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**START-UP ECOSYSTEMS AS A FRAMEWORK
FOR THE COOPERATION BETWEEN START-UP
COMPANIES AND KNOWLEDGE-BASED
INSTITUTIONS IN POLAND**

**EKOSYSTEMY STARTAPOWE
JAKO RAMY WSPÓŁPRACY POMIĘDZY
NOWO UTWORZONYMI PRZEDSIĘBIORSTWAMI
A INSTYTUCJAMI OPARTYMI NA WIEDZY
W POLSCE**

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Summary: The aim of the article is to outline the picture of the Polish start-up ecosystem (in fact consisted of few ecosystems but functioning under the same scheme), i.e. its main actors and relations among them with the special focus put on the ways and “channels” the cooperation between start-ups and knowledge-based institutions (later termed *K-BI*) are to be realized.

Keywords: start-up companies, knowledge-based institutions, start-up ecosystem, institution framework, business models.

Streszczenie: Istotną składową tzw. ekosystemów startupowych w różnych krajach stanowi współpraca sieciowa pomiędzy tego typu firmami a instytucjami wiedzy, jak uniwersytety, instytuty badawcze i inne ośrodki naukowe, a także z samymi naukowcami. Celem artykułu jest prezentacja struktury podmiotowej ekosystemów w Polsce w kontekście relacji pomiędzy startupami i tymi instytucjami. Analizując to zagadnienie należy zwrócić uwagę, że kooperacja ta może przybierać różne formy w zależności od stopnia sformalizowania omawianych kontaktów.

Słowa kluczowe: firmy typu start-up, ekosystem startupowy, współpraca nauki i biznesu.

1. Introduction

Start-up companies (defined usually as small, nascent, resource-constrained firms from the high-technology branches) and so-called start-up ecosystems constitute relatively new market phenomena in Poland and this fact contributes to the small

number of publications and scientific studies on different aspects of this special-type small and micro firms. However, since the startups as business entities comply with the main goals of the economic policy led nowadays in Poland (as to e.g. supporting the innovativeness and international competitiveness of the modern branches and hi-tech Polish firms)¹, the thoroughful analysis of start-ups, i.e. their business models, expansion plans, specialization areas, branches of activity, financing, entrepreneurs' characteristics, innovativeness level etc. is both a promising and desired way of empirical studies.

Within the subject, the special focus should be put on the quality of Polish startup "local" ecosystems with their peculiarities such as human capital, real assets, access to financing (sources and structure of funding), space for doing business, access to advisory and guidance services concerning financial resources and legal and tax regulations as well as the quality of formal and informal relations with actors of the social and economic surrounding. This surrounding constitutes a "world of relations", i.e. real economic and social network those companies exist and develop in, and which extensively determines development, performance and international expansion potential of Polish start-ups. Very important part of this network is built by the cooperation between start-up companies and the knowledge-based institutions (later termed K-BI) like universities, scientific institutes, research centers etc.

The article aims to present the structure of the Polish start-up ecosystems i.e. its main actors and relations among them in view of the ways and "channels" of the cooperation between start-ups and knowledge-based institutions. Needless to say, this issue deserves much research attention as actually is a part of a wider problem of the broadly-understood ties and collaboration between business and science – very much desired and discussed in the public debate and in policy on the different institutional levels (domestic, regional, international). The article results are based on the overview of institutional documents and introductory observations and discussions with the representatives of both scientific institutions and startup companies.

2. Literature overview

It is only in the present decade that the term "start-up" appeared in the literature and began to be the subject of analyses, studies and reports, i.e. organized, structured theses which assume a uniform definition of start-up as business entity. Previously, i.e. since the 1990s, the research concentrating on the nascent small enterprises, mainly from the sector of advanced technologies, had not usually used the term. Those "early" studies were concentrated almost exclusively on the USA and mainly on the phenomenon of Silicon Valley. Today's international reports, such as Global

¹ The goals are connected with the necessity of the escape from the the "trap of the middle-income" (see the place of Poland in the global competitiveness and innovativeness rankings).

Startup Ecosystem Report [2012; 2015; 2017; 2018] and European Startup Monitor present a general perspective of the issue and provide horizontal conclusions on startups in different countries.

At the moment, startups are the subject of empirical research and studies which analyse them in different contexts and areas, such as psychology of entrepreneurship, regional conditions for micro entrepreneurship, quality of the institutions in the business environment, sources of financing, efficiency of allocating funds for innovations, role of formal and informal network of relationships with the environment, models and strategies of selling products and services in foreign markets, expansion trends and other [compare: Colombo et al. 2004; Mata et al. 1996; Gatewood, Huyhebaert et al. 2000; Doutriaux 1992; Birley 1985 (for the UK); Görg et al. 2000; Burgel, Murray 2000].

In light of the issue touched in the article it should be pointed out to “the social network approach” present in the economic literature in recent years which emphasizes the role of local “networks” in creating business environment for firms. This approach can be related in particular to the start-up ecosystems taking into consideration not only the literature references but mainly the special characteristics of the “startup world”. Thus, in my opinion, it serves as a suitable theoretical base for constructing the empirical studies on the subject issue. The term “networks” tends to be understood in this field of research in various ways which includes among other: quality of local environment, material infrastructure, financial system, access to high quality advisory services, density of formal and informal ties between individual and public agents [compare: Armington, Acs 2002; Granovetter 1973]. Important line of research emerged with its primary objective to explore innovativeness of startups measured by the number and quality of patents [compare: Lynskey 2004; Almeida, Kogut 1997]. Here, the discussed relations should be referred to understanding networks in a sociological sense, i.e defined in literature as strong and weak social ties, with the further coming from outside of the individual’s contacts and interrelations [Gans et al. 2000; Jack 2010; Peña 2002; Zimmer, Aldrich 1986; Terpstra, Olson 1993; Scott 1993; Hayter 2013; Jack 2010; Knoke, Yang 2008]. Considering the expected volume of the article only the restricted place can be devoted to presenting the literature and theoretical overview of the issue (for broader analysis see other works of the author).

Considering the subject issue of the article it is worth pointing out that studies and reports on EU issues underline the importance of building and supporting relationships between business and academic “spheres” (society, systems, institutions etc.), which considerably contributes to realizing important goals and tasks of the key policies of the European Union, also the cohesion policy. One of many examples is EU Research and Innovation Program Horizon 2020 being up-to-date flagship initiative aimed at securing Europe’s global competitiveness and creating the “genuine single market for knowledge, research and innovation”. In particular, cooperation between business and scientific institutions substantially relates to the

effectiveness of EU policies in achieving such specific objectives of Horizon 2020 as e.g. “removing barriers to innovation and making it easier for the public and private sector to work together in delivering innovation”, “supporting research infrastructures, stimulating innovation in SMEs”, “helping to better integrate the knowledge triangle – research, researcher training and innovation” as well as “supporting the development and implementation of research and innovation agendas through public-private partnerships”. There is also a number of strategic reports and institutional documents (prepared by/for different Polish ministries) in Poland highlighting the innovative potential and internationalization perspectives of those small innovative firms (active mainly in the modern high-tech sectors) as crucial for realizing the development strategies, enhancing the technological progress and international competitiveness of Polish economy. Among others most of those documents accentuate the importance of strong ties between the business practice and academia/scientific institutions and networks in contributing to upgrading the level of the Polish economy’s innovativeness (measured e.g. by the patenting performance). This includes the National Development Strategy 2020 [Strategia Rozwoju... 2012], highlighting the covered issue especially in the specific objectives of “Increasing the innovativeness of the economy” (point II.3), “Development of the Human Capital” (IV.2) and “Enhancing the usage of the digital technologies (II.5). Another important report is Polska 2030. Trzecia fala nowoczesności [2012] and – as the most recent document [Strategia na Rzecz Odpowiedzialnego Rozwoju 2017] which takes a prominent place in establishing the strategic agenda for the development of the Polish economy at the moment by underlining among others the subject-issue of the business-academic partnership expectations.

3. Start-up ecosystems as a framework for ties between companies and knowledge-based institutions in Poland

When analysing the “place” and role of the knowledge-based institutions in the startup ecosystems in Poland it should be emphasized that they can be seen from at least three different perspectives: firstly, as “providers” of the scientific and technological infrastructure that can be utilized by business, secondly, as a source of human capital potentially to be engaged in the business undertakings of various forms, and thirdly, as a source of ideas and knowledge (scientific inventions and discoveries) to be marketed. Before characterising the involvement of the K-BI in the start-up ecosystem in Poland, there should be presented the ecosystem as specific economic and social framework the startups develop and exist in².

² The Polish startups perform their business mainly in the following branches: analytics/research tools/business intelligence, Internet of Things, Big Data, tools for programists and developers, natural sciences/healthcare/biotechnology, technologies for marketing, games/entertainment, electronics/robotics, education, design/fashion (see: Start-up Poland’s reports).

The startup ecosystems in Poland consist of all entities – both private and public – that the startups have relationships with. Among them we can specify three types of subjects: another firms (from the micro and small, through medium-sized companies to big international corporations), so called “business environment institutions” (instytucje otoczenia biznesu, IOB) and public (local, governmental etc.) institutions. Whereas the first category does not need more explanation, it is worth presenting (at least in a general way) the remaining two other groups.

Public entities involved in the start-up ecosystems in Poland are represented by a number of different institutions – most of them being the agencies of Polish ministries and other central bodies responsible e.g. for managing and distributing public funds (European Union grants, subsidies, governmental subventions and other financing) and realizing a number of different national programs. Among them it is worth enumerating National Centre of Research and Development (Narodowe Centrum Badań i Rozwoju, NCBR), National Centre for Science (Narodowe Centrum Nauki, NCN) or Polish Agency for Enterprise Development (Polska Agencja Rozwoju Przedsiębiorczości. PARP). There is actually a great number of programs and financing schemes offered and realized by various public institutions (both local and central level) which can be mentioned when analysing the cooperation between business and science in general (and start-up companies, in particular). However, considering the expected volume of the paper I should like to point out especially some programs which are directly dedicated to supporting this cooperation. The first one is the NCBR Programme Gospostrateg (150 mln PLN) which is solely and mainly targeted at supporting the existing mechanisms of the transfer of knowledge from the research centers, universities and any other scientific bodies to the business practice as well as triggering the new, competitiveness- and innovativeness-enhancing mechanisms crucial for the development of Polish economy and involving it into the global knowledge networks. Another program worth mentioning in the discussed area is the one called “BRIDGE: Research, Development, Innovations” („BRIDGE: Badanie Rozwój Innowacje”) continuing the previous Project “Commercialization of the results of scientific research and development works – testing the new mechanisms of support”. BRIDGE is aimed at assisting the commercialization of the results of the scientific works in its broad sense, i.e through developing, testing as well as putting the new intervention tools into practice. It is going to contribute – among others – to detecting the existing gaps in the offer of public institutions in supporting the commercialization of R&D results in Poland. Another NCBR program devoted to servicing and improving the cooperation between business and knowledge-based institutions through commercialization of the latter’s works and achievements is called Innovativeness Creator (Kreator Innowacyjności). This particular Program is focused on elevating the number of the commercialized technologies and innovative solutions, expanding the network of organizations supporting the entrepreneurship of scientists and additionally raising the effectiveness of the cooperation between science and

business. All of the programmes presented above will be surveyed in course of the empirical work on the subject.

The third group of entities creating the “network” startup ecosystems in Poland which are important when characterising the cooperation between business and science involves Business Environment Institutions (IBEs). According to the commonly accepted definition, IBEs involve the entities offering all services in the field of broadly-understood support for business. Polish system of IBEs is very comprehensive both considering a large number of institutions and their diversity. We can specify three types (groups) of them: entrepreneurship centers, innovation centers entailing technological parks, entrepreneurship incubators and centres of the technology transfer and finally financial institutions. According to PARP in Poland there exist 42 technological parks, 23 entrepreneurship incubators, 41 centers of the technology transfer as well as 24 academic incubators of entrepreneurship: all together there are 130 institutions serving the crucial role in the process of the diffusion of knowledge and technology and supporting the development of the innovativeness. Considering the title issue of the article the special attention will be attached to the “innovation centers” functioning in Poland.

The first category of entrepreneurship centers is aimed at a wide promotion and incubation of entrepreneurship (mainly in the discriminated or unprivileged social groups) through providing support services to small and micro firms as well as activating the development of the peripheral regions touched by structural problems. Innovation centers in turn are dedicated to playing the same role for the innovative entrepreneurship. They are also responsible for transferring technologies from science to market as well as activating the academic entrepreneurship and cooperation between knowledge-based institutions and business. Under this category in the business environment in Poland there exist technological parks, technological incubators and technology transfer centres. The first type – technological park or scientific park – is a sole entity focused on supporting the development of enterprises based on innovative modern technologies, in particular small and medium-sized firms in the way of providing them with real estate sites like offices or coworking space (sometimes free of charge) or technical infrastructure. The comprehensive help they serve involves also the advisory and mentoring on company management, technology transfers and transforming the results of the scientific research and work in progress into technological innovations. Entrepreneurship incubator is in turn an entity disposing of the real estate premises and other infrastructure which can provide the complex support for the companies in their initial stage, i.e. from the idea for a business until gaining the stable position on the market (so called business incubator program). The third type of the innovation centre entity is the center of technology transfer which is a special department in the structure of the university or one of the Polish Academy of Science institutes established in order to sell or give in a free-of-charge manner the results of the scientific work to business practice. Thus, its main task is a wide commercialization and transfer of technology (know-how) to the

market and promotion of the scientific work's results as well as creating the cooperation between business and academic institutions..

Numerous institutions creating the startup ecosystems in Poland not only support or realize the cooperation between business and science in a concrete way, e.g. through the common projects or putting the scientific inventions into practice. They also contribute to building the intangible part of the system by organizing a large number of events involving e.g. trainings, workshops, congresses, conferences, fairs and competitions. They serve a role of support for the new-emerged ideas or nascent firms, as well as a source of knowledge and inspiration, giving among others the opportunity for developing the professional contacts between the representatives of the knowledge-based institutions and startup businesses.

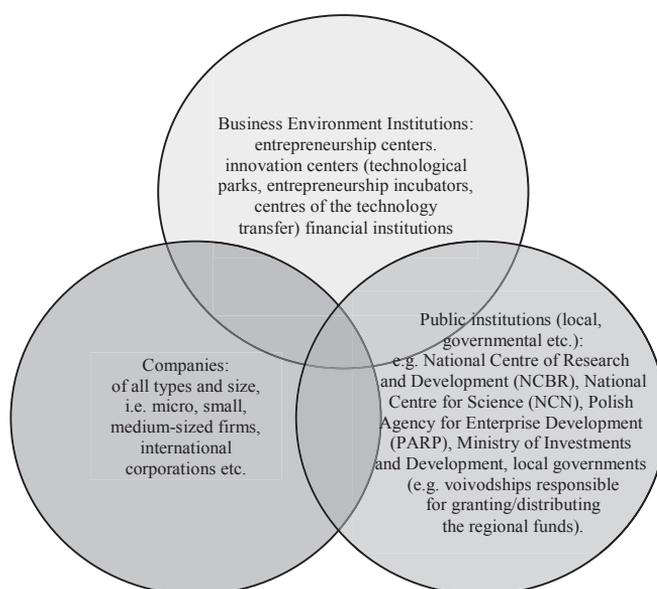


Fig. 1. Startup ecosystem in Poland [scheme]

Source: own work based on data from PARP.

As stated above, the effects of the cooperation between start-up companies and knowledge-based institutions will be researched in details considering the wider context of the startup ecosystem/ecosystems in Poland in the further stages of my research. In particular there will be studied transferring the basic research from knowledge-based institutions (like academia) to practitioners (the market) through commercial applications. Within analyzing the issue it is necessary to get insight into such “traditional” forms of this cooperation as innovation diffusion, value chains or collaborative research with industry. There should be highlighted also the relevance

of collaborative research, contract research, consulting and informal relationships for university-industry knowledge transfer.

Although this project is in fact a multiannual undertaking there can be some superficial and very general conclusions drawn basing on the above characteristics of start-up ecosystem in Poland. Namely, the rich structure of this ecosystem, the number of possibilities created and offered by numerous entities and institutions (contacts, mentoring, advisory, financing, other support etc.) and especially the abundance of the available funds build promising and relatively “friendly” environment for usually young, ambitious and creative people eager to get into market with their business in new technological branches. Also the newspaper articles, news and some comments found in media share the similar opinion. However, the quality of the discussed cooperation and the overall functioning of the environment is one thing and the real effects are sometimes a different story. For example, according to “mambiznes.pl” portal a lot of the financial resources granted for the start-up companies are in fact squandered. As it was reported in 2016 in the framework of the 8.1 Action of the Operational Program Innovative Economy people with the idea for business in Internet were granted all together the huge amount accounting for 1,222 bln PLN (until 31st December 2015) – the equivalent of 93.7% of the support Poland distributed among start-up companies. There were 2427 fledgling businesses which got on average 503 thousand zlotys each, but most of them do not exist any more as they have not found enough clients interested in using services offered by them in the Internet or are striving to survive now.

Another preliminary “suspicion” concerning the core subject-issue of the general potential and perspectives for the cooperation between start-up firms and science which can be drawn from the literature overview and other researchers’ results is that there may exist some obstacles and difficulties for the success of such collaboration. Namely, as some authors highlight the academia and industry usually represent different “mentality” and viewpoints, such as “relevance, rigor, time horizons, planning practices and predictability” [Sandberg, Arts 2011, p. 60].

4. Conclusions

In conclusion, from the empirical observations concerning the relations between start-up companies and the K-BI in Poland it should be noted that those ties take place in two main forms which also have to do with the level of formality of this cooperation. The first one refers to the personal contacts with the exchange of soft abilities and knowledge, the second is the “hard cooperation” realized in a more tangible way (like working on projects together, common financing, transferring the results of the scientific research into business practice or transferring them into real products and services on the market (implementations)).

In the most direct and “tangible” sense the K-BI dispose physically with the technical infrastructure (laboratories, technical and engineering equipment, tools for

conducting experiments and research as well as any premises and working space which is sometimes offered to enterprises e.g. on the free-of-charge or any kind of mutual agreement basis, at any stage of doing business). Secondly, those institutions' "input" in the business process refers to the involvement of human capital (individual researchers, teams of scientists, whole institutes/departments/chairs etc.) in the production/business undertakings (of the start-up companies).

Looking at a "formal" perspective of the issue, we can mention scientists' engagement or cooperation with the companies in the role of mentors, advisors, co-workers or persons responsible for managing/completing the given tasks in the concrete business projects, their participation in works on new products, technologies, services marketed later by a company etc. The representatives of the knowledge-based institutions temporarily work, realize contracts or take part in projects conducted by business-environment institutions, such as innovation centres, centres of technology transfer or public institutions, e.g. Polish Agency of Enterprise Development. When we take more "informal" perspective, there should be accentuated the participation of K-BI representatives in numerous events, such as trainings, workshops, conferences, courses etc., organized by entities-actors of the startup ecosystems. The ways and channels of cooperation between K-BI and start-up companies in Poland shortly characterized above will be comprehensively and meticulously researched, "measured" and then presented in the quantitative terms in the empirical part of the author's studies.

Another important aspect of the issue refers to some "intangible" impact or input of the knowledge-based institutions in the start-up ecosystem under which the author understands the spillover of ideas, knowledge and information coming from universities, research centres, scientific institutes and other within the studied ecosystems. This kind of impact refers to different domains of the start-ups' environment and can be realized itself at different stages of those business entities' emergence and development.

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