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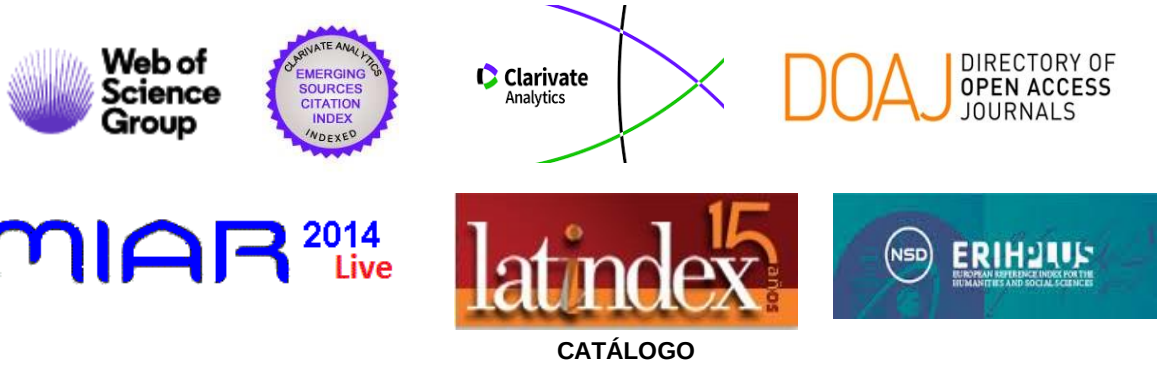

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DIGITAL ACADEMIC ENTREPRENEURSHIP: NEW OPPORTUNITIES FOR STUDENTS IN THE DEVELOPMENT OF THE INFORMATION ENVIRONMENT

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Abstract

Purpose of the article. The purpose of the research is to analyze the opportunities of digital academic entrepreneurship provided to students in the context of the development of the information environment. Main results. To develop digital academic entrepreneurship, it is necessary to combine all available resources (human, organizational, financial) of existing research parks and departments for the development and support of entrepreneurship, create "exemplary" successful spin-off projects (subsidiaries created by employees or alumni of a university, based on technologies, the rights to which belong to the university), train students in entrepreneurial skills, and "unlock" scientific knowledge by institutions that are unable to ensure the practical use of their patents. Application of the study. The results of the work can be used in the organization of academic entrepreneurship at universities. The materials and conclusions of the study can be used in teaching the subjects of the business cycle in higher education.

Keywords

Academic entrepreneurship – Startup project – Spinoff enterprise – Technology transfer

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Introduction

Over the past three decades, much attention in the leading economically developed countries of the world has been paid to the development of scientific research that directly affects the economic and industrial state of states[1]. Thus, the study of specific examples of the new role of universities in the knowledge-based economy confirmed the increase in the influence of universities on the economic and scientific development of Europe, the United States, and other countries[2]. The results of the activities of leading universities in economically developed countries indicate the importance of introducing innovative entrepreneurship in their activities[3]. The term "academic entrepreneurship" as a way of commercializing scientific developments in the modern scientific professional literature is used by scientists in different meanings.

Usually, the term "academic entrepreneurship" is used to highlight the participation of scientists in the commercialization of their developments[4]. A. Grandi[5] considers academic entrepreneurship as the main way of economic development and increasing the competitiveness of the country and the region. M. Goethner et al.[6] emphasize the potential of academic entrepreneurship to meet the needs of a university or individual academic entrepreneur. M.S. Wood[7] defines academic entrepreneurship as the efforts and measures that universities and their industry partners make to commercialize the results of faculty research. J. Bercovitz and M. Feldman[8] point out that academic entrepreneurship is the process by which a person or group of people connected through their work at a university

[1] K. S. Alpysbayev; Y. E. Gridneva; G. S. Kaliakparova; A. D. Saparbayev y S. Sarsebekovna, "Economic security management at industrial enterprises: a case study", Journal of Security and Sustainability Issues Vol: 9 num 4 (2020): 1165-1176; V. A. Biryukov; O. V. Dmitrieva; V. B. Frolova; L. K. Nikandrova y A. B. Arkhipov, "Formation of a Tourism Entrepreneurial Environment in the Conditions of Competition", Journal of Environmental Management and Tourism Vol: 10 num 8 (2020): 1779-1784 y T. Y. Mazurina; Y. S. Matkovskaya; K. L. Neopulo y T. M. Rogulenko, "Studying the impact of the depreciation policy on the development of innovation potential of industrial enterprises", Entrepreneurship and Sustainability Issues Vol: 7 num 3 (2020): 1513-1526.

[2] K. Philpott; L. Dooley; C. O'Reilly y G. Lupton, "The entrepreneurial university: Examining the underlying academic tensions", Technovation Vol: 31 num 4 (2011): 161-170; B. Sporn, "Building adaptive universities: emerging organizational forms based on experiences of European and US universities", Tertiary Education and Management Vol: 7 num 2 (2001): 121-134 y R. C. Atkinson y P. A. Pelfrey, "Science and the Entrepreneurial University", Issues in Science & Technology Vol: 26 num 4 (2010): 39-48

[3] H. Etzkowitz, "The evolution of the entrepreneurial university", International Journal of Technology and Globalization Vol: 1 (2004): 64-77; D. Di Gregorio y S. Shane, "Why do some universities generate more start-ups than others?", Research Policy Vol: 32 num 2 (2003): 209-227 y N. H. Ahmad; H. A. Halim; T. Ramayah y S. A. Rahman, "Revealing an open secret: Internal challenges in creating an entrepreneurial university from the lens of the academics", International Journal of Conceptions on Management and Social Sciences Vol: 1 num 1 (2013): 2357-2787.

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[6] M. Goethner; M. Obschonka; R. K. Silbereisen y U. Cantner, "Scientists' transition to academic entrepreneurship: Economic and psychological determinants", Journal of Economic Psychology Vol: 33 num 3 (2012): 628-641.

[7] M. S. Wood, "A process model of academic entrepreneurship", Business Horizons Vol: 54 num 2 (2011): 153-161.

[8] J. Bercovitz y M. Feldman, "Academic entrepreneurs: organizational change at the individual level", Organization Science Vol: 19 num 1 (2008): 69-89.

or research center use the knowledge created in their research to create business ventures or remote companies. J.K. Osiri et al.[9] note that in the global dimension, academic entrepreneurship in universities is implemented through patenting and licensing (as tools for technology transfer) and startups.

Currently, academic entrepreneurship is disclosed in the context of the following types of activities[10]: formal commercial activities; informal commercial activities; non-commercial activities.

The international experience of academic entrepreneurship shows that startups based on the use of the results of scientific and technical developments are an important channel for technology transfer between science and the SME sector in both directions[11]. Most of the graduates who start a business, as a rule, remain in the region near their university, that is, they do not emigrate either from the country or from the region. In other words, academic entrepreneurship helps to stop the bleeding[12]. Regions with a high level of academic entrepreneurship attracting young professionals with high potential not only for startups but all industries, i.e., academic entrepreneurship facilitates the flow of frames[13]. The exchange of knowledge and specialists between sectors of small and medium business, higher education sector, and public research institutions contributes to the development of high-tech clusters and innovative environments[14].

The purpose of the article is to analyze the opportunities of digital academic entrepreneurship provided to students in the context of the development of the information environment.

Research problem:

- to identify forms of digital academic entrepreneurship involving students;

- to specify available activities and provide recommendations for organizing digital academic entrepreneurship.

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[9] J. K. Osiri; D. R. Miller; L. Clarke y L. Jessup, “Academic Entrepreneurship: Technology Transfer in Higher Education”, Journal of Entrepreneurship Education Vol: 17 num 1 (2014): 39-61.

[10] K. E. Nyeko y N. K. Sing, “Academic Entrepreneurs and Entrepreneurial Academics: Are They the Same”, International Journal of Social Science and Humanity Vol: 5 num 12 (2015): 1050-1055 y M. A. Lundqvist y K. L. Williams Middleton, “Academic entrepreneurship revisited-university scientists, and venture creation”, Journal of Small Business and Enterprise Development Vol: 20 num 3 (2013): 603-617.

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[13] J. Bercovitz y M. Feldman, “Entpreprenerial Universities and Technology Transfer: A Conceptual Framework for Understanding Knowledge-Based Economic Development”, The Journal of Technology Transfer Vol: 31 num 1 (2006): 175-188.

[14] M. Wright; S. Birley y S. Mosey, “Entrepreneurship and University Technology Transfer”, Journal of Technology Transfer Vol: 29 (2004): 235-246; A. E. Suglobov; O. A. Repushevskaya; A. V. Tkach; L. P. Dashkov y E. I. Balalova, “E-Commerce development prospects in the enterpreneurship of the Russian Federation”, Revista Inclusiones Vol: 7 num Especial (2020): 342-349 y L. I. Bushueva; Y. F. Popova y A. P. Shikverdiev, “Factor analysis of administrative barriers to entrepreneurial activities”, Revista Inclusiones Vol: 7 num 2 (2020): 242-254.

Research hypothesis. In order to develop digital academic entrepreneurship, it is necessary to combine all available resources (human, organizational, financial) of existing research parks and departments for the development and support of entrepreneurship, create "exemplary" successful spin-off projects, organize training in entrepreneurial skills at universities, and "unlock" scientific knowledge by institutions that are not able to ensure the practical use of their existing patents.

Based on the results of the study, it can be concluded that the goal set in the study was achieved.

Methods

The main method of research was a survey of experts in this field of research. The experts were asked to voluntarily fill out a semi-formal questionnaire with questions.

As an initial theoretical position, the expert survey was based on the idea that academic entrepreneurship is rather a specific motivation for students' actions than a specific mechanism. Following this concept, the experts focused their recommendations on activities and steps that: 1) are within the competence of individuals and institutions, 2) do not require significant additional resources, 3) do not require significant changes in state regulation.

The survey was conducted in Russian, online on September 11, 2020.

The survey was attended by the experts in the field of academic entrepreneurship, university employees (35 people), whose professional activity for more than five years was related to the implementation of digital academic entrepreneurship.

All survey participants were warned about the survey's goals and that the study organizers planned to publish its results in a generalized form.

Results

According to the experts, there are usually three forms of digital academic entrepreneurship involving students (Table 1).

No.	Form of digital academic entrepreneurship	Content of digital academic entrepreneurship
1	Academic spinoffs	new corporations that base their business on the direct transfer of scientific knowledge and technology from public research institutes and higher education institutions
2	Academic startups	new companies founded by students, graduates, or scientists who use the knowledge or research results of government research institutes and higher education institutions
3	Academic entrepreneurs	students, graduates, and academics who become entrepreneurs in business fields that require academic knowledge

Note: compiled based on the expert survey

Table 1

Forms of digital academic entrepreneurship

According to the experts, the latter group is usually the largest in Western countries such as Germany, the UK, and the US, while the first group is the smallest. Although these three forms may seem very different at first glance, they are similar in terms of motivation to create them and exist in the same ecosystem. They mainly differ in the intensity of technology and scientific knowledge transfer.

In the view of the experts, according to the proposed concept of digital academic entrepreneurship, the following measures and recommendations should be implemented (Table 2).

No.	Events	Recommendations
1	Integrating efforts	pooling all available resources (human, organizational, financial), reducing the number of science parks and other similar institutions, and establishing links beyond existing institutions
2	Creating a successful start-up projects	create real and avoid fictional success stories
3	Business training	introduce business education in all faculties and courses of study in all higher education institutions and research institutes
4	"Unlocking" of scientific knowledge	institutions that are unable to commercialize their patents should transfer them free of charge to start-up companies established in the scientific sector

Note: compiled based on the expert survey

Table 2

Available events and recommendations for organizing digital academic entrepreneurship

Discussion

Based on the expert survey, it is possible to focus on the available activities for organizing digital academic entrepreneurship in more detail.

Speaking about combining the efforts of universities, the experts noted that Russia has a sufficient level of human capital development, an appropriate level of knowledge, and the resources necessary for a significant leap in the development of digital academic entrepreneurship. However, this requires the joint efforts of institutions and people.

Some universities and state research institutes have science parks, business incubators, and other similar structures, but none of them has sufficient resources and opportunities for full functioning. That is why the results of their activities are modest[15]. However, all existing science parks and business incubators are not enough for the rapid advancement of digital academic entrepreneurship. None of the teams that manage these institutions has the necessary experience and competence to independently carry out such activities.

[15] M. N. Dudin; O. F. Shakhov; N. P. Ivashchenko y M. S. Shakhova, “Development of entrepreneurial competencies in the economy (evidence from digital entrepreneurship)”, Revista Inclusiones Vol: 7 num Especial Enero-Marzo (2020): 54-68; L. B. Sitdikova y S. J. Starodumova, “Corporate agreement as a means of providing security in the course of entrepreneurship development”, Entrepreneurship and Sustainability Issues Vol: 7 num 1 (2019): 324-335 y A. Gurinovich; I. Afanasiev; V. Churin; V. Perekrestova y O. Tolmachev, “Development of Small and Medium-Sized Entrepreneurial Businesses in The Energy Sector: Features of Highly Intelligent Projects’ Evolution”, AD ALTA: Journal of Interdisciplinary Research Vol: 9 num 1 (2019): 352-359.

The experts called for joint efforts, at least at the initial stage of development, considering a conditional region as an example, where it is possible to establish one business incubator or science park by combining all available resources, all workers involved in this area, and all supporters. One such science park will be enough to start with for all higher education institutions, institutes, and the region as a whole.

At first glance, such a proposal may seem radical, but it is based on the successful experience of Germany[16].

There are eight state universities and higher education institutions with 50 thousand students in the state of Brandenburg. The region was one of the weakest in Germany in economic terms. The regional government, which under the German system provides funding for universities, did not provide additional funds for academic entrepreneurship until the end of the 1990s. In the early 2000s, all state universities and higher education institutions in the land of Brandenburg merged and created the Brandenburg Center for Academic Entrepreneurship. In 2003, the Center was able to receive funds from the federal program and one of the funds. These funds were used by the center to pay employees whose duties included training in entrepreneurship and supporting scientific spinoff projects with consultations and training. However, these funds were not enough to finance the infrastructure to support academic entrepreneurship in each of the universities. Then they united and created a virtual network science park, where all universities and higher education institutions collaborated and exchanged information, best practices, and educational materials. Employees joined teams to support entrepreneurs and spinoff projects. In 2009, the University of Potsdam, a member of the network, ranked first among all German universities in terms of academic entrepreneurship development. In other words, the university's academic entrepreneurship support infrastructure has risen from last to first place in less than a decade. One of the most famous spinoffs of the University of Potsdam is the Signavio company, created in 2009.

The neighboring land of Berlin repeated the success story of the Brandenburg University network. The network of academic entrepreneurship support at Berlin universities and higher education institutions is one of the most successful in Germany and even around the world.

The experts presented the components of the digital academic entrepreneurship support ecosystem (modeled on the academic entrepreneurship ecosystem in Berlin) (Table 3).

Partner	Contribution
Business and economics faculty	Provides teaching courses in entrepreneurship and business at other faculties
University career centers	Provide new entrepreneurs with training on managerial, or soft skills
University faculties	Integrate entrepreneurial and business disciplines, as well as soft skills training for all training courses
Technology seekers	Carry out the analysis of the research results of professors and academic departments for their commercial potential

[16] H. Klandt y C. Volkmann, “Development and Prospects of Academic Entrepreneurship Education in Germany”, Higher Education in Europe Vol: 31 num 2 (2006): 195-208 y L. Leišytė y L. Sigl, “Academic institutional entrepreneurs in Germany: navigating and shaping multilevel research commercialization governance”, Triple Helix Vol: 5 num 13 (2018): 1-20.

Talent seekers	Ensure the unity of scientists and those who want to be an entrepreneur, initiate entrepreneurial team building
Technology transfer offices	Provide advice on intellectual property policy
Principal	Develops an entrepreneurial culture at the university
Departments of development and support of entrepreneurship in universities	Support aspiring entrepreneurs with advice and help them find a suitable business support program
Central authorities	Provide funds and programs to support entrepreneurship: access to finance, non-financial support programs such as coaching and consulting, access to premises
Regional authorities	Provide grants for academic startups and spinoffs
Private business incubators and accelerators	Financial support for startups, providing them with advice, premises, and assistance in creating networks. Rely on a large base of potential entrepreneurs from the ranks of university graduates. Act as additional mechanisms to motivate even more graduates to start a business
Private venture funds	Invest in startups for commercial purposes. Rely on a large base of potential entrepreneurs from the ranks of university graduates. Act as additional mechanisms to motivate even more graduates to start a business
Professional services	Advice on legal issues, tax issues, design, creating websites for academic startups and entrepreneurs. The provider of such professional services may itself be an academic entrepreneur, which in turn creates additional incentives for academic entrepreneurship
Chambers of Commerce and Industry	Provide free advice on basic legal issues and help to create networks
Recruitment agencies	Provide information about the career advantages of entrepreneurship compared to working as an employee
Commercial banks	Create special departments for working with startups and provide startups with special conditions for maintaining accounts
Industry associations	Conduct business plan competitions in collaboration with universities
Foundations of civil society	Provide entrepreneurship training and grants for start-up entrepreneurs who have limited access to government programs, such as social entrepreneurs
Offices for the coordination of networks	Support the coordination and knowledge sharing of all partners in the academic entrepreneurship ecosystem

Note: compiled based on the expert survey

Table 3

Components of the digital academic entrepreneurship support ecosystem

After reaching an agreement on joint work and cooperation, it is important to create successful start-up projects. Successful projects are direct proof of the correctness of theoretical assumptions. The results obtained, that is, the spinoff enterprises created, are much more convincing evidence than any theoretical arguments or scientific research[17].

According to the experts, success stories are one of the best tools for positive changes in the attitude of students and teachers to academic entrepreneurship. Successful representatives of academic entrepreneurship can be considered as a kind of model that can become a role model for students. In the future, the number of teachers who will be aware of the importance of entrepreneurship for a particular faculty and educational institution as a whole will grow. The overall environment in this context will become more favorable. Universities and institutes will develop a strong entrepreneurial culture.

[17] K. Hoye y F. Pries, "Repeat commercializers, the habitual entrepreneurs of university-industry technology transfer", Technovation Vol: 29 (2009): 682-689.

The above positive impact will occur if successful spinoff businesses meet certain criteria. It should be a private company with open information about the owners and management structure, which is easy to find and which will publicly disclose information about its financial condition (balance sheet and financial results of operations)[18].

Speaking about business education, the experts believed that universities and research institutes can do much more to develop academic entrepreneurship than they do today, without any changes in regulation or additional resources. First of all, because universities and research institutes have the right to independently change the curriculum and choose the teaching staff. In particular, it is within the authority of these institutions to include in the curriculum of all faculties and all courses such a discipline dedicated to business development as business planning.

Postulating the need to "unblock" scientific knowledge, the experts pointed out that even in cases where the right to own intellectual property is clearly defined, state research institutes funded from budget funds do not have the ability or sufficient resources to commercialize their patents. Thus, scientific knowledge, being protected by intellectual property rights, cannot be used due to the small number of license agreements.

The experts recommended opening up opportunities for the free use of scientific knowledge in practice as soon as possible, even if this means the free transfer of patents to startups (it is clear that the company should receive the exclusive right to use such a patent). At the same time, the condition must be met, according to which startups must use patents for production, further development, or for sale on the market. It is necessary to avoid a situation where a company passively owns a patent, because this will again "preserve" knowledge, and this will be an excellent opportunity to transfer knowledge and technology to the country's economy, as well as create conditions for the development of startups.

Conclusion

Academic entrepreneurship makes it possible to form initiative, independent, professional, and economically active entrepreneurs among students and employees of higher education institutions and contributes to the development of knowledge for making managerial and organizational decisions following the requirements of the market environment. The strengthening of efforts in the field of academic entrepreneurship has a positive impact on the development of the region, which is reflected in the growth of the number of jobs and employment, the development of regional infrastructure, improving the standard of living of the population, reducing local budget expenditures, and increasing revenues to the local budget.

The results of the study confirmed the hypothesis that in order to develop digital academic entrepreneurship, it is necessary to combine all available resources (human, organizational, financial) of existing research parks and departments for the development and support of entrepreneurship, create "exemplary" successful spin-off projects, organize training in entrepreneurial skills at universities, and "unlock" scientific knowledge by institutions that are not able to ensure the practical use of their existing patents.

[18] M. C. Brennan y P. McGowan, “Academic entrepreneurship: an exploratory case study”, International Journal of Entrepreneurial Behavior and Research Vol: 12 num 3 (2006): 44-64.

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