International Telecommunication Union
Development Sector

Startup Central Eurasia Ecosystem Ranking

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Annotation

The Startup Central Eurasia Ecosystem Ranking report is a product developed as part of the development of the Startup Central Eurasia platform, supported by the International Telecommunication Union, and prepared based on a comprehensive study of the current development of startup ecosystems in the countries of the region based on the ITU methodology for assessing ICT-centric innovation and startup ecosystems.

"I am proud to present the Startup Central Eurasia Report, a look at the innovative Central Eurasia, which was created with the support of ITU. The report will help strengthen the potential of the startup ecosystem in Central Eurasia. We plan to publish it annually and cover more and more countries. The report will serve as an analytical document for countries in the region wishing to improve their performance in developing startup ecosystems and the country's competitiveness."

Irakli Kashibadze, ITU Expert, Startup Central Eurasia project coordinator

"Innovative entrepreneurship is one of the driving forces of modern socio-economic development in countries, and policies and strategies for developing innovative potential and startup ecosystems are among the most discussed issues. The governments of the countries of Central Eurasia actively participate and promote the development of innovations, creating a favorable environment for human development and business startup."

Natalia Mochu, ITU Regional Director for the CIS Region

We hope that the data and recommendations provided in the report on improving innovative potential will allow the countries of the Central Eurasia region to assess the level of development of startup ecosystems, identify problem areas, identify growth points, and make decisions aimed at the consistent development of innovation and startup ecosystems and the digital development of countries and the region.

Note

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The analysis and recommendations contained in this report are based on the results of desk research, as well as information and opinions obtained during the surveys conducted, and materials provided by the government and other local stakeholders in the preparation of this report. All information contained in this report may be updated, changed, or replaced at any time. In addition, the report's authors are not allowed to practice law in the countries analyzed in the report.

Accordingly, nothing in this report constitutes a legal opinion, and no conclusions should be drawn as to the completeness, adequacy, accuracy, or suitability of the findings or recommendations. The views and conclusions expressed in this paper do not necessarily reflect the views of the ITU or its members.

Acknowledgements

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Introduction

The International Telecommunication Union (ITU), the UN's lead information and communications technology (ICT) agency, plays a key role in keeping member states informed about technological change.

ITU has created a framework, common methodology, and functionality for analyzing innovation ecosystems, including the startup ecosystem. These tools are used to develop national strategies and policies that promote innovative growth and create a sustainable enabling environment for digital development.

The purpose of the report is to conduct a comparative analysis of startup ecosystems in the countries of Central Eurasia to identify key challenges and opportunities for growth. The study's recommendations will support the development of technology startups, contribute to bridging the digital divide, and, in the future, create new jobs in the region. Given the level of startup maturity within the regional ecosystem, the Pre-seed and Seed stages were selected for analysis. These stages serve as the basis for the formation of startup ecosystems both in individual countries and in the region.

This report is a practical guide for stakeholders and includes a brief overview of economic activity, analysis, assessment and rating of startup ecosystems, key challenges, and recommendations for the development of startup ecosystems in the countries under study at the Pre-seed and Seed development levels.

For data collection and analysis, in-depth interviews with the main stakeholders of the countries' startup ecosystems, desk research were used, which made it possible to obtain a holistic study on the development of building blocks in two sections of Pre-seed and Seed in seven countries of Central Eurasia (Azerbaijan, Armenia, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan). The report should serve as a comprehensive reference tool to identify the advantages and disadvantages of the startup ecosystems of the countries studied, using the findings and results of the rating to direct support for innovation and the development of the startup ecosystem in the right direction.

1. Methodology for assessing the level of development of a startup ecosystem

To determine the level of development of the startup ecosystem and its further development, and to identify the weak and strong points of stakeholders, it is necessary to develop a methodology for assessing the level of development of the startup ecosystem, which will allow creating a rating of countries in terms of the startup ecosystem.

The startup ecosystem consists of building blocks, whose efficiency and interconnected use are conditions for the creation of full-fledged technology companies with the potential to change the world for the better in the context of solving social problems and digital transformation.

Building blocks are allocated in five stages:

● Pre-seed; ● Seed; ● Startup; ● "Valley of Death"; ● SME.

The developed methodology can be used to evaluate the building blocks at all stages; however, in this report, the methodology is presented in more detail for the Pre-seed and Seed stages. Beyond that, the building blocks differ depending on the stakeholder. They are divided into six main groups:

● Entrepreneurs; ● Academia; ● Entrepreneurial support networks; ● Financiers; ● Private sector; ● Public sector.

Each of the stakeholders corresponds to a certain process of the startup ecosystem, as shown in Figure 1.

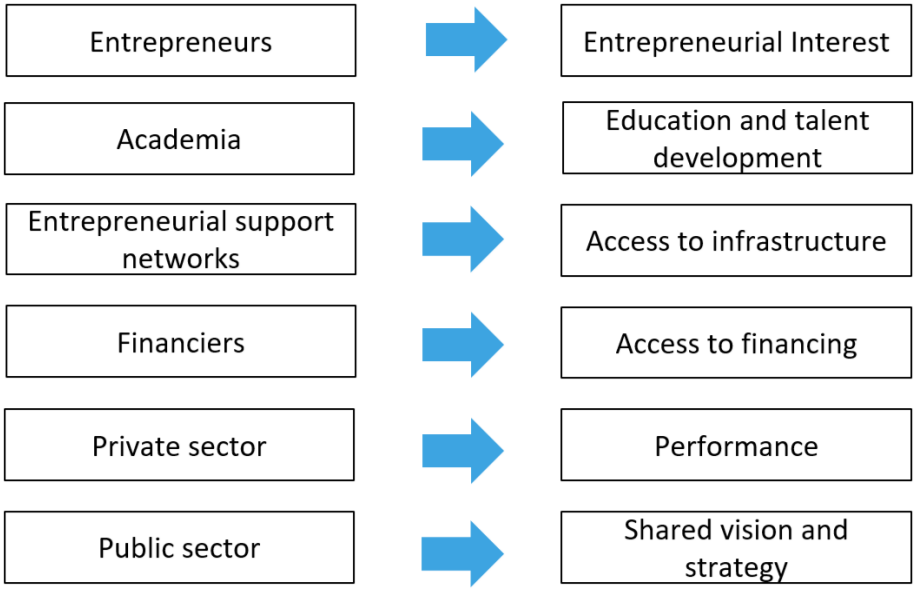

Figure 1. Stakeholder actions are predetermined by their role in the ecosystem within certain startup ecosystem processes

Within each of the processes, certain actions are performed (Figure 2), which lead to the creation and subsequent development of the corresponding building block.

Figure 2. Actions necessary for the development of startup ecosystem processes at the stages of Pre-seed and Seed

The structure of the building block is shown in Figure 3.

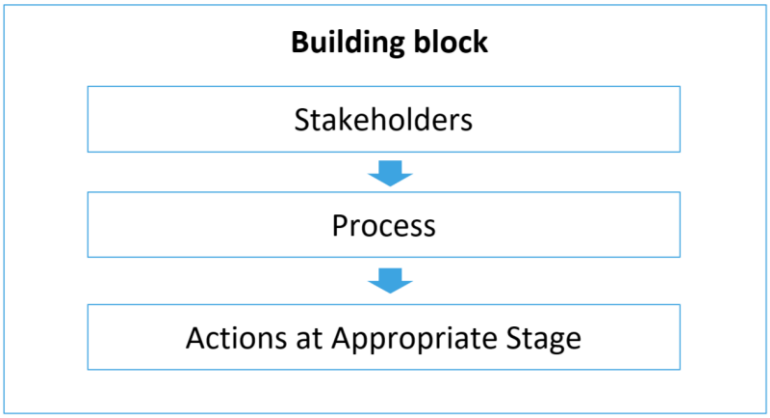

Figure 3. Building block structure

To understand the level of development of building blocks within the startup ecosystem processes, each is assigned a startup ecosystem process indicator. Based on the data received from stakeholders and open sources, the level of each indicator is determined: low, below average, medium, above average, and high. Each level is assigned a corresponding score (from 0 to 4). The following formula determines the values of indicators:

$$P_i = \frac{BL_i}{4}$$

where P_i is the value of the i-th indicator; BL_i is the assigned score according to the level.

Pre-seed indicators

Entrepreneurial interest:

- understanding the definition of a startup;
- support for technology businesses;
- use of a startup business model.

Performance:

- the number of startups that have attracted funding in excess of ten times GDP per capita per 1 million population over the past 3 years;
- the number of science-intensive startups that have attracted funding more than ten times GDP per capita per 1 million people over the past 3 years;
- percentage of knowledge-intensive startups relative to all startups that raised funding of more than ten times GDP per capita in the last 3 years.

Access to finance:

- average amount of initial financing;
- the maximum amount of initial financing.

Education and talent development:

- average experience of a startup founder;
- the average salary of a software engineer per year relative to the country's GDP per capita;
- percentage of startup founders with higher education;
- percentage of startup founders with advanced degrees.

Access to infrastructure:

- percentage of the population covered by fixed broadband Internet access;
- percentage of the population covered by mobile broadband Internet access;
- number of startups accepted into incubation and acceleration programs per 1 million people

Shared vision and strategy:

- the level of quality of the national strategy for the startup ecosystem;
- the level of understanding and consensus on the main issues of the development of the startup ecosystem among stakeholders;
- the level of the country's competitiveness in terms of the startup ecosystem at the regional and global level.

Seed stage indicators

Entrepreneurial interest:

- startup focus on a specific market;
- priority areas for the development of startups;
- approach to participating in startups.

Performance:

- the total number of startups created over the past 3 years per 1 million people;
- the number of prototypes / MVPs created over the last 3 years per 1 million people;
- the number of registered patents for the last 3 years per 1 million people.

Access to finance:

- average amount of initial financing;
- the maximum amount of initial financing.

Education and talent development:

- availability of fundamental research to form ideas and create innovations in relation to the number of universities;
- the amount of money allocated to basic research to generate ideas and create innovations.

Access to infrastructure:

- the number of competitions held over the past 3 years per 1 million people;
- the number of programs implemented over the past 3 years per 1 million people;
- the number of hackathons conducted over the past 3 years per 1 million people;
- the presence of the main techno park / IT Park, which deals with key areas of development for technology startups.

Shared vision and strategy:

- the existence of regulatory legal regulation to meet the needs of stakeholders in the protection of their intellectual property;
- availability of legal regulation for modern technologies;
- availability of regulatory legal regulation for the venture sector.

Criteria for determining the values of indicators are presented in Appendix A.

With the help of the obtained values of indicators, indexes of startup ecosystem processes are formed. For the formation of indices, it is necessary to determine the weighting coefficients of each of the indicators. For this, the method of pairwise comparisons is used. The pairwise comparison method is the most accurate and reliable for identifying preferences.

The idea of the method is that two indicators are compared in pairs, and the superiority of one of them is determined. It is believed that when solving a problem, it is much easier to make a qualitative comparison of two indicators, based on the opinions of experts, than to establish quantitative values.

Each of the experts fills in the matrix of pairwise comparisons. The experts are experts from the International Telecommunication Union, as well as representatives of stakeholders from the countries participating in the rating. As a result of filling in the matrix, the values of the importance of indicators are formed.

The weighting factors are determined by the following formula:

$$WC_i = \frac{1}{n} \sum_{j=1}^{n} IP_j,$$

where WC_i is the value of the i-th weight coefficient; IP_j is the value of the importance of indicators for the j-th expert; n is the number of experts.

Index values are determined by the following formula:

$$I_k = \sum_{i=1}^{m} P_i \times WC_i,$$

where I_k is the value of the k-th index.

As a result, the following representation of the indices in the form of a petal star is formed for each stage, as visually represented in the example in Figure 4.

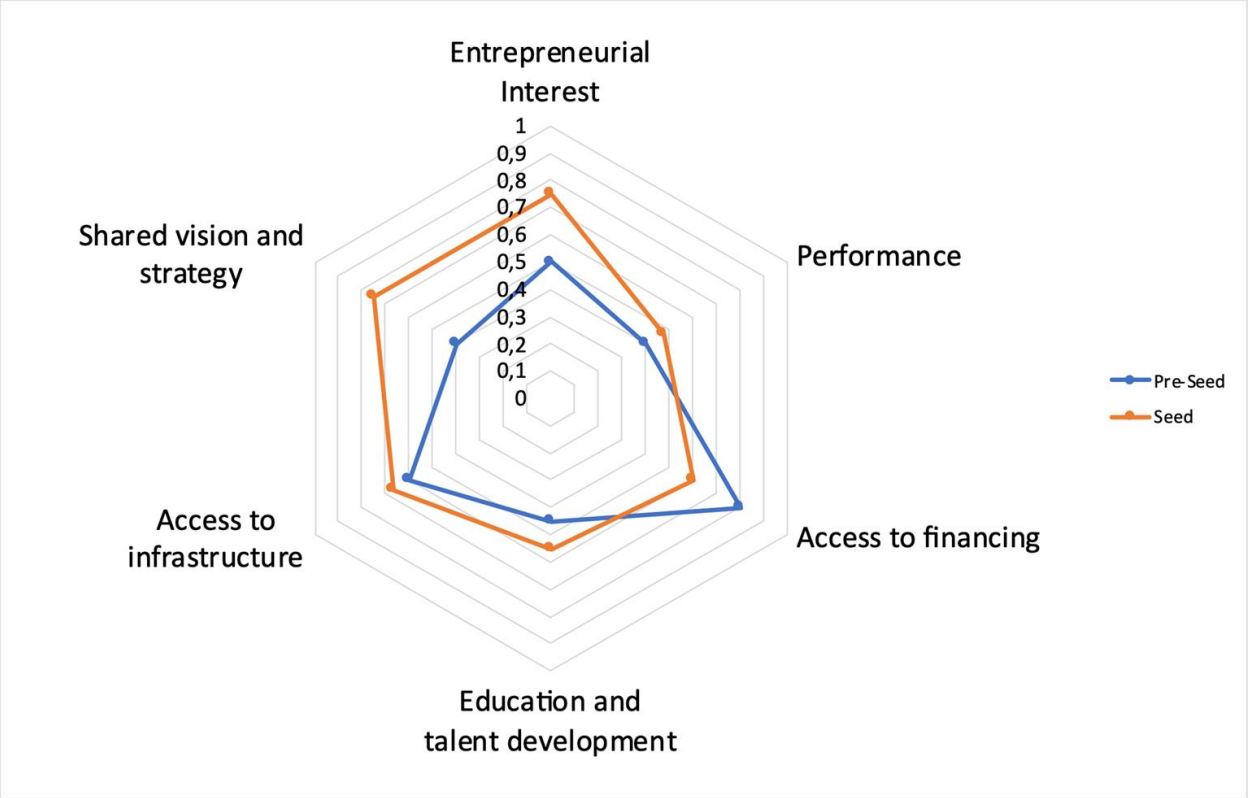

Figure 4. An example of representing process indices of a startup ecosystem in the form of a petal star

The value of the Country Rating in terms of the startup ecosystem at a certain stage is determined by the following formula:

$$R_h = \frac{1}{l} \sum_{k=1}^{l} I_k,$$

where R_h is the value of the rating of the h-th country at a certain stage; l is the number of indexes.

The startup ecosystem maturity map is presented in Appendix B.

2. The startup ecosystem of Central Eurasia

In Central Eurasia, there is an active development of the startup ecosystem: There are new success stories of startups that attract investments from regional and international investors. The popularity of entrepreneurship is growing rapidly in the region. However, there are still countries where there is no clear understanding of the difference between innovative (technological)[1] and classical business in society, where innovation means providing a company with completely new or significantly improved products and services that improve processes, saving time and resources. To achieve these indicators, startups use new technologies, including IT (information technology), so the term technology startups are often used. As before, many startups are created with a focus on the local market, or their ideas are copied from existing startups. The significant problem is that the results of regional startups from stage to stage are inferior to the results of the countries of Eastern Europe (and even more so to the developed countries of the EU, the USA, and Israel)[2].

A positive factor in the countries of Central Eurasia is the creation of specialized government agencies responsible for the development of the startup ecosystem. Such state institutions have different statuses and provide stakeholders with support programs, Access to innovation infrastructure, finance, and other products for the development of innovative enterprises. Unfortunately, some state institutions duplicate each other and are engaged in the development of one direction. However, a positive trend is noticeable in the same example of Kazakhstan, where duplicate agencies were connected to the Astana Hub Techno Park to maintain a unified policy in the field of innovation and startups. But, despite the positive developments, work in this direction is still very important, as duplication and a lack of a unified approach affect the provision of Access to finance and work on knowledge-intensive startups.

Regarding regional cooperation, it is important to note the existence of elements in individual countries that can be useful to the entire region of Central Eurasia. The Astana International Financial Center (AIFC) is such an effective tool that promotes the development of the startup ecosystem in Kazakhstan and the region. When creating the AIFC, best practices were used in terms of creating international financial centers in which English law operates, for example, the Dubai International Center. The AIFC has an efficient system for registering venture capital funds that both regional and international stakeholders can use.

The venture industry in Central Eurasia is at the initial level of development, but there are active processes for its development. Venture funds are actively involved in the development of the venture capital market by conducting training for potential fund partners and angel investors. Despite the efforts of venture funds, people with a high level of income prefer to invest in classic sectors (real estate, restaurant business, and trade) and do not diversify their investment portfolio very actively, thereby not actively investing in venture funds. To improve this process, a more intensive process of developing investment literacy is needed, as is improving the quality of management of venture funds, using the best practices of the region and leading ecosystems, and cooperating in this area.

[1] An innovative (technological) business meets the definition of a startup.

[2] https://eufordigital.eu/wp-content/uploads/2021/04/Guide-for-building-the-ICT-entrepreneurial-ecosystems-in-the-Eastern-partner-countries-maturity-analysis-and-recommendations.pdf.

In terms of the problems in the region, all countries highlight the need for highly qualified IT personnel and the competencies necessary to develop startups. All stakeholders note the importance of developing entrepreneurship education systems in universities and university infrastructure for student startups that will support innovative projects. The problems of legislation in the field of venture financing, support for startups in entering international markets, and cooperation between ecosystems are also highlighted.

In general, the region has great potential for development and the achievement of high results in the case of active collaboration of ecosystems, sharing of existing resources, optimization of government institutions responsible for the development of the startup ecosystem, a focus on the global market, and increasing the productivity of local industries.

The rating of countries in terms of the startup ecosystem at the stages of Pre-seed and Seed is presented in Figures 5 and 6, respectively.

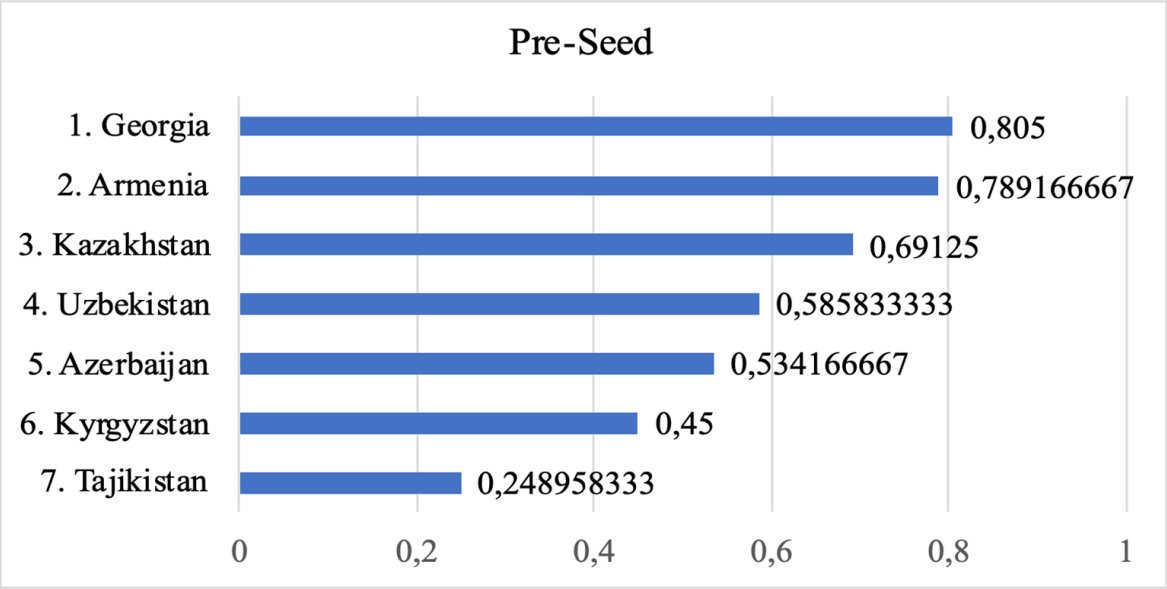

Figure 5. Rating of countries in terms of the startup ecosystem at the Pre-seed stage

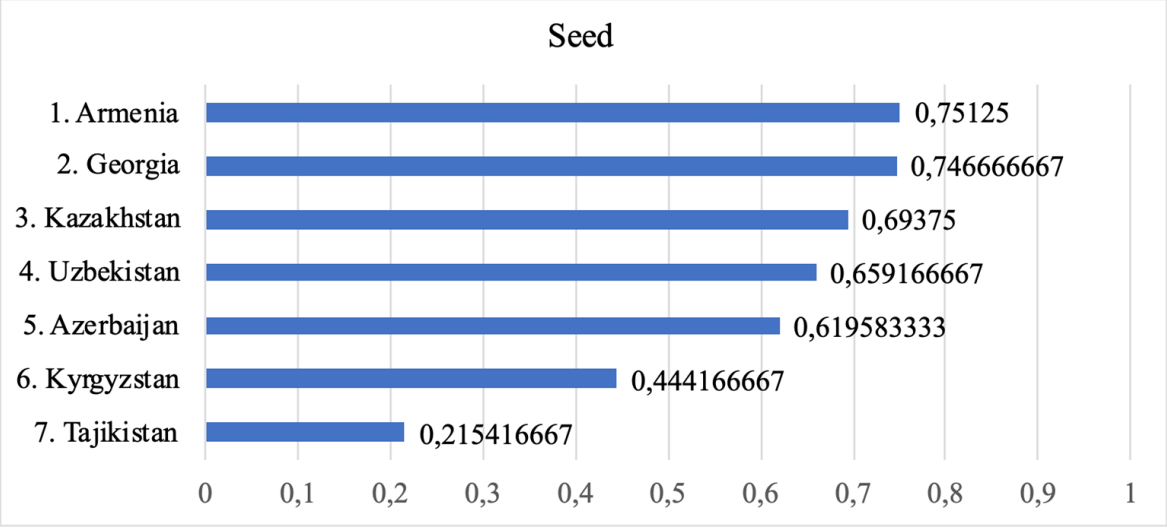

Figure 6. Rating of countries in terms of the startup ecosystem at the Seed stage

2.1 Azerbaijan

2.1.1 A brief overview of economic activities

Azerbaijan is an upper-middle-income country with a developing economy and innovative potential. GDP, according to data for 2021, is $54.6 billion[3]. In the structure of GDP, industry accounted for 51.1%, trade and repair of vehicles for 8.2%, transport and warehousing for 6%, agriculture and forestry, fish farming for 4.8%, construction for 4.8%, the sphere of accommodation of tourists and catering facilities for 1.6%, the information and communication sector for 1.4%, and other sectors for 14.7%[4]. The population of Azerbaijan is 10,156,000 people[5]. The GDP per capita is $7,818.

2.1.2 Overview of the Startup Ecosystem at the Pre-Seed Stage

2.1.2.1 Entrepreneurial interest

For most entrepreneurs, a startup is a technological business with the prospect of growth and the ability to scale due to a global view of the problem. The country's innovation leaders understand a startup as a team of people working on developing an innovative product to solve some problems in the market and satisfy customers' needs. In most cases, the founders of startups are 2–3 people. Creating a startup aims to develop a new product that will solve the problems in the country. Theory U is used to create and develop startups; that is, decisions are made under conditions of uncertainty. Support for technology businesses is different in comparison with the classic small business, but a significant study of tax incentives is still required (at this stage, the inconsistency of benefits between ministries makes it difficult to get real Access to them and reduces Entrepreneurial interest), as are free economic zones for foreign investment. Entrepreneurs use the main business models in the B2B and B2C segments: SaaS, subscription, and commission.

2.1.2.2 Performance

Entrepreneurs are visible to beginners; this is due to the relatively high number of successful startups. The most successful startups include:

- Hirelamp (a platform that allows you to find professional industry mentors to find a job or improve your professional skills);
- Glorri (smart talent acquisition system);
- Perkskit (worker performance improvement platform);
- Medicnext (a platform for getting medical advice online);
- Ziv4 (crypto exchange);
- Beep (a platform that provides an opportunity to find experienced drivers for personal and commercial use).

[3] Based on 2021 data https://data.worldbank.org/indicator/NY.GDP.MKTP.CD GDP growth of 14.2% in 2022 https://www.interfax.ru/business/884025.

[4] https://www.interfax.ru/business/881021.

[5] https://www.stat.gov.az/source/demoqraphy/ap/?lang=en.

2.1.2.3 Access to finance

At this stage, entrepreneurs rarely use their own capital. In terms of financing, we can highlight the business angel club Technovate - SABAH[6], which is a network of investors from Azerbaijan interested in investing in projects with regional and global potential and investing from 10 thousand USD to 50 thousand USD. The club is managed by Technovate Investments, LLC, and Sabah.lab and has 25 members. Its further goal is to expand the number of members to 100 within 2 years and attract at least $1 million in investments, 30% of which will be from Azerbaijan. In addition, to support startups, it is planned to create a matching fund (co-financing fund). Turkish venture fund BoğaziçiVentures allocated $5 million to accelerate Azerbaijani startup projects.

The largest banks developing the internal ecosystem in Azerbaijan are the International Bank of Azerbaijan (International Bank of Azerbaijan)[7], Pasha Bank (Pasha Bank)[8], and Capital Bank. Banks generally prefer to support startups that are directly related to their corporate innovation. The average amount of initial financing is about 5–10 thousand USD. The maximum amount of initial financing is $80,000 USD.

2.1.2.4 Education and talent development

For this process at the Pre-seed stage, it is important to demonstrate the activity of higher education institutions in terms of the development of a startup ecosystem. Incubation and acceleration centers, programming schools, and several other specialized institutions have been formed at a number of higher education institutions, the National Academy of Sciences of Azerbaijan, and state departments. The most active of them are Barama, New Space, AppLab, Youth Inc., and Tech. Az incubation centers[9].

The ADA University under the Ministry of Foreign Affairs is launching the “Ideas Incubation Program” in 2023 in cooperation with Azercell. This program will help turn ideas into MVPs or full-fledged companies. For the development of this process at the Pre-seed stage, it is important to understand the average experience of startup founders (1-3 years in Azerbaijan)[10]., the average salary of a software engineer (14.1 thousand USD per year)[11], and the percentage of startup founders with higher education and a degree (80% and 20%)[12].

2.1.2.5 Access to infrastructure

At this stage, for the development of a startup ecosystem, it is important to have a developed network infrastructure in the country, which will allow supporting startups using modern technologies, including remote access. Thus, the percentage of the population covered by fixed and mobile broadband Internet access is 86.5% and 88.8%[13], respectively. The key task is to provide support at the beginning of the entrepreneur's life cycle. Particular attention is paid to the inclusion of women in the development of the startup ecosystem.

[6] http://www.technovateangelsclub.com/.

[7] https://www.trend.az/azerbaijan/business/3504626.html.

[8] https://www.trend.az/azerbaijan/business/3504648.html.

[9] https://caliber.az/post/87164/ .

[10] According to a survey conducted by Startup Central Eurasia in 2022-2023.

[11] https://www.glassdoor.com/Salaries/baku-software-engineer-salary-SRCH_IL.0,4_IM1230_KO5,22.html.

[12] According to the survey conducted by Startup Central Eurasia in 2022-2023.

[13] State Statistical Committee of the Republic of Azerbaijan.

This is how Femtech works with female startup founders to help women with tech backgrounds launch their own startup[14]. Private companies such as Azercell, Bakcell and Nar Mobile play an important role by providing grants to incubation centers for startup competitions.

2.1.2.6 Shared vision and strategy

The country does not have a separate strategy for the development of the startup ecosystem; however, many issues related to the stakeholders of the startup ecosystem are taken into account in the digital transformation strategy. In 2022, the Agency for Innovation and Digital Development was created, which oversees many key processes for the development of startup ecosystems.

2.1.3 Rating of the startup ecosystem at the Pre-seed stage

Based on the data received from stakeholders, as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed. The calculation of startup ecosystem process indices is presented in Table 1.

Table 1. Calculation of startup ecosystem process indices at the Pre-seed stage in Azerbaijan

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Definition of a startup	0,4	3	0,75	0,3	0,65
Technology business support	0,4	2	0,5	0,2	
Using the Startup Business Model	0,2	3	0,75	0,15	
Performance					
Number of startups that raised more than 10 times GDP per capita per 1 million population in the last 3 years	0,37	2	0,5	0,18	0,4125
Number of knowledge-intensive startups that have attracted funding of more than ten times GDP per capita per 1 million population in the last 3 years	0,3	2	0,5	0,15	
Percentage of knowledge-intensive startups relative to all startups that raised funding of more than ten times GDP per capita in the last 3 years	0,33	1	0,25	0,0825	
Access to finance					
Average initial funding	0,7	2	0,5	0,35	0,65
Maximum initial funding	0,3	4	1	0,3	
Education and talent development					
Average experience of startup founders	0,3	1	0,25	0,075	0,4625
The average salary of a software engineer per year relative to the country's GDP per capita	0,2	1	0,25	0,05	
Percentage of startup founders with college degrees	0,35	3	0,75	0,2625	
Percentage of startup founders with advanced degrees	0,15	2	0,5	0,075	
Access to infrastructure					

[14] https://femtech.az/.

Percentage of the population covered by fixed broadband Internet access	0,17	3	0,75	0,1275	0,45
Percentage of the population covered by mobile broadband Internet access	0,23	3	0,75	0,1725	
Number of startups accepted into incubation and acceleration programs per 1 million people	0,6	1	0,25	0,15	
Shared vision and strategy					
The quality level of the national strategy for the startup ecosystem	0,47	2	0,5	0,235	0,58
The level of understanding and consensus on the main issues of development of the startup ecosystem among stakeholders	0,37	2	0,5	0,185	
The level of the country's competitiveness in terms of the startup ecosystem at the regional and global level	0,16	4	1	0,16	

Figure 7 depicts indexes in the form of petal star.

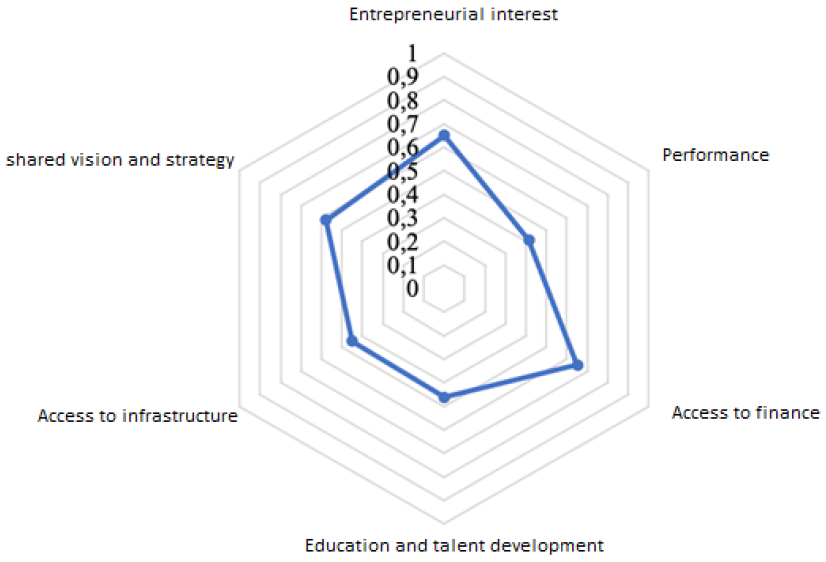

Figure 7. Indexes of the startup ecosystem processes at the Pre-seed stage in Azerbaijan.

The value of the country rating in terms of the startup ecosystem at the Pre-seed stage was **0.534** (the arithmetic average of all index values).

2.1.4 The main challenges for the development of a startup ecosystem at the pre-seed stage

Entrepreneurial interest:

- Startup founders at this stage have problems with motivation, and a fragmented understanding of a startup, especially in terms of project commercialization;
- Startup support does not correspond to the full cycle of creating a technology business;

● The use of startup core business models is underdeveloped in the B2G segment.

Performance:

● Most successful startups (startups that have attracted significant funding) are not science-intensive.

Access to finance:

● The number of business angels in the country is not large enough;

● It is necessary to develop an investment culture in the country.

Education and talent development:

● There are no necessary financial funds in higher education institutions to support startups;

● Insufficient cooperation between higher education institutions for the exchange of experience;

● Insufficient number of qualified personnel in higher education institutions with practical experience in the field of startups.

Access to infrastructure:

● Acceleration centers face problems in terms of the mentality of the population, which hinders the development of interest in innovation and entrepreneurship in general.

● The approach of entrepreneurs is often very stereotyped, which increases the time for creating a startup;

● Insufficient level of support at the beginning of the formation of the enterprise's life cycle.

Shared vision and strategy:

● There is no separate strategy for the development of the startup ecosystem;

● The ecosystem lacks a well-established system of communications between stakeholders and within individual programs, including acceleration programs;

● Shortage of qualified specialists, as well as a lack of coordination in providing startups with the necessary knowledge at the early stages of their development;

● The problem of uncoordinated work and duplication of functions among ministries involved in issuing certificates for exemptions and tax reductions may lead to the non-delivery of promised benefits. For example, when one ministry issues a certificate for tax breaks to a startup, the other ministry may not have information about it. A common framework solution is needed to coordinate actions between ministries to increase efficiency and avoid duplication of functions in issuing certificates for incentives and tax reductions for startups.

● The Azerbaijani government has mandated multiple agencies to support and fund startups, which can lead to difficult decision-making when it is not clear who has priority in case of overlap.

2.1.5 Overview of the Startup Ecosystem at the Seed Stage

2.1.5.1 Entrepreneurial interest

Most startups are directed at the international market. The priority areas for entrepreneurs are EdTech, FinTech, AgroTech, E-Commerce.

> *"Typically, the startups we work with start in the local market, with plans to subsequently expand into Turkey, Central Eurasia, the European Union, and the US, respectively."*
>
> *SABAH.hab experts*

2.1.5.2 Performance

The total number of startups created in the country was more than 300. The number of prototypes/MVPs created was more than 60. There is no information on the number of registered international patents.

2.1.5.3 Access to finance

At this stage, entrepreneurs also rarely use their own capital. In terms of financing, it is possible to allocate a fund called Caucasus Ventures in the amount of 6,600,000 USD. The fund's resources include direct investments and co-investments, which help to develop mainly local startups in the early stages by providing financing in the amount of 50–250 thousand USD.

It is important to note that the global venture studio Technovate is a tool for investing in the early stages of startup development. The studio focuses on technology startups and finds entrepreneurial talent in developing countries around the world. The main goal is to find opportunities for startups at an early stage and work with the founders from day one to help them overcome the main obstacles and barriers to success. Technovate provides access to capital, talent, and global vision to realize the full potential of startups. They are currently focused on startups in Azerbaijan and Georgia, with plans to expand to other regions soon. The studio helps scale global startups and bring them to new markets, including the US. An Azerbaijani investment company, within the framework of cooperation with the Israeli company OurCrowd, has invested $1 million in a technology startup for the first time.

The average amount of initial financing is about 20 thousand USD. The maximum amount of initial financing is 100,000 USD.

2.1.5.4 Education and talent development

The total amount of funding for scientific activities in 2022 amounted to 202.79 million manats (118 million USD)[15]. Among the results of activities for 2022, research was presented in such areas as the creation and application of highly effective functional materials in priority areas covering physical, mathematical, and engineering sciences, ensuring cybersecurity and social sustainability in the context of the use of artificial intelligence technologies and digital transformations[16].

Most higher education institutions conduct basic research to form ideas and create innovations. For example, Ganja State University has a technology transfer department that is directly responsible for issues related to business incubation, technology, intellectual property

[15] https://e-cis.info/news/569/95786/.

[16] https://science.gov.az/ru/news/open/24387.

protection, startups, and projects. The Innovation Department provides the following services for potential startup founders (introductory training on innovation and entrepreneurship; assistance with organizing events such as startup weeks and competitions; mentoring in the field of innovation and entrepreneurship; helping students prepare for national competitions; helping students find competitions that provide grants).

> *"In order to develop serious projects, startups need to have at least a regional level and think about globality. The education system should inculcate a global mindset at the state level."*
>
> *Farid Ismailzade, CEO Technovate*

2.1.5.5 Access to infrastructure

The Innovation and Digital Development Agency sees Azerbaijan as a leader in the region in technological entrepreneurship and digital development. The agency focuses on the development of the innovation ecosystem in the country, which includes the development of human capital in the field of technology, the development of technology companies, the support of the investment ecosystem, the promotion of technology entrepreneurship, the development of the Absheron Valley, and the improvement of legislation.

The country runs programs for the development of startups. In 2022, there will be 35 startups participating in acceleration programs. There are 76 startups in the incubation programs. The agency supported four incubation and acceleration programs, trained 12 people under the CIO program, worked on projects with six local ecosystem players, and trained 100 mentors by 2023. To achieve its goals, the agency has set key performance indicators (KPIs) for the coming years: 3,000 Technest Fellows, $30 million in assets under management for Azerbaijan investors as a target, 100 new companies with MVPs, more than 30 startup investment cases and the creation of three innovation spaces in the regions of the country.

The agency is actively involved in organizing and holding various events and conferences. It supported 21 events and participated in 42 conferences. In addition, the agency initiated the organization of 12 events, and its employees acted as speakers at 24 events. The agency is working on two main projects: the creation of an ecosystem map and the Startup Awards project. In their activities, they collaborate with six universities, organize training sessions and seminars, and participate in the process of identifying and solving problems that arise in the startup ecosystem. Their activities are divided into four key segments: 1. Providing opportunities for networking; 2. Investments up to 50% in projects within the first year of startup development (then up to 25% in the second year); 3. Strengthening the potential of stakeholders (conducting training and master classes); 4. Understanding market quality standards and validating opportunities.

An important element for this stage is the presence of the main technopark / IT park. Now, there is no technopark as such in Azerbaijan, but the agency performs many of its functions. Nevertheless, there are prospects for the development of the startup ecosystem in this direction. With the support of the Ministry of Industry and Technology of Turkey, the Turkish GOSB Technopark, and the Azerbaijan Innovation Agency, several projects are planned to develop the startup ecosystem, including the creation of a joint Turkish-Azerbaijani technopark and Deneyap technology workshops.

2.1.5.6 Shared vision and strategy

There is legal regulation in the country in terms of intellectual property, and work is underway on the legal regulation of the venture capital sector[17][18].

> *"For now, we are laying the foundation of the startup ecosystem, and the results will come later. We have metrics and milestones for the coming years that we guide ecosystem stakeholders against. After a while, the startup ecosystem will work, so the agency is not so necessary."*
>
> *Igor Ovcharenko, Agency for Innovation and Digital Development*

2.1.6 Rating of the startup ecosystem at the Seed stage

Based on the data received from stakeholders as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed. The calculation of startup ecosystem process indices is presented in Table 2.

Table 2. Calculation of startup ecosystem process indices at the Seed stage in Azerbaijan

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Startup targeting a specific market	0,47	4	1	0,47	0,85
Priority areas for startup development	0,3	2	0,5	0,15	
Approach to participation in startups	0,23	4	1	0,23	
Performance					
The total number of startups created over the past 3 years per 1 million people	0,4	3	0,75	0,3	0,6825
Number of prototypes created / MVP for the last 3 years per 1 million population	0,33	3	0,75	0,2475	
Number of registered patents for the last 3 years per 1 million population	0,27	2	0,5	0,135	
Access to finance					
Average initial funding	0,8	2	0,5	0,4	0,5
Maximum initial funding	0,2	2	0,5	0,1	
Education and talent development					
Availability of basic research to generate ideas and create innovations relative to the number of universities	0,6	2	0,5	0,3	0,7
Amount of funds for R&D	0,4	4	1	0,4	
Access to infrastructure					
Number of competitions held over the past 3 years per 1 million population	0,22	2	0,5	0,11	0,5
Number of programs implemented over the past 3 years per 1 million population	0,22	2	0,5	0,11	
Number of hackathons conducted over the past 3 years per 1 million people	0.1	2	0,5	0,05	

[17]https://wipolex-res.wipo.int/edocs/lexdocs/laws/ru/az/az100ru.pdf.

[18]https://caliber.az/post/76378/.

Availability of the main technopark / IT Park, which deals with key areas of development of technology startups	0,46	2	0,5	0,23	
Shared vision and strategy					
Existence of regulatory legal regulation to meet the needs of stakeholders in the protection of their intellectual property	0,27	3	0,75	0,2025	0,485
Existence of regulatory legal regulation for modern technologies	0,33	1	0,25	0,0825	
Existence of normative legal regulation for the venture sphere	0,4	2	0,5	0,2	

Figure 8 shows the indexes in the form of a petal star.

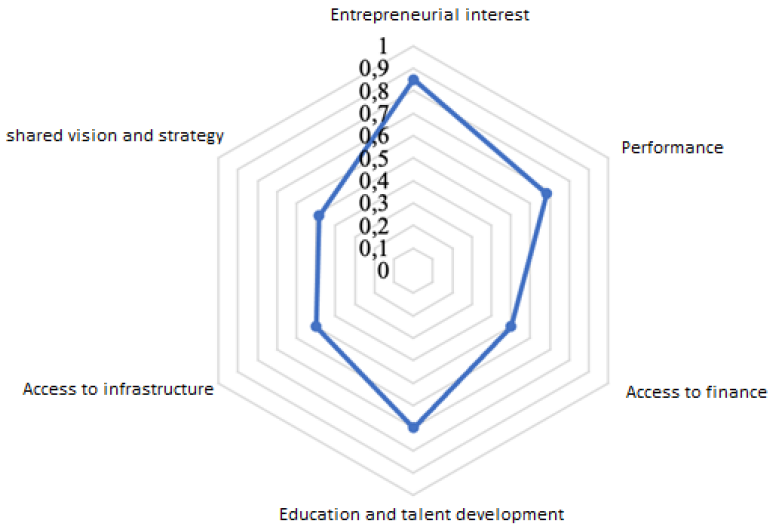

Figure 8. Indexes of the startup ecosystem processes at the Seed stage in Azerbaijan

The value of the country rating in terms of the startup ecosystem at the Seed stage was **0.62** (the arithmetic average of all index values).

2.1.7 Main challenges for the development of a startup ecosystem at the seed stage

Entrepreneurial interest:

- In order to develop serious projects, startups need to be targeted at the regional market and think about globality;
- Entrepreneurs lack opportunities and competence to attract investments (including foreign ones).

Performance:

- Lack of sufficient funding and R&D support from the private sector;
- The ecosystem is facing challenges, including problems with the availability of human capital, limited funds, mental health issues, and a lack of corporate involvement.

Access to finance:

- Insufficient level of support for entrepreneurs by their relatives and friends;

● Insufficient number of business angel clubs that could finance $100,000 for a startup;

● Insufficient number of venture capital funds; lack of matching funds.

Education and talent development:

● It is necessary to pay attention to the development of highly qualified specialists in various fields (STEM and business areas), including those with interdisciplinary skills;

● Insufficient level of teaching global outlook at the state level.

Access to infrastructure:

● The market is somewhat limited in terms of the number of certain players in niche industries, which makes it difficult for startups to approach certain talents/partners/clients.

Shared vision and strategy:

● At the state level, startups and innovations are not identified as a priority for future strategies;

● There are barriers for entrepreneurs in the tax sphere at the state level;

● Insufficient level of fulfillment of obligations by the public sector in the field of providing benefits to startups for a specified period (especially in cases when a startup grows rapidly and becomes a "small and medium-sized business"), which reduces the motivation of potential entrepreneurs to develop projects in Azerbaijan due to business risks.

2.1.8 General findings by country

Among the countries studied, Azerbaijan took 5th place in the ranking of countries in terms of the startup ecosystem, both at the Pre-seed and Seed stages, with values of **0.534** and **0.62**, respectively.

The values are broken down into indices in Figure 9.

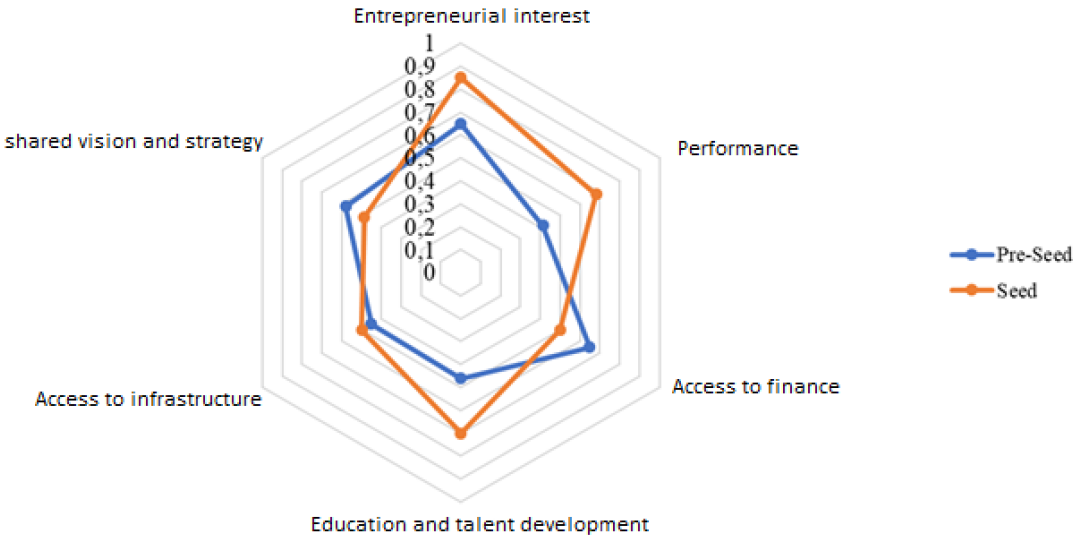

Figure 9. Indexes at the Pre-seed and Seed stages in Azerbaijan

Azerbaijan's startup ecosystem is currently in the development stage. This implies the presence of IT specialists, their high qualifications, the quality of the ideas of the projects themselves, as well as the interest of investors. The domestic startup ecosystem is actively developing in this direction. Some many interesting projects and stakeholders may further interest an international audience and investors, as well as enter international markets.

For further development and growth of indicators, it is necessary to solve the challenges presented in paragraphs 2.1.4 and 2.1.7 by increasing the understanding of the definition of startups, creating motivation for creating startups among the population and increasing competencies to attract investments (including foreign ones). Startups need to be targeted at the regional market and think globally. It is necessary to increase the number of successful science-intensive startups and their percentage of the total; increase funding and support for R&D from the private sector; increase the number of business angels and venture funds in the country; develop an investment culture; create university startup communities; provide financial funds in higher education institutions to support startups; create and develop qualified personnel; popularize the importance and value of startups; provide support at the beginning of the formation of the life cycle of an entrepreneur; and develop a separate strategy for the development of a startup ecosystem.

2.2 Armenia

2.2.1 A brief overview of economic activity

Armenia is an upper-middle-income country with a developing economy and innovative potential. GDP, according to the data for 2022, is $15.802.007.365.800[19]. GDP is mainly dependent on agriculture, industry, tourism, and information technology. In 2022, GDP growth amounted to 14.2%, while the main sources of GDP growth in 2022 were the services sector - 28.2%, the trade sector - 17%, the energy complex - 16.1% and the construction sector - 12.5 %, and to a slightly lesser extent, the industrial sector - 7.9%[20]. Also, the country is rich in natural resources. The population of Armenia is 2,976,000[21]. The GDP per capita is $4522.

2.2.2 Overview of the Startup Ecosystem at the Pre-Seed Stage

2.2.2.1 Entrepreneurial interest

Entrepreneurs in the country understand the definition of a startup. For most entrepreneurs, a startup is a technological business with the prospect of growth and the ability to scale due to a global view of the problem. In many cases, the founders of startups are four people. Creating a startup aims to develop a new product that will solve the problems in the country. Theory U is used to create and develop startups; that is, decisions are made under conditions of uncertainty. Support for technology businesses is different from classic small businesses regarding tax incentives and free economic zones for foreign investment. Entrepreneurs use the main business models in the B2B and B2C segments: Saas, transactional, and marketplace.

2.2.2.2 Performance

- Experienced entrepreneurs are visible to beginners, this is due to the relatively high number of successful startups. The most successful startups include:
- PicsaArt (a world-famous photo editing service and a social network of the same name);
- Renderforest (a well-known platform to create compelling videos for commercial, promotional, and marketing purposes without spending too much time, with over 20 million active users and raising $20 million in funding);
- Sololearn (the largest mobile social platform for programmers around the world to create and share programming content);
- Monitis (platform for monitoring site performance helps to control sites, servers, and applications, shows site uptime, response time, monitors server performance, network performance, and user metrics);
- Memoir Systems (a service in the field of semiconductor technology to increase the performance of storage devices, is an embedded memory technology);
- Denovo Sciences (a company that creates new therapeutics using the most advanced artificial intelligence technologies);
- LiveLook (a cloud service for exchanging visual information in real time that provides users with the ability to conduct remote presentations of the product, there is a cobrowsing mode);

[19] Based on 2021 data https://data.worldbank.org/indicator/NY.GDP.MKTP.CD taking into account GDP growth in 2022 by 14.2% https://www.interfax.ru/business/884025.

[20] https://finport.am/full_news.php?id=47703&lang=2.

[21] https://www.gov.am/ru/demographics/.

- Joomag (a multifunctional platform for digital publishing: it is possible to create interactive content and distribute it through many channels, the ability to track results, monetization);
- Teamable (a service for quickly finding highly qualified specialists in a team, automatically helps to select employees with open positions suitable for the company);
- Menu Group (fast food delivery service).

2.2.2.3 Access to finance

At this stage, entrepreneurs rarely use their own capital. It is important to note the business angel networks (STAN, AICA, BANA, Hero House), which are key players in terms of funding at this stage. For example, AICA, BANA Angels, and STAN are networks of investors uniting entrepreneurs and leaders from Armenia and the Armenian diaspora interested in investing in startup Armenian startups. Hero House Angels primarily targets California-based business angels co-investing in SmartGateVC deals. There is a program of innovative and regional grants under which grants are provided only for regions. This program is important in terms of ecosystem development since 70% of startups are created in Yerevan and only 30% in other regions. The average amount of initial financing is about USD 50,000. The maximum amount of initial financing is USD 1,000. About 40% of startups are funded at this stage.

> *"We rely on venture building; we are looking for scientists and entrepreneurs; we correctly cross their ideas with the market; and from scratch, we are trying to create startups that enter accelerators and come to investors."*
>
> *Ruben Osipyan and Suzanna Shamakhyan, FAST experts*

2.2.2.4 Education and talent development

For this process at the Pre-seed stage, it is important to demonstrate higher education institutions' activity in developing a startup ecosystem. Here it is important to note the positive role of the American University of Armenia, the first educational institution in the territory of the former Soviet Union accredited in the United States. A degree from this university is recognized within the United States and has the same status as a degree from a university in the United States. The EPIC business incubator operates at this university, which helps entrepreneurs go from an idea to a full-fledged product. The university has a complex and unique Armenian prototyping laboratory with sophisticated tools like the FARO EDGE 3D scanner. In addition, the activities of the Armenia Startup Academy are important, which focuses on creating entrepreneurship and startup training programs that equip capable teams with the knowledge and skills to create finished products. Also, there are educational centers for developing programming and entrepreneurial skills initiated by IBM and Microsoft.

In Armenia, robotics laboratories are being actively created in schools. Until 2026, it is planned to create research laboratories and classrooms for information and communication technologies in all schools in Armenia. Armenia has the following incubation programs: SAP Startup Factory, Tech Ideation Incubation Program by TUMO Labs, Impact AIM AgriTech Accelerator, ArtBox Incubator for Creative Industries, and M1TQ hackathon and acceleration program. Events are held regularly through the Seaside Startup Summit platform (the first outdoor micro-acceleration platform in camping that promotes intense deal-making).

Also, we note that M1TQ participates in the organization of hackathons and acceleration programs. FAST was involved in the development of the M1TQ concept. As part of FAST, several stages of venture building programs were made: InVent and ASCENT. For the development of this process at the Pre-seed stage, it is important to understand the average experience of startup founders (7–10 years in Armenia), the average salary of a software engineer (23.3 thousand USD per year), and the percentage of startup founders with higher education and a degree (90% and 31.5%).

“After 6 years, such dialogues have appeared that many understand the priority of knowledge-intensive startups. International partners, the government, and the private sector want to help develop them. The main thing now is to understand how to ensure that scientific and educational activities are at the appropriate level and implement a natural transition to the commercialization of ideas.” Ruben Osipyan and Suzanna Shamakhyan, FAST experts

2.2.2.5 Access to Infrastructure

At this stage, for the development of a startup ecosystem, it is important to have a developed network infrastructure in the country, which will allow supporting startups using modern technologies, including remote Access. Thus, the percentage of the population covered by Internet access in Armenia was 66.5% of the total population.

The turnover in the IT sector of the Republic of Armenia in 2022 increased by more than 50%, and the share of the information technology and communications sector in Armenia's GDP is consistently growing. The key task is to provide support at the beginning of the entrepreneur's life cycle. There is an ecosystem of incubators throughout the country (opportunities for Access to equipment and training for the development of a startup).

2.2.2.6 Shared vision and strategy

The country does not have a separate strategy for the development of the startup ecosystem; however, many issues related to the stakeholders of the startup ecosystem are considered in the digital transformation strategy.

2.2.3 Rating of the startup ecosystem at the Pre-seed stage

Based on the data received from stakeholders as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed.

The calculation of startup ecosystem process indices is presented in Table 3.

Table 3. Calculation of startup ecosystem process indices at the Pre-seed stage in Armenia

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Definition of a startup	0,4	3	0,75	0,3	0,75
Technology business support	0,4	3	0,75	0,3	
Using the Startup Business Model	0,2	3	0,75	0,15	
Performance					
Number of startups that raised more than 10 times GDP per capita per 1 million population in the last 3 years	0,37	4	1	0,36	0,675
Number of knowledge-intensive startups that have attracted funding of more than ten times GDP per capita per 1 million population in the last 3 years	0,3	2	0,5	0,15	
Percentage of knowledge-intensive startups relative to all startups that raised funding of more than ten times GDP per capita in the last 3 years	0,33	2	0,5	0,165	
Access to finance					
Average initial funding	0,7	4	1	0,7	1
Maximum initial funding	0,3	4	1	0,3	
Education and talent development					
Average experience of startup founders	0,3	3	0,75	0,225	0,8875
The average salary of a software engineer per year relative to the country's GDP per capita	0,2	4	1	0,2	
Percentage of startup founders with college degrees	0,35	4	1	0,35	
Percentage of startup founders with advanced degrees	0,15	3	0,75	0,1125	
Access to infrastructure					
Percentage of the population covered by fixed broadband Internet access	0,17	3	0,75	0,1275	0,75
Percentage of the population covered by mobile broadband Internet access	0,23	3	0,75	0,1725	
Number of startups accepted into incubation and acceleration programs per 1 million people	0,6	3	0,75	0,45	
Shared vision and strategy					
The quality level of the national strategy for the startup ecosystem	0,47	2	0,5	0,235	0,6725
The level of understanding and consensus on the main issues of development of the startup ecosystem among stakeholders	0,37	3	0,75	0,2775	
The level of the country's competitiveness in terms of the startup ecosystem at the regional and global level	0,16	4	1	0,16	

Figure 10 shows the indexes in the form of a petal star.

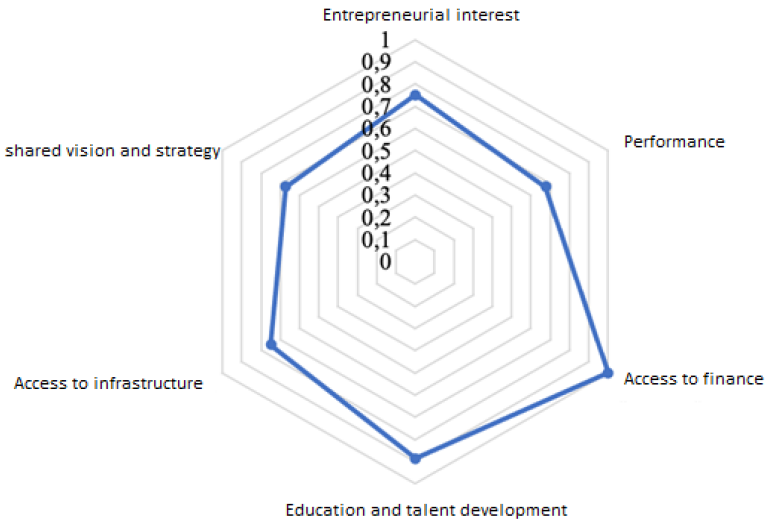

Figure 10. Indexes of the startup ecosystem processes at the Pre-seed stage in Armenia

The value of the country rating in terms of the startup ecosystem at the Pre-seed stage was **0.789** (the arithmetic average of all index values).

2.2.4 The main challenges for the development of a startup ecosystem at the pre-seed stage

Entrepreneurial interest:

- There is no understanding that a startup is a full-fledged work and not just a beautiful story (a fragmentary understanding of a startup);
- The use of startup core business models is underdeveloped in the B2G segment.

Performance:

- Most successful startups (startups that have attracted significant funding) are not science intensive.

Access to finance:

- There are many R&D teams in the country that strive to create science-intensive startups with commercialization potential, but when they present their startups to venture funds, they face misunderstanding due to the funds' lack of relevant knowledge and expertise to support such projects.

Education and talent development:

- There are practically no strong incubators based on universities;
- Projects that are not ready for investment are created; for example, within the framework of the University of America in Armenia, there is an incubation program that helps startups at an early stage, and, following the results of this incubation program, they have a pitch deck that is used further. Although the program wants to create a stream of strong startups, the result is initiatives that do not meet market requirements and do not offer great opportunities for scaling, and as a result, they do not attract investment.

Access to infrastructure:

- There is a shortage of qualified personnel in the field of student entrepreneurship who can develop a local ecosystem within higher education institutions.

Shared vision and strategy:

- There is no separate strategy for the development of the startup ecosystem, which would ensure the uniform development of all processes of the startup ecosystem, considering the needs of all stakeholders.

2.2.5 Overview of the Startup Ecosystem at the Seed Stage

2.2.5.1 Entrepreneurial interest

Most startups are directed at the international market. The priority areas for entrepreneurs are Biotech, Healthtech, Fintech, Agritech and Advanced Materials.

Most Armenian startups target the US and EU markets. Based on the ecosystem data from the Science and Technology Foundation of Armenia, the markets are distributed as follows:

- USA and EU: 70%.
- local market: 20%.
- rest of the world: 10%.

It should be noted that the mission of the Fund is to turn Armenia into a country in the Top 10 global innovators and in the Top 5 leaders in the field of data science and artificial intelligence by 2041. The Foundation's entrepreneurial programs aim to help startups develop Data Science and AI solutions to solve global problems.

2.2.5.2 Performance

The total number of startups created in the country was 3,000, according to the EIF (note that 700 startups are the most active). More than 300–400 startups participate in EIF programs every year. The EIF is actively involved in organizing competitions for startups, organizing about seven such events a year, which in total attract more than 350 teams. In addition, they host hackathons monthly, totaling about 15 per year.

2.2.5.3 Access to finance

At this stage, entrepreneurs also rarely use their own capital. The country is actively working to attract global investment funds so that startups can receive funding from global investors. The Enterprise Incubator Foundation is working towards providing funding and grants to raise the valuation of startups. This will allow startups to attract large investments and, accordingly, develop. The Science and Technology Foundation of Armenia provided funding for 55 researchers, supported 27 international research projects, and hosted over 100 foreign scientists in Armenia. Several programs resulted in 25 visits to international laboratories and the publication of more than 70 scientific articles.

In the ITU methodology, venture funding is attracted at the “Valley of Death” stage; however, in Armenia, such venture funds as Granatus Ventures, BigStory VC, Triple S Ventures, Formula VC, and SmartGate VC can provide funding for startups already at the Seed stage. Also, funds in the direction of impact investment are starting to work in Armenia.

The average amount of initial financing is about 100,000 USD. The maximum amount of initial funding is 2.5 million USD.

"The world is technologically changing, and the market is changing. We need to play more actively in this market to influence it. Any problems around the world are also opportunities that startups can provide answers to with their technological solutions."

Bagrat Yengibaryan, Founding Director of the Enterprise Incubator Foundation

2.2.5.4 Education and talent development

The total amount of funding for scientific activities in 2021 amounted to 25 billion drams (50 million USD), but in the future, the amount is expected to increase by 85%, and the amount allocated for thematic scientific research should have increased by 2.5 times. Centers for training new personnel are being actively created to raise interest in the topic of startups and the startup ecosystem in Armenia. Also, the Enterprise Incubator Foundation, in partnership with PMI Science, has been implementing extensive programs to develop the research and development ecosystem since 2018.

Most higher education institutions conduct basic research to generate ideas and create innovations.

2.2.5.5 Access to Infrastructure

The country hosts numerous hackathons for the development of startups (15 in 2022). Competitions are held (7; total number of teams: 350).

The Science and Technology Foundation of Armenia also plays an essential role in terms of Access to infrastructure. The Foundation seeks to develop and implement innovative programs based on partnerships and the support of this global network, as well as intellectual and financial resources. The Science and Technology Foundation of Armenia organizes events, meetings, workshops, and forums to strengthen ties with industry, government, non-profit organizations, the diaspora, academia, investors, and supporters. The goal is to pool resources to restore Armenia's scientific and technological potential, revitalize the industry, and create an innovation ecosystem.

Since 2017, the Science and Technology Foundation of Armenia has implemented and is still implementing a total of 25 programs, including 9 programs in the field of education, 5 programs in the field of research, 9 programs in the field of commercialization, and 2 programs at the ecosystem level (3 in 1 whole ecosystem). By the end of 2022, the foundation will have attracted more than 1,600 participants in its programs, and more than 7,500 people will have gained access to more than 100 workshops, events, and initiatives to develop startups and networking.

In addition, the Engineering City begins to play an active role, which assists in creating real prototypes. Currently, 22 companies operate in the Engineering City, and 50 pilot projects are being implemented. The engineering city will help increase the number and quality of science-intensive startups. Within the framework of the Engineering City, there is a single workspace where the equipment is common, the industrial zone, and there is also common access to the plant (provided for 1–2 hours to get your prototype).

An important element for this stage is the presence of the main technopark (affecting the entire ecosystem), but now there are technoparks in Armenia only in the regions of the country, so the ecosystem works more decentralized. In Armenia, the Enterprise Incubator Foundation and the Science and Technology Foundation of Armenia play active roles in the country, playing an

important role in the development of all processes of the startup ecosystem. The technology park in Gyumri, Armenia's second-largest city, plays an important role in fostering a culture of innovation and entrepreneurship by educating a new generation of programmers and engineers.

2.2.5.6 Shared vision and strategy

The country has legal regulations in terms of intellectual property and venture capital. In addition, the following main areas have been regulated: crowdfunding and regulatory sandboxes have been created. The main program is a special law on state support in the field of information technology in the Republic of Armenia. More than 2,000 companies have benefited from the release of this law. Another government program provides a 50% income tax refund for IT firms.

The Ministry of High Technologies implements many support programs, including:

- program for startups of the technological diaspora "Neruzh";

- grant program "From idea to business"; - pilot project "Internship in Practice".

In parallel, there are many support programs implemented by international and private organizations aimed at the development and growth of technology companies.

The National Center for Innovation and Entrepreneurship plays an important role. Having four branches (Gyumri, Vanadzor, Hrazdan and Kapan) in the territory of Armenia, the center is recognized as the center of coordination and interstate exchange of scientific and technical information in Armenia and the CIS countries. In addition, the center should become a national center for technology transfer. The main goal is to strengthen the national system to aid in assessing the potential of projects, including the issue of investment.

2.2.6 Rating of the startup ecosystem at the Seed stage

Rating of the startup ecosystem at the Seed stage Based on the data received from stakeholders as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed. The calculation of startup ecosystem process indices is presented in Table 4.

Table 4. Calculation of startup ecosystem process indices at the Seed stage in Armenia

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Startup targeting a specific market	0,47	4	1	0,47	0,925
Priority areas for startup development	0,3	3	0,75	0,225	
Approach to participation in startups	0,23	4	1	0,23	
Performance					
The total number of startups created over the past 3 years per 1 million people	0,4	4	1	0,4	0,7
Number of prototypes created / MVP for the last 3 years per 1 million population	0,33	2	0,5	0,165	
Number of registered patents for the last 3 years per 1 million population	0,27	2	0,5	0,135	
Access to finance					
Average initial funding	0,8	3	0,75	0,6	0,8
Maximum initial funding	0,2	4	1	0,2	
Education and talent development					
Availability of basic research to generate ideas and create innovations relative to the number of universities	0,6	4	1	0,6	0,7

Amount of funds for R&D	0,4	1	0,25	0,1	
Access to infrastructure					
Number of competitions held over the past 3 years per 1 million population	0,22	4	1	0,22	0,715
Number of programs implemented over the past 3 years per 1 million population	0,22	3	0,75	0,165	
Number of hackathons conducted over the past 3 years per 1 million people	0.1	4	1	0,1	
Availability of the main technopark / IT Park, which deals with key areas of development of technology startups	0,46	2	0,5	0,23	
Shared vision and strategy					
Existence of regulatory legal regulation to meet the needs of stakeholders in the protection of their intellectual property	0,27	3	0,75	0,2025	0,6675
Existence of regulatory legal regulation for modern technologies	0,33	2	0,5	0,165	
Existence of normative legal regulation for the venture sphere	0,4	3	0,75	0,3	

Figure 11 shows the indexes in the form of a petal star.

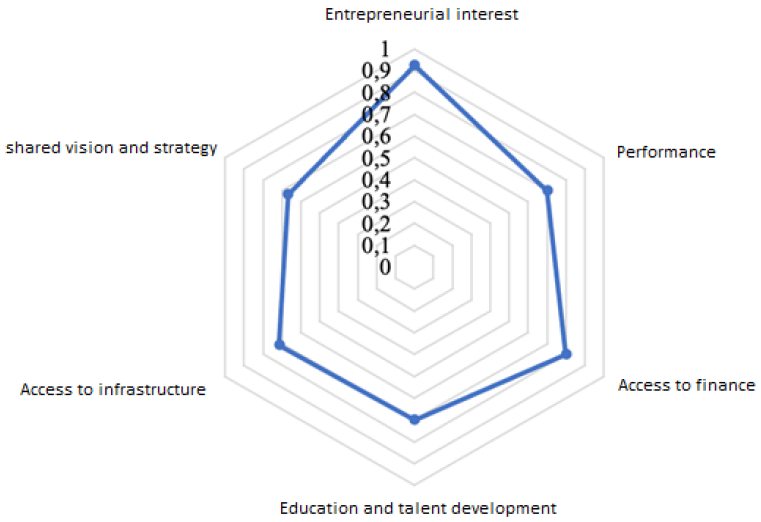

Figure 11. Indexes of the startup ecosystem processes at the Seed stage in Armenia

The value of the country rating in terms of the startup ecosystem at the Seed stage was 0.751 (the arithmetic average of all index values).

2.2.7 The main challenges for the development of a startup ecosystem at the Seed stage

Entrepreneurial interest:

- There is a lack of knowledge in the field of working with investors and venture funds.

Performance:

- Lack of sufficient funding and support for R&D from the private sector;
- There are significantly fewer real startups than initiatives;

● Startups fall into a vicious circle due to their constant participation in similar programs at incubators and accelerators.

Access to finance:

● There are difficulties in increasing funding in the light of global trends in venture capital financing.

Education and talent development:

● Higher education institutions are not ready to integrate basic science commercialization courses, and those who want to teach innovative entrepreneurship do not have the proper infrastructure;

● Insufficient numbers of IT students study at Armenian universities;

● In recent years, there has been insufficient interest in the work of a programmer among the population of the country.

Access to infrastructure:

● There is a shortage of qualified personnel.

Shared vision and strategy:

● In the IT industry, there is a need for an additional workforce. It is necessary to deepen work in the field of analytics of the startup ecosystem (startup ecosystem mapping) and the availability of data to interested parties.

2.2.8 General findings by country

Among the countries studied, Armenia took 2nd place in the ranking of countries in terms of the startup ecosystem at the Pre-seed stage and 1st place at the Seed stage, with values of **0.789** and **0.751**, respectively.

The values are broken down into indices in Figure 12.

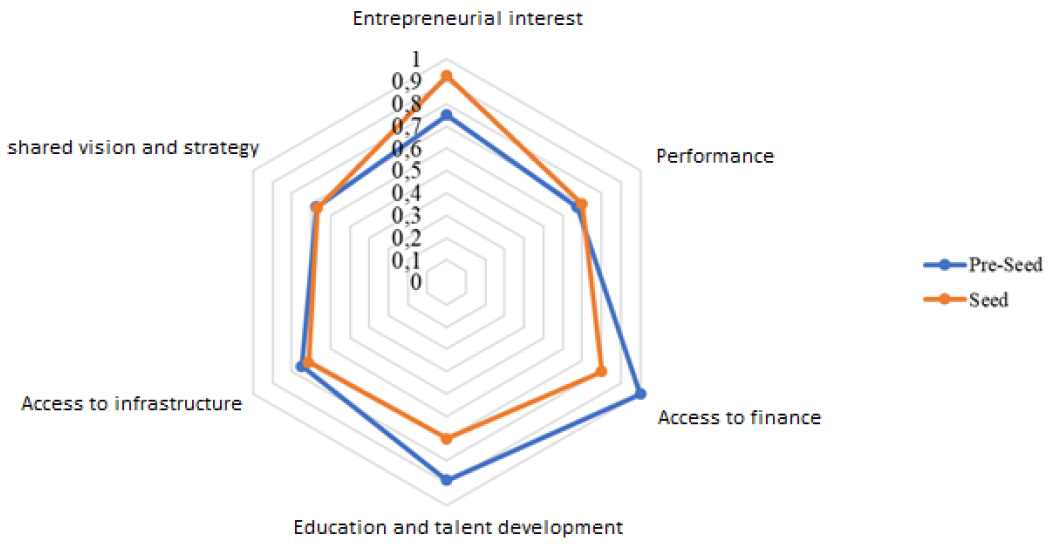

Figure 12. Indexes at the Pre-seed and Seed stages in Armenia

The startup ecosystem is one of the most developed in the Central Eurasia region. Thanks to the cooperation of stakeholders in the startup ecosystem with international organizations and foundations, local startups manage to receive financial and consulting support. The market for investment in the country is small, and, accordingly, local startups need to think at an early stage about how to get into the global market and how to develop their product there. Several platforms for the development of startups have been created in Armenia: training centers, incubators, and accelerators. They provide entrepreneurs with the opportunity to learn from useful experience and find opportunities for financing.

For further development and growth of indicators, it is necessary to solve the challenges presented in paragraphs 2.2.4 and 2.2.7 by increasing the understanding of the definition of startups and increasing the level of knowledge in the field of working with investors and venture capital funds; increasing successful knowledge-intensive startups and their percentage of the total, increasing funding and support for R&D from the private sector; increasing the level of competencies of local funds, popularizing the importance and value of startups; increasing strong university-based incubators, integrating basic science commercialization courses into curricula; creation and development of qualified personnel in all processes of the startup ecosystem; development of a separate strategy for the development of a startup ecosystem.

2.3 Georgia

2.3.1 A brief overview of economic activities

Georgia is a country with an upper middle-income group, an open economy, favorable business conditions, and innovative potential. GDP, according to 2022 is $24.6 billion[22]. In the structure of GDP in 2022, the share of services increased by 15.3%, thanks to an increase in accommodation, catering, trade, transport, and real estate. Industry expanded 18.0%, led by manufacturing and utilities, while agriculture grew 2.3% thanks to favorable weather and good harvests [23]. The population of Georgia is 3,736,000. The GDP per capita is $6,671.9.

2.3.2 Overview of the Startup Ecosystem at the Pre-Seed Stage

2.3.2.1 Entrepreneurial interest

Entrepreneurs in the country understand the definition of a startup. For most entrepreneurs, a startup is a company that uses new or existing technologies to create innovative products and services focused on a market need or problem in order to create a high-value-added product based on a business model that is scalable and focused on rapid growth. In most cases, the founders of startups are three people. Theory U is used to create and develop startups; that is, decisions are made under conditions of uncertainty.

Technology business support differs from classical small business support in terms of tax incentives (Georgia's virtual IT zone includes special tax incentives for IT companies at a tax rate of 5%). Entrepreneurs use the main business models in the B2B and B2C segments: Saas, transactional, and marketplace. But B2C-focused startups have more difficulty finding the best business model or pricing strategies.

> *"Despite the growth and potential of Georgia's startup ecosystem, there are many areas that need improvement, especially when it comes to pre-seed startups. Such areas for improvement are limited access to capital, few mentors, a lack of support (especially a lack of integration of international experience), and limited market size."*
>
> *Ketevan Ebanoizde, co-founder of Impact Hub*

2.3.2.2 Performance

Experienced entrepreneurs are visible to beginners; this is due to the relatively high number of successful startups. The most successful startups include:

- Pulsar (an AI-based automotive software startup that made its first exit in Georgia, becoming the first domestic startup acquired by an American company: digital automotive trading platform SpinCar);
- Elvin Technologies is a Georgian startup that created a fireproof and self-cooling fire suit. Their main goal is to invent a new type of space suit in which heat resistance is one of the key elements. Now the startups are in California, collaborating with Tesla;
- Voovoo (a startup that solves the problem of reckless driving in real time using safe driving technology);

[22] https://www.geostat.ge/en/modules/categories/23/gross-domestic-product-gdp.

[23] https://www.adb.org/news/georgian-economy-grow-7-2022-adb.

● Theneo (an AI startup from Georgia for creating API documentation; a startup raised $1.5 million in investments and is a winner of Web Summit 2022);

● Kernel (a fintech startup with invoicing and financial tools for small businesses and freelancers);

● Payze (a financial transaction platform and the first Georgian startup supported by Y Combinator, enabling businessmen from all over the world to receive online payments through a single integration);

● Citypay.io (a system for businesses that allows them to accept cryptocurrency payments from their clients);

● MaxinAI (a blockchain and custom software development company);

● Singular.ge (an award-winning iGaming software provider that gives you the freedom to be your own brand).

2.3.2.3 Access to finance

At this stage, entrepreneurs rarely use their own capital. In terms of financing, we can single out the Axel Club, which is a network of investors and entrepreneurs from Georgia and other countries interested in investing in startup companies. Axel is the first and largest Georgian business angel network, which aims to facilitate access to Smart Money investments for the most promising Georgian and regional entrepreneurs. As of March 2023, the club had more than 80 individual and eight corporate members, 17 investment meetings were held (90 startups presented projects), and 15 investment deals were concluded.

Axel partners with foreign business angel networks to bring their expertise, resources, and leadership to support entrepreneurs in developing effective angel investment strategies. In 2022, Axel became a member of the board of EBAN, Europe's leading investment network, and as part of cooperation with it, it has already completed the first joint investment deal in a foreign startup, Spacetech.

Also, the Georgian Innovation and Technology Agency (GITA) provides funding in grants up to 150,000 lari (57,000 USD). By mid-2021, more than 280 startups will have received GITA grants totaling 21.9 million Georgian lari (8.3 million USD). The Georgian Venture Capital Association, founded in 2017, stimulates innovation and entrepreneurship in Georgia by creating a favorable investment climate and connecting Georgian and international investors.

However, there are not many opportunities to get funding at an early stage in Georgia. The average amount of initial financing is about 20–25 thousand USD. The maximum amount of initial financing is $250,000.

2.3.2.4 Education and talent development

For this process at the Pre-seed stage, it is important to demonstrate the activity of higher education institutions in terms of developing a startup ecosystem. It is important to note that universities, including the Free University, Georgian Technical University, Ilya State University, the University of Business and Technology, Tbilisi State University, and Tbilisi State Academy of Arts, have created business incubators on their own. In addition, there are three private business accelerators operating in Georgia: Spark (funded by the EU and Tbilisi City Hall), TBC Startuper and BOG Fintech.

In addition, the Future Laboratory's activities in terms of Education and talent development are important, as they develop concepts and methodologies aimed at preparing schoolchildren and students for the challenges of the 21st century. As part of their initiatives, they develop concepts for the infrastructure and design of schools and implement project-based learning (PBL), which

helps children acquire 21st-century skills. The concept of Fablab+STEAM is also applied, the purpose of which is learning through the process and the implementation of practical projects. In addition, the processes of entrepreneurship and acceleration of school startups are being introduced, as are trainings for teachers and lecturers (Training of Trainers - ToT)

The Georgian Innovation and Technology Agency (GITA) has unique IT training programs. During the period from 2014 to 2020, and because of the GITA programs, they have helped and educated many people, including students and startups. So, 941 people have already received certificates; 785 startups have completed additional education in the field of e-commerce; and 130 students have been trained in innovation schools. In general, between 2014 and 2019, the total number of participants who became involved in the startup ecosystem and the beneficiaries of the programs was more than 56,000, with more than 4,556 people from the regions. Georgia Capital has committed $3.2 million to startup studio Redberry to offer incubation programs and equity investments for tech startups.

For the development of this process at the Pre-seed stage, it is important to understand the average experience of startup founders (7–10 years in Georgia), the average salary of a software engineer (45.7 thousand USD per year), and the percentage of startup founders with higher education and a degree (90% and 70%, respectively).

2.3.2.5 Access to infrastructure

At this stage, for the development of a startup ecosystem, it is important to have a developed network infrastructure in the country, which will allow supporting startups using modern technologies, including remote access. Thus, the percentage of the population covered by fixed and mobile broadband Internet access is 88% and 99%, respectively Impact Hub Tbilisi is also actively involved in the development of technology entrepreneurship through its programs and projects, such as the Impact Hub Tbilisi Startup Pre-Accelerator. The Startup Pre-Acceleration Program also offers classical mentoring to improve business process skills for startup founders in Georgia. In total, 60 teams were accepted into the incubation and pre-acceleration programs, and 45 teams were accepted as part of the social entrepreneurial incubation program.

Future Laboratory plays a key role in the development of the startup ecosystem in Georgia, having organized 12 pre-acceleration and acceleration programs so far, in which 110 startup teams have participated. As a result, three startups received funding, and the total amount of investments in their startup pool exceeded 1 million Georgian lari. Future Laboratory has been developing the first corporate acceleration program in Georgia since 2022, Startup Drive, together with the leading transport company Tegeta Motors. The pre-acceleration program covers work with 15 startup teams, and the acceleration program includes work with 10 startup teams. In the last iteration of the program, three startups received funding in the amount of 200,000 Georgian Lari.

The infrastructure for the development of startups is also present in a number of private universities (Georgian American University, University of Georgia, Caucasus University), which combine both acceleration programs and access to coworking space. The University of Georgia also provides access to funding for both student startups and those who have taken part in their acceleration program.

2.3.2.6 Shared vision and strategy

The country does not have a separate strategy for the development of the startup ecosystem; however, many issues related to the stakeholders of the startup ecosystem are taken into account in the digital transformation strategy.

The Georgian Innovation and Technology Agency (GITA) aims to create an efficient system in Georgia where innovation and technology can develop. The main goal is to promote the commercialization of innovative knowledge, introduce the latest technologies in all sectors of the economy, and create the necessary platform for innovative development. To achieve these goals, the agency aims to use its infrastructure for the development of innovations and technologies, focus on the priority commercialization of Georgia's innovations and technologies, stimulate the growth of investment capital, and attract the participation of private business to increase research in the field of innovation commercialization, as well as establish effective processes necessary for increasing competitiveness, especially by promoting distance learning.

> *"The development of innovation and entrepreneurship is a fundamental component of long-term competitiveness. The use of modern technologies is a prerequisite for stimulating economic growth and job creation in the country."*
>
> *Anni Vashakmadze, Head of Donor Relations and International Relations, Georgian Innovation and Technology Agency (GITA)*

2.3.3 Rating of the startup ecosystem at the Pre-seed stage

Based on the data received from stakeholders as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed. The calculation of startup ecosystem process indices is presented in Table 5.

Table 5. Calculation of startup ecosystem process indices at the Pre-seed stage in Georgia

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Definition of a startup	0,4	3	0,75	0,3	0,75
Technology business support	0,4	3	0,75	0,3	
Using the Startup Business Model	0,2	3	0,75	0,15	
Performance					
Number of startups that raised more than 10 times GDP per capita per 1 million population in the last 3 years	0,37	4	1	0,36	0,675
Number of knowledge-intensive startups that have attracted funding of more than ten times GDP per capita per 1 million population in the last 3 years	0,3	2	0,5	0,15	
Percentage of knowledge-intensive startups relative to all startups that raised funding of more than ten times GDP per capita in the last 3 years	0,33	2	0,5	0,165	
Access to finance					
Average initial funding	0,7	4	1	0,7	1
Maximum initial funding	0,3	4	1	0,3	
Education and talent development					
Average experience of startup founders	0,3	3	0,75	0,225	0,925

The average salary of a software engineer per year relative to the country's GDP per capita	0,2	4	1	0,2	
Percentage of startup founders with college degrees	0,35	4	1	0,35	
Percentage of startup founders with advanced degrees	0,15	4	1	0,15	
Access to infrastructure					
Percentage of the population covered by fixed broadband Internet access	0,17	3	0,75	0,1275	0,8075
Percentage of the population covered by mobile broadband Internet access	0,23	4	1	0,23	
Number of startups accepted into incubation and acceleration programs per 1 million people	0,6	3	0,75	0,45	
Shared vision and strategy					
The quality level of the national strategy for the startup ecosystem	0,47	2	0,5	0,235	0,6725
The level of understanding and consensus on the main issues of development of the startup ecosystem among stakeholders	0,37	3	0,75	0,2775	
The level of the country's competitiveness in terms of the startup ecosystem at the regional and global level	0,16	4	1	0,16	

Figure 13 shows the indexes in the form of a petal star.

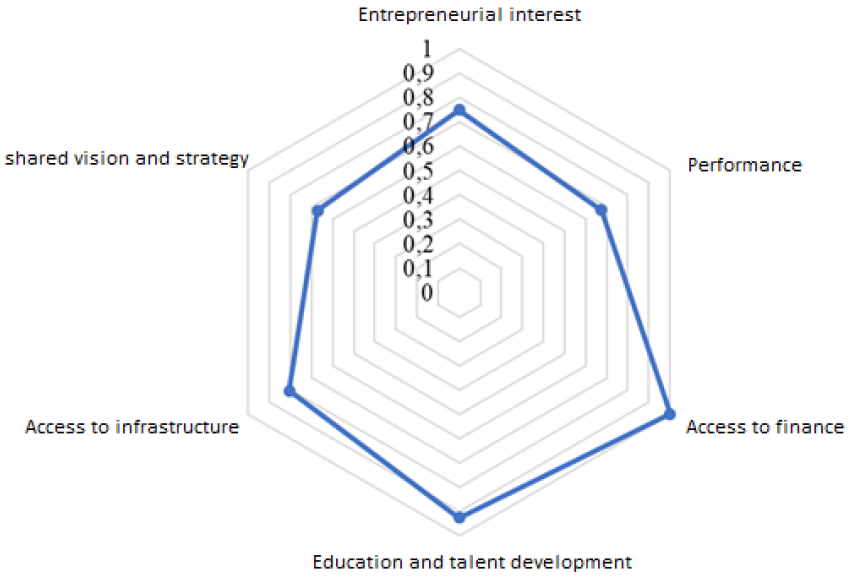

Figure 13. Indexes of the startup ecosystem processes at the Pre-seed stage in Georgia

The value of the country rating in terms of the startup ecosystem at the Pre-seed stage was 0.805 (the arithmetic average of all index values).

2.3.4 Main challenges for the development of the startup ecosystem at the Pre-seed stage

Entrepreneurial interest:

- Startups often have difficulty finding suitable business models;
- Some entrepreneurs see grants as an end in themselves, not a means. Their focus on getting grants diverts their attention from product validation and commercializing the business model in the market with the help of consumers (not just grant judges). Startups that only focus on winning grants become serial grant applicants that fail to find consumer and investor support for sustainability and growth;
- There is a lack of knowledge among potential entrepreneurs and education problems: many do not have information on how to create a startup and do not know about the existing legal regulations. Difficulties arise in areas such as fintech, medtech or biotech, where there are many regulations.

Performance:

- Limited market size;
- Most successful startups (startups that have attracted significant funding) are not science intensive.

Access to finance:

- Limited access to capital;
- Lack of knowledge among potential investors (business angels) for investing in startups (businesses lack knowledge in terms of understanding how to invest in startups, what are the real indicators that are important to look at, what is most important in startups, and what to ask startup founders). There are 4.5 billion dollars of deposits in banks, but there is no high level of knowledge on how to diversify the investment portfolio of potential investors in startups. One of the assets is venture financing (up to 5% of investments);
- Startups face the problem of a lack of long-term prospects after using the funds received from grants. For example, if a startup receives funding from GITA, these funds usually last for several months, after which the team has a minimum viable product (MVP). However, by this time, financial resources are exhausted, and professional investors are often not ready to support the project due to the lack of metrics and profit from users. This problem is exacerbated by the small size of the domestic market.

Education and talent development:

- Limited access to mentoring and support (especially lack of international experience);
- One of the very important elements that is currently lacking in Georgia is a culture of mentorship, which is critical to the growth and success of startups (mentorship plays an important role in guiding founders, passing on valuable expertise, and helping to overcome the complexities and challenges associated with creation and scaling of a startup);
- Problems in finding technical specialists who are ready to work for a startup, especially when it comes to specialized areas (knowledge-intensive startups).

Access to infrastructure:

- Lack of affordable coworking spaces for resource-poor early-stage startups, no permanent model of coworking at the higher education level other than private universities.

Shared vision and strategy:

- There is no separate strategy for the development of the startup ecosystem;
- In the startup financing process, the state (GITA) does not distinguish between the stages of a startup (as in the pre-seed, seed, and beyond). Sometimes startups that might be of interest to VC don't go for a deal because they're waiting for free grants from the government;
- There are no intermediate grants that can help a startup to test a hypothesis and a primary product. The system of progress-based financing (financial model in which capital is provided in the form of tranches based on the achievement of specific milestones or indicators of progress) has exhausted itself 7 years ago and needs to be changed in relation to the early stages of startups.

2.3.5 Overview of the startup ecosystem at the Seed stage

2.3.5.1 Entrepreneurial interest

The bulk of startups are directed to the international market, given the limited size of the local market. Recognizing the relatively small size of their home market, these startups understand that attracting a larger customer base is vital to their growth and success. As a result, their focus is often on expanding their business into the United States market.

Over the past 2-3 years, there has been a noticeable increase in the interest of Georgian startups in Central Asian countries such as Kazakhstan and Uzbekistan. Due to their significant market size and growing openness to international startups, these countries represent a promising prospect for expansion. Many stakeholders, such as Impact Hub Tbilisi, are committed to developing and supporting startups with scalable business models.

The priority areas for entrepreneurs are AI, fintech, blockchain, advanced materials, and cleantech. Note that the Data Analysis Center works in such a way as to create a model for operating and recognizing the Georgian language in the context of modern AI technologies and large language models. We note the recently developed chatbot with large language models, Chat. Supernova was created and is functioning in the Georgian language.

The Fintech Association of Georgia is the first non-profit organization in the country to represent the interests of FinTech companies of all sizes in Georgia. The association aims to facilitate collaboration between all market participants and stakeholders in the FinTech ecosystem[24][25] .

> *"Most startups in Georgia are focused on global markets, given the limited size of the local market. Understanding the relatively small size of the home market, these startups recognize that they need to attract a large customer base to grow and succeed. As a result, their focus is often on scaling into the US market."*
>
> *Ketevan Ebanoizde, co-founder of Impact Hub*

[24] https://chat.supernova.ge/.

[25] https://www.fintechs.ge/.

2.3.5.2 Performance

The total number of startups created in the country was 714 (the number of startups used by GITA in total since 2015). Information on the number of prototypes / MVPs created in the country and registered patents is not available. But there is evidence that GITA issued grants for the creation of 314 prototypes.

2.3.5.3 Access to finance

At this stage, entrepreneurs also rarely use their own capital. You can highlight the accelerator program at 500 Georgia. The program is unique for the region and is implemented in partnership with GITA and the Bank of Georgia. We note the venture fund Kedari Ventures (small fund), which has already invested up to 1 million lari in startups. There is also a fund called Isari Ventures ($5 million).

Currently, the Central Eurasia Venture Fund (2.5 million USD) is under creation; it will be the first AI fund in the region. Starting in 2023, the Central Eurasia Venture Club, an alliance of venture capital funds created by Future Laboratory based on Startup Central Eurasia in collaboration with ITU, will be launched to promote cooperation and provide access to funding for startups in the Central Eurasia region. The club allows startups, networks of angel investors, and governments to have direct access to the resources of venture capital funds in Central Eurasia, Europe, and the USA. This collaboration platform promotes knowledge sharing, investment opportunities, and the development of the region's startup ecosystem.

In addition, GITA entered into an agreement with the TECH Friends of Georgia investment fund, which aims to connect American investors with Georgian startups. GITA will help identify Georgian startups with the potential for international growth. These startups will be able to connect with Californian startups and raise up to $500,000 in equity capital.

Catapult Ventures, a California Seed-stage technology investment firm, has invested $713 million in 323 companies, generated 100 exits worth $19.2 billion, and helped launch 26 unicorn startups. He is currently working on the creation of a new investment fund with Strategist. It is planned to create a Catapult Eurasia I fund in the future, which will be focused on investing in innovative startups from Central Eurasia. The fund plans to raise a sum of $100 million to focus on Eurasian startups in the following areas: consumer, enterprise, advanced technologies (Al, machine learning, FinTech, loT. Robotics). Approximate duration of 8 years and a 5-year investment period. Previously, along with the US Market Access Center and Startup Grind Tbilisi, Catapult Ventures planned to provide both investment and mentoring support to around 50 Georgian startups over the next ten years.

In the ITU methodology, venture financing is attracted at the “Valley of Death” stage; however, investment companies and individual investors inside and outside of Georgia are showing increasing interest in technology startups. Funds can be noted: Investors in Cartooli SPVs (1 mm), Fund Investors in Cartooli's Network, Frontier Market Fund. Investors who can provide funding for startups already at the Seed stage. GITA provides innovation matching grants in the amount of 650,000 GEL for startups at the seed stage starting in 2019. GITA issued such grants to 24 startups.

The average amount of initial financing is about 50-100k USD. The maximum amount of initial funding is $1,000,000. It should be noted that the total volume of attracted private investments attracted by startups at all stages in general is 310 million lari (118 million USD), according to GITA. And the total amount of investments made by GITA at all stages of the development of a startup, made by GITA, is 32 million lari (12 million USD).

2.3.5.4 Education and talent development

The state of Georgia actively finances R&D and research institutes at universities. Note that about 90% of researchers are concentrated in higher education institutions, and the remaining 10% are in other parts of the public sector. Despite these efforts in the development of R&D in the public sector, the use of resources for the development of knowledge-intensive startups and industry is insufficient. The links between industry and science are at a rather low level since Georgian higher education institutions are focused more on the scientific and theoretical level of research than the commercialization of the results of scientific activity. Most higher education institutions conduct basic research to generate ideas and create innovations.

At the higher education level, Future Laboratory offers a two-year master's program based on the Berkeley Entrepreneurship Method that provides students with the quality of Berkeley education in Georgia. The Startup Semester program at Berkeley SCET provides students with a unique opportunity to put their knowledge and skills into practice. Also, Future Laboratory cooperates with UC Berkeley IBI in the following areas: corporate innovation, design thinking, data analytics, and open innovation. All these initiatives make Future Laboratory an important participant in the development of the educational system in Georgia, shaping the next generation of innovators and entrepreneurs.

The country has a training program for 3,000 information technology specialists. The project "GENIE" (National Innovation Ecosystem of Georgia) trains highly demanded and highly qualified specialists in various fields of activity within the framework of the Agency for Innovation and Technology of Georgia. The grants are distributed from the state budget as well as the World Bank's program "Georgia's National Innovation Ecosystem", which was launched in 2016 and runs until 2023 with a total cost of $23.4 million. In general, resources were directed to startups and infrastructure development (technoparks throughout Georgia). Also, the Prodact community is developing in the country, which allows entrepreneurs to provide relevant knowledge and resources for managing startups.

2.3.5.5 Access to infrastructure

Georgia hosts a significant number of competitions in the context of access to infrastructure for startups at the Seed stage: 183 teams participated in the pre-acceleration of startups, and 700 teams participated in the social entrepreneurial incubation program. The average team size is three people. Several programs for startups were implemented: three iterations in the pre-acceleration of startups and seven iterations in the social entrepreneurial incubation program. The number of participants in the implemented startup programs also averages three people per team.

According to GITA, the number of startups that have passed international acceleration programs is 42. In addition, there are an average of 10 hackathons per year, which further expands the opportunities for the development and application of innovative ideas in the startup ecosystem. An important element for this stage is the presence of the main technopark / IT park. In Georgia, GITA, which is actively operating in the country, plays an important role in the development of all processes in the startup ecosystem. GITA technology parks and innovation centers are represented in various cities in Georgia, including Tbilisi, Batumi, Kaspi, Gurjaani, Telavi, Akhmeta, Zugdidi. GITA helps to develop and commercialize innovations and has already helped more than 400 startups (mostly focused on startups with international potential).

Organizations providing access to infrastructure also play an important role:

● Startup Grind - a global startup community created to educate and unite innovative entrepreneurs in Georgia, already has 3928 members;

● Startup Buro - a platform that provides pre-acceleration and acceleration opportunities, hosts events, and opens up new investment opportunities for startups, has already implemented 43 programs and organized 150 events, reaching 46,200 participants;

● Globalize is a professional community of Georgian entrepreneurs and investors from all over the world. With more than 5,000 members, their representatives have created more than 55 unique business solutions.

> *"Georgia's government is moving towards sustainable development, based on understanding the value of new ideas, digital technologies, and products; to this end it promotes the dissemination of knowledge across sectors, the scaling of startups, as well as the uniform development of human capital, which gives the country the advantage it needs to transform into a modern economy."*
>
> *Anni Vashakmadze, Head of Donor Relations and International Relations, Georgian Innovation and Technology Agency (GITA)*

2.3.5.6 Shared vision and strategy

The country has legal regulations in terms of intellectual property and venture capital. In addition, the following main areas have been regulated: crowdfunding, regulatory sandboxes, and The National Bank of Georgia is the regulator of the investment fund industry in Georgia, including venture capital investments. In the future, the development of their activities will help establish venture funds in Georgia. The regulatory framework for the investment fund industry also covers venture capital investments. However, there are no specialized legal provisions for venture funds, but it is quite possible to register a fund under the general regulation.

2.3.6 Rating of the startup ecosystem at the seed stage

Based on the data received from stakeholders as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed.

The calculation of startup ecosystem process indices is presented in Table 6.

Table 6. Calculation of startup ecosystem process indices at the Seed stage in Georgia

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Startup targeting a specific market	0,47	4	1	0,47	0,925
Priority areas for startup development	0,3	3	0,75	0,225	
Approach to participation in startups	0,23	4	1	0,23	
Performance					
The total number of startups created over the past 3 years per 1 million people	0,4	4	1	0,4	0,475

Number of prototypes created / MVP for the last 3 years per 1 million population	0,33	0,5	0,125	0,04125	
Number of registered patents for the last 3 years per 1 million population	0,27	0,5	0,125	0,03375	
Access to finance					
Average initial funding	0,8	3	0,75	0,6	0,8
Maximum initial funding	0,2	4	1	0,2	
Education and talent development					
Availability of basic research to generate ideas and create innovations relative to the number of universities	0,6	4	1	0,6	0,8
Amount of funds for R&D	0,4	2	0,5	0,2	
Access to infrastructure					
Number of competitions held over the past 3 years per 1 million population	0,22	2	0,5	0,11	0,73
Number of programs implemented over the past 3 years per 1 million population	0,22	2	0,5	0,11	
Number of hackathons conducted over the past 3 years per 1 million people	0.1	2	0,5	0,05	
Availability of the main technopark / IT Park, which deals with key areas of development of technology startups	0,46	4	1	0,46	
Shared vision and strategy					
Existence of regulatory legal regulation to meet the needs of stakeholders in the protection of their intellectual property	0,27	3	0,75	0,2025	0,75
Existence of regulatory legal regulation for modern technologies	0,33	3	0,75	0,2475	
Existence of normative legal regulation for the venture sphere	0,4	3	0,75	0,3	

Figure 14 shows the indexes in the form of a petal star.

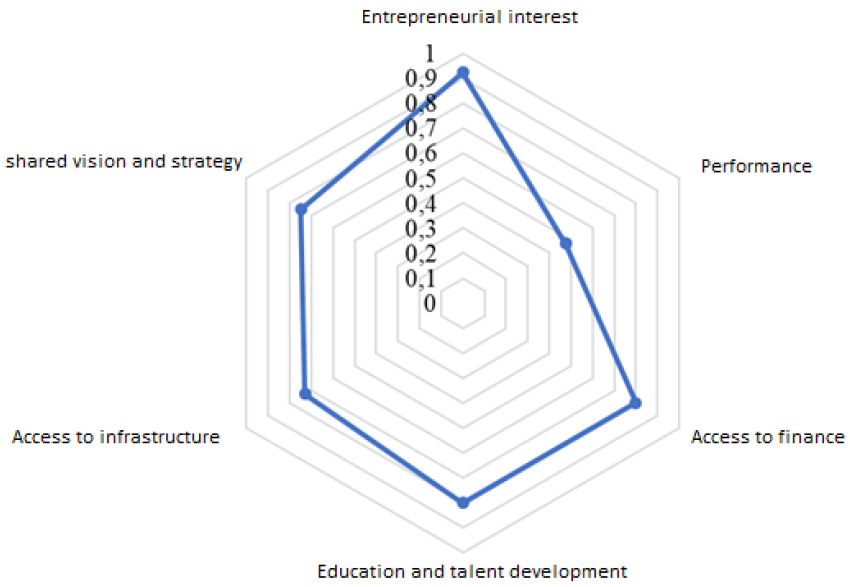

Figure 14. Indexes of the startup ecosystem processes at the Seed stage in Georgia

The value of the country rating in terms of the startup ecosystem at the Seed stage was 0.747 (the arithmetic average of all index values).

2.3.7 Main challenges for the development of the startup ecosystem at the Seed stage

Entrepreneurial interest:

- Insufficient level of business promotion, especially in terms of management practices, to ensure the development of new ideas.
- Entrepreneurs lack opportunities and competence to attract investments (including foreign ones).

Performance:

- Limited market opportunities (especially when compared to the European or American market);
- Lack of sufficient funding and R&D support from the private sector.

Access to finance:

- Limited access to follow-up funding and a lack of diversity of funding sources, there is a strong disadvantage in the absence of active venture capital funds within Georgia;
- Traditional investors prefer to invest in businesses that guarantee immediate and significant returns rather than startups (however, it is worth noting that there has been a gradual transition in this regard over the past 2 years, so we can talk about positive future prospects).

Education and talent development:

- Limited talent pool to scale the startup internationally;
- Lack of incentives for private sector investment in R&D in terms of higher education institutions;
- Problems with access to talent (key personnel go to banks, which is a problem for a startup);
- Insufficient links between industry and science to ensure the effective use of resources allocated to R&D by the state to ensure the creation of science-intensive startups and the commercialization of ideas at the level of higher education institutions in the future.

Access to infrastructure:

- Shortage of qualified personnel.

Shared vision and strategy:

- There are no specialized legal regulations required for venture funds.

2.3.8 General findings by country

Among the countries studied, Georgia took 1st place in the ranking of countries in terms of the startup ecosystem at the Pre-seed stage and 2nd place at the Seed stage, with values of **0.801** and **0.747**, respectively.

The values are broken down into indices in Figure 15.

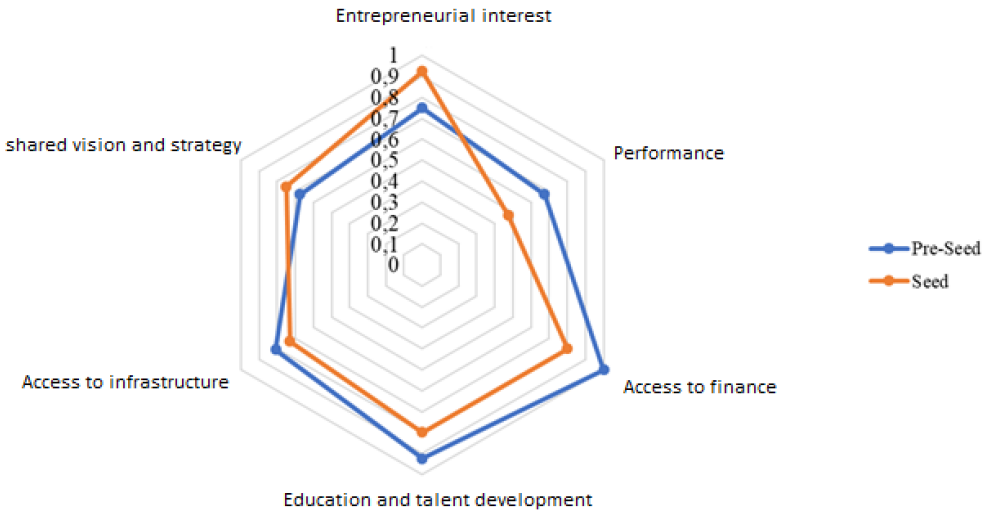

Figure 15. Indexes at the Pre-seed and Seed stages in Georgia

Over the past few years, the startup ecosystem in Georgia has been growing and developing rapidly. It has a thriving business community and a growing pool of talented entrepreneurs and developers. The country has a favorable tax and regulatory environment for startups, as well as many initiatives and programs to promote entrepreneurship and innovation.

For further development and growth of indicators, it is necessary to solve the challenges presented in paragraphs 2.3.4 and 2.3.7 by searching for suitable business models, increasing knowledge in terms of scaling, regulation and management among potential entrepreneurs through increasing the level of education, increasing the level of business promotion, especially in parts of management practices; increasing successful knowledge-intensive startups and their percentage of the total, increasing funding and support for R&D from the private sector; training potential investors to invest in startups, creating prospects for startups after the implementation of the money from the grant, promoting investment in startups, and not traditional business; developing a culture of mentoring, creating and searching for talent to scale startups internationally, creating links between industry and science; more active involvement of the private sector in the development of the startup ecosystem; creating accessible co-working spaces at an early stage, including within State Universities; development of a separate strategy for the development of a startup ecosystem.

2.4 Kazakhstan

2.4.1 A brief overview of economic activity

Kazakhstan is a country with an upper middle-income group, a developing economy, and innovative potential. GDP as of 2022 is $196,729.512.370. GDP is mainly dependent on the oil and gas sector. In 2022, GDP growth was 3.1%, growth in the real sector was 3.2%, growth in the service sector was 2.5%, and investment in fixed assets grew by 7.8%. Also, the country is rich in natural resources. The population of Kazakhstan is 19,644,000. GDP per capita is $10015.

2.4.2 Pre-seed Overview of the Startup Ecosystem at the Pre-Seed Stage

2.4.2.1 Entrepreneurial interest

Entrepreneurs in the country understand the definition of a startup. For most entrepreneurs, a startup is a technological business that has the prospect of growth and the ability to scale due to a global view of the problem. In most cases, the founders of startups are 2–3 people. The creation of a startup is aimed at developing a new product that will solve the problems existing in the country. Theory U is used to create and develop startups; that is, decisions are made under conditions of uncertainty.

Support for technology businesses is equated with small businesses, however, most of the entrepreneurs who create startups participate in acceleration programs, and there are positive trends in increasing their number. Entrepreneurs use the main business models in the B2B and B2C segments: Saas, transactional, and marketplace.

2.4.2.2 Performance

Experienced entrepreneurs are visible to beginners, this is due to the relatively high number of successful startups. The main driver for creating successful startups is Astana Hub. Astana Hub was established by the Decree of the Government of the Republic of Kazakhstan dated October 16, 2018, No. 644 CF "International technopark of IT Startups "Astana Hub" and defined as the international technology park "Astana Hub". Officially opened on November 6, 2018.

The subject of Astana Hub activity is the development of an innovative culture and improvement of the startup ecosystem by providing acceleration services and technological business incubation to Astana Hub participants, holding consulting, informational, analytical, educational, marketing, and other events aimed at stimulating the development of Astana Hub participants, and other areas activities in the field of innovation ecosystem development.

Successful startups include:

- JET (system of stationless short-term rental of electric scooters by analogy with carsharing);
- S1LKPAY (an innovative fintech bank offering a non-standard money transfer solution);
- Cerebra (software for diagnosing stroke at an early stage based on computed tomography images);
- CTOgram (auto services from trusted suppliers and automotive products and parts from wholesalers);
- Clockster (HRM system for workforce management with a focus on blue collar workers) and many others.

2.4.2.3 Access to finance

At this stage, entrepreneurs rarely use their own capital. In terms of financing, MOST Ventures can be singled out within the framework of which the MOST Business Incubator project is being implemented, which helps develop startups at early stages (Pre-seed and Seed) by providing

funding in the amount of 20–50 thousand USD. In addition, it is important to note the Nuris Innovation Cluster of Nazarbayev University, within the framework of which there is an accelerator program "Quick Start" in the "All Inclusive" format for startups at the stage of a working product (MVP) with confirmed demand. As part of it, you can attract investments up to 3 million tenge (6,750 USD) at the start of the program. Let's single out the Falconry Fund, which invests in startups with MVPs and the potential to reach a capitalization of 100 million USD.

Tumar Venture Fund is an early-stage venture fund established in 2021 as part of the Fostering Productive Innovation Project in partnership with the World Bank and the Ministry of Digital Development, Innovation, and Aerospace Industry of the Republic of Kazakhstan. The fund is registered with the AIFC and is managed by White Hill Capital Ltd. It invests in startups starting at $50,000 USD. Let's note two other venture funds supported by the state: Tech Garden Ventures and Almaty Venture Fund.

2.4.2.3 Access to finance

At this stage, entrepreneurs rarely use their own capital. In terms of financing, MOST Ventures can be singled out within the framework of which the MOST Business Incubator project is being implemented, which helps develop startups at early stages (Pre-seed and Seed) by providing funding in the amount of 20–50 thousand USD. In addition, it is important to note the Nuris Innovation Cluster of Nazarbayev University, within the framework of which there is an accelerator program "Quick Start" in the "All Inclusive" format for startups at the stage of a working product (MVP) with confirmed demand. As part of it, you can attract investments up to 3 million tenge (6,750 USD) at the start of the program. Let's single out the Falconry Fund, which invests in startups with MVPs and the potential to reach a capitalization of 100 million USD.

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Also, we note the following investment venture clubs:

● UMAY ANGEL CLUB (consisting of 100 investors, with an average startup financing check of 100 thousand to 150 thousand USD);

● Activat Invest (consisting of 60 investors with an average funding check of USD 20,000).

The average amount of initial financing is about 20–150 thousand USD. The maximum amount of initial financing is 650 thousand USD.

“Startups are afraid to grow globally, a change in mindset from local to global is needed. Startups place a very big focus on the local market and the region. Startups lack a scaling strategy. It would be ideal if startups would receive 80% of their profits from the international market and 20% would be generated from the local market.”

Alim Khamitov, founder and director of MOST

2.4.2.4 Education and talent development

For this process at the Pre-seed stage, it is important to demonstrate the activity of higher education institutions in terms of the development of a startup ecosystem. Here it is important to note the positive role of the Association Business-Incubator of Kazakhstan, which brings together 18 members from universities and venture funds to develop the innovation and technology ecosystem, integrating the connection of the educational level with other elements of the ecosystem. It should be noted that two universities in Kazakhstan entered the top 100 universities in Asia (according to the World University Rankings, which are compiled by QS Quacquarelli Symonds).

In addition, the activities of Astana Hub in terms of Education and talent development play an important role. Astana Hub has unique IT training programs, such as the TechOrda program. The amount of funding for the program is up to 600,000 tenge (1,338 USD) per student in a private school to train students in the field of IT. The program stimulates the opening of new IT schools in all regions of the country. The project is focused on creating qualified specialists and strengthening the IT industry in Kazakhstan. Selected schools will begin training about 3,000 IT professionals this year. Also developed is the Startup Academy, a program aimed at universities in Kazakhstan. The goal of the program is to develop and implement educational programs and teaching methods for the course on technological entrepreneurship for bachelor's and master's programs. The program is an online course on technological entrepreneurship in Kazakh and Russian with relevant assignments and is hosted on the LMS Astana Hub platform. The course can be implemented at universities as a compulsory or elective course, where students can receive credits for attending the course, or as an additional course outside the university curriculum. For the development of talents at the Pre-seed stage, it is important to understand the average experience of startup founders (7–10 years in Kazakhstan), the average salary of a software engineer (18.3 thousand USD per year), and the percentage of startup founders with higher education and an academic degree (90 % and 18%, respectively).

2.4.2.5 Access to infrastructure

At this stage, for the development of a startup ecosystem, it is important to have a developed network infrastructure in the country, which will allow supporting startups using modern technologies, including remote access. Thus, the percentage of the population covered by fixed and mobile broadband Internet access is 50% and 88.8%, respectively.

The key task is to provide support at the beginning of the entrepreneur's life cycle. It should also be noted here that the Astana Hub, within which the Techpreneurs program operates, provides for the provision of continuous support for startup projects at all stages, including the Pre-seed stage, with the ability to choose services within the program separately from each other. In addition, Astana Hub is actively developing the startup school. A startup can take part in Startup School even if it doesn't have a startup or idea yet. The course is aimed at aspiring entrepreneurs, as well as startups with an idea at the MVP stage. 6,785 people have already become students at the school (1,058 people received certificates), according to Astana Hub.

2.4.2.6 Shared vision and strategy

The country does not have a separate strategy for the development of the startup ecosystem, however, many issues related to the stakeholders of the startup ecosystem are considered in the digital transformation strategy.

2.4.3 Rating of the startup ecosystem at the Pre-seed stage

Based on the data received from stakeholders as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed. The calculation of startup ecosystem process indices is presented in Table 7.

Table 7. Calculation of startup ecosystem process indices at the Pre-seed stage in Kazakhstan

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Definition of a startup	0,4	3	0,75	0,3	0,75
Technology business support	0,4	3	0,75	0,3	
Using the Startup Business Model	0,2	3	0,75	0,15	
Performance					
Number of startups that raised more than 10 times GDP per capita per 1 million population in the last 3 years	0,37	3	0,5	0,27	0,5025
Number of knowledge-intensive startups that have attracted funding of more than ten times GDP per capita per 1 million population in the last 3 years	0,3	2	0,5	0,15	
Percentage of knowledge-intensive startups relative to all startups that raised funding of more than ten times GDP per capita in the last 3 years	0,33	1	0,25	0,0825	
Access to finance					
Average initial funding	0,7	3	0,75	0,525	0,825
Maximum initial funding	0,3	4	1	0,3	
Education and talent development					
Average experience of startup founders	0,3	3	0,75	0,225	0,75
The average salary of a software engineer per year relative to the country's GDP per capita	0,2	2	0,5	0,1	
Percentage of startup founders with college degrees	0,35	4	1	0,35	
Percentage of startup founders with advanced degrees	0,15	2	0,5	0,075	
Access to infrastructure					
Percentage of the population covered by fixed broadband Internet access	0,17	2	0,5	0,085	0,7075
Percentage of the population covered by mobile broadband Internet access	0,23	3	0,75	0,1725	
Number of startups accepted into incubation and acceleration programs per 1 million people	0,6	3	0,75	0,45	
Shared vision and strategy					
The quality level of the national strategy for the startup ecosystem	0,47	2	0,5	0,235	0,6125
The level of understanding and consensus on the main issues of development of the startup ecosystem among stakeholders	0,37	3	0,75	0,2775	
The level of the country's competitiveness in terms of the startup ecosystem at the regional and global level	0,16	2,5	0,625	0,1	

Figure 16 shows the indexes in the form of a petal star.

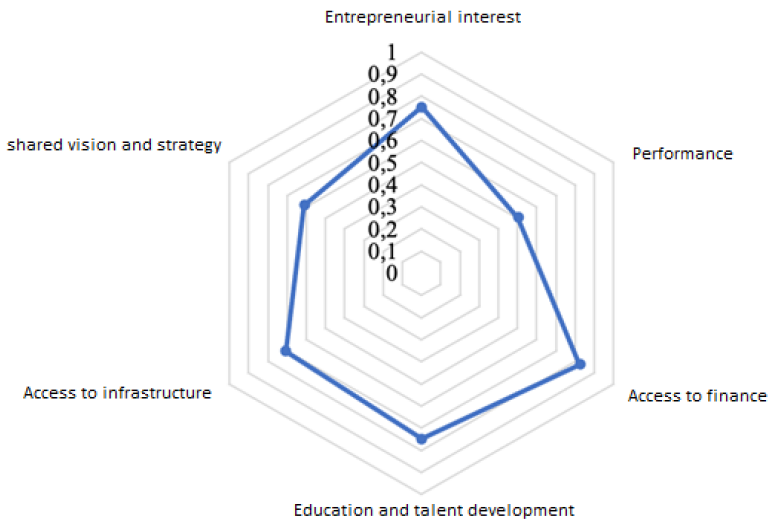

Figure 16. Indexes of the startup ecosystem processes at the Pre-seed stage in Kazakhstan

The value of the country rating in terms of the startup ecosystem at the pre-seed stage was 0.691 (the arithmetic average of all index values).

2.4.4 The main challenges for the development of a startup ecosystem at the pre-seed stage

Entrepreneurial interest:

- When generating startup ideas for most entrepreneurs, the main goal is to create a successful commercial business and not change the world for the better.
- Current startup support mechanisms do not cover all stages of technology business development.
- Startups in the b2g (business-to-government) segment, where businesses offer their products or services to government organizations, do not fully use, or have not adapted the main business models of startups.
- When forming a business model, insufficient attention is paid to sales of the product, mainly, the emphasis is on the product itself.

Performance.

- Most successful startups (startups that have attracted significant funding) are not science intensive.

Access to finance:

- There are tendencies of distrust for angel investments, and therefore, people with appropriate capital make investments outside the country;
- High-income people are not very active in the management of their capital venture funds.

Education and talent development:

- Students have many knowledge gaps in the field of business and the development of startup projects. According to market players, most of them lack the process of attracting talented graduates to the system of creating and developing startups, where they can test different hypotheses and ideas and develop innovative projects in the process of receiving education;
- The problem is the weak motivation of students to take business incubation programs, the insufficient level of student awareness (the secondary priority for students is to acquire entrepreneurial skills, while the primary is not to lose a scholarship or a grant), and within the framework of the incubation program, only 10% of students reach the final;
- The process of creating support systems and financing startup initiatives by the university itself is at a very early stage.

Access to infrastructure:

- Insufficient level of support at the initial stages of a startup's life cycle;
- There is a shortage of qualified personnel in the field of student entrepreneurship who can develop a local ecosystem within higher education institutions. Shared vision and strategy:
- There is no separate strategy for the development of the startup ecosystem, which would ensure the uniform development of all startup ecosystem processes and building blocks, considering the needs of all stakeholders.

2.4.5 Overview of the Startup Ecosystem at the Seed Stage

2.4.5.1 Entrepreneurial interest

The majority of startups are aimed at domestic and regional markets. The priority areas for entrepreneurs are Fintech, Gamedev, blockchain, Edtech, and Govtech.

> *"We do not limit startups to the local market and help startups reach global consumers, helping them enter the US, Southeast Asia, and other countries. This process creates more opportunities for unicorn startups to emerge in Kazakhstan. The Astana Hub service also includes access to experts, mentors, international agents, and embassies. Astana Hub is ready to help startups enter the global market and raise money by any means and through any channels. This is our top priority and is becoming a growth driver for the country."*
>
> *Astana Hub Experts*

2.4.5.2 Performance

The total number of startups created in the country was more than 550. The number of prototypes / MVPs created was more than 300, and the number of registered patents was more than 20.

2.4.5.3 Access to finance

At this stage, entrepreneurs also rarely use their own capital. In terms of financing, MOST Ventures can be singled out within the framework of which the MOST Business Incubator project

is being implemented, which helps develop startups at early stages (Pre-seed and Seed) by providing funding in the amount of 20–50 thousand USD. It should be noted that the important role of Kazakhstan Investment Corporation, which, as a fund of funds, is engaged in the formation of private venture funds (invests money as LPs Limited Partners and strives to expand the country's venture investment market as efficiently as possible). They are also working on attracting foreign investment to Kazakhstan. The Fund of Funds works closely with the ecosystem, its core stakeholders, and private enterprises (Most Ventures, others). Their role has a positive effect on all levels of investment in startups in Kazakhstan.

Kazakhstan Investment Corporation implemented a program for the development of the Kazakhstan Digital Accelerator startup ecosystem together with a Singaporean company and the Quest Ventures fund. Since 2020, as part of the KDA program, he has trained and invested in 39 startups, some of which have already managed to attract large investments. For example, Kazakhstan-based startup Cerebra (an artificial intelligence-based software for the early diagnosis of stroke) received a $1 million investment from businessman Timur Turlov. In addition, thanks to signed agreements with international funds Quest Ventures in Singapore and 500 Global in the US, three domestic startups were able to attract investments. In the ITU methodology, venture funding is attracted at the "Valley of Death" stage; however, in Kazakhstan, such venture funds as Falconry Fund, Tumar Venture Fund, and Jas Ventures can provide funding for startups already at the Seed stage. The average amount of initial financing is about 20–25 thousand USD. The maximum amount of initial funding is $500,000.

“As a quasi-public sector, we want to give impetus to development and do not want to replace the private sector. So that as many organizations as possible in the venture direction appear and are ready to receive support from the state. At the beginning of the development of the ecosystem, the involvement of the public sector is inevitable because there is no mature private market yet. Therefore, the state takes on the role of forming many elements of the ecosystem. It is important to act on the principle of "create and step aside." Now the market has formed quite rapidly. The state understands that it is necessary to push but not replace.”

Kazakhstan Investment Corporation experts

2.4.5.4 Education and talent development

The total amount of funding for scientific activities in 2022 amounted to 84 billion tenge (188 million USD). However, higher education institutions perform only 15-20% of R&D in the total. Now, the level and quantity of university research are not high enough. The first reason for this is the reduced pay for university research workers. The second reason is the excessive workload of a university employee with educational activities, when each teacher conducts about 5-7 independent courses per year, for which it is necessary to develop the entire package of documents, starting from the syllabus (a document that contains a detailed description of the training course) and TMC (the educational methodological complex) to test questions for the exam. In such circumstances, they have little time to conduct research.

Most higher education institutions conduct basic research to generate ideas and create innovations.

2.4.5.5 Access to Infrastructure

The country hosts numerous hackathons for the development of startups (15 in 2022). Competitions are held (10, total number of participants: 1543), and programs are implemented

(8, total number of participants: 453). Within the framework of this activity, it is possible to highlight the pitching of startups, the key organizer of which is Astana Hub. Pitching events are organized for startups at different stages of development.

Once every two weeks, Astana Hub organizes Pizza Pitch events, where seed-stage startups can present their ideas and get feedback from investors and trackers. Another platform for pitching startups organized by Astana Hub is Invest Day, a business platform where IT startups from Kazakhstan and abroad can present their product to potential business angels and venture funds, and investors will have the opportunity to choose startups for their investment portfolio and find a co-investor.

For the period of 2020, Astana Hub organized six demo days, during which 67 startup teams had the opportunity to present their companies to investors. As part of the Digital Bridge forum, Astana Hub held a demo day of the Silkway Accelerator program, a joint program with Google for startups. Accelerator program participants got the opportunity to present their products to investors and business angels. Another platform for pitching startups is the Astana Hub Battle, which is held in 2022 as part of the Digital Bridge Forum 2022. The number of applicants was 253 people; applications were received from Kazakhstan, Uzbekistan, Russia, Kyrgyzstan, Belarus, Azerbaijan, and Turkey. The prize fund of the competition was $18,000 ($10,000 for 1st place, $5,000 for 2nd place, and $3,000 for 3rd place).

An important element for this stage is the presence of the main technopark / IT park. In Kazakhstan, this is the Astana Hub, which is actively operating in the country and plays an important role in the development of all processes in the startup ecosystem.

2.4.5.6 Shared vision and strategy

The country has legal regulations in terms of intellectual property and venture capital. In addition, the following main areas have been regulated: crowdfunding, big data turnover, and regulatory sandboxes. In terms of blockchain and cryptocurrency, a draft law on digital assets has been developed; however, as of January 20, 2023, it has been sent for revision.

It is important to note that several state departments that were engaged in duplicating functions were abolished in the country, and a transition was made under the management of the Astana Hub (reforming the Zerde holding and merging the QazInnovations agency and the Astana Hub technopark into one organization - the Park of Innovative Technologies).

> *"The AIFC was created in the image and likeness of the Dubai International Center and several operators using English law. Kazakhstan has a unique ecosystem of financial centers and fintech companies. Liberal legislation, Internet penetration, financial literacy, and digital literacy allow people to use all the tools."*
>
> *Pavel Koktyshev, Chief Executive Officer AIFC Fintech*

2.4.6 Startup Ecosystem Ranking at the Seed Stage

Based on the data received from stakeholders as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed.

The calculation of startup ecosystem process indices is presented in Table 8.

Table 8. Calculation of startup ecosystem process indices at the Seed stage in Kazakhstan

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Startups targeting a specific market	0,47	2,5	0,625	0,29375	0,7375
Priority areas for startup development	0,3	4	1	0,3	
Approach to Participation in startups	0,23	2,5	0,625	0,14375	
Performance					
The total number of startups created over the past 3 years per 1 million people	0,4	2	0,5	0,2	0,515
Number of prototypes created / MVP for the last 3 years per 1 million population	0,33	3	0,75	0,2475	
Number of registered patents for the last 3 years per 1 million population	0,27	1	0,25	0,0675	
Access to finance					
Average initial funding	0,8	2	0,5	0,4	0,55
Maximum initial funding	0,2	3	0,75	0,15	
Education and talent development					
Availability of basic research to generate ideas and create innovations relative to the number of universities	0,6	4	1	0,6	0,8
Amount of funds for R&D	0,4	2	0,5	0,2	
Access to infrastructure					
Number of competitions held over the past 3 years per 1 million population	0,22	3	0,75	0,165	0,81
Number of programs implemented over the past 3 years per 1 million population	0,22	2	0,5	0,11	
Number of hackathons conducted over the past 3 years per 1 million people	0.1	3	0,75	0,075	
Availability of the main technopark / IT Park, which deals with key areas of development of technology startups	0,46	4	1	0,46	
Shared vision and strategy					
Existence of regulatory legal regulation to meet the needs of stakeholders in the protection of their intellectual property	0,27	3	0,75	0,2025	0,75
Existence of regulatory legal regulation for modern technologies	0,33	3	0,75	0,2475	
Existence of normative legal regulation for the venture sphere	0,4	3	0,75	0,3	

Figure 17 shows the indexes in the form of a petal star.

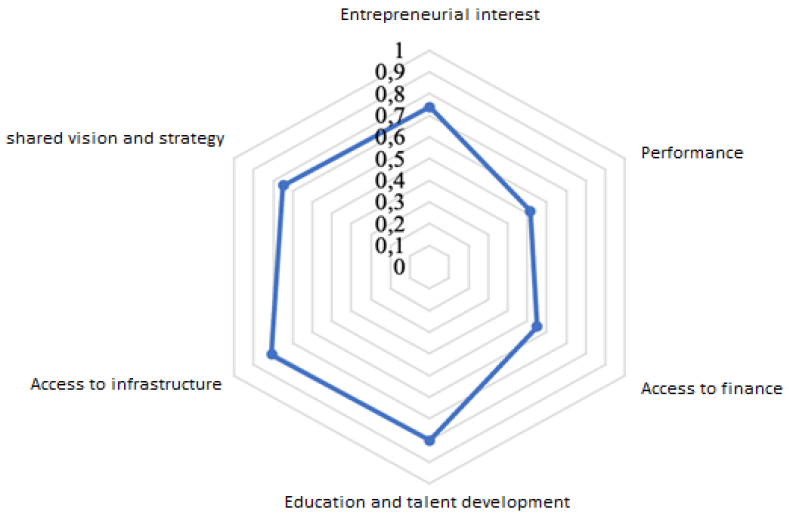

Figure 17. Indexes of the startup ecosystem processes at the Seed stage in Kazakhstan

The value of the country rating in terms of the startup ecosystem at the seed stage was **0.694** (the arithmetic average of all index values).

2.4.7 Challenges for the development of the startup ecosystem at the seed stage

Entrepreneurial interest:

- Great focus is placed on the local and regional market; many startups do not have a scaling strategy;
- The lack of self-reliance of entrepreneurs and the lack of strategic planning are considered by market players as important problems;
- Insufficient knowledge of the development of startups, the strategy does not change if the idea does not work at the right level, the ideas of international startups are copied, and the emphasis is on creating startups with a small innovative component that already has large international competitors.

Performance:

- Lack of sufficient funding and support for R&D from the private sector;
- The lack of relevant competencies and experience prevents startups from Kazakhstan from reaching the next stages of financing, and therefore funds must constantly monitor the development of a startup until it reaches the next rounds of financing.

Access to finance:

- The venture system is not fully formed at the legislative level; there is no protection and guarantee for venture funds and business angels;
- MOST Venture conducts courses for venture investors, after which there is a very high conversion rate. In practice, people join the club to make subsequent angel investments, but this process in the region should take place at all levels to exchange transactions and create shared investment syndicates like in Europe and the USA.

● Most Ventures organize training courses for venture investors that demonstrate high conversion: many participants, after completing the courses, join the club to make angel investments. However, to intensify the exchange of transactions and the creation of joint investment syndicates, like those that exist in Europe and the United States, it is necessary that such processes take place at all levels of the regional ecosystem.

Education and talent development:

● There are no necessary financial funds in higher education institutions;

● Insufficient cooperation between higher education institutions for the exchange of experience;

● Lack of a university startup community;

● Absence or constant change of personnel responsible for startup education;

● There is no single approach and educational program for developing startup skills;

● The problem is to attract teachers with practical experience who have an accurate understanding of the startup ecosystem development processes and can impart the necessary knowledge to students.

Access to infrastructure:

● Shortage of qualified personnel. Shared vision and strategy

● The Law on Venture Investments has not been updated since 2018 and needs to be updated, considering current trends in the development of the startup ecosystem;

● The Law on Digital Assets is being finalized.

2.4.8 General findings by country

Among the countries studied, Kazakhstan took 3rd place in the ranking of countries in terms of the startup ecosystem both at the Pre-seed stage and at the Seed stage with values of 0.691 and 0.694, respectively. The values are broken down into indices in Figure 18.

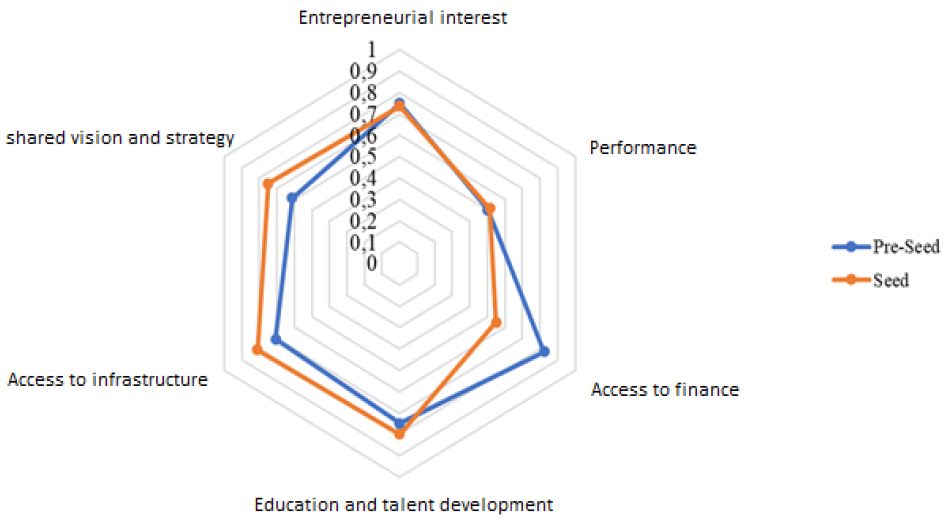

Figure 18. Indexes at the Pre-seed and Seed stages in Kazakhstan

The startup ecosystem of Kazakhstan is among the leaders in the countries of Central Eurasia. Stakeholders develop an innovative culture, improve the startup ecosystem, and provide acceleration services and technological business incubation. Consulting, informational, analytical, educational, and marketing events are held aimed at stimulating the development of stakeholders in the startup ecosystem.

For further development and growth of indicators, it is necessary to solve the challenges presented in paragraphs 2.4.4 and 2.4.7 by creating a clear separation between the technology business and traditional business, popularizing the startup ecosystem, increasing the level of competencies of all stakeholders in terms of the startup ecosystem, increasing the number of successful startups, including science-intensive ones, and increasing funding and support for R&D from the private sector. It is necessary to improve the investment culture, using international experience to encourage investment within your own country. Also, it is important to use the existing experience of local venture funds in the process of creating new venture structures using public money and the financial resources of quasi-state organizations.

It is necessary to improve the venture system at the legislative level. It is important to increase the level of knowledge regarding the startup ecosystem in higher education institutions, both among students and teachers, to increase the level of support and funding for startup initiatives. Furthermore, it is necessary to create your own qualified personnel in terms of all processes in the startup ecosystem. It is necessary to develop a separate strategy for the development of a startup ecosystem. It is also important to reduce the duplication of functions in state structures dealing with startup areas. In the process of developing the startup ecosystem, it is also necessary to gradually delegate the processes carried out by Astana Hub to the private sector, where the state should help create and develop more players that accelerate startups and organize various types of competitions and infrastructure projects.

2.5 Kyrgyzstan

2.5.1 A brief overview of economic activities

Kyrgyzstan is a lower-middle-income country with a changing economy and a creative population[26]. GDP, according to data for 2022, amounted to $10.517.943.260. GDP is mainly dependent on industry, electricity, and services. In 2022, the average GDP growth rate was about 7%. According to the data for 2022, the population of Kyrgyzstan is 7 million people. GDP per capita is $1502.

2.5.2 Overview of the Startup Ecosystem at the Pre-Seed Stage

2.5.2.1 Entrepreneurial interest

Entrepreneurs in the country have an average understanding of the definition of a startup. For most entrepreneurs, a startup is equated to creating a business on the Internet (in the context of Industry 4.0). Nevertheless, many startups are quite creative, so NBFit from Kyrgyzstan won first place at the Astana Hub Battle in 2022.

Technology business support is equated to small business. A relatively low proportion of entrepreneurs who create startups participate in acceleration programs; there are no positive trends in increasing their number.

Entrepreneurs use the main business models in the B2B and B2C segments: Saas, transactional, and marketplace.

2.5.2.2 Performance

Experienced entrepreneurs are hardly visible to beginners; this is due to the absence of a pronounced key player in terms of startup development. Among the more notable players are NBFit, Growave, FIN.

High-Tech Park of the Kyrgyz Republic: at the moment, 138 companies (about 1300 employees) are registered in the HTP of the Kyrgyz Republic. Almost 90% of services in the HTP are exported abroad. HTP residents of the Kyrgyz Republic export to more than 30 countries around the world. The turnover for 2021 amounted to more than 2.1 billion soms (1 US dollar - 85 soms). DEVCIT is a center that develops acceleration programs for businesses. It has been operating since 2019 and provides acceleration services, prepares acceleration programs for businesses, and develops a startup studio. The main customers of these programs are international organizations and foundations. At the moment (2022), the center has conducted 10 acceleration programs and 2 mentoring programs. More than 360 entrepreneurs and startups have been trained. At the same time, 24 companies received seed investments as a result of acceleration, and 40 received grants. DEVCIT Acceleration has 23 business trackers, over 60 consultants, and experts in various fields.

Accelerate Prosperity is a global initiative of the Aga Khan Development Network (AKDN) in Central and South Asia aimed at incentivizing businesses where economic opportunities remain scarce, actively impacting the startup ecosystem of Kyrgyzstan, and offering social investment of up to $50,000 to develop small businesses. And medium-sized businesses in Kyrgyzstan currently have 317 graduates, have been funded 1024506 USD, have 36 companies in their portfolio, and have conducted 20 accelerations.

Successful startups include[27]:

- Growave (a marketing platform used by brands from all over the world);

[26] https://mineconom.gov.kg/ru/post/8808.

[27] https://weproject.media/articles/detail/6-kyrgyzstantsev-zapustivshikh-uspeshnye-startapy-v-bishkeke/.

- Codify (courses in various areas: from the basics of programming and computer science to leadership and communications);
- Ecoland (the first store in Kyrgyzstan that sells organic food from both local and foreign producers);
- Namba Group (an ecosystem of IT products, the heart of which is Namba One (super app); today, Namba Group's severals include Namba Pay (a payment system), Namba Food (delivery service), Namba Way (taxi service), Namba Market (free delivery of products), Namba Trade (B2B marketplace), Namba Profi (service for the self-employed), K-money (payment aggregator) and a number of other services).

2.5.2.3 Access to finance

At this stage, entrepreneurs practically do not use their own capital. The country is experiencing a low percentage of investments at this stage, which is associated with the weakness of the capital market, the lack of available long-term investments, and the rudimentary state of the angel investment market.

The average amount of initial financing is about 5–10k USD. The maximum initial funding amount is $20,000 USD.

> "Startups in Kyrgyzstan are focused on getting a grant rather than gaining market share and profits. The same startups come up with the hope of getting a $10,000 grant to run a team. The grants are focused on social projects and are obtained almost effortlessly."
>
> Devcit Experts

2.5.2.4 Education and talent development

For this process at the Pre-seed stage, it is important to demonstrate the activity of higher education institutions in terms of developing the startup ecosystem, but such activity is low. Since the education sector does not produce enough engineers, entrepreneurs, and IT specialists, the population has a great interest in entrepreneurial activity but lacks the relevant competencies. In terms of talent development, the activities of the multifunctional innovation center of Kyrgyz patent, which pays attention to the segment of children's inventions, can be noted: it works with all schools and children's centers, holds events for young inventors, teaches intellectual property and startups, and works actively with schools to understand startups, innovations, and intellectual property.

For the development of this process at the Pre-seed stage, it is important to understand the average experience of startup founders (4–6 years in Kyrgyzstan[28]), the average salary of a software engineer (7.5 thousand USD per year[29]), and the percentage of startup founders with higher education and a degree (90% and 85%, respectively[30]).

2.5.2.5 Access to Infrastructure

At this stage, for the development of a startup ecosystem, it is important to have a developed network infrastructure in the country, which will allow supporting startups using modern

[28] According to a survey conducted by Startup Central Eurasia in 2022-2023.

[29] https://economist.kg/novosti/dengi/2020/04/11/skolko-zarabatyvajut-programmisty-v-kyrgyzstane-obzor/.

[30] According to a survey conducted by Startup Central Eurasia in 2022-2023.

technologies, including remote access. Thus, the percentage of the population covered by fixed and mobile broadband Internet access is 60% and 99%[31], respectively.

The key task is to provide support at the beginning of the entrepreneur's life cycle. Here it is also necessary to note the multifunctional innovation center of Kyrgyz patent, which provides support to startups and provides them with various services, training, and access to tools for prototyping and testing innovative products. An innovation center that includes a production and innovation laboratory, FabLab, a children's technical laboratory, Youth-iLab, a work area with co-working mini-offices, a multifunctional conference room with modern equipment, and the Front Desk - a single window for stakeholders with a database of mentors and startups.

2.5.2.6 Shared vision and strategy

The country does not have a separate strategy for the development of a startup ecosystem. However, many issues related to stimulating a startup ecosystem are considered in the digital transformation strategy. The main strategy for the development of innovation was approved by the Decree of May 20, 2022, No. 265, "On Approval of the State Program for the Development of Intellectual Property and Innovation in the Kyrgyz Republic for 2022-2026". As noted in the Resolution, the main international indices demonstrate a low level of use of the results of intellectual activity and innovations based on them, which indicates the urgent need for the accelerated formation of an ecosystem of intellectual property (hereinafter referred to as IP) and innovation. The main strategic goal is to create conditions for the formation of a balanced and efficient ecosystem of IP and innovation in the Kyrgyz Republic by 2026, contributing to the development of the IP market and the production of innovative products.

2.5.3 Rating of the startup ecosystem at the Pre-seed stage

Based on the data received from stakeholders as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed.

The calculation of startup ecosystem process indices is presented in Table 9.

Table 9. Calculation of startup ecosystem process indices at the Pre-seed stage in Kyrgyzstan

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Definition of a startup	0,4	2	0,5	0,2	0,45
Technology business support	0,4	1	0,25	0,1	
Using the Startup Business Model	0,2	3	0,75	0,15	
Performance					
Number of startups that raised more than 10 times GDP per capita per 1 million population in the last 3 years	0,37	2	0,5	0,18	0,255
Number of knowledge-intensive startups that have attracted funding of more than ten times GDP per capita per 1 million population in the last 3 years	0,3	1	0,25	0,075	
Percentage of knowledge-intensive startups relative to all startups that raised funding of more than ten times GDP per capita in the last 3 years	0,33	0	0	0	

[31] http://www.stat.kg/ru/news/den-interneta-99-kyrgyzstancev-ohvacheny-mobilnymi-setyami/.

Access to finance					
Average initial funding	0,7	2	0,5	0,35	0,5
Maximum initial funding	0,3	2	0,5	0,15	
Education and talent development					
Average experience of startup founders	0,3	2	0,5	0,15	0,6
The average salary of a software engineer per year relative to the country's GDP per capita	0,2	3	0,75	0,15	
Percentage of startup founders with college degrees	0,35	3	0,75	0,2625	
Percentage of startup founders with advanced degrees	0,15	1	0,25	0,0375	
Access to infrastructure					
Percentage of the population covered by fixed broadband Internet access	0,17	2	0,5	0,085	0,4075
Percentage of the population covered by mobile broadband Internet access	0,23	3	0,75	0,1725	
Number of startups accepted into incubation and acceleration programs per 1 million people	0,6	1	0,25	0,15	
Shared vision and strategy					
The quality level of the national strategy for the startup ecosystem	0,47	2	0,5	0,235	0,4875
The level of understanding and consensus on the main issues of development of the startup ecosystem among stakeholders	0,37	1	0,25	0,0925	
The level of the country's competitiveness in terms of the startup ecosystem at the regional and global level	0,16	4	1	0,16	

Figure 19 shows the indexes in the form of a petal star.

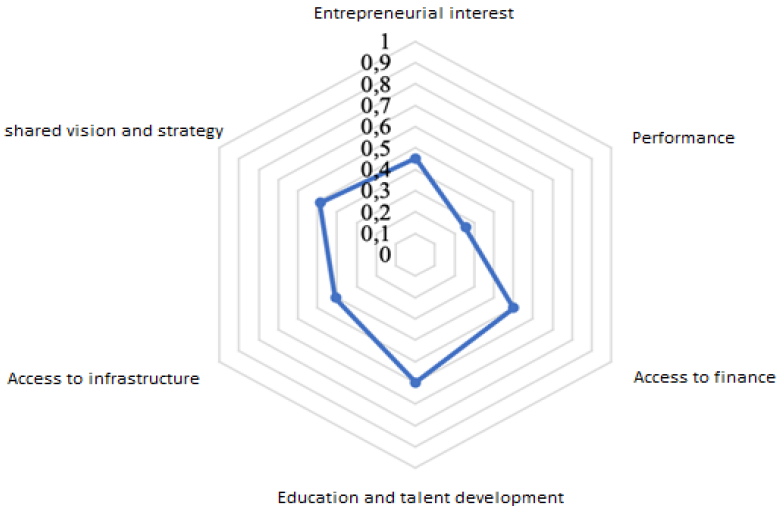

Figure 19. Indexes of the startup ecosystem processes at the Pre-seed stage in Kyrgyzstan

The value of the country rating in terms of the startup ecosystem at the pre-seed stage was 0.45 (the arithmetic average of all index values).

2.5.4 The main challenges for the development of a startup ecosystem at the pre-seed stage

Entrepreneurial interest:

- Lack of a clear separation in understanding the creation of a technology business and a traditional business;
- Startup support does not correspond to the full cycle of creating a technology business;
- The use of key startup business models is underdeveloped in the B2G segment;
- Entrepreneurs are grant-oriented. Rather than gaining market share and profits, the same entrepreneurs come hoping to get a $10,000 grant to pay their team. Grants are social project-oriented and almost effortless.

Performance:

- The lack of the right approach to interact with experienced entrepreneurs and other ecosystems, and most startups copy the projects of other countries in the region (therefore, it is important to increase the attractiveness of the country's market so that other startups are interested in it);
- Most successful startups (startups that have attracted significant funding) are not science-intensive.

Access to finance:

- The percentage of Pre-seed investments is very low; potential investors are more interested in innovative projects at the Seed stage;
- There are no long-term investments available; the angel investment market is in its infancy.

Education and talent development:

- The problem is the lack of IT specialists in the country; the education sector does not produce enough engineers, entrepreneurs, and IT specialists.
- The population has a great interest in entrepreneurial activity, but there are no relevant competencies.

Access to infrastructure:

- The development of the online payment system is at a low level;
- The population does not have sufficient digital literacy, and the market is not ready for IT innovations.

Shared vision and strategy:

- Lack of a separate strategy for the development of the startup ecosystem;
- The existence of several government departments responsible for the development of the startup direction leads to fragmentation of the joint vision for the development of the ecosystem.

2.5.5 Overview of the Startup Ecosystem at the Seed Stage

2.5.5.1 Entrepreneurial interest

Startups in Kyrgyzstan are predominantly focused on global and regional markets. The majority of startups and potential startup founders (52%) are oriented to the global market; 48% of the founder's plan to scale to the region and neighboring countries.

The priority areas for entrepreneurs are EdTech, MedTech, Artificial Intelligence and FinTech.

> *The challenge of the ecosystem is the lack of the right approach to interact with the experience of other startups and ecosystems. It is necessary to learn not only from success stories but from failure stories."*
>
> *Chubak Temirov, Deputy Director of the High-Tech Park of Kyrgyzstan*

2.5.5.2 Performance

There is not enough information to conduct an analysis. The process is in its infancy.

2.5.5.3 Access to finance

At this stage, entrepreneurs also practically do not use their own capital. They have the same problems as at the Pre-seed stage.

The average amount of initial financing is about 10–15 thousand USD. The maximum amount of initial financing is 100,000 USD.

2.5.5.4 Education and talent development

The total amount of funding for scientific activities in 2022 amounted to 7.36 million USD [32]. With increasing interest in entrepreneurship, higher education institutions cannot finance startups. Among other things, there is a lack of consistency in work, especially in the context of the role of startup education in the ecosystem. According to representatives of the startup ecosystem, it is necessary to teach programming at an early age. Also, everyone notes that universities are the starting point for entrepreneurship education, but there is not enough staff and appropriate curricula for teaching entrepreneurial activity in the field of startups.

Some higher education institutions conduct basic research to form ideas and create innovations.

> *"The education sector is not producing enough engineers, entrepreneurs, and IT professionals. The population has a great interest in entrepreneurial activity, but there are no relevant competencies."*
>
> *Peak Experts*

[32] https://ru.sputnik.kg/20220315/kadamzhaydyn--1062853313.html.

2.5.5.5 Access to Infrastructure

An important element for this stage is the presence of a technopark / IT park. In Kyrgyzstan, this includes the High Technology Park and the Innovation Center created by Kyrgyz patent based on the technical library.

2.5.5.6 Shared vision and strategy

There is legal regulation in the country in terms of intellectual property[33], and in terms of venture financing, a normative legal act is under development[34]. One of the key factors for the next stage of development in Kyrgyzstan will be the adoption of the Law of the Kyrgyz Republic, "On Innovation," which has already reached the Parliament with the participation of Kyrgyzpatent.

Since 2022, Law No. 88 on the creation of the Creative Industries Park has been approved. According to paragraph 10 of Article 4, the creative industries include the following sectors of the economy: programming, the development of IT products, robotics, and artificial intelligence. This park will be a good factor in the development of a new phase of the innovation ecosystem in the Kyrgyz Republic.

2.5.6 Startup Ecosystem Ranking at the Seed Stage

Based on the data received from stakeholders as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed. The calculation of startup ecosystem process indices is presented in Table10.

Table 10. Calculation of startup ecosystem process indices at the Seed stage in Kyrgyzstan

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Startups targeting a specific market	0,47	4	1	0,47	0,925
Priority areas for startup development	0,3	3	0,75	0,225	
Approach to participation in startups	0,23	4	1	0,23	
Performance					
The total number of startups created over the past 3 years per 1 million people	0,4	0,5	0,125	0,05	0,125
Number of prototypes created / MVP for the last 3 years per 1 million population	0,33	0,5	0,125	0,04125	
Number of registered patents for the last 3 years per 1 million population	0,27	0,5	0,125	0,03375	
Access to finance					
Average initial funding	0,8	1	0,25	0,2	0,3
Maximum initial funding	0,2	2	0,5	0,1	
Education and talent development					
Availability of basic research to generate ideas and create innovations relative to the number of universities	0,6	2	0,5	0,3	0,5
Amount of funds for R&D	0,4	2	0,5	0,2	
Access to infrastructure					
Number of competitions held over the past 3 years per 1 million population	0,22	0,5	0,125	0,0275	0,4125

[33] https://invest.gov.kg/ru.

[34]https://www.akchabar.kg/ru/news/v-kr-razrabotayut-zakonoproekt-dlya-privlecheniya-venchurnogo-finansirovaniya.

Number of programs implemented over the past 3 years per 1 million population	0,22	0,5	0,125	0,0275	
Number of hackathons conducted over the past 3 years per 1 million people	0.1	0,5	0,125	0,0125	
Availability of the main technopark / IT Park, which deals with key areas of development of technology startups	0,46	3	0,75	0,345	
Shared vision and strategy					
Existence of regulatory legal regulation to meet the needs of stakeholders in the protection of their intellectual property	0,27	3	0,75	0,2025	0,4025
Existence of regulatory legal regulation for modern technologies	0,33	0	0	0	
Existence of normative legal regulation for the venture sphere	0,4	2	0,5	0,2	

Figure 20 shows the indexes in the form of a petal star.

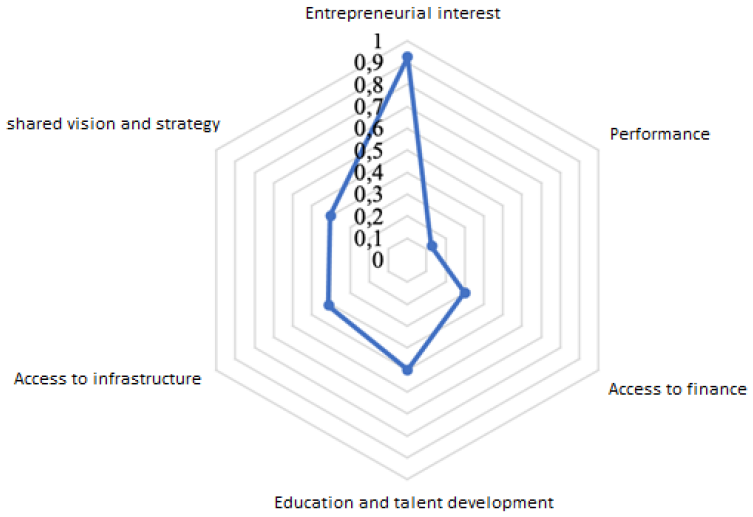

Figure 20. Indexes of the startup ecosystem processes at the Seed stage in Kyrgyzstan

The value of the country rating in terms of the startup ecosystem at the seed stage was 0.444 (the arithmetic average of all index values).

2.5.7 Main challenges for the development of the startup ecosystem at the seed stage

Entrepreneurial interest:

- Despite the fact that startups are focused on the international market, some startups in Kyrgyzstan are still geared towards solving local problems, and startup entrepreneurs are afraid to enter large markets;
- Most startups are created in the capital (95% - Bishkek, 3% - Osh and 2% - other cities).

Performance:

- The process is in its infancy.

Access to finance:

- Venture funds are in their infancy;
- Funding is provided mainly to the traditional sectors of the economy: restaurants and real estate; high-risk businesses are not in demand among local investors.

Education and talent development:

- Financing of startups in higher educational institutions is not carried out;
- There is no consistency in work, especially in the context of the role of startup education in the ecosystem;
- The low level of higher education institutions for teaching technology entrepreneurship, the low level of staff competencies, and the lack of necessary training programs for teaching entrepreneurial activity in the field of startups, which negatively affects the startup ecosystem, since universities are the starting point for the development of startups.

Access to infrastructure:

- Shortage of qualified personnel.

Shared vision and strategy:

- Legislation for the venture capital sector is under development;
- Areas: crowdfunding, blockchain, and cryptocurrencies—not regulated at the legislative level;
- There is no legal regulation in the field of company registration: all growing startups go to Delaware (USA) to register and facilitate investment attraction.

2.5.8 General findings by country

Among the countries studied, Kyrgyzstan took 6th place in the ranking of countries in terms of the startup ecosystem both at the Pre-seed and Seed stages with values of 0.45 and 0.444, respectively.

The values are broken down into indices in Figure 21.

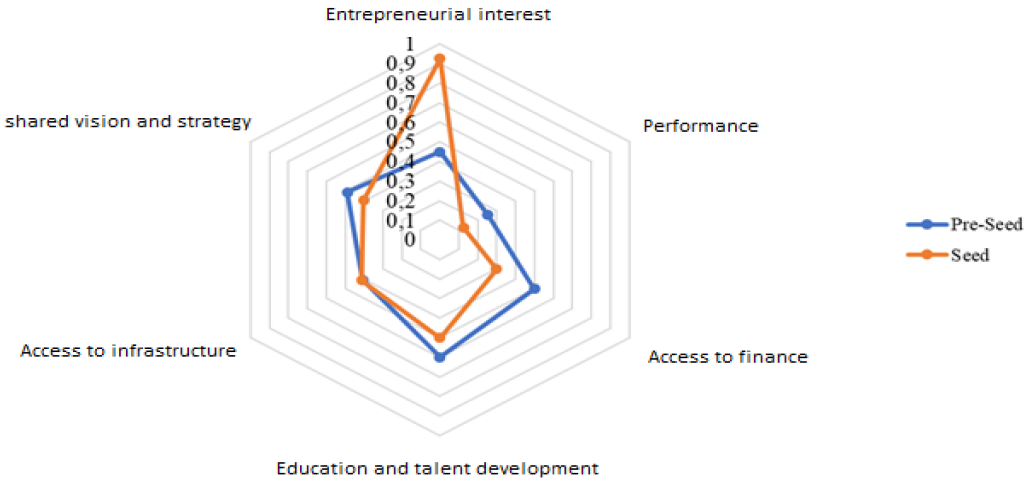

Figure 21. Indexes at the Pre-seed and Seed stages in Kyrgyzstan

The startup ecosystem of Kyrgyzstan is at the initial stage of development and begins the path to creating an innovative economy. Every year, the conditions for the development of startups improve and offer more opportunities for entrepreneurs to implement their projects with the necessary help, knowledge, and skills thanks to the High Technology Park, DEVCIT, and the Kyrgyzpatent Innovation Center. One of the important advantages of the startup ecosystem in Kyrgyzstan is its focus on the international market. However, the country has a very small percentage of investments in the early stages. The capital market is rather weak. There are no long-term investments available, and the angel investment market is in its infancy.

For further development and growth of indicators, it is necessary to solve the challenges presented in paragraphs 2.5.4 and 2.5.7 by forming a clear separation in understanding the creation of technological and traditional businesses, the development of startups in the regions; increasing successful startups, including knowledge-intensive ones, increasing funding and R&D support from the private sector; increasing the number of IT specialists in the country, increasing the competencies of all stakeholders; creation of educational centers, incubators, and accelerators; creating communities of business angels and venture funds, developing a separate strategy for the development of a startup ecosystem. It is important to learn from the experience of more developed countries in the region in terms of creating and developing a startup ecosystem.

2.6 Tajikistan

2.6.1 A brief overview of economic activity

Tajikistan is a country with a lower middle-income level and the potential for economic development and integration into the digital space. GDP, according to data for 2022, is $11.3 billion. GDP mainly depends on the agricultural sector and industry. In 2022, the average GDP growth was about 8%. According to the data for 2022, the population of Tajikistan is 10 million people. The GDP per capita is $1130.

2.6.2 Overview of the Startup Ecosystem at the Pre-Seed Stage

2.6.2.1 Entrepreneurial interest

Entrepreneurs in the country have a weak understanding of the definition of a startup; there is no separation between technological and classical business. There is a lack of understanding of startup business models.

2.6.2.2 Performance

Experienced entrepreneurs are almost invisible to beginners, as the startup ecosystem is in its infancy. But nevertheless, we note the startup Zypl.ai in the field of artificial intelligence. In terms of support from private businesses, we can single out the StartUP-Talks platform, where successful entrepreneurs conduct master classes for young people and aspiring entrepreneurs (held once every 2 weeks), as well as Business-Connect, a platform where aspiring and existing entrepreneurs meet to find a business opportunity. Partners, business contacts, and increasing the circle of contacts (held every six months). Among the well-known startups, the Zypl.ai startup from Tajikistan, during the Silkway Accelerator program, attracted $1.1 million in investments from AloqaVentures (Uzbekistan), Activat (Kazakhstan), and UzVC National Venture Fund in partnership with other foreign funds.

2.6.2.3 Access to finance

At this stage, entrepreneurs practically do not use their own capital. Also, the country has a very small percentage of investments at this stage. The capital market is rather weak. There are no long-term investments available, and the angel investment market is in its infancy. In terms of financing startups, information was not provided and is not publicly available. The creation of the first venture capital fund, Tajikistan Venture Capital, by the 55 Group of companies is in its infancy. Also, donor organizations and the efforts of the private sector are promoting the development of investment literacy among people with high-income levels. This type of training is organized by Fiftyfive Group, which also carries out angel investment activities.

> *"Angels in the country can be counted on one hand, there are a lot of people with large incomes, but you need to do the same as in Kazakhstan, Uzbekistan, and Georgia and demonstrate to people with a high level of investment capital that you can invest 5% of your portfolio in startups."*
>
> *Ravshan Kurbanov, director of the investment management company Fiftyfive Group and founder of Tajikistan Venture Capital*

2.6.2.4 Education and talent development

For this process at the Pre-seed stage, it is important to demonstrate the activity of higher education institutions in terms of developing the startup ecosystem, but this activity is at a low level. It is possible to single out the StartUP-Choikhona competitions - these are regional and interregional university competitions that allow identifying talented young people with innovative business ideas for their further development from the level of incubation and acceleration to the implementation of a full-fledged business (the competition is held every quarter, and there is a program in 7 cities of Tajikistan). More than 1056 people took part in the Startup Choikhona program, and 32 winning projects were supported by UNDP. Projects are being implemented in the fields of Agriculture, Production, Service, and IT. Also, in Tajikistan, there is a new Peak initiative with the support of UK aid of the UK Government, which annually graduates up to 25 potential startup founders.

For the development of this process at the Pre-seed stage, it is important to understand the average experience of startup founders (5-7 years in Tajikistan [35]), the average salary of a software engineer (6 thousand USD per year [36]), and the percentage of startup founders with higher education, which is 60%[37].

2.6.2.5 Access to Infrastructure

At this stage, for the development of a startup ecosystem, it is important to have a developed network infrastructure in the country, which will allow supporting startups using modern technologies, including remote access. The total number of Internet users, together with mobile and fixed Internet users, has reached 4.2 million people, which is 42% of the population of Tajikistan[38].

The key task is to provide support at the beginning of the life cycle of a startup. It should be noted here that the StartUP-Cup is a competition where everyone on the territory of the Republic of Tajikistan, regardless of age and social significance, has the opportunity to apply for participation in this program with their business idea, going through the stages of incubation, acceleration and implementation of their idea (held once a year).

2.6.2.6 Shared vision and strategy

There is no unified innovation strategy for the development of startups and digital technologies. Presented only in the context of artificial intelligence. The country has an Artificial Intelligence Council, which was created to develop, implement, and monitor the implementation of the National Strategy of Tajikistan in the field of artificial intelligence. Its goal is to promote programs aimed at positioning Tajikistan as a regional hub of artificial intelligence, one of the first in our region.

Many stakeholders are not aware of the priority areas for the country's development in the field of innovation, which is why the startup ecosystem is developing in a fragmented way.

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[35] According to a survey conducted by Startup Central Eurasia in 2022-2023.

[36] https://doodle.tj/programmist-eto-odin-iz-samyh-vysokooplachivaemyh-top-professij-mira//.

[37] According to a survey conducted by Startup Central Eurasia in 2022-2023.

[38] https://khovar.tj/rus/2022/07/sluzhba-svyazi-kolichestvo-polzovatelej-interneta-v-strane-dostiglo-4-2-mln-chelovek/.

2.6.3 Rating of the startup ecosystem at the Pre-seed stage

Based on the data received from stakeholders as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed. The calculation of startup ecosystem process indices is presented in Table11.

Table 11. Calculation of startup ecosystem process indices at the Pre-seed stage in Tajikistan

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Definition of a startup	0,4	1	0,25	0,1	0,2
Technology business support	0,4	1	0,25	0,1	
Using the Startup Business Model	0,2	0	0	0	
Performance					
Number of startups that raised more than 10 times GDP per capita per 1 million population in the last 3 years	0,37	0,5	0,125	0,045	0,12375
Number of knowledge-intensive startups that have attracted funding of more than ten times GDP per capita per 1 million population in the last 3 years	0,3	0,5	0,125	0,0375	
Percentage of knowledge-intensive startups relative to all startups that raised funding of more than ten times GDP per capita in the last 3 years	0,33	0,5	0,125	0,04125	
Access to finance					
Average initial funding	0,7	0,5	0,125	0,0875	0,125
Maximum initial funding	0,3	0,5	0,125	0,0375	
Education and talent development					
Average experience of startup founders	0,3	2	0,5	0,15	0,5625
The average salary of a software engineer per year relative to the country's GDP per capita	0,2	4	1	0,2	
Percentage of startup founders with college degrees	0,35	2	0,5	0,175	
Percentage of startup founders with advanced degrees	0,15	1	0,25	0,0375	
Access to infrastructure					
Percentage of the population covered by fixed broadband Internet access	0,17	1	0,25	0,0425	0,2325
Percentage of the population covered by mobile broadband Internet access	0,23	2	0,5	0,115	
Number of startups accepted into incubation and acceleration programs per 1 million people	0,6	0,5	0,125	0,075	
Shared vision and strategy					
The quality level of the national strategy for the startup ecosystem	0,47	1	0,25	0,1175	0,25
The level of understanding and consensus on the main issues of development of the startup ecosystem among stakeholders	0,37	1	0,25	0,0925	
The level of the country's competitiveness in terms of the startup	0,16	1	0,25	0,04	

ecosystem at the regional and global level					

Figure 22 shows the indexes in the form of a petal star.

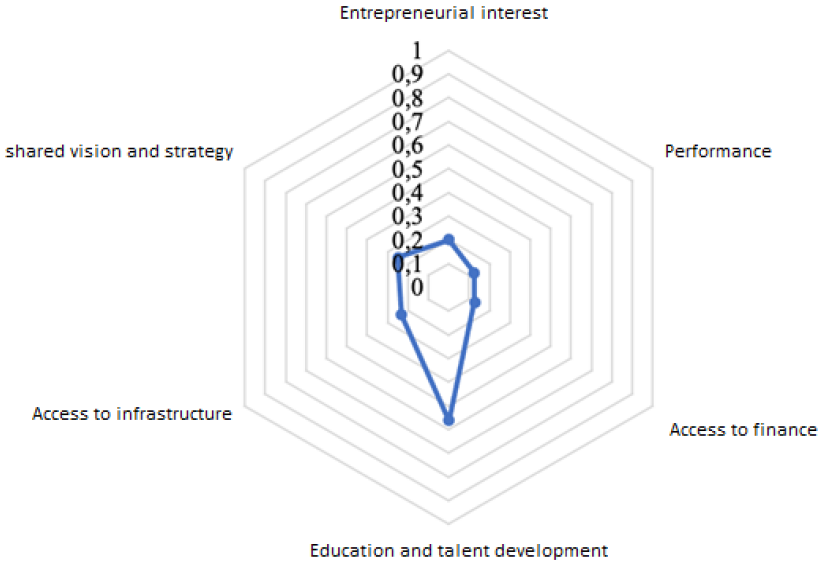

Figure 22. Indexes of the startup ecosystem processes at the Pre-seed stage in Tajikistan

The value of the country rating in terms of the startup ecosystem at the pre-seed stage was 0.249 (the arithmetic average of all index values).

2.6.4 Main challenges for the development of the startup ecosystem at the pre-seed stage

Entrepreneurial interest:

- There is no separation between the creation of technological and traditional businesses;
- Support for startups does not correspond to the full cycle of creating a technology business;
- The use of key startup business models is underdeveloped in all major segments;
- There is a lack of understanding among startup founders on how to scale their startup and how to carry out the process of attracting investments (especially when attracting the first investments).

Performance:

- There is no right approach to interacting with experienced entrepreneurs and other ecosystems; most startups copy projects from other countries in the region.
- Most successful startups (startups that have attracted significant funding) are not science-intensive, except for the Zypl.ai startup.

Access to finance:

- There is a significant problem in financing startups: the culture of business angel financing and venture investment is in its infancy. At the same time, only one group of companies, the 55 Group, is engaged in investment and management activities, investing in early-stage startups.

Education and talent development:

- Lack of IT staff;
- Lack of university-based programs for entrepreneurship training;
- Lack of infrastructure and support systems for student startup initiatives and their funding.

Access to infrastructure:

- Lack of special support measures for technology startups: most startup incubators and accelerators are not focused on supporting technology startups but are focused on creating traditional businesses.
- Donor organizations are mainly involved in the country.

Shared vision and strategy:

- There is no separate strategy for the development of the startup ecosystem;
- Issues related to the startup ecosystem remain unresolved, and stakeholders do not take part in solving problems that arise in the process of developing the startup ecosystem.

2.6.5 Overview of the Startup Ecosystem at the Seed Stage

2.6.5.1 Entrepreneurial interest

Startups in Tajikistan are mainly focused on the domestic market, with predominantly local growth priorities, but the situation may change with the development of funds and business angel clubs. The priority areas for entrepreneurs are delivery, marketplaces, MedTech, fintech, and AI.

2.6.5.2 Performance

There is not enough information to conduct an analysis. The process is in its infancy.

2.6.5.3 Access to finance

At this stage, entrepreneurs also practically do not use their own capital. They have the same problems as at the Pre-seed stage. Venture financing in the country is only in its infancy. The number of business angels is minimal.

One can single out the School of Venture Capital, which opened on March 29, 2022, by the Business Incubator in cooperation with USAID, UNDP and Tajikistan Venture Capital. The school is co-funded by the UNDP Digital Solution and Adaptation Project and USAID, which currently involves 11 entrepreneurs and four business coaches. It will promote venture capital investment among private companies to provide financial access for young startups. In terms of financing startups, information was not provided and is not publicly available.

2.6.5.4 Education and talent development

In terms of funding for scientific activities, information was not provided and is not publicly available. Universities have a lot of active students at the educational level, but they all lack special knowledge in the field of startups and investments. Some higher education institutions conduct basic research to form ideas and create innovations.

2.6.5.5 Access to Infrastructure

In terms of hackathons, competitions, and programs, there is not enough information to conduct an analysis. The process is in its infancy. An important element for this stage is the presence of the main technopark / IT park. In Tajikistan, work is underway to create the first IT Park in the country, which will be a joint project of the executive body of state power Dushanbe and SUE "Smart City."

> *"Most of our startup incubators and accelerators are not focused on supporting technology startups but are focused on creating traditional businesses; this approach needs to be changed."*
>
> *USAID experts in Tajikistan*

2.6.5.6 Shared vision and strategy

UNDP plans to work closely with the State Committee for Investments and State Property Management of Tajikistan and other partners to improve legislation related to venture capital and promote a venture culture in the private sector.

2.6.6 Startup Ecosystem Ranking at the Seed Stage

Based on the data received from stakeholders as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed. The calculation of startup ecosystem process indices is presented in Table12.

Table 12. Calculation of startup ecosystem process indices at the Seed stage in Tajikistan

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Startups targeting a specific market	0,47	1	0,25	0,1175	0,325
Priority areas for startup development	0,3	2	0,5	0,15	
Approach to participation in startups	0,23	1	0,25	0,0575	
Performance					
The total number of startups created over the past 3 years per 1 million people	0,4	0,5	0,125	0,05	0,125
Number of prototypes created / MVP for the last 3 years per 1 million population	0,33	0,5	0,125	0,04125	
Number of registered patents for the last 3 years per 1 million population	0,27	0,5	0,125	0,03375	
Access to finance					
Average initial funding	0,8	0,5	0,125	0,1	0,125
Maximum initial funding	0,2	0,5	0,125	0,025	

Education and talent development					
Availability of basic research to generate ideas and create innovations relative to the number of universities	0,6	1	0,25	0,15	0,2
Amount of funds for R&D	0,4	0,5	0,125	0,05	
Access to infrastructure					
Number of competitions held over the past 3 years per 1 million population	0,22	0,5	0,125	0,0275	0,1825
Number of programs implemented over the past 3 years per 1 million population	0,22	0,5	0,125	0,0275	
Number of hackathons conducted over the past 3 years per 1 million people	0.1	0,5	0,125	0,0125	
Availability of the main technopark / IT Park, which deals with key areas of development of technology startups	0,46	1	0,25	0,115	
Joint vision and strategy					
Existence of regulatory legal regulation to meet the needs of stakeholders in the protection of their intellectual property	0,27	2	0,5	0,135	0,335
Existence of regulatory legal regulation for modern technologies	0,33	0	0	0	
Existence of normative legal regulation for the venture sphere	0,4	2	0,5	0,2	

Figure 23 shows the indexes in the form of a petal star.

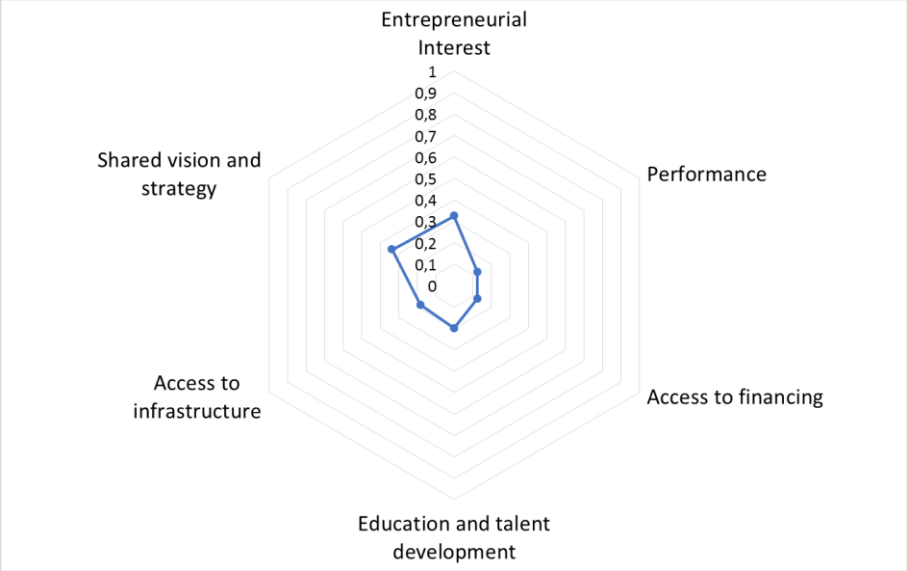

Figure 23. Indexes of the startup ecosystem processes at the Seed stage in Tajikistan

The value of the country rating in terms of the startup ecosystem at the seed stage was 0.215 (the arithmetic average of all index values).

2.6.7 Main challenges for the development of the startup ecosystem at the seed stage

Entrepreneurial interest:

- Entrepreneurs follow the path of least resistance, focusing primarily on local markets. Performance:
- There is a shortage of qualified personnel with knowledge in the field of digital transformation applicable to new business models and startups;
- Lack of funding and support for R&D from the private sector.

Access to finance:

- Venture capital financing is only in its infancy in the country, and the number of business angels is minimal.

Education and talent development:

- There are many active students at the educational level in higher education institutions, but all of them lack special knowledge in the field of startups and investments;
- Financing of startups in higher educational institutions is not carried out;
- There is no consistency in work, especially in the context of the role of startup education in the ecosystem.

Access to infrastructure:

- The process is in its infancy.

Shared vision and strategy:

- There is no legislation for the venture sphere or guarantees for business angels;
- Areas: crowdfunding, blockchain, and cryptocurrencies are not regulated at the legislative level.

2.6.8 General findings by country

Among the countries studied, Tajikistan ranked 7th in the ranking of countries in terms of the startup ecosystem both at the pre-seed and seed stages, with values of 0.249 and 0.215, respectively.

The values are broken down into indexes in Figure 24.

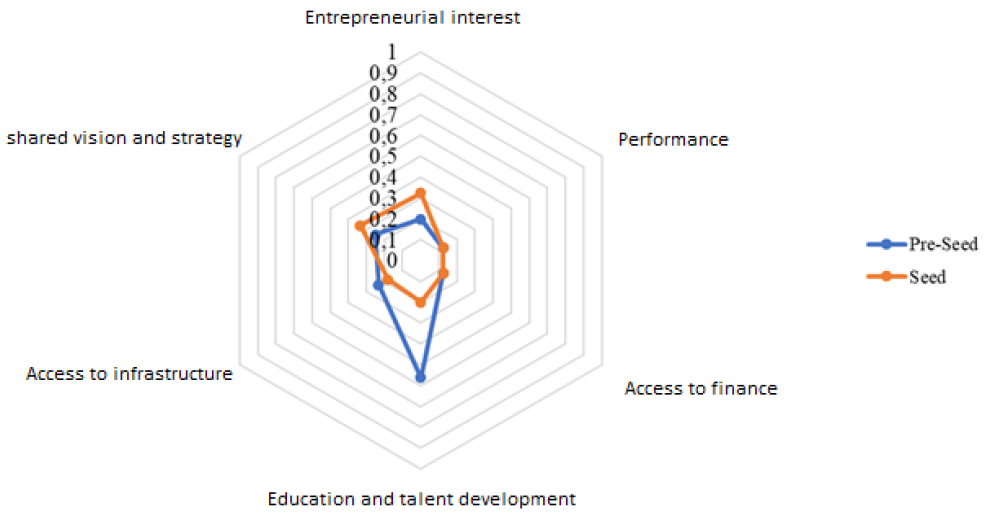

Figure 24. Indexes at the Pre-seed and Seed stages in Tajikistan

The startup ecosystem of Tajikistan is at the stage of formation, and at the moment, in many processes, there is no understanding of the separation of technological and classical entrepreneurship in terms of support, funding, and educational programs. Investment opportunities in Tajikistan are also limited. But despite this, the country's investment ecosystem begins to gradually integrate into the global venture market, and the first active startups appear that use regional opportunities, for example, Zypl.ai. To develop the startup ecosystem of Tajikistan, the state needs to determine the direction of movement, form a clear plan in the form of regulatory legal documents, and use the experience of neighboring, more experienced countries in terms of creating a startup ecosystem.

2.7 Uzbekistan

2.7.1 A brief overview of economic activity

Uzbekistan is a lower middle-income country with a transforming economy and great potential for development. GDP, according to data for 2021, is $80.4 billion. GDP mainly depends on industry, services, and the agricultural sector[39]. In 2022, the average GDP growth rate was about 5.7%. In the sectoral structure of GDP, agriculture, forestry, and fisheries accounted for 25.1%, industry for 26.7%, construction for 6.7%, and services for 41.5%[40]. Also, the country is rich in natural resources. The population of Uzbekistan is 36024946 people[41]. The GDP per capita is $2232.

2.7.2 Overview of the Startup Ecosystem at the Pre-Seed Stage

2.7.2.1 Entrepreneurial interest

Entrepreneurs in the country have an average level of understanding of the definition of a startup. For most entrepreneurs, a startup is equated to creating a business on the Internet (in the context of Industry 4.0). Technology business support is equated to small business. A relatively small proportion of entrepreneurs who create startups participate in acceleration programs, and there are noticeable positive trends in increasing their number. The most common startup business model is the subscription and advertising business model.

2.7.2.2 Performance

Experienced entrepreneurs become visible and important reference points for those who are just starting their business, popularizing the direction of creating their startup. Since then, successful startups have appeared that have reached the stage of small and medium-sized businesses, which improves the image of technological entrepreneurship in the country. The main driver for creating successful startups is IT Park Uzbekistan, which is a special economic zone that provides its residents with special conditions. The park was opened in 2019 by the Ministry of Digital Technologies of the Republic of Uzbekistan on the initiative of President Shavkat Mirziyoyev.

IT Park is a state organization whose tasks include the development of the startup ecosystem in Uzbekistan. This is a complex of facilities, buildings, and structures designed to ensure the launch and market launch of promising startup projects in the field of information technology as an extraterritorial free economic zone for IT companies, including through integration with scientific and educational organizations. A place where active and gifted people in the IT sector will have the best chance of turning their ideas into real business projects through accounting, legal, marketing, and educational support. IT Park provides an organizational platform with a set of innovative tools and new approaches to accelerate economic transformation, accelerate the growth of the IT industry, create new jobs, and attract local and foreign investment.

[39] https://www.wipo.int/global_innovation_index/en/2022/.

[40] https://stat.uz/ru/press-tsentr/novosti-goskomstata/34107-2022-yilda-o-zbekiston-respulikasi-yaim-qanchani-tashkil-etdi-2.

[41] https://www.aa.com.tr/ru/мир/население-узбекистана-превысило-36-млн-человек/2786937.

In Uzbekistan, in addition to the main building of the IT Park of Uzbekistan, regional IT Park branches, youth technology parks, and many IT centers are also opening, demonstrating a high level of infrastructure development in the country across the regions. The process is mostly carried out with strong involvement of the public sector and little activity of the private sector, which in the future may affect the asymmetric development of the ecosystem due to competition and the risks of creating structures that compete with the private sector. In Uzbekistan, there is also a tendency for duplication of actions on the part of state institutions in the direction of developing the startup ecosystem and some elements of its support.

Successful startups include[42]:

- Zip24 (SaaS B2B, logistics, supply chain, and e-commerce fulfillment management system);
- Tass Vision (an intelligent video surveillance system that helps improve productivity in companies);
- Girgitton (a startup for the delivery of food from cafés and goods from shops in Ferghana, Kokand, Andijan and Namangan);
- Kiva Sesame (natural food startup);
- Data Learning Center (an innovative learning center that actively uses artificial intelligence) and others.

The appearance of the first "unicorn" in the country is planned for 2028[43].

2.7.2.3 Access to finance

At this stage, entrepreneurs rarely use their own capital. Also, this stage is practically not considered for investment due to weak interest from business angels. For development at this stage, work is underway with incubation centers at universities. At this stage, investments can be attracted from the venture fund "AloqaVentures"[44], which was created in 2021 by the joint-stock commercial bank "Aloqabank" to invest in innovative and promising startup projects in the early stages.The average amount of initial financing is 11 thousand USD. The maximum amount of initial financing is $50,000 USD.

2.7.2.4 Education and talent development

For this process at the pre-seed stage, it is important to demonstrate the activity of higher education institutions in terms of the development of a startup ecosystem. For the development of personnel, the One Million Uzbek Coders Project (OMUC) is being implemented[45][46], and as of June 2022, the number of registered applicants for the program was 2,503,060 people, while 47% received a certificate of successful completion of the program[47].

For the development of this process at the Pre-seed stage, it is important to understand the average experience of startup founders (5 years in Uzbekistan), the average salary of a software engineer (14.4 thousand USD per year[48]), and the percentage of startup founders with higher education and a degree (83% and 15%, respectively).

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[42] https://weproject.media/articles/detail/8-startapov-uzbekistana-kotorye-privlekli-investitsii-v-2021-godu/.

[43] https://digitalbusiness.kz/2022-07-07/kak-vyglyadit-ekosistema-startapov-v-uzbekistane-v-odnom-slajde/.

[44] https://aloqaventures.uz/ru/.

[45] https://uzbekcoders.uz/.

[46] The One Million Uzbek Coders Project (OMUC) is a free online platform aimed at providing the population with skills related to programming and working with digital technologies.

[47] https://it-park.uz/uz/itpark/news/one-million-uzbek-coders-loyihasi-final-bosqichi-g-oliblari-aniqlandi.

[48] https://www.spot.uz/ru/2020/11/02/programmistsalary/.

2.7.2.5 Access to Infrastructure

At this stage, for the development of a startup ecosystem, it is important to have a developed network infrastructure in the country, which will allow supporting startups using modern technologies, including remote access. Thus, the percentage of the population covered by fixed and mobile broadband Internet access is 54% and 98%[49] respectively.

The key task is to provide support at the beginning of the entrepreneur's life cycle. In addition to the activities of the IT Park of Uzbekistan in this area, it is important to note the Ministry of Digital Technologies of the Republic of Uzbekistan. Among the areas of work of the Ministry:

1) Creation and strengthening of the innovation ecosystem.

2) Development of human capital.

3) Creation of infrastructure for innovations.

4) Support and development of youth programs and competitions for young scientists. Creation of university technoparks on the basis of campuses. Support for the initiatives of scientists and young people in the form of funding for their startups. Work towards technology transfer.

2.7.2.6 Shared vision and strategy

The country does not have a separate strategy for the development of the startup ecosystem; however, many issues related to the stakeholders of the startup ecosystem are considered in the digital transformation strategy.

2.7.3 Rating of the startup ecosystem at the pre-seed stage

Based on the data received from stakeholders as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed.

The calculation of startup ecosystem process indices is presented in Table 13.

Table 13. Calculation of startup ecosystem process indices at the Pre-seed stage in Uzbekistan

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Definition of a startup	0,4	2	0,5	0,2	0,55
Technology business support	0,4	2	0,5	0,2	
Using the Startup Business Model	0,2	3	0,75	0,15	
Performance					
Number of startups that raised more than 10 times GDP per capita per 1 million population in the last 3 years	0,37	2	0,5	0,18	0,4125
Number of knowledge-intensive startups that have attracted funding of more than ten times GDP per capita per 1 million population in the last 3 years	0,3	2	0,5	0,15	
Percentage of knowledge-intensive startups relative to all startups that raised funding of more than ten times GDP per capita in the last 3 years	0,33	1	0,25	0,0825	

[49] https://www.spot.uz/ru/2022/12/15/shermatov-digital/.

Access to finance					
Average initial funding	0,7	3	0,75	0,525	0,75
Maximum initial funding	0,3	3	0,75	0,225	
Education and talent development					
Average experience of startup founders	0,3	2	0,5	0,15	0,725
The average salary of a software engineer per year relative to the country's GDP per capita	0,2	3	0,75	0,15	
Percentage of startup founders with college degrees	0,35	4	1	0,35	
Percentage of startup founders with advanced degrees	0,15	2	0,5	0,075	
Access to infrastructure					
Percentage of the population covered by fixed broadband Internet access	0,17	2	0,5	0,085	0,465
Percentage of the population covered by mobile broadband Internet access	0,23	4	1	0,23	
Number of startups accepted into incubation and acceleration programs per 1 million people	0,6	1	0,25	0,15	
Shared vision and strategy					
The quality level of the national strategy for the startup ecosystem	0,47	2	0,5	0,235	0,6125
The level of understanding and consensus on the main issues of development of the startup ecosystem among stakeholders	0,37	3	0,75	0,2775	
The level of the country's competitiveness in terms of the startup ecosystem at the regional and global level	0,16	2,5	0,625	0,1	

Figure 25 shows the indexes in the form of a petal star.

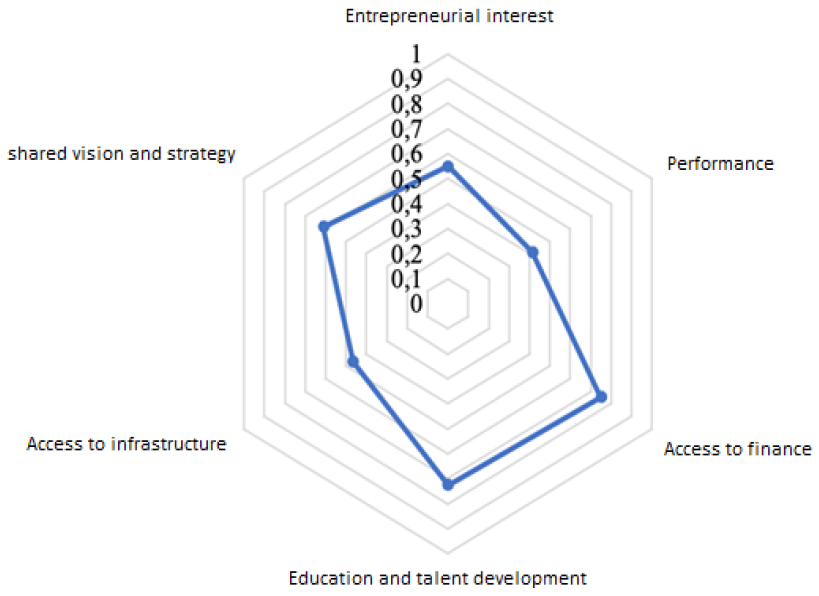

Figure 25. Indexes of the startup ecosystem processes at the Pre-seed stage in Uzbekistan

The value of the Country Rating in terms of the startup ecosystem at the Pre-seed stage was 0.586 (arithmetic average of all index values).

2.7.4 Main challenges for the development of the startup ecosystem at the pre-seed stag

Entrepreneurial interest:

- Lack of a clear separation in understanding the creation of a technology business and a traditional business, which, accordingly, affects the support of technology startups at the state level, which should be completely different taking into account the specifics;
- Startup support does not correspond to the full cycle of creating a technology business;
- The use of key startup business models is underdeveloped in the B2G segment;
- Lack of knowledge among entrepreneurs in the field of commercialization and marketing.

Performance:

- Lack of synchrony between entrepreneurs and representatives of the private sector; stakeholders are not fully interconnected in terms of a common vision of ecosystem development;
- Most successful startups (startups that have attracted significant funding) are not science-intensive.

Access to finance:

- Investment conditions are not safe enough for business angels; there are no guarantees of investor protection;
- Insufficient number of micro-grants of 5–10 thousand US dollars, which does not allow numerous startups to receive early funding;
- For state funds, the number of invested projects is more important than the number of private investors (local and foreign).

Education and talent development:

- Higher education institutions are not sufficiently involved in the creation of startups;
- The younger generation is being trained in modern skills and programming, but they are not quite business-oriented or commercializing their ideas. IT Park is working on the creation of acceleration programs at universities and on a process where the creation of a startup will be counted as part of the academic education process, but the processes need to be scaled up.
- Most higher education institutions are not able to allocate financial resources to support startups for students and do not have the opportunity to participate in startups.

Access to infrastructure:

- Insufficient level of support at the beginning of the formation of the entrepreneur's life cycle.

Shared vision and strategy:

- The lack of a separate strategy for the development of the startup ecosystem: the lack of a clear system of state support for startups at the pre-seed stage, which hinders the

development of the startup ecosystem, mainly in countries where there is support in the form of loans.

2.7.5 Overview of the Startup Ecosystem at the Seed Stage

2.7.5.1 Entrepreneurial interest

In Uzbekistan, startups are mainly focused on the domestic and regional markets. Most Uzbek startups (62%) are developing their product for the Uzbek market at that time; 21% of the founders plan to scale to the regional market, the rest to international markets. The priority areas for startups in the Republic of Uzbekistan are E-commerce, EdTech, MedTech and FinTech.

2.7.5.2 Performance

The total number of startups created in the country was more than 200. The number of prototypes/MVPs created was more than 300. Information on the number of registered patents was not presented and is not available in open sources.

2.7.5.3 Access to finance

At this stage, entrepreneurs also rarely use their own capital. The average amount of initial financing is $50,000 USD. The maximum amount of initial financing is up to 300 thousand USD.

It should be noted that the National Venture Fund "UzVC" [50] operates in the country (it has been operating since January 2021), which operates based on the strategy of the Fund of Funds, which involves co-financing projects in partnership with a private venture investor. So far, the fund has financed three projects. Also, AloqaVentures [51] is actively operating at the seed level. According to data for 2023, they funded ten startups. Interested in areas: business automation, e-commerce, cloud technologies, artificial intelligence, financial technologies, voice assistants, and chatbots.

2.7.5.4 Education and talent development

In 2022, the Science Financing and Innovation Support Fund received 636.9 billion soums (56.4 million USD)[52]. The problems of the development of science are presented in the Concept for the Development of Science until 2030, approved by the Decree of the President of the Republic of Uzbekistan dated October 29, 2020, No. UP-6097[53]. In particular, the low interest of enterprises in the real sector of the economy in science, the increase in the average age of research teams, the insufficient level of allocation of financial resources to finance science and scientific research. The solution to these problems plays an important role and requires the adoption of comprehensive and systemic measures. Most higher education institutions conduct basic research to generate ideas and create innovations.

2.7.5.5 Access to Infrastructure

The country hosts many hackathons for the development of startups (7 in 2022, the average number of participants is 100 people). Competitions are held (more than 160 different competitions with an average number of participants of 60 people), and programs are being

[50] https://nationaluzvc.uz/en/faq/.

[51] https://aloqaventures.uz/ru/.

[52] https://www.gazeta.uz/ru/2021/11/26/budget/.

[53] https://uz24.uz/ru/articles/o-razvitti-nauki.

implemented (the number of implemented incubation and acceleration programs is 27, and the total number of participants in all programs exceeds 1680).

The country hosts large-scale forums that gather numerous stakeholders from all over Central Eurasia, such as ICT WEEK UZBEKISTAN 2022, held in Samarkand with the support of the Ministry of Digital Technologies of the Republic of Uzbekistan and Avantage Event Agency. Within the framework of the forum, 22 events were held, in which 7,776 participants took part. Ten documents were signed (including investment agreements) for about $200 million.

An important element for this stage is the presence of the main technopark / IT park. In Uzbekistan the IT Park of Uzbekistan, which is actively operating in the country, plays an important role in the development of all processes of the startup ecosystem.

2.7.5.6 Shared vision and strategy

The country has legal regulations in terms of intellectual property [54] and venture capital[55]. . In addition, the following main areas have been regulated: crowdfunding[56], blockchain[57], and cryptocurrencies[58],, and regulatory sandboxes have been created[59]. However, further development in these areas is needed. Many issues are settled within the framework of common programs by one event or task.

2.7.6 Startup Ecosystem Ranking at the Seed Stage

Based on the data received from stakeholders as well as from open sources, the levels of indicators of the startup ecosystem processes were determined. Based on the levels of indicators, their values are formed.

The calculation of startup ecosystem process indices is presented in Table 14.

Table 14. Calculation of startup ecosystem process indices at the Seed stage in Uzbekistan

Index	Weight coefficient	Level	Indicator value		Index value
Entrepreneurial interest					
Startups targeting a specific market	0,47	2,5	0,625	0,29375	0,6625
Priority areas for startup development	0,3	3	0,75	0,225	
Approach to Participation in startups	0,23	2,5	0,625	0,14375	
Performance					
The total number of startups created over the past 3 years per 1 million people	0,4	2	0,5	0,2	0,4325
Number of prototypes created / MVP for the last 3 years per 1 million population	0,33	2	0,5	0,165	
Number of registered patents for the last 3 years per 1 million population	0,27	1	0,25	0,0675	
Access to finance					

[54] https://lex.uz/docs/5987125?ONDATE=26.04.2022 00.

[55] https://review.uz/post/venchurnoe-finansirovanie.

[56]https://nrm.uz/contentf?doc=574715_ukaz_prezidenta_respubliki_uzbekistan_ot_08_01_2019_g_n_up-5614_o_dopolnitelnyh_merah_po_obespecheniyu_dalneyshego_razvitiya_ekonomiki_i_povysheniyu_effektivnosti_ekonomicheskoy_politiki&products=1_vse_zakonodatelstvo_uzbekistana.

[57]https://nrm.uz/contentf?doc=574715_ukaz_prezidenta_respubliki_uzbekistan_ot_08_01_2019_g_n_up-5614_o_dopolnitelnyh_merah_po_obespecheniyu_dalneyshego_razvitiya_ekonomiki_i_povysheniyu_effektivnosti_ekonomicheskoy_politiki&products=1_vse_zakonodatelstvo_uzbekistana.

[58] https://azizovpartners.uz/ru/2021/03/26/kriptoaktivy-v-respublike-uzbekista/.

[59] https://www.norma.uz/novoe_v_zakonodatelstve/cb_utverdil_poryadok_sozdaniya_regulyatornyh_pesochnic.

Average initial funding	0,8	3	0,75	0,6	0,7
Maximum initial funding	0,2	2	0,5	0,1	
Education and talent development					
Availability of basic research to generate ideas and create innovations relative to the number of universities	0,6	3	0,75	0,45	0,65
Amount of funds for R&D	0,4	2		0,2	
Access to infrastructure					
Number of competitions held over the past 3 years per 1 million population	0,22	1	0,25	0,055	0,76
Number of programs implemented over the past 3 years per 1 million population	0,22	4	1	0,22	
Number of hackathons conducted over the past 3 years per 1 million people	0.1	1	0,25	0,025	
Availability of the main technopark / IT Park, which deals with key areas of development of technology startups	0,46	4	1	0,46	
Shared vision and strategy					
Existence of regulatory legal regulation to meet the needs of stakeholders in the protection of their intellectual property	0,27	3	0,75	0,2025	0,75
Existence of regulatory legal regulation for modern technologies	0,33	3	0,75	0,2475	
Existence of normative legal regulation for the venture sphere	0,4	3	0,75	0,3	

Figure 26 shows the indexes in the form of a petal star.

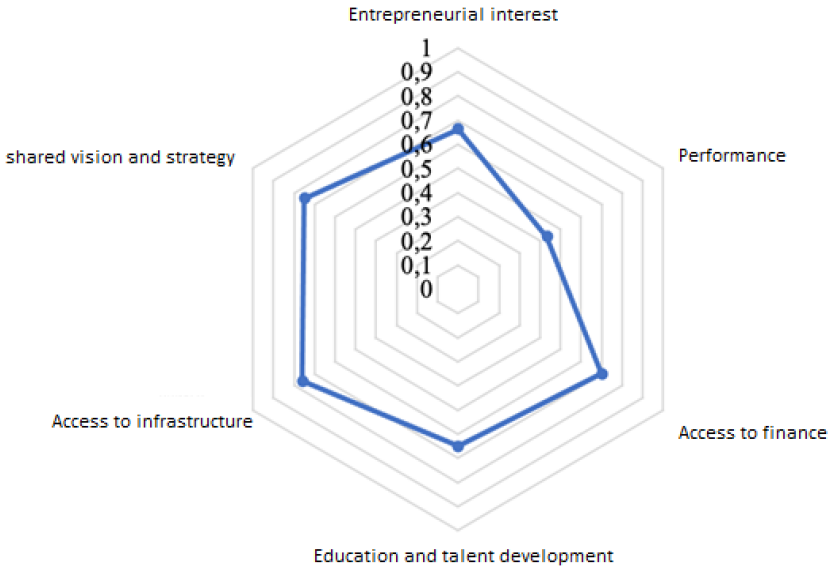

Figure 26. Indexes of the startup ecosystem processes at the Seed stage in Uzbekistan

The value of the country rating regarding the startup ecosystem at the seed stage was 0.659 (the arithmetic average of all index values).

2.7.7 Main challenges for the development of the startup ecosystem at the seed stage

Entrepreneurial interest:

- Lack of success stories with startups from the region entering the global markets MENA, Turkey, SEA, and others; most startups have a local mindset and are focused only on the domestic market;
- Entrepreneurs lack opportunities and competence to attract investments (including foreign ones).

Performance:

- Lack of sufficient funding and R&D support from the private sector Access to finance:
- Venture funds are not active enough at this stage and do not seek to finance startups;
- The UzVc Fund of Funds is in the development stage and has not started active actions to stimulate the creation of private venture funds.

Education and talent development:

- Lack of entrepreneurial culture among teachers and academia;
- Lack of trust among educators and academics in the startup ecosystem (even considering the great potential for commercialization of developments and funding opportunities).
- Low involvement of research institutes of the Academy of Sciences in the development of startups (including in the scientific field);
- Lack of understanding on the part of the Research Institute of the Academy of Sciences of new opportunities and development trends, which leads to outdated approaches in the field of scientific development, which is why young scientists have barriers to developing their science-intensive startups.

Access to infrastructure:

- Shortage of qualified personnel.

Shared vision and strategy:

- Lack of state support in terms of creating a venture culture of investing and attracting investments (it is necessary to bridge the gap between potential investors and developing startups);
- Legal regulation of all processes for creating innovations in the startup ecosystem is not fully carried out.

2.7.8 General findings by country

Among the countries studied, Uzbekistan took 4th place in the ranking in the development of a startup ecosystem at the pre-seed and seed stages, with values of 0.586 and 0.659, respectively.

The values are broken down into indices in Figure 27.

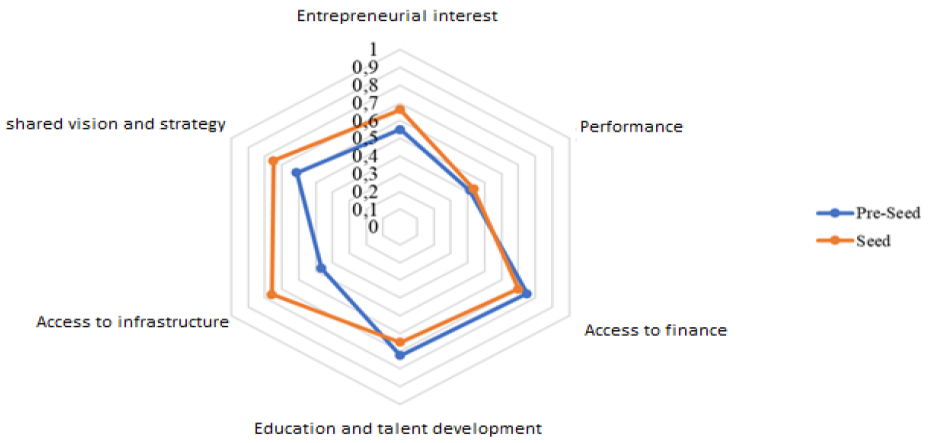

Figure 27. Indexes at the Pre-seed and Seed stage in Uzbekistan

The startup ecosystem in Uzbekistan is at a stage of development. The government began to actively support the country's startup ecosystem in 2019 when the IT Park Uzbekistan was founded. Educational programs, incubation and acceleration programs, and venture funds appeared.

For further development and growth of indicators, it is necessary to solve the challenges presented in paragraphs 2.7.4 and 2.7.7 by creating a separation between technological and traditional businesses, popularizing the startup ecosystem in general, and improving the understanding of a startup as a technology business in particular, increasing the level of competence of all interested parties in the startup ecosystem, increasing the number of successful startups, including science-intensive ones, and increasing funding and support for R&D from the private sector. It is necessary to create guarantees to protect investors to increase the number of microgrants. Venture capital funds should be more active in funding startups. More active work is needed to teach investment literacy and diversify investments. In developing the venture industry, it is necessary to support new managers of venture funds, including improving their skills in the principles of proper management of venture funds and investors' financial resources.

Higher education institutions should be more involved in the creation of startups. It is necessary to create an entrepreneurial culture among teachers and academia, drawing on the experience of more developed countries. It is necessary to develop a separate strategy for developing a startup ecosystem.

Conclusion

The startup ecosystem consists of building blocks, the efficiency and interconnected use of which are conditions for the creation of full-fledged technology companies with the potential to enter global markets and increase local industries' productivity.

The main task of state structures in developing a startup ecosystem should be to ensure the uniform and interconnected development of all its elements. To do this, the most important task is to monitor the current processes and analyze how much the state must continue to actively participate in the development of a particular "building block" of the startup ecosystem and whether there is already an appropriate critical mass of stakeholders in the private sector that can take on the development of this direction. In this case, the government can continue acting as a partner in the innovation process, providing partial financial and consulting assistance.

Government agencies need to continue active work to improve the quality of entrepreneurship education in higher education institutions by updating educational programs, improving the qualifications of teaching staff, promoting the creation of university acceleration programs integrated into the educational process (including appropriate incentives for teaching staff to increase involvement), and improving legislation that creates an opportunity to finance student startups.

In terms of developing infrastructure for innovation, it is necessary to create technology parks and innovation centers in large cities and regions. When developing a regional infrastructure for innovation, it is necessary to consider the specifics of the region and the direction of traditional business development to maximize the integration of startup projects in the process of increasing the productivity of business forms and industry sectors developed in the region. In terms of access to finance, it is necessary to continue work on creating and improving legislation in the field of venture financing, initiating by states the creation of a fund or funds to promote venture financing.

It is important to improve the competence of venture investors themselves and potential partners of venture funds who are ready to transfer their investment resources to a venture fund for management. In the area of Entrepreneurial interest, it is important to create conditions for the creation and development of globally scalable startups, considering trends in the field of increased use of computing technologies, artificial intelligence, process optimization, and an innovation wave driven by "deep science" (using R&D) based on breakthroughs in biotechnology, nanotechnologies, and the creation of new materials. Accordingly, to fully utilize the country's potential, it is necessary to increase the economy's productivity through the introduction of innovations and the development of startup projects, as well as increase the amount of resources allocated to research with the subsequent commercialization of these projects.

To increase the region's competitiveness, it is important to cooperate between ecosystems, implement joint projects to bring startups from the region to international markets and develop the venture financing market, including raising capital to invest in local startups from the world's leading ecosystems.

Information sources

The data used in the report was obtained from open sources: national plans and programs for developing innovative ecosystems and digital technologies, legislative and regulatory acts of countries, and official websites of organizations. To clarify and validate the collected data and form a more accurate picture of the development of the startup ecosystem of each individual country, interviews were conducted with key players in the startup ecosystems of the countries of Central Eurasia, as well as online surveys among academic organizations and startups.

We thank all the organizations that participated in the interviews for their assistance in conducting the study and preparing the report.

The list of organizations that participated in the study includes:

Azerbaijan:

- Technovate Investments, LLC
- Sabah Lab
- Sabah Angels Club
- Innoland
- FemTech

Armenia:

- BANA Angels
- Formula VC
- Digitain (M1TQ Acceleration)
- Angel Investor Club of Armenia (AICA)
- Startup Grind
- Foundation for Armenian Science and Technology (FAST)
- Enterprise Incubator Foundation (EIF)

Georgia:

- National Bank of Georgia
- Impact Hub
- Future Laboratory
- AXEL (Georgian Business Angel Network)
- Central Eurasia Ventures
- GITA

Kazakhstan:

- Astana Hub
- Astana International Financial Centre (AIFC)
- Most Ventures
- MyVentures
- Qazaqstan Investment Corporation
- Community of the Association of University Business Incubators and Accelerators of Kazakhstan (Association Business-Incubator)

Kyrgyzstan:

- High Tech Park Kyrgyzstan
- Devcit
- Kyrgyzpatent
- Peak

Tajikistan:

- Tajikistan Venture Capital
- USAID
- FIFTY-FIVE GROUP
- Business-Incubator of Tajikistan
- StartUP-Choikhona

Uzbekistan:

- IT Park Uzbekistan
- Ministry of Digital Technologies of the Republic of Uzbekistan
- National Venture Fund «UzVC»
- AloqaVentures
- C.A.T. Science accelerator

About Startup Central Eurasia

Startup Central Eurasia is a platform for assisting the countries of Central Eurasia in the development of startup ecosystems by bringing together and cooperating with all interested ecosystem participants, including country, regional, and international partners. Supported by the region's countries, the initiative has begun to develop actively since 2020 as part of the ITU (Regional Office for the CIS Region) program work in cooperation with Future Lab (Georgia).

The main goals of the platform are:

- analysis and identification of the strengths of the countries of the region in the development of startup ecosystems; formation of a format and structure of cooperation between them for the sharing of their elements, which can help increase the competitiveness of each of the ecosystems and avoid duplication of functions.

- analysis and identification of the countries' main challenges and assistance in their solution, involving donor organizations and leading world experts.

- providing support to ecosystems in increasing the competitiveness of startups in the world's leading markets.

- cooperation with international organizations, governments, agencies, and technology parks responsible for developing the innovation and startup ecosystem, leading venture funds, and private accelerators.

The areas of work of the platform include:

Ecosystem analysis:

• Central Eurasia Startup Ecosystem Rating, Central Eurasia Startup Ecosystem Map Market analysis in Central Eurasia:

• Guide to the Startup Ecosystem of Central Eurasia

• Startup KPI calculator Cooperation and development:

• Regional news and events agenda

• Regional training and mentoring sessions

• Regional forums and summits

• Venture days and pitching sessions for startups

• Cooperation of startups with investors and partners from Silicon Valley

Website: www.startupcentraleurasia.com

Contact details:

Future Lab CEO Irakli Kashibadze: ikashibadze@futurelab.ge

ITU Program Coordinator Farid Nakhli: farid.nakhli@itu.int

Annex A
Criteria for determining the values of indicators

№	The name of the indicators	Low level (0 points)	Below average (1 point)	Average level (2 points)	Above average (3 points)	High level (4 points)
Pre-seed						
Entrepreneurial interest						
1.1	Understanding the definition of a startup	The term startup is missing.	A startup is equated to a classic business (small business).	A startup is equated to creating a business on the Internet (only in the context of Industry 4.0).	A startup includes features: 1. is a technology business; 2. has the prospect of rapid growth; 3. has the ability to scale due to a global view of the problem (organizations created to find a reproducible and scalable business model); 4. founders are 2-3 people; 5. is a new product to solve the problem;	A startup includes features: 1. is a technology business; 2. has the prospect of rapid growth; 3. has the ability to scale due to a global view of the problem (organizations created to find a reproducible and scalable business model); 4. The founders are 2–3 people; 5. is a new product to solve the problem;

№	The name of the indicators	Low level (0 points)	Below average (1 point)	Average level (2 points)	Above average (3 points)	High level (4 points)
					6. carries out actions in conditions of uncertainty.	6. carries out actions in conditions of uncertainty; 7. A startup, despite being a business, is primarily a tool for changing the world for the better.
1.2	Technology business support	The technology business is not supported.	Technology business support is equated to small business.	Support for technology businesses is equated with small businesses, but the first acceleration programs are opening, and there are positive trends (for some organizations in the context of supporting startups).	Support for technology businesses is equated with small businesses, but the first acceleration programs are opening, and there are positive trends (for most organizations in the context of supporting startups).	Startup support meets the full cycle of creating a technology business, taking into account the following factors: 1. A startup will probably not be profitable in its first, second, or even third year (and some startups will never even achieve profitability); 2. The startup targets a large market; 3. A startup has difficulty attracting funding; 4. startup life cycle (more than 90% of startups close within three years, for

№	The name of the indicators	Low level (0 points)	Below average (1 point)	Average level (2 points)	Above average (3 points)	High level (4 points)
						small businesses, this figure is around 30%); 5. the difference in the exit strategy of a startup (through a major sale or IPO).
1.3	Using the Startup Business Model	There is no startup business model.	Simple business models, marketplace, and licenses are presented.	The main business models of Saas, transactional, and marketplace are presented. In the main B2B segments.	The main business models of Saas, transactional, and marketplace are presented. In the B2B, B2C segment.	The main business models of Saas, transactional, and marketplace are presented. In the main segments, B2B, B2C, and B2G.
Performance						
1.4	Number of startups that raised more than 10 times GDP per capita per 1 million people in the last 3 years	Up to 0.3	0.3 to 1	1 to 2.5	2.5 to 4	Over 4
1.5	Number of knowledge-intensive startups that have attracted funding of more than ten times	Up to 0.1	0.1 to 0.3	0.3 to 0.7	0.7 to 1	Over 1

№	The name of the indicators	Low level (0 points)	Below average (1 point)	Average level (2 points)	Above average (3 points)	High level (4 points)
	GDP per capita per 1 million population in the last 3 years					
1.6	Percentage of knowledge-intensive startups relative to all startups that raised funding of more than ten times GDP per capita in the last 3 years	Below 10%	10% to 30%	30% to 50%	50% to 70%	Over 70%
Access to finance						
1.7	Average initial funding	There is no funding.	Up to 5000 $	From 5000$ to 10000$	From $10,000 to $25,000	Over 25000$
1.8	Maximum initial funding	There is no funding.	Up to 10000$	From $10,000 to $25,000	From $25,000 to $50,000	Over 50000$
Education and talent development						
1.9	Average experience of startup founders	Experience is missing.	1-3 years	4-6 years	7-10 years	Over 10 years
1.10	The average salary of a software engineer per year relative to the	Below 1	From 1 from 2	2 to 3	3 to 5	Over 5

№	The name of the indicators	Low level (0 points)	Below average (1 point)	Average level (2 points)	Above average (3 points)	High level (4 points)
	country's GDP per capita					
1.11	Percentage of startup founders with college degrees	Below 20%	20% to 40%	40% to 60%	60% to 80%	Over 80%
1.12	Percentage of startup founders with advanced degrees	Below 5%	From 5% to 10%	10% to 20%	20% to 40%	Over 40%
Access to infrastructure						
1.13	Percentage of the population covered by fixed broadband Internet access	Below 25%	25% to 50%	From 50% to 75%	75% to 90%	Over 90%
1.14	Percentage of the population covered by mobile broadband Internet access	Below 25%	25% to 50%	From 50% to 75%	75% to 90%	Over 90%
1.15	Number of startups accepted into incubation and acceleration programs per 1 million people	Up to 2	2 to 5	5 to 7	7 to 10	Over 10

Shared vision and strategy						
1.16	The quality level of the national strategy for the startup ecosystem	The issues of the startup ecosystem are not settled.	Steps are being taken to create a separate strategy for developing the startup ecosystem or to integrate startup ecosystem issues into digital transformation strategies.	The startup ecosystem issues are defined in the digital transformation strategies.	Startup ecosystem issues are identified as a priority in digital transformation strategies.	A separate strategy for the development of a startup ecosystem has been developed.
1.17	The level of understanding and consensus on the main issues of development of the startup ecosystem among stakeholders	Stakeholders do not participate in the execution of tasks defined by the development issues of the startup ecosystem.	1 group of stakeholders participates in the execution of tasks defined by the development issues of the startup ecosystem.	2-3 groups of stakeholders are involved in the execution of tasks defined by the issues of development of the startup ecosystem.	4-5 groups of stakeholders are involved in the execution of tasks defined by the issues of development of the startup ecosystem.	6 groups of stakeholders are involved in the execution of tasks defined by the issues of development of the startup ecosystem.
1.18	The level of the country's competitiveness in terms of the startup ecosystem at the regional and global level	In regulatory legal documents, the key market is not defined.	The domestic market is defined as the key in regulatory legal documents.	In regulatory legal documents, the domestic market and the market of neighboring countries are identified as key.	The regulatory legal documents define the regional market as the key one.	The global market is defined as the key in regulatory legal documents.

Seed						
Entrepreneurial interest						
2.1	Startups targeting a specific market	There is no sense of purpose.	Focus on the domestic market.	Focus on the domestic market and the market of neighboring countries.	Focus on the regional market.	Targeting the global market.
2.2	Priority areas for startup development	None of the areas correspond to the priority areas identified by the WEF.	1 area corresponds to the priority areas identified by the WEF.	2 areas correspond to the priority areas identified by the WEF.	3-4 areas correspond to the priority areas identified by the WEF.	5 areas correspond to the priority areas identified by the WEF.
2.3	Approach to Participation in startups	There are no approaches.	Mainly the domestic market is supported.	It mainly supports the domestic market and the market of neighboring countries.	Mainly the regional market is supported.	A predominantly global market is supported.
Performance						
2.4	The total number of startups created over the past 3 years per 1 million people	Up to 5	5 to 10	10 to 20	20 to 30	Over 30
2.5	Number of developed prototypes/MVP over	Up to 5	5 to 10	10 to 15	16 to 20	Over 20

	the past 3 years per 1 million people					
2.6	Number of registered patents for the last 3 years per 1 million population	Up to 1	1 to 2	2 to 3	3 to 4	Over 4
Access to finance						
2.7	Average initial funding	There is no funding.	Up to 20000 $	From $20,000 to $50,000	From $50,000 to $100,000	Over $100,000
2.8	Maximum initial funding	There is no funding.	Up to 100000$	From $100,000 to $300,000	From $300,000 to $500,000	Over 500000$
Education and talent development						
2.9	Availability of basic research to generate ideas and create innovations relative to the number of universities	Up to 0.5	0.5 to 0.6	0.6 to 0.7	0.7 to 0.8	Over 0.8
2.10	The amount of money allocated to basic research to generate ideas and create innovations (Amount of funds for R&D)	Below 0.02% of GDP	From 0.02% of GDP to 0.05% of GDP	From 0.05% of GDP to 0.1% of GDP	From 0.1% of GDP to 1% of GDP	Over 1% of GDP

Access to infrastructure						
2.11	Number of competitions held over the past 3 years per 1 million population	Up to 1	1 to 2	2 to 3	3 to 5	Over 5
2.12	Number of programs implemented over the past 3 years per 1 million population	Up to 1	1 to 2	2 to 3	3 to 5	Over 5
2.13	Number of hackathons conducted over the past 3 years per 1 million people	Up to 1	1 to 2	2 to 3	3 to 5	Over 5
2.14	Availability of the main national technopark / IT Park, which deals with key areas of development of technological startups (especially in the context of creating conditions for their creation)	Missing	Missing but under development	There is no separate organization, but its functions are partially performed by business incubators or foundations	The technopark is active in the country but mainly affects the capital	Technopark is active in the country, and plays an active role throughout the country (branches and regional centers, or technoparks, are open)
Shared vision and strategy						
2.15	Existence of regulatory legal regulation to meet the needs of	There is no legal regulation.	-	Normative legal regulation is at the	There is legal regulation.	Regulatory regulation is in place in accordance with

	stakeholders in the protection of their intellectual property			stage of development.		European standards; basic guarantees are given.
2.16	Existence of regulatory legal regulation for modern technologies	There is no legal regulation.	At least 1 of the main areas has been resolved: 1. regulatory sandboxes; 2. blockchain and cryptocurrencies; 3. crowdfunding; 4. turnover of big data.	At least 2 of the main areas have been resolved: 1. regulatory sandboxes; 2. blockchain and cryptocurrencies; 3. crowdfunding; 4. turnover of big data.	At least 3 of the main areas have been resolved: 1. regulatory sandboxes; 2. blockchain and cryptocurrencies; 3. crowdfunding; 4. turnover of big data.	At least 4 of the main areas have been resolved: 1. regulatory sandboxes; 2. blockchain and cryptocurrencies; 3. crowdfunding; 4. turnover of big data.
2.17	Existence of normative legal regulation for the venture sphere	There is no legal regulation.	-	Normative legal regulation is at the stage of development.	There is legal regulation.	Regulatory regulation is in place in accordance with European standards; basic guarantees are given.

Annex B
Startup Ecosystem Maturity Map

The Startup Ecosystem Maturity Map, also known as the Innovation Path Map, identifies the work that needs to be done in an ecosystem to harness innovation on a transformative path from pre-idea to high growth (Pre-Seed and Seed research at this point). It describes the roles of stakeholders in supporting entrepreneurs and innovators at every stage of the life cycle. The Startup Ecosystem Maturity Maps color coding system identifies areas that are well-supported (green), underserved (yellow), and missing/lagging behind (red).

	Entrepreneurial Interest		Performance		Access to financing		Education and talent development		Access to infrastructure		Shared vision and strategy		Ranking	
	Pre-seed	Seed	Pre-seed	Seed	Pre-seed	Seed	Pre-seed	Seed	Pre-seed	Seed	Pre-seed	Seed	Pre-seed	Seed
1. Georgia	0,75	0,925	0,675	0,475	1	0,8	0,925	0,8	0,8075	0,73	0,6725	0,75	0,805	0,746667
2. Armenia	0,75	0,925	0,675	0,7	1	0,8	0,8875	0,7	0,75	0,715	0,6725	0,6675	0,789167	0,75125
3. Kazakhstan	0,75	0,7375	0,5025	0,515	0,825	0,55	0,75	0,8	0,7075	0,81	0,6125	0,75	0,69125	0,69375
4. Uzbekistan	0,55	0,6625	0,4125	0,4325	0,75	0,7	0,725	0,65	0,465	0,76	0,6125	0,75	0,585833	0,659167
5. Azerbaijan	0,65	0,85	0,4125	0,6825	0,65	0,5	0,4625	0,7	0,45	0,5	0,58	0,485	0,534167	0,619583
6. Kyrgyzstan	0,45	0,925	0,255	0,125	0,5	0,3	0,6	0,5	0,4075	0,4125	0,4875	0,4025	0,45	0,444167
7. Tajikistan	0,2	0,325	0,12375	0,125	0,125	0,125	0,5625	0,2	0,2325	0,1825	0,25	0,335	0,248958	0,215417