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Table of Contents:

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Innovative Approaches to the Formation and Development of the Startup Ecosystem

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Abstract:

The article is devoted to considering the peculiarities of startup ecosystem formation. Modern theoretical views on the definition of startup ecosystem have been studied. The author's definition of "startup ecosystem" term has been given. Innovation and entrepreneurial ecosystems aimed at creating innovative products and services by startup companies have been analyzed. The structural elements of startup ecosystem under endogenous and exogenous changes in the business environment have been singled out. The situation of startup development in Ukraine and their further prospects have been

analyzed. Emphasis has been placed on the formation of entrepreneurial universities as an important component of the ecosystem. The experience of leading countries in the implementation and formation of startup ecosystem has been studied and adapted.

Keywords: startup; startup ecosystem; innovations; innovative development; entrepreneurial university; the YEP project.

JEL Classification: Q23; Q32; Q57.

Introduction

The intellectual economy is creating new global trends in production, consumption, markets and business structures. The formation of the global ecosystem of startups was a significant tendency in the intellectual economy development of the last decade. The global startup ecosystem is becoming a powerful generator of new business ideas, which, being embodied in breakthrough innovations, are changing the lives of millions of consumers. As to the number of the most valuable startups, Silicon Valley is leading, 50% of the world's most valuable startups are located here (Sytnyk 2017). Under the increasing role of the global startup ecosystem in the world economy, studies devoted to various aspects of its functioning are becoming increasingly topical.

1. Research Background

The conceptual foundations of investigating startup ecosystem can be found in the works of Blanc S., Dorf B., Moore James F (1996), Zaikin A., Holierova V. (Zaikin 2020), Sytnyk N.I. (2017), Glushenkov A.A. (2016), and others. But there is an urgent need to assess the current state and prospects of startup ecosystem development.
The problems of forming and functioning ecosystems are topical and widely studied in the world. The given definition was originally used only for researches concerning the environment. The question of ecosystems' classification arose in the society in order to implement the UN programs adopted in Rio de Janeiro in 1992 (Didukh 2004). In economic aspect, the term "ecosystem" was first mentioned by J. Moore in 1993 in a publication for the Harvard Business Review (Moore 1996). Introducing the term "entrepreneurial ecosystem", the scientist noted that companies did not develop in a "vacuum", but in a specific environment (Gorb 2017, 2020; Aranchiy, 2017, 2020). This approach is of great importance in the process of supporting and developing startups, as these business units require special conditions for functioning, and ecosystem, as a whole, is directed at their implementation – jointly and competitively to support innovative developments, ideas, to forecast and satisfy clients' needs.

2. Methodology

The startup industry demonstrates high growth rates every year and depends on the coordinated work of all participants in this ecosystem. Therefore, theoretical and practical studies of startup ecosystem formation are extremely important. The purpose of the article is to identify the peculiarities of startup ecosystem development and determine the role of its subjects under the conditions of exogenous and endogenous changes.

3. Results and Discussion

Today, startups are becoming one of the most attractive places for investments, and the vast majority of innovative and new products and services are created by them. Startups can be implemented more effectively in a developed startup ecosystem (Yasnolob 2018, 2019). Let us study modern theoretical views on the definition of startup ecosystem in Table. 1.

Table 1. Modern theoretical views on the definition of "startup ecosystem"

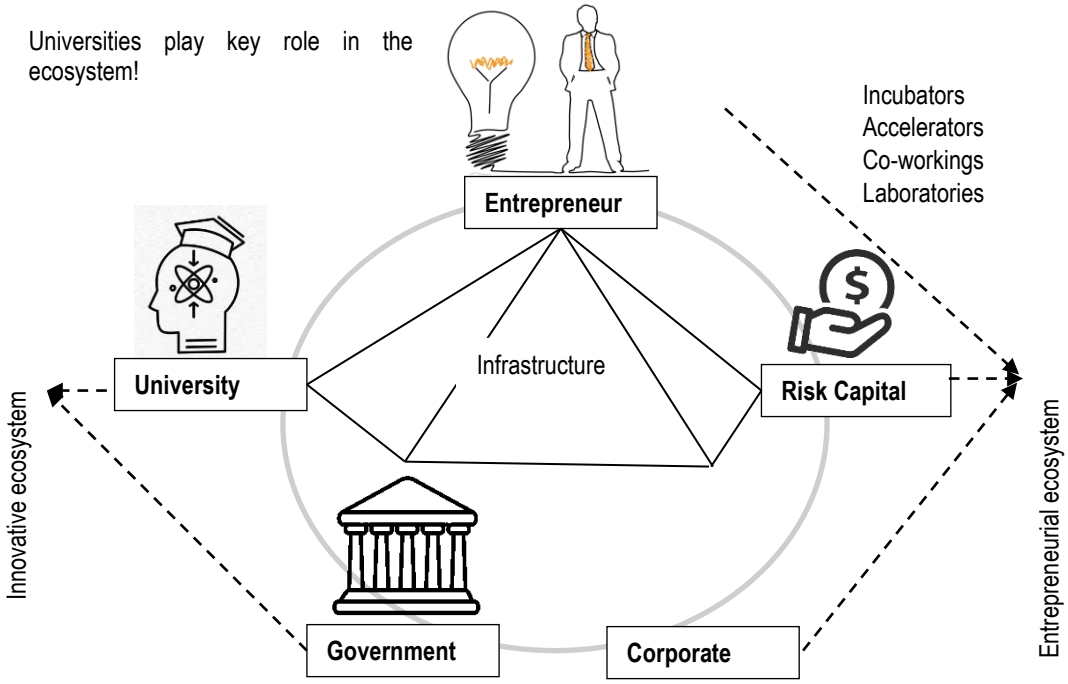
Authors	Leading functions
Zaikin A., Holierova V. (Zaikin 2020)	It is an environment, in which all participants interact, who are one way or another connected with startup industry
Sytnyk N.I. (2017)	It is an open dynamic system, in which startup companies are the system-forming entity at different stages of life cycle
EU4Digital (Success stories 2021)	*It is formed from people, startups at their various stages and different types of organizations in a (physical and/or virtual) place, interacting as a system to create new startup companies*
James Moore (Innovative startups 1993)	It is a system, which stimulates innovations and gives energy to the initial stage of business
Glushenkova A.A. (2016)	It is a complex of organizations, institutions, enterprises, which promote the development of innovation activities and ensure successful startup foundation and formation

Source: the author`s development

The author's definition of "startup ecosystem" is the following: it is the environment, in which all participants connected with startup industry interact and their aim is to stimulate the development of innovative projects. There must be a connection between all the participants. In each country, the components of the system are filled differently.

The more actively and openly the ecosystem players interact, the more opportunities there are for startups. The startup ecosystem consists of the following elements: entrepreneurs, universities, government, corporations, and investors (Figure 1).

Figure 1. Components of startup ecosystem



Source: supplemented by the authors based on (Murray, 2016)

Startup ecosystem is a subsystem of the innovation and entrepreneurial ecosystem and is directed at creating innovative projects by startup companies. The main functions of the structural elements of startups' ecosystem under exogenous and endogenous changes are presented in Table 2.

Entrepreneurs (startup companies) at different stages of life cycle and potential participants of startups with or without experience in innovative entrepreneurship are the system-forming entities occupying a prominent place in the ecosystem. Relying on their intellectual potential, they participate in generating new ideas and developing commercially viable innovative products and services (Sytnyk 2017).

The countries' Governments have to support entrepreneurs and implement appropriate legislative initiatives. Corporations often become the starting clients of startups and help check-up ideas, hypotheses, and testing.

Investors provide the first capital and promote the growth of startups and their entry into the market. There is a tendency in startups of many countries with underdeveloped economies that potentially successful projects, including in the field of IT technologies, are created by the national scientists, but their further development and investment process take place abroad. Correspondingly, in Ukraine, a limiting factor for startups' creation and the organization of an international company is the absence of sufficient free capital from domestic investors and the state.

Infrastructure is also an important ecosystem element, which includes organizations promoting the development of startups – incubators and accelerators, co-workings, laboratories, etc. (Zaikin 2020). The purpose of such organizations is to help startups at the initial stages of their development. They initiate the creation of an environment in which young entrepreneurs receive stimuli and practical experience. Educational programs are implemented, mentor support and grant financing or first investments are provided. The participation of a startup in various incubation or acceleration programs increases the chances of its success at the early stages.

Table 2. Main functions of startups' ecosystem

Entities	Main functions
Entrepreneurs (startup companies) at different stages of the life cycle and potential participants in startups	Generate new ideas, develop and launch commercially viable innovative products and services on the market
State central and local authorities	Form the legal basis of entrepreneurship, policy in the field of innovative entrepreneurship and protection of intellectual property rights
Investors: private and state capital, business angels, venture capital, investment companies and funds, crowd-funding platforms	Finance startup projects at different stages of life cycle, in particular provide the first capital and promote the growing of startups and their launching on the market
Universities and other centers of competence: research institutes, highly-technological companies, mentors	Form professional and business competencies of startup participants, act as potential partners of startups
Corporations	Become the starting clients of startups and help in checking-up ideas, hypotheses and testing
Infrastructure	Organizations promoting startups' development and creating "territories of opportunities": incubators, accelerators, co-workings, laboratories, etc.
Experts and activators: professional consultants, technical and business experts, mentors, lawyers, coaches	Provide professional consulting services to startups' participants and help increase their professional competences in the process of developing innovative products, promoting innovative ideas and products
Agents of changes: bloggers, journalists, famous politicians, business people, public figures, social groups	Provide information support to the ecosystem, form the society's attitude to startups, promote their popularization
Coordinating bodies: governmental and non-governmental committees, work groups, professional associations and unions	Perform a coordinating role in the ecosystem, create platforms for interaction of ecosystem participants (meetings, conferences, competitions, exhibitions, presentations, workshops, boot camps, etc.), promote establishing communication channels and developing knowledge exchange networks between startup entities and improving the competence of startup participants

Source: supplemented by the authors based on (Zaikin 2020; Sytnyk 2017)

Access to knowledge and transfer of experience are important at all stages of ecosystem development. Therefore, the main factor for the formation of startup ecosystem is high-quality human capital. This confirms the fact that according to ecosystems' ranking, which is compiled by Startup Genome, the first place is occupied by Silicon Valley in the United States (Global Startup, 2021). Since the twentieth century, this country has begun to invite highly qualified specialists and scientists.

Paul Graham, the cofounder of Y Combinator, stated that in the United States "there are no technology hubs without first rate universities… if you want to make a Silicon Valley you not only need a university, but one of the top handful in the world" (Ernestine Fu 2021). And the document of the European Commission in 2014 "Boosting Open Innovation and Knowledge Transfer in the European Union" contains four recommendations for action: to put the transfer of knowledge and technologies in the first place, to encourage innovative businesses, hubs and platforms, to make universities entrepreneurial, to finance the ecosystem sensibly (Dvorak 2014).

Education is always in the turbulence zone, questions arise as to what for a university is necessary if there are online courses; knowledge is rapidly aging and so the application of electronic scoreboards with answers from professionals is practiced, and specialists study directly while working. Some companies, Apple, for example, use their resources to create universities within the organization. Let us analyze the approach implemented by the world-class universities so that entrepreneurship in campus gave them the opportunity to work, rethink scientific approaches and become important for the society and even saving for the country (Table 3).

University graduates' associations often become investors in student startups. Thus, so that universities may become entrepreneurial, it is necessary to regulate the innovation ecosystem on the whole and within separate universities.

Brain drain is a major risk for many countries, including Ukraine, which the local ecosystem has faced for the recent 10 years. Accordingly, the role of the state sector is to organize the work properly and provide sufficient stimuli so that specialists stay in the country. One of the important conditions for the development of knowledge economy is increasing the role of higher educational establishments in this process. Entrepreneurial university has three main tasks: to train students for entrepreneurial activities; as an institution to create

innovations; to become a basis for the concentration of entrepreneurial activities and networking. Universities have talented students who are able to generate ideas and must be provided with all the necessary resources.

Table 3. The experience of world-class universities in improving entrepreneurship

Country	List of measures
The USA	Since 1951, Stanford University has built offices and leased them out exclusively to highly technological companies (about 40,000 companies were born, such as Linkedin, Netflix, Google and Nike, etc.). According to the ranking of "Top 50 universities, which graduate entrepreneurs" (Gabbert, 2018) from 2006 to 2018, 1,178 Stanford graduates founded 1,015 of their own startups and attracted $ 29 billion financing. Cornell Tech new business campus was founded by Cornell University in 2012 with the participation of New York city. Realizing the importance of business development, the city gave the whole island to create an innovative campus there
Great Britain	One third of universities have incubation programs – the programs working with startups to develop them to a new level
Israel	On the initiative of students, the Entrepreneurship Center was created at Tel Aviv University. The cooperation with more than 4,000 entrepreneurs a year takes place, about 30 programs are used

Source: supplemented and constructed by the authors according to the data (Semenova-Shelevytska, 2020)

In September 2020, the YEP project together with the Ministry of Digital Transformation of Ukraine, the Ministry of Education and Science of Ukraine, the Ukrainian Startup Fund with the support of the USAID program "Competitive Economy of Ukraine" launched the "Entrepreneurial University" initiative. The main goal of the project is to bring university entrepreneurship in Ukraine to a qualitatively new level and launch the trend of creating startups by young people and students. As part of a pilot project in the fall semester of 2020, the academic course "Innovative Entrepreneurship and Startup Project Management" was launched by YEP. Lecturers participated in interesting trainings and together with students gave feedback to the creative project (Rabchynska 2021). The course stipulated generating innovative ideas in a team of the second and third year students, because at this period young scientists are active in creating innovative projects most of all.

Poltava State Agrarian University (PSAU, Ukraine) passed the Competitive selection of the YEP project for teaching the course "Innovative Entrepreneurship and Startup Project Management" and was a partner in the event.

While studying the course, the students were divided into teams, chose roles according to the field of activity, and also determined the vision, mission and values of the team. In the process of forming a startup idea, young scientists looked for problems and built empathy map using design thinking; selected high-quality ideas based on brainstorming; validated ideas with a crash test; consolidated the problem and solution segments by developing a Lean Canvas of the business model outline; formed the client's portrait; conducted preliminary market research (questionnaires, interviews, focus groups, etc.) and discussed customer development; made the plan of creating a Minimum Viable Product. The students also assessed the startup scaling potential, determined the market volume using TAM, SAM, SOM methods, studied unfair advantages; chose communication channels with the target audience, got acquainted with modern trends; determined basic legal questions in the startup development and stages of investment attracting, and finally, were able to pitch their startups.

On the whole, with the help of questionnaires, the university students proved the following: with the rapid development of innovative technologies and the *situation connected* with COVID pandemic, the using of different gadgets by people regardless of their age increases. To improve everyday life comfort, web applications, websites, messengers are browsed. Therefore, the main startup ideas proposed by the third year students majoring in "Entrepreneurship, Trade and Exchange Activities" and "Management" in the first semester of 2020-2021 academic year are connected with IT technologies (Table 4).

Thus, within the formed teams, the students worked on solving both socially important problems and on the economic development of the country by introducing creative business ideas. As a result of scientific and business collaboration, three startups were created. Experts from the relevant fields were invited to validate them: nutritionist/ the owner of the International Center of Personal Nutrition; the owner of Pecher's coffee shops (stationary, which positions itself as an area of opportunities for entrepreneurs and mobile solar-powered; the manager of the author's clothing workshop and specialists in IT field.

Table 4. Startup ideas of students of Poltava State Agrarian University (Ukraine), 2020

The name of the application	Area of application	Peculiarity of startup idea
Easy Cook	Nutrition	The digital application, which will be placed on refrigerator and will function synchronously with mobile phone. It will include the following functions: will show recipes from food products available in the refrigerator and entered additionally; will satisfy the need in fast and balanced nutrition; will provide a list of diets for weight loss (calories will be counted) taking into account the entered indicators of the organism's vital activity based on filling out the clinical record personally for each user; consultations of a psychologist and a nutritionist in the application will provide positive emotions and fight with complexes; notification on the phone about the amount of water consumption is provided; the availability of telegram chat will include discussion of food problems
Your cup	Nutrition	The digital application provides online ordering of coffee and coffee products takeaway in certain places (university, organization, parks, etc.) by prepayment. It will include online chat
Makosha	Fashion	Creating a 3D online fitting site using a virtual double. It is a platform for national designers and their brands helping to sell exclusive clothes and giving consultations for individual tailoring at the optimal price.

Source: composed by the authors based on the developments of PSAU students

The results of the first half of the 2020-2021 academic year showed a high level of interest and openness of universities to the topic of entrepreneurship in Ukraine. At the forums, the lecturers confirmed their striving for development in this direction. It is very important in the context of developing the entire ecosystem and digital economy of the country. Implementing such potential requires further efforts of all participants of the "Innovative Entrepreneurship" initiative to improve the content, attract new universities, constantly improve lecturers' skills, develop the level of innovation management of universities' administration and create the opportunities for further development of students' startups. "Entrepreneurial University" creates a new business culture and community at different university levels of Ukraine (Rabchynska 2021). According to the results of the course studying, boot camps were held and the first all-Ukrainian national competition-final of students' startups was organized in 2021 by the mentors of the YEP project. Poltava University also takes part in other business initiatives.

Thus, in order to reorganize universities into entrepreneurial ones, it is necessary to establish innovations' ecosystem on the whole and within separate universities (Table 5).

Table 5. Ways to reorganize universities into business ones

Direction	Means of implementation
Creating a cluster of startup ecosystems	Creating a think tank, an institution which will make a roadmap for developing innovations. This establishment will bring together all stakeholders of the innovation ecosystem, analyze objective data and propose clear steps. Permanent participation in international projects is envisaged
The mechanism of stimulating university startups	Tax holidays for young entrepreneurs (the experience of Poland). To finance STEM and business education in schools and universities, to create a separate fund for infrastructural support of incubators, to provide benefits to companies cooperating with universities. Establishing campuses at certain universities
Profit distribution	Universities can make money by technology transfer. It is necessary to develop legislation for financing endowment funds. There must be fair and transparent rules for distributing profits from inventions between the university, department, professor, and student
Partnership of companies and universities	A positive example of Ukraine: Global Logic Education project (Naftogaz company) - the company trains students and teachers, as well as it created study equipment for universities. Companies' mission for universities is: study programs' review, dual education, support of creative formats, creation of business incubators on the basis of universities (universities provide companies with students and infrastructure, and the company provides incubator software, accompanies students' projects), teacher training, technology support at TRL 4-6 level, participation in university supervisory boards

Source: supplemented and constructed by the authors according to the data (Dvorak 2014)

On the whole, Ukraine has a significant potential for developing startup ideas, a high level of IT industry specialists' qualification is observed. The following national projects are recognized internationally: Petcube – a robot for pets, Ugears – mechanical 3D puzzles made of wood, iBlazr – an external flash for a smartphone, Preply – a platform for finding tutors, Ecoisme – a home energy management system, and others. In general, Ukraine was in the top 30 countries with the best ecosystems for startups in 2020 (Table 6).

Table 6. A selection of countries with the best ecosystems for startups

Ranking in the list	Rank change (from 2019)	Country
1	0	The United States
2	0	The United Kingdom
3	+1	Israel
…	…	…
27	-7	Poland
28	0	Austria
29	+2	Ukraine
30	New	Taiwan

Source: Derevyanko 2020

The first place in the ranking is occupied by the USA. Ukraine ranked the 29th in the list of the most technological countries in the world. The rating was made by StartupBlink company as part of the Startup Ecosystem Rankings study. Ukraine's popularity is explained by a large number of local professionals who are ready to develop their products. An important factor is also the low cost of business organization, which attracts Western investors to the country (Derevyanko 2020).

At the same time, Kyiv was recognized as a European hub of Ukraine. The capital took the 32nd place among technological capitals of the world (Startup Ranking 2021; Global Map 2021). The main participants in Kyiv ecosystem of startups are investment funds, accelerators, co-workings, and other organizations, such as: TA Ventures, A Ventures, EastLabs, Happyfarm, Polyteco, iForum, KyivWorking, Seed Forum Ukraine, etc.

Thus, the synergistic effect of startups ecosystem has to be formed by coordinating actions and progressive development of all its components.

Conclusions

An ecosystem is an environment, in which all participants involved in startups' industry and aimed at stimulating the development of innovative projects, interact. It is located at the intersection of business and innovation systems. A startup ecosystem consists of the following components: entrepreneurs, universities, government, corporations, and investors.

In Ukraine, a limiting factor for the creation of startups and organization of an international company is the outflow of scientific personnel abroad and the absence of sufficient free capital from the national investors and the state, which result in selling and implementing startup ideas in countries with available resources.

For universities to become entrepreneurial, it is necessary to establish on the whole the ecosystem of innovations at different levels – state, city and local – at separate universities. They have to create all conditions for education and merging students' startups. The scientific infrastructure of the university must promote the emergence of knowledge-intensive and technological innovative ideas.

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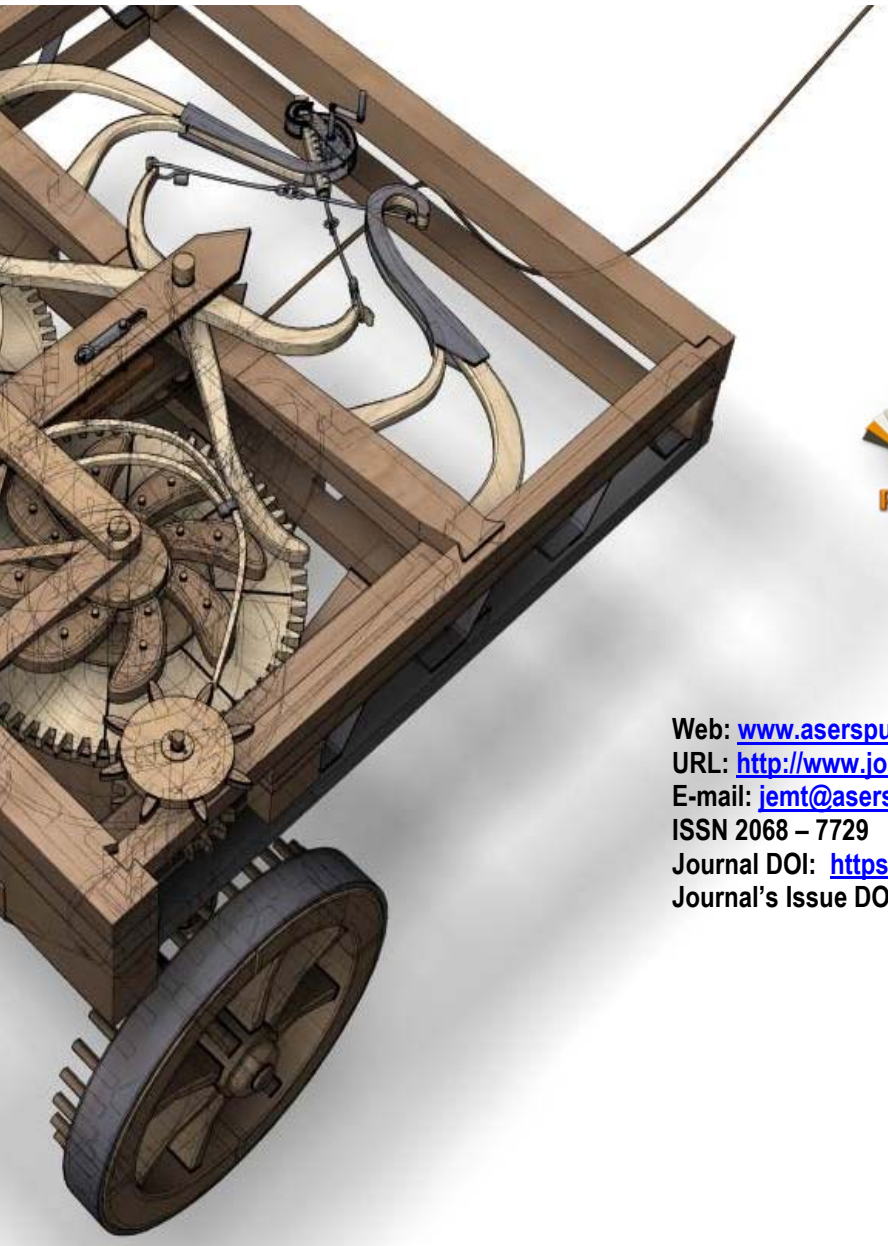

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