

EXPLORING AN ENTREPRENEURIAL ECOSYSTEM WITH REGARD TO BUSINESS-SCIENCE-GOVERNMENT COOPERATION: PRELIMINARY RESEARCH FINDINGS

Ewa BADZIŃSKA

Poznan University of Technology, Faculty of Engineering Management; ewa.badzinska@put.poznan.pl,
ORCID: 0000-0002-2621-976X

Purpose: The paper provides a theoretical foundation of entrepreneurial ecosystems with strong focus on start-up ecosystem. The empirical purpose of the study is to identify the key actors, institutions and organisations which can provide a nurturing environment and services for the creation of the start-up ecosystem of the city of Poznań with regard to business-science-government collaboration.

Design/methodology/approach: The research applies the method of in-depth semi-structured direct interview with experts in the field of support services to potential founders and start-ups with academic origin, the case study method, participatory observation, and reflection. The explorative qualitative study uses both descriptive and explanatory techniques.

Findings: The research findings provide insight in the real nature of the local start-up ecosystem presenting its key stakeholders, the scope of their support and ways of creating a conducive environment for potential founders and start-ups. The research results highlight the importance of studying the interdependencies among key actors in the start-up ecosystem in order to provide them with necessary resources and to stimulate the synergy effect.

Research limitations/implications: Research limitations resulting from the analysis of a purposefully-selected case of the start-up ecosystem do not allow formulating general conclusions. Nevertheless, it illustrates a real business practice and challenges of the development of the specific entrepreneurial ecosystem. Future research line will concern an in-depth analysis of the most critical obstacles in the process of start-up creation as well as the assessment of the interdependencies among the key stakeholders of the start-up ecosystem to look for more effective cooperation.

Practical implications: The synthesis of the current reflections on entrepreneurial ecosystems and the research findings reflected here can benefit both employees of business incubators, researchers, and entrepreneurship teachers and become an inspiration for further analysis and extended research on problems associated with increasing the efficiency and sustainability of local start-up ecosystems and the need to build valuable relationships with key stakeholders.

Originality/value: The originality of the conducted exploratory research lies in presenting the real business practice and challenges of the development of the specific entrepreneurial ecosystem, and thus contribute to the discussion on the dilemmas associated with conducting the more effective practice-oriented research on start-up ecosystems.

Keywords: entrepreneurial ecosystem, entrepreneurship, start-up ecosystem, incubators, triple helix.

Category of the paper: Research paper.

1. Introduction

Entrepreneurial ecosystems play an important role in stimulating innovation in regions by supporting the creation and development of young companies from future-oriented industries (e.g. ICT, artificial intelligence, biotechnology and others), which in turn is a significant factor driving economic growth. The way in which entrepreneurial ecosystems are formed and evolving is particularly important in the context of searching for the path of economic development for Poland. A significant challenge is to increase the level of “innovation, new assets, and competitiveness through the more efficient use of the research results that lead to the development of products and services” (Badzińska, Mrugalska, 2022, p. 145). The accelerated pace of digitization contributes to an even greater increase in dynamics of the business environment and market structure. Thus, science and technology are critical for the execution and operations of modern businesses.

Innovation support systems emphasize the role of interaction between various actors of the economic environment and innovation policy for the success of activities. Etzkowitz (2002, 2008) underlined the requirement to shift toward a triple helix model of partnership between government, industry, and higher education to strengthen the dynamics of innovation and build a business support network. In turn, Isenberg pointed out that in order “to ignite venture creation and growth, governments need to create an ecosystem that sustains entrepreneurs” (Isenberg, 2010, p. 41).

Entrepreneurial ecosystems develop naturally through co-evolution, but by implementing appropriate forms of substantive, regulatory, financial or infrastructural support, one can try to design them in an intelligent manner and stimulate their development. “Ecosystems are usually a result of intelligent evolution, a process that combines the invisible hand of markets and institutional support to ensure (relative) self-sufficiency” (Buła, Schroeder, 2020, p. 23). Thus, a proper understanding of the nature of the entrepreneurial ecosystem is essential in developing entrepreneurship in the region. Therefore, the ability to identify the triple helix partnerships can be crucial when trying to design a sustainable ecosystem. Moreover, success stories of innovative companies in the ecosystem can affect its condition, contributing to its evolution. “Even one success can have a surprisingly stimulating effect on an entrepreneurship ecosystem – by igniting the imagination of the public and inspiring imitators” (Isenberg, 2010, p. 48).

A look at ecosystems from the point of view of cities as a kind of innovative “hubs” is important, as examples of European start-up ecosystems (e.g. London, Berlin, Munich, Stockholm) confirm that a strong concentration of start-up entrepreneurship occurs precisely around large cities (The Global Startup Ecosystem Report, 2017). In publications and reports on the activity of young innovative companies and start-ups in Poland, cities such as Warsaw, Kraków, Poznań, Wrocław, and Gdańsk are indicated as key cities for the start-up scene

(Deloitte, 2016; Skala, 2018; Polskie Startupy, 2021). The reports emphasize the dominant operating model of companies, the range of services and products they offer, methods of financing or acquiring new employees and building a network of contacts. However, there is still a lack of indications on the actors as well as the conditions for further development relating to the analysis of specific ecosystems at a regional level.

The cognitive goal of this study is therefore an attempt to fill this gap by exploring the start-up entrepreneurial ecosystem of the city of Poznań. Despite the increasing interest in entrepreneurial ecosystems, there is still a challenge how they should be composed and interrelated to create a supportive environment for innovative ventures and thus contribute to the development of the region. The article strives for a more deeper understanding what the real nature of the local start-up ecosystem “driven” by the actors representing the triple helix entities looks like. An essential basis for this study is the concept of entrepreneurial ecosystems (Isenberg, 2011; Brown and Mason, 2017) and the local start-up ecosystem, which focuses on the start-up scene (Wallisch et al., 2019). The empirical part of the paper aims to identify the key actors, institutions and organisations which can provide a nurturing environment and services for the creation of the start-up ecosystem in the city of Poznań. Using a case study method (Yin, 2013) we can understand entrepreneurial ecosystems in a more specific manner and diagnose which actors really provide and organize the connection of resources within the specific ecosystem.

2. Entrepreneurial Ecosystems – theoretical background

The emergence of the concept of entrepreneurial ecosystems is the result of applying the “ecosystem” metaphor to the issue of entrepreneurship where the ecosystem is considering a functional whole of the coordinated set of elements and mutual relationships between them and their environment. The origins of this concept can be traced back to James Moore (1993), who compared the evolutionary dynamics of firms to the natural environment. He claimed that businesses do not evolve in a “vacuum” and noted the relationally embedded nature of how firms interact with suppliers, customers and financiers. In turn, one of the first uses of the term “entrepreneurial ecosystem” is attributed to Boyd Cohen (2006), who defines it as an interconnected group of actors in the local (geographically) community committed to sustainable development by supporting new ventures. In turn, Mason and Brown describe it as an interconnected set of actors, organizations, and processes that “coalesce to connect, mediate and govern the performance within the local entrepreneurial environment” (Mason, Brown, 2014, p. 5). This definition was then supplemented by Stam and Spigel (2016), who constrain the entrepreneurial ecosystem to a geographic cluster of well-related factors with the power of nurturing business ventures: It is “a set of interdependent actors and factors coordinated in such

a way that they enable productive entrepreneurship within a particular territory” (Stam, Spigel, 2016, p. 1). Moreover, ecosystems are capable of self-organization and self-development in the form of complex, adaptive systems related to the interrelationships of components and the ability to adapt ‘inside’ and evolve together with the changing environment (Chan, 2001, in: Tomski, 2018, p. 115).

A particularly influential approach to entrepreneurial ecosystems was developed by Daniel Isenberg (2010) at Babson College who identified six generic domains within the entrepreneurial ecosystem, namely: a conducive culture, a range of institutional and infrastructure supports, quality human capital and social networks, venture friendly markets for products and services, as well as enabling policies and leadership, and availability of appropriate financial capital. Moreover, all these domains contain many elements and factors “interacting in highly complex and idiosyncratic ways” (Mason, Brown, 2014, p. 5). Therefore, special attention should be paid to the diversity of the ecosystem's entities, processes and mutual formal and informal relationships created by “a set of interconnected entrepreneurial actors (both potential and existing), entrepreneurial organizations (e.g. firms, venture capitalists, business angels, banks), institutions (universities, public sector agencies, financial bodies) and entrepreneurial processes (e.g. the business birth rate, numbers of high growth firms and serial entrepreneurs (...))” (Mason, Brown, 2014, p. 5).

It should be emphasized that the efficiency of organizations and entities included in entrepreneurial ecosystems depends not only on their own competences and potential, but also on interactions with other entities and the condition of the entire ecosystem. Therefore, the essence of entrepreneurial ecosystems is “to connect a critical mass of actors and resources that fuel the entrepreneurial actors in the entire region and provide a self-sustaining environment in which entrepreneurial activity emerges and start-ups develop and expand” (Freiling and Baron, 2017, p. 73).

Entrepreneurial ecosystems have gained increasing attention over the past decade as governments, private companies, universities and communities began to recognize the potential of integrated policies, structures, programs and processes that foster entrepreneurial activities in the region and boost innovation, employment growth and productivity (Isenberg, 2010, 2011; Mason and Brown, 2014; Stam, Spigel, 2016; Brown and Mason, 2017; Freiling and Baron, 2017; Spigel, 2017, 2020; Theodoraki et al., 2018; Tomski, 2018; Wallisch et al., 2019; Buła, Schroeder, 2020; Badzińska, 2021; Stam, Welter, 2020). When analyzing various approaches to the concept of entrepreneurial ecosystem, it can be noticed that it consists of the following factors: economic and social, cultural, technological, financial, managerial and regulatory, the mutual and effective use of which determines the ecosystem's ability to develop.

According to the entrepreneurial ecosystem model by Isenberg (2011), each ecosystem emerges under a unique set of conditions and circumstances where social, cultural and institutional factors play an underpinning role. Therefore, the interpretation of cause-and-effect relationships is difficult, because these relationships are multidimensional and ambiguous.

“The common denominator among entrepreneurship ecosystem elements is their essentialness for increasing numbers of companies growing more and more rapidly. Intrinsic to the ecosystem metaphor is that these elements interact in ways that the “whole” (the ecosystem) is self-sustaining” (Isenberg, Onyemah, 2016, p. 73). Therefore, it is important to look for answers to research questions about the genesis, key factors and main stakeholders, ways of creating common value as well as appropriate policies and conditions conducive to the creation of sustainable entrepreneurial ecosystems (Stam, Welter, 2020).

Taking into account the above considerations, it should be noted that the start-up ecosystem as a specific type of entrepreneurial ecosystem focuses on the potential of founders and start-ups in their region. The start-up ecosystem includes, as the name suggests, start-up ventures, i.e. those at the initial (seed) stage of development, looking for a scalable and profitable business model (Blank, Dorf, 2012), introducing innovative products and services to the market (Ries, 2011) and operating in conditions of high variability of the environment and competitiveness. Moreover, a start-up ecosystem forms the framework conditions and networks for this specific target in order to provide a better accessibility of resources and facilities to ensure an effective cooperation with local stakeholders. Furthermore, it aims to promote relationships between the ecosystem actors and to identify appropriate operations for the development of networks and support measures in the region (Wallisch et al., 2019). However, despite the ongoing research on ecosystems, there is still a challenge how to provide conducive framework conditions for (potential) academic founders and start-ups and support networking within the entire ecosystem to achieve common goals.

3. Research design and methods

For the theoretical-cognitive goal of this paper, a review of the management science literature was conducted along with the analysis of reports and data from secondary sources on the concept of entrepreneurial ecosystems. The following methods were used to cover various approaches to this subject of study: defining, comparing, attribute analysis, inference.

In turn, the empirical part of the study was designed to explore the main actors (within the business-science-government relationships) of the entrepreneurial ecosystem of the city of Poznań and their activities as well as scope of support they provide for its development. Therefore, in order to achieve the research objective and exemplify the studied problem in practice, the following research questions were posed: What is the configuration of critical triple helix stakeholders within the studied start-up ecosystem? What scope of services and facilities they provide to create a conducive environment for the creation and development of start-ups and the entrepreneurial culture in the local environment.

The empirical method makes use of a case study involving the analysis of stakeholders providing a nurturing environment for start-up incubation in the city of Poznań. The rationale for the use of the case study is its usefulness for the practice-oriented approach (Yin, 2013) related to the need of building effective cooperation within the entrepreneurial ecosystem. The nature of the case study is descriptive and reflective, and as a result it provides an illustration of the local start-up ecosystem of the city of Poznań.

The confrontation of multiple data sources justifies the iterative nature of data collection in the years 2020-2022. Primary data acted as a basis to identify the key stakeholders in the studied start-up ecosystem. An explorative qualitative study was conducted based on in-depth direct interviews with six experts in the field of commercialization and technology transfer, academic entrepreneurship and start-up incubation, intellectual property management as well as with four co-founders of ICT start-ups with academic origin. The experts represented, *inter alia*, Academic Entrepreneurship Incubator of Poznań University of Technology, the University Center for Innovation and Technology Transfer of Adam Mickiewicz University in Poznań (AMU), Poznan Science and Technology Park (PPNT) of Adam Mickiewicz University Foundation, and Foundation for Creating Shared Value by Students. The selection of respondents (experts) was purposeful and resulted from: (i) expert knowledge and practical experience of interview participants in the studied area; (ii) their long-term cooperation with the academic community in Poznań; (iii) their employment in institutes / foundations closely related to the transfer of knowledge and commercialization of research results; (iv) their experience as start-up co-founders; (v) the pragmatic criterion of availability of data. The above criteria lead to the conclusion that data obtained from the surveyed experts would help to attain the objective of the research.

An interview questionnaire was semi-structured and contained the following areas: (i) general questions about their organization (institution, foundation); (ii) questions about forms and scope of support for young entrepreneurs (potential start-up founders); (iii) questions about the sources of financing innovative business concepts of students and alumni; (iv) questions about the critical actors of the start-up ecosystem and the forms of support they provide. In order to verify the gathered information, further online conversations were conducted and the interview questionnaire was sent in an electronic form.

The source of primary data was also: the author's participatory observation, reflection and interviews in the field of supporting academic entrepreneurship conducted as part of a research internship at the Chair of Economic Sciences at the Faculty of Law and Administration at Adam Mickiewicz University (AMU) in Poznan in the period March-June 2020.

The necessity to confront various data sources forced the application of the triangulation principle (multi-method study) (Sułkowski, 2012; Glinka, Czakon, 2021). To expand the database on the studied stakeholders an analysis of materials from the available secondary sources was also conducted. They included: websites of incubators, technology park, foundations, the city of Poznań, press releases, opinions of supported students and start-ups as well as the social media run by academic incubators and start-up community in Poznań.

4. Research findings and discussion

The results of the empirical research allow us to conclude that the start-up ecosystem of the city of Poznań is made up of representatives of the business, scientific and research spheres, as well as the local government. The configuration of critical stakeholders within the studied start-up ecosystem consists of: research institutions, universities, incubators, science and technology parks, start-up environment creating a talent pool, business sphere represented by innovative enterprises, private equity investors and other business-related stakeholders, moreover financial and advisory institutions, as well as public administration and local authorities in supporting entrepreneurship. As a result of the conducted empirical research, stakeholders considered necessary for the studied start-up ecosystem were identified, as outlined in Table 1 (Appendix).

Human capital is a strong point of the studied start-up ecosystem. Poznań is characterized by a large number of students and graduates, including technical sciences and engineering (in the 2020/2021 academic year there were 104,729 students and 24,900 graduates in Poznań; <https://badam.poznan.pl/2021-studenci/>). Nevertheless, the education process still requires a greater practice-oriented approach and better adaptation to the needs of the market.

In the studied ecosystem the crucial role may be played by business and technological universities, which could try to connect the most powerful actors creating and supporting the whole start-up ecosystem in a highly complex manner. An important role in the area of strengthening the entrepreneurial ecosystem is played, for example, by the Adam Mickiewicz University in Poznań, the Poznań University of Economics and Business, and the Poznań University of Technology. They are strongly linked with the economic, social and administrative environment through the collaboration with numerous enterprises and national institutions, as well as global concerns and research units. The intensification of science-industry cooperation is of key importance by creating, inter alia, platforms for the exchange of new technologies and inventions, and delivering appropriate solutions for external partners. Cooperation with local government, national agencies (e.g. Polish Agency for Enterprise Development) and business sphere is of great importance for joint participation in designing a pro-development offer in the field of the broadly understood knowledge-based economy. Entrepreneurial universities are expected to intensify the process of applying for research projects strictly aimed at increasing the competitiveness and innovation of enterprises in the region, thus contributing to the sustainable development of the ecosystem. “The objective is to enable universities to play a creative role in economic and social development from an independent perspective while still being responsive to government and industry priorities” (Etzkowitz, 2016, p. 83).

Undoubtedly, the most important contribution universities make to the start-up ecosystem is their students who bring new ideas and increase the intellectual capacity of the community. Students and alumni as potential founders and existing start-ups create a talent pool for the regional environment and much more broadly. To a large extent, it is their commitment, innovation and creativity that determines whether the start-up scene will be created and will evolve as the core of the entrepreneurial ecosystem. Moreover, active participation in student organizations and scientific circles contribute to raising awareness of entrepreneurship, self-employment and further development of competences. Students involved in creating innovative solutions within scientific circles in the field of computer science, artificial intelligence, biotechnology, telecommunications, production engineering, machine building and many others undoubtedly bring tangible results to the development of the entrepreneurial ecosystem. In turn, participation in national and international competitions creates an opportunity to build both bilateral relationships among local stakeholders and extended multilateral relations as well. The informal ties that arise on this occasion can also be beneficial to the evolution of the ecosystem. Furthermore, start-ups with academic origin “can increase the transfer of research findings from university to the market, drive productivity growth, create new employment, as well as promote business internationalization” (Badzińska, 2021, p. 26). There is also evidence that growth-oriented start-ups provide an important stimulus within entrepreneurial ecosystems by increasing cooperation, the efficient allocation of resources, and investing heavily in human capital. The role played by the academic community represented by researchers, entrepreneurship teachers and authorities providing both substantive, organizational, and financial support as well should also be emphasized. Knowledge transfer is a fundamental driver of ecosystem evolution over time and it is responsible for the creation of intra- and inter-organizational networks of cooperation.

Entrepreneurship incubators located at universities should play a fundamental role in shaping entrepreneurial mindset. Generally, an incubator’s purpose is to provide a supportive environment that enhances the probability of survival and success of incubated entrepreneurs. These institutions are expected to be heavily involved in creating a start-up friendly climate and undertake activities to strengthen the entrepreneurial culture in the region, improve framework conditions and support start-up networks. Incubators placed at universities (e.g. Academic Entrepreneurship Incubator of Poznań University of Technology) are the key actor of the university-based entrepreneurial ecosystem who should provide services to potential founders and start-ups with academic origin facilitating their access to academic and business networking as well as match them with the right scientists and mentors. Unfortunately, the analysis of activities undertaken by academic incubators at public universities leads to the conclusion that their activity is practically invisible to the target group (e.g. lack of extensive promotional campaigns of events, selection of inappropriate communication channels, lack of awareness among students about the existence of an incubator) or that any actions are taken very rarely (e.g. on-line seminars) or not at all. Another issue is the need to adequately adjust the content

of organized events to the needs of potential founders. An undoubted weakness of university incubators is usually the lack of funding from external sources (by third-party funds), but only from modest university funds. As a result, there are very limited possibilities of organizing useful events for students, such as, for example, workshops conducted by business practitioners (e.g. legal, financial and tax advisors, entrepreneurs, investors in the seed and start-up phase) who could share valuable knowledge and real experiences. Moreover, an incubator usually employs one person (sometimes it is even a university teacher) who, for objective reasons, is not able to effectively organize and promote events that build entrepreneurial attitudes among students. A reduction in public funds may affect the scope of activities and further limit support for potential founders.

An example of effective operations in supporting student entrepreneurship is the activity undertaken by the incubator in the Poznań Science and Technology Park of Adam Mickiewicz University Foundation (PPNT). Professionals with many years of experience in the field of pre- and incubation provide professional advice and connectivity with the key actors of the local entrepreneurial ecosystem. In order to overcome resource gaps in the seed stage of potential founders and start-ups the employees of PPNT help support networking with external entities such as advisers, investors, potential partners or team members, early-adopter customers, and potential employees as well. Furthermore, people involved in the activities of the Foundation rely on various actors in the ecosystem to provide potential founders with substantial knowledge. They take on the role of an intermediary, for example by linking young entrepreneurs with private business consultants such as lawyers, tax consultants, business consultants or marketing advisers. All activities are designed to improve the chances of success for this target group. They are providing interactive and practice-oriented opportunities to share knowledge, experience and exchange best practices valuable for potential founders.

The Foundation for Creating Shared Value by Students, in turn, supports economic development and science, including the development of entrepreneurship, disseminates and implements new business solutions among students, promotes project management techniques and implements a socio-economic project. The mission of the Foundation is to support students in creating projects while maintaining the idea of creating shared value. Cooperation with the Foundation helps build students' awareness of the entrepreneurial mindset through a variety of events and formats but also of the challenge that it takes time to build a vibrant, sustainable venture.

Startup communities are an important part of the entrepreneurial ecosystem. They have a significant impact on the cohesion and evolution of the entrepreneurial ecosystem. Moreover, founders and start-ups gain significant value through their access to internal and external networks, which help them develop business partnerships, recruit qualified personnel, and obtain advice from external experts. Community members can enhance both individual performance and benefit from the value created by the ecosystem. Therefore, it is necessary to understand and stimulate the mutual relationships that determine the sustainability of the entire

ecosystem. Moreover, a friendly environment where trust dominates fosters the transfer of knowledge and skills between the members involved.

Key elements of the start-up ecosystem are also made up of entrepreneurs associations, network platforms and co-working spaces. They provide opportunities to engage potential founders, as they facilitate the sharing of knowledge and business experience, building a sense of a common start-up community. In addition, each member of the start-up community contributes through their core competencies, creating added value for the entire ecosystem.

The Co-working space “+1” is a joint project of the City of Poznań and the municipal company Wielkopolskie Centrum Wspierania Inwestycji (Investment Support Center of Greater Poland). It provides services and infrastructure to entrepreneurially stimulate local start-up communities. The mission of the co-work is to create a widely accessible place for meetings, work, and exchange of knowledge and experiences in Poznań. The space is focused on supporting people planning to start a business, entrepreneurs, freelancers, people working in the remote work model.

The availability of finance is a further critical factor of entrepreneurial ecosystems. Particularly important is a critical mass of seed and start-up investors to provide finance and hands on support. The investors in the initial waves of new ventures are often private individuals. As noted earlier, most start-ups are initially funded through a combination of self-financing, microcredit, loans from family and friends, and bootstrapping (Polskie Startupy, 2021).

Financial support is provided, for example, by InCredibles powered by Sebastian Kulczyk. The InCredibles is a tech acceleration program focused on supporting talented entrepreneurs from across Central and Eastern Europe in launching disruptive businesses. The InCredibles mentoring program offers free workshops, participation in international conferences and individual consultations with experts and investors in the field of, among others, management, sales and marketing, strategy, communication, financing and human resources. InCredibles supports the diffusion of knowledge and experience as well as establishing of business contacts. It effectively connects young entrepreneurs with investors, clients and contractors. Moreover, InCredibles creates a network of mentors, competence centers, industry organizations and venture capital funds, becoming a platform for support, development and inspiration for young entrepreneurship leaders (InCredibles, 2022).

Focusing on relational elements within the start-up ecosystem a crucial role is played by providing specific and continuous updated information important for the members, offering intended and unintended learning processes within the community, as well as shared entrepreneurial cultural behaviours. All the factors stimulate better mutual understanding, but their effectiveness depends on the local social relations. It is well known that entrepreneurs and potential founders need to utilize their social networks to access the cut edge knowledge, human capital, and other resources required to create and sustain their entrepreneurial ventures. A significant challenge in the studied ecosystem is the lack of coherent communication to build

sustainable relationships with valuable actors and create common ecosystem value. There is a need to create a common communication channel so that all interested parties can keep abreast of information and contribute to important entrepreneurial activities in the local environment. A solution could be to create a platform managed by the local administration, where potential start-up founders and other interested parties could find information about current events offered by various stakeholders. Moreover, proactive management can help improve conditions for members of the entire ecosystem.

As there are a lot of possible combinations of actors in an entrepreneurial ecosystem, the question is who is the “leader” of the structure of the entire ecosystem. Usually „all the members of an entrepreneurial ecosystem have some discretion to act as architects of resources and capital structures” (Freiling, Baron, 2017, p. 74). This study assumes that within the start-up ecosystem of the city of Poznań there are many leaders who manage entrepreneurial actions and programs, but only within their own units (foundations, incubators, entrepreneurship agencies). However, there is no main “architect” who may act as a catalyst for a variety of actors (e.g. universities, chambers of commerce, founding teams, start-up community, government institutions and private business consultants) to encourage the creation of programs and favourable conditions that build awareness of the local start-up community, stimulate the inflow of new founders, but also support the further development of established entrepreneurs.

5. Conclusions

The activities of entrepreneurs, research and scientific institutions, business incubators, seed funds, private equity and other key stakeholders build the position of both companies and the entire entrepreneurial ecosystem. Poznań has strong potential "anchors" for the start-up ecosystem in the form of large national and international enterprises and universities, which are the main sources of knowledge, skills and cooperation. Here is an active start-up community and a significant infrastructure for business development, including entrepreneurship accelerators and incubators, which proves the development potential of local entrepreneurship. Thus, there are favorable conditions for the emergence and development of innovative start-ups.

Nevertheless, some aspects of the local ecosystem require more attention and more targeted efforts to identify enterprises with high potential to support them with the appropriate package of measures, including professional consulting and networking. In addition, the ability of large enterprises to engage in local entrepreneurship should be greatly enhanced by developing a clear and consistent value proposition for the stakeholder. It is necessary to provide a number of forums and initiatives aimed at supporting multilateral cooperation between science,

business and local government and building trust in the field of knowledge exchange, in order to identify projects and initiatives that bring mutual benefits. Local authorities should strengthen their network intermediary function by taking on the role of local network coordinators or intermediaries. Although local authorities have started to support networking events, they often fail to turn these initiatives into concrete actions or stakeholder agreements. Moreover, a lack of integrated activities and information about comprehensive and complementary events is a weakness of this ecosystem. In turn, in the support sphere, there are still many acceleration programs needed to provide different sources of funding and appropriate scope of action.

An ecosystem must be composed not of specific isolated actors but of the interactions among them. Thus, one of the major challenges for the sustainable start-up ecosystem is to interconnect actors, available resources and competences in a highly useful manner. In order to take advantage of the opportunities offered by the entrepreneurial ecosystem, its actors must be aware of the potential benefits of their participation in it. Therefore an increase in consciousness of the activities carried out by various entities and stakeholders belonging to the ecosystem could have a positive impact on its co-evolution. Besides access to young, highly motivated, ambitious and committed entrepreneurs, openness and connections with other ecosystems are necessary in order to share good practices and exchange complementary resources for the development of innovative companies.

Exploring an entrepreneurial ecosystem requires to take into considerations its origin, stimulus as well as the processes by which it becomes self-sustaining. It is well known that ecosystems possess certain resources that are not available elsewhere. For this reason, the interplay of local resources and their relationships for supporting entrepreneurship have become of major relevance to local and regional strategies. In order to use the resources available in the region as effectively as possible and to stimulate the entrepreneurial potential of the key stakeholders of the start-up ecosystem, integration and transparency of activities undertaken by business, science and local authorities is needed. In addition, open access to comprehensive information on programs, policies and operations conducive to the creation of an active start-up community in the region, will allow decision-makers to design complementary offers. Only coordinated and systematic activities between business, science and the government will effectively stimulate the evolution of the start-up ecosystem of the city of Poznań and bring tangible benefits for the development of the agglomeration and the region.

Despite the ongoing research on ecosystems, there is still a challenge how to interrelate all these stakeholders and support measures that may drive the performance and dynamism of start-up ecosystems in Poland. Drawing on this research stream, future research line will concern an in-depth analysis of the most critical obstacles in the process of start-up creation as well as the assessment of the interdependencies among the key stakeholders to look for more effective cooperation for building a sustainable start-up ecosystem in the region. The next step will be to explore examples of good practice from other cities in Poland, develop comparable metrics and

try to provide recommendations for regional policy-makers for further strengthening of local entrepreneurship.

Research limitations of this study resulting from the analysis of a purposefully-selected case of the start-up ecosystem do not allow formulating general conclusions. Nevertheless, it illustrates a real business practice and challenges of the development of the specific entrepreneurial ecosystem, and thus contribute to the discussion on the dilemmas associated with conducting the more effective practice-oriented research on start-up ecosystems.

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Appendix

Table 1.

Stakeholders of the start-up ecosystem of the city of Poznań and the scope of the provided support

Type of entity	Examples	Scope of support
Public Universities	Adam Mickiewicz University in Poznań, Poznań University of Economics and Business, Poznań University of Technology Poznań University of Life Sciences	Substantive support provided by scientists, academics, business practitioners and university authorities. Dissemination of knowledge and practical experiences, entrepreneurship and business modeling courses. Organizational and substantive support: scientific clubs and student organizations, workshops, competitions and trainings, technical facilities and laboratory infrastructure, coworking spaces.
Private Business Schools	Collegium Da Vinci WSB University in Poznań Poznan College of Communication and Management Poznan School of Logistics Poznań Trade and Commerce College Poznan University College of Business University of Social Sciences and Humanities (USWPS) University of Technology and Humanities "Human Resources for Europe"	Substantive support provided by business practitioners. Dissemination of knowledge and practical experiences within entrepreneurship courses. Organizational and substantive support: student organizations, workshops, competitions and trainings, technical facilities and laboratory infrastructure, coworking spaces.
Entrepreneurship incubators at universities; Centers for research, innovation and technology transfer; Foundations, other contact points	Academic Entrepreneurship Incubator of Poznan University of Technology (exemplary support program: "Create Your Start-up" competition) Internship and Career Center at Poznan University of Technology University Center for Innovation and Technology Transfer of Adam Mickiewicz University in Poznań Adam Mickiewicz University Career Office Foundation for Creating Shared Value by Students (exemplary support program: "Shared Value Competition")	Substantive support: exchange of experiences, collaboration supporting students in the development of their innovative business ideas and business models. Developing critical thinking, problem-solving and social responsibility approach, communication, leadership. Substantive and organizational support for students in the implementation of projects while maintaining the idea of creating common value. Consultation of projects and preparing students to participate in competitions. Financial support (scholarships).

Cont. table 1.

<p>Founding teams, start-up community, potential founders; Competitions and networking platforms</p>	<p>StethoMe, Hotailors, IC Solutions, lubimyczytac.pl, Dice+, Glip.pl., notiOne, GO4Robot, 3DTEAM, InStream, Bitnoise, Sempire, picup, Bin-e, EcoEmber "Meetup" Startup Community Poznań Startup POZnań – Poznań Startup Community Poznań Entrepreneurship Days Startup Challenge competition Poznań Entrepreneurship Leader competition in the STARTUP category Shared Value Competition</p>	<p>Substantive and organizational support: dissemination of knowledge and practical experiences through workshops, competitions, trainings and hackathons, founders' meetings, networking, sharing important resources. Startup Community helps meet potential business partners, investors, and like-minded people. Benefits from the value created by the community. Promoting the sustainability of the entire ecosystem and the transfer of knowledge and skills among start-up community members.</p>
<p>Business incubators, innovative laboratories, science and technology parks</p>	<p>Poznan Science and Technology Park of Adam Mickiewicz University Foundation (exemplary support programs: project for start-ups "Scale-up Champions"; the "Innovation Incubator 4.0", "Technological incubator", "Hub R&D". Sigma Software Labs – startup incubator, based on the product and IT service business synergy. The Poznań Technological and Industrial Park (PPTP)</p>	<p>Shaping pro-entrepreneurial and pro-innovative attitudes of students, doctoral students and scientists through specialized training (exchange of best practices, interactive and practice-oriented workshops valuable for founders, start-ups, linking young entrepreneurs with private business consultants). Implementation of incubation projects for innovative companies and start-ups. Supporting technologically advanced digital startups in entering international markets, establishing cooperation with foreign corporations and investors, in scaling their activities. Intermediation in access to the research potential of the academic community, including international cooperation. Support in the commercialization of scientific and technological research results. Offering high-quality R&D services in the field of specialized analyzes and technology development as well as financing research activities; Business consulting in the field of EU projects, EU structural funds and other external national funds. Sigma Software Labs mainly focuses on pre-seed and early stage investments. PPTP is intended for ICT companies in the mature stage of development.</p>
<p>Local government administration bodies</p>	<p>Marshal's Office of the City of Poznań The Department of Economic Activity and Agriculture of the Poznań City Hall the municipal company Investment Support Center of Greater Poland Polish Agency for Enterprise Development (PARP)– Regional Office in Poznań</p>	<p>Providing consultancy, training and financial support in setting up a business. PARP identifies, develops and tests new forms of support for entrepreneurs; introduces new forms of support related to the concept of circular economy and the related processes of automation and digitization of enterprises; cooperates with entrepreneurs, entrepreneurs' organizations, institutions, universities and local government units in voivodships of Western Poland.</p>

Cont. table 1.

<p>Investors and business angels Local companies supporting the ecosystem</p>	<p>Mentoring program InCredibles by Sebastian Kulczyk SpeedUp Venture Capital Group – a leading group of venture capital funds Carlson EVIG Alfa VC Fund For Finance – Private Equity Poznań</p> <p>Volkswagen Poznań, Amica, Beiersdorf Manufacturing Poznań, Bridgestone Poznań, Solaris Bus & Coach, Delpharm, Kompania Piwowarska S.A.</p>	<p>InCredibles provides free workshops, participation in international conferences, individual consultations with experts and investors in the field of management, sales and marketing, strategy, communication, financing and human resources.</p> <p>SpeedUp supports the development of technology companies (from areas such as: consumer internet, electromobility, energy, fintech, martech, adtech, medtech, IoT and hardware) in an early stage of development (seed, pre-revenue, early growth) in Central and Eastern Europe.</p> <p>Carlson EVIG Alfa supports investments in technology projects at an early stage of development. of innovative IoT research projects</p> <p>Substantive support, internships for students, consulting service, financial support</p>
<p>Public business advisory centers</p>	<p>Business Advisory Center Competence Development Academy Poznań Center for Entrepreneurship Support Agency for Enterprise Development of Greater Poland Investment Support Center of Greater Poland</p>	<p>Substantive and organizational support: creating a platform combining business and scientific environment, promoting entrepreneurship among young entrepreneurs, supporting innovative activities.</p> <p>Strengthening the position of the city of Poznań as a leading urban center in Poland through the development of innovative branches of the economy and contributing to a new spatial order for the city of Poznań.</p>
<p>Private business consultants</p>	<p>Lawyers (e.g. law office SMW Legal) Tax consultants Business consultants Marketing advisers</p>	<p>Substantive support, consulting service for start-ups and social organizations</p>
<p>Coworking Spaces</p>	<p>Co-working space “+1” – a joint venture of the City of Poznań and the municipal company Wielkopolskie Centrum Wspierania Inwestycji (Investment Support Center of Greater Poland).</p> <p>Poznań Biznes Partner Business and Science Ltd. Business Link Maraton – The biggest chain of coworking spaces in Poland</p>	<p>A commonly accessible place for meetings, work and exchange of knowledge and experience in business which uses human and idea diversity to build new value. The co-working space is aimed at supporting people planning to set up a business, entrepreneurs, freelancers, and people working remotely. It promotes startups related to the city of Poznań providing access to the necessary knowledge, activating the local community.</p> <p>Infrastructure, IT and organizational support</p>

Source: own study.