <u>support policies</u>) on <u>AE intentions</u>, involving spin-offs intention, patenting and licensing intention and contract research and consulting intention (theory of planned behaviour modelling) 	Wang, Cai and Munir, 2021
<ul style="list-style-type: none"> knowledge spillovers in universities influence the process of knowledge commercialisation through entrepreneurship (knowledge spillover theory of entrepreneurship) 	Goethner and Wyrwich, 2020

Source: Own compilation based on literature review.

references to the entrepreneurship theoretical concepts, such as entrepreneurial intentions (Wang et al., 2021) opportunity recognition (Rasmussen, 2011), risk-taking (Knight’s view of entrepreneurship) (Åstebro et al., 2019) or creation of innovations (Schumpeterian perspective) (Korpysa, 2014) can also be identified.

1.4. Evolving scope of academic entrepreneurship concept

The findings from the literature review suggest the evolutionary character of the AE concept, and we can see that there are calls for taking the broader perspective of AE in order to embrace the heterogeneity of the phenomenon (Marzocchi et al., 2019). Table 1.4 contains a compilation of different aspects of the AE concept, with a comparison being made between narrow and broader views as found in international literature. This presents a more traditional vs. emerging understanding of the engaged actors and resources, as well as the different forms and outcomes of AE activities.

From the traditional perspective, AE can be described as a phenomenon related strictly to university research commercialisation that is reflected through entrepreneurial activities (such as (especially) spin-off creation) undertaken by academic staff or postdocs with the use of academic knowledge, technology and infrastructure that is implemented in order to provide revenues for the academic community. This type of conceptualisation shows rather a narrow view of the

Table 1.4. Evolving scope of academic entrepreneurship

Aspects of AE concept	Narrow view/traditional perspective	Broader view/new perspective (additional aspects)
Contribution of the university to the development of AE according to the university mission	university research—intellectual property commercialisation (invention or discovery); knowledge or technology transfer into its commercial application	university education (methods of teaching and creation of students entrepreneurial mindset, cooperation with alumni, promotion of entrepreneurship, education for entrepreneurship and initiatives promoting start-ups creation)
Actors of AE who create and discover entrepreneurial opportunities and undertake entrepreneurial activities	academic staff and postdocs	students and alumni
Entrepreneurial activities of academic staff	patenting, licensing, spin-off creation	grants, projects, consultancy activities, publications
Outcomes of AE	financial revenues from product or service innovation	social impact, economic development, economy innovativeness
Resources engaged in the AE	mainly knowledge and technology and university infrastructure (e.g. technology transfer offices TTO)	access to broader resources through collaboration with different university stakeholders; university-industry collaboration, role of networks, potential of ecosystem, importance of context
Main approach in AE studies	process of academic employees spin-off creation (economic and technology perspective)	other forms of AE, which create value for wider society, e.g. formation of other university stakeholder start-ups—job creation, innovations (value creation perspective)
Level of analysis in AE studies	rather macro or mezo levels of analysis	studies on the micro level of analysis (e.g. intentions or motivation of academic staff towards entrepreneurial activities, academic staff identity, work-life balance)

Source: Based on (Siegel & Wright, 2015; Marzocchi et al., 2019; Davey et al., 2016; Abreu & Grinevich, 2017; Fischer et al., 2018; Balven et al., 2018; Hayter et al., 2018; Powell & Rey, 2019; Kobylińska, 2020; Wang et al., 2021).

AE phenomenon. Newly appearing challenges in the university socio-economic environment have provoked an evolution of the understanding of the AE concept. Indeed, its scope tends to be seen wider in AE studies regarding the role of universities as actors who discover entrepreneurial opportunities, as well as in research regarding type of entrepreneurial activities, resources engaged in the AE process and the outcomes of the phenomenon.

The emerging perspective embraces additional aspects in AE conceptualisation and studies. Now, not only is the view of actors and stakeholders broader (as we now take into account entrepreneurial activities undertaken by students and alumni), but also the type of activities in the scope of AE is extended to consultancy activities, grants or projects. Special attention is now given to the educational role of universities in the students' mindset creation through specific programs and

initiatives for entrepreneurship promotion, cooperation with external institutions and the creation of an ecosystem for supporting AE development. The understanding of the effects of AE, therefore, goes beyond the academic community advantages and are seen as a value for the society and the whole economy.

1.5. Methodological issues

Balven and others (2018) pointed out that studies on AE are characterized by methodological diversity, as the authors use qualitative, as well as quantitative methods, and the research samples originate from different national environments. In AE studies, we can find both theoretical/conceptual publications and empirical studies. For example, some authors followed a systematic literature review process, searching Scopus or Web of Science, Google Scholar and EBSCOhost databases (e.g. Neves & Brito, 2020; Sandström, Wennberg, Wallin, & Zherlygina, 2018; Terán-Pérez, Valdez-Lafarga, & Félix, 2020). Moreover, some authors of empirical studies who employ qualitative methods chose case study or multiple-case studies. Lundqvist and Williams Middleton (2013), for instance, used a qualitative study of two venture creation cases: one from a US university, and one from Sweden. The data was gathered through interviews, documentation, participant observation and archival material and was triangulated. In addition, Schaeffer and Matt (2016) took a qualitative case study approach in order to explore the role of the University of Strasbourg and its TTO in supporting academic start-up creation. What is more, Rasmussen (2011) chose a narrative approach and multiple-case studies to research the process of creation of four university spin-offs ventures. Beyond the aforementioned, Balven and others (2018) conducted semi-structured interviews with 30 faculty members, department chairs and TTO employees at two universities in the United States, with the aim “to explore why faculty members engage in technology transfer, especially informal practices”.

In contrast, quantitative methods with large samples were applied to study AE in the international context. For example, Goethner and Wyrwich (2020) used the data on business start-up grants received by faculty members between 2007 and 2014 in German universities to examine spatial proximity between faculties as an AE driver. For this purpose, OLS and instrumental variables regressions were applied. In contrast, the study of Abreu and Grinevich (2017) was based on a survey that provided microdata on over 22,000 academics in UK. The intent was to look for the determinants of the AE gender gap. Furthermore, Davey and others (2016) carried out an online survey in 33 countries in Europe and European Economic Area that provided a sample of 2925 responses. The aim of the study was to understand the barriers and drivers of AE in different regional and national context.

1.6. Findings from academic entrepreneurship studies

As typical for entrepreneurship research with different methodological approaches and theoretical perspectives applied, results of AE studies do not bring about an entire phenomenon description. What is more, the findings from the domain are rather fragmented. Still, Terán-Pérez and others (2020) conclude that the number of AE studies is growing, with more quantitative methods applied, but more holistic approaches are still required.

The findings of Goethner and Wyrwich (2020) suggest the presence of knowledge spillovers in universities, between natural science and business schools that has impact upon the process of knowledge commercialisation through entrepreneurship. Their study contributes to the knowledge spillover theory of entrepreneurship, social networks and university context literature (Goethner & Wyrwich, 2020).

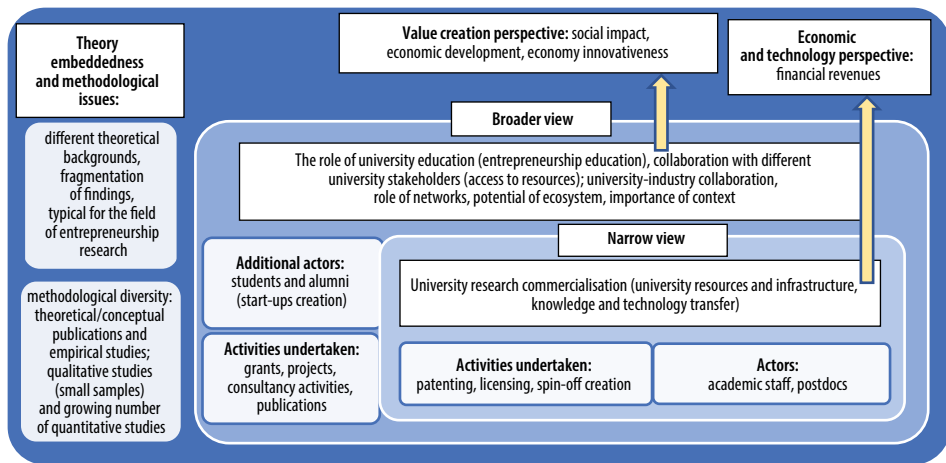
The line of AE study at the individual level brings interesting results regarding cognitions and intentions of academics towards entrepreneurial activities. The work of Neves and Brito (2020) reveals multiple, context-dependent and hierarchy-dependent push factors behind the entrepreneurial intentions of academics. Abreu and Grinevich (2017) found important differences between male and female academics in their attitudes to entrepreneurship that help to explain the gender gap in AE observed through lower rates of female academic venture creation activities.

Schaeffer and Matt (2016) confirmed the entrepreneurial contribution of the university, using the case-study of the University of Strasbourg's efforts towards enhancing the development of entrepreneurial ecosystem through building a network with different stakeholders within the local system of innovation. Herein, a special role in supporting AE was attributed to the TTO switching from revenue perspectives to the social and economic regional development model. However, according to Schaeffer and Matt (2016), the university collaboration with stakeholders depends on specific environmental conditions. Davey and others (2016), in exploring this, found a diversity of factors, barriers and drivers that condition university-business cooperation in European countries. These include: awareness barriers, funding barriers, cultural barrier, barriers relating to the usability of results; relationship drivers, access drivers, research drivers and university mission drivers. Moreover, according to Fischer and others (2018), the quality of university-industry collaboration is a stronger predictor of AE than the quantity of connections between them. Finally, the role of teaching and the contribution of education to AE development should be highlighted. In Siegel and Wright's (2015) opinion, there is too little scientific interest in "teaching/education—third mission nexus".

Conclusions

The AE concept is evolving and there is a tendency to broaden its scope in international studies. Scientific interest in the AE phenomenon is growing, however, AE is not a principal topic of research in management and entrepreneurship journals. In addition, while authors of AE studies borrow concepts and theoretical backgrounds from different disciplines, the domain is still closely related to the theme of technology transfer and commercialisation of academic knowledge. From the entrepreneurship research perspective, however, there are a growing number of publications that relate AE studies to specific entrepreneurship research aspects, such as entrepreneurial opportunity recognition, entrepreneurial intentions or motivations that are reflected in studies at micro level of analysis. It is also worth highlighting that some methodological problems and fragmentation of findings from AE domain are the same as compared to the whole entrepreneurship field.

Taking into account the above presented insights drawn from international studies, scheme 1.1 presents a summary of the important issues related to AE conceptualisation and studies.



Scheme 1.1. The scope of AE concept in international studies

Source: Own elaboration.

The AE phenomenon is still mainly described from the perspective of US and UK contexts. In European studies, there is a lack of greater contribution from CEE countries (or publications from that region do not have enough international publicity). In addition, insights from other emerging economies should be more frequently presented to the international scientific audience.

The problem of AE development is complex and contextual, thus a diversity of study from different environments should help to better understand the whole phenomenon. Moreover, AE should be analysed not only from the perspective of advantages at individual or organisational levels, but also through taking a more general social and economic perspective of the evaluation of AE importance and outcomes.

Among the emerging lines of research on AE phenomenon, two aspects should be especially highlighted. Firstly, the importance of entrepreneurship education and the role of university education in the creation of student entrepreneurial mind-sets in cooperation with different university stakeholders are important issues related to the AE development. Secondly, the changing technological conditions which impact socio-economic development should also lead us to better understanding of digital academic entrepreneurship, as well as digital academic innovations and their contribution to the emerging digital economy. Digital academic entrepreneurship is supposed to be one of the important lines in AE studies regarding the changing technological and socio-economic environments. Rules governing entrepreneurship in the digital world are changing, and these should be taken in consideration in the academic context (Arlott, Henike, & Hölzle, 2019).

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