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START-UP ECOSYSTEMS: THE EXPERIENCE OF LATVIA, LITHUANIA, ESTONIA*

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Abstract. The present article aims to empirically confirm the role of start-up ecosystems in shaping and increasing the role of entrepreneurial activity in the socio-economic development of the Baltic countries (Latvia, Lithuania, Estonia). The following tasks were addressed sequentially: determining the relevance of the topic of start-up ecosystems, reflecting the given multifaceted phenomenon in the socio-economic works by contemporary authors, and examining the experience of teams of international research projects focused on start-up ecosystems. Subsequently, the role of start-up ecosystems in the Baltic countries was assessed from a comparative standpoint. The paramount factors that serve as significant positive conditions for their impact on start-up ecosystems and the factors that hinder their positive dynamics were identified. The empirical basis for the research was international research projects: Global Start-up Ecosystem Report, data science competition platform Kaggle, Global Entrepreneurship Monitor (GEM), Global Talent Competitiveness Index (GTGI), Global Competitiveness Report by World Economic Forum, as well as the authors' own research studies on entrepreneurial activity and entrepreneurial universities. Causal and comparative analyses were used as the main research methods. During the research work, the terminology used was clarified so that it matched the main subject of the study – start-up ecosystems as the most important factor in the development of the innovative economy of countries and regions. A ranking of the factors that most positively influence the effectiveness of start-up ecosystems, especially from the perspective of their financing opportunities, were carried out. The study results showed the importance of start-up ecosystems among other drivers of the country's socio-economic growth. The role of higher education, state and municipal support in expanding the practice of start-up ecosystems was also shown. In this aspect, it is extremely important to expand the practice of entrepreneurial education for students of all specialities, gradually transforming educational and research higher schools into entrepreneurial universities.

Keywords: start-up ecosystems; innovative economy; crowdfunding; entrepreneurial universities; Latvia; Lithuania; Estonia

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1. Introduction

The term “start-up” is usually used to describe young companies that seek both rapid growth (Blank & Dorf, 2012) and scaling of their business. These companies often operate in innovative fields and strive to create new products or services that have potential to change the market. In the late 1990s and early 2000s, start-up activity and culture became widespread due to the development of the Internet and the technology boom. Many successful companies such as Google and Amazon were founded during that time. Since then, start-ups have become more popular in various countries and types of economic activity; they continue developing and attracting the attention of entrepreneurs from all over the world. In recent years, start-up ecosystems as a collection of several digital platforms with different products and services in online/offline modes as part of an integrated process have developed in many regions and cities around the world, and states have begun to actively support their development through financing programmes and business incubators (Androniceanu & Georgescu, 2022; Sharma & Goyal, 2024)

The start-up ecosystem plays an important role in attracting and retaining talent, stimulating economic growth, and fostering innovative solutions (Bikse et al., 2020; Macalik, 2021; Becker & Eendenich, 2023).

It describes a set of factors, conditions and resources that contribute to the development and support of start-ups in a certain location or region (Kirsanov et al., 2023). The ecosystem creates a favourable environment for the creation, growth and success of start-ups, providing access to financing, expertise, infrastructure, network connections, and other resources that entrepreneurs may need (Ratanova & Vorončuka, 2019; Popovici et al., 2021; Belitski & Büyükbalci, 2021; Montero & Parga, 2023).

According to the *Start-up Genome* report (Global Start-up Ecosystem Report), the most developed start-up ecosystems are in the following countries: the USA, the UK, Canada, Israel, and Germany. These countries stand out for their innovative approaches, availability of investment and favourable environments for the development of start-ups. The *Start-up Genome* report highlights the top 10 most successful start-ups, which include companies such as Stripe, SpaceX, Instacart, DoorDash, Robinhood, Canva, Brex, Ginkgo Bioworks, Samsara, and Flexport (Start-up Genome, 2023).

The main interconnected components of the start-up ecosystem include:

- Financing, i.e., the involvement of investors, venture funds, banks and government programmes that are ready to invest in start-ups during the early stages of their development and subsequent growth. Incubators and accelerators, which include organizations that provide space, resources, and expertise for start-ups, help them in both development and scaling (Prabhakar et al., 2023);
- Technology parks and infrastructure, i.e., all the clusters, regions or zones where high-tech enterprises, universities and scientific research centres are concentrated, providing access to technical resources and innovative expertise (Condom-Vilà, 2020; Banal-Estañol et al., 2023);
- Education and research institutions, including universities, colleges and research institutes that provide educational programmes and research activities, which create an innovative and entrepreneurial culture (Dedusenko & Elina, 2022; Voronov et al., 2023);
- A network and community of entrepreneurs, investors, mentors and experts who share knowledge, experience and support each other. Ideally, government support facilitated by a government programme, that encourages the creation and development of start-ups, tax incentives, regulatory frameworks and policies that promote innovation and entrepreneurship (Font-Cot et al., 2023).

Participants in the “start-up ecosystem” market and successful companies launching start-ups are fraught with many problems, and any mistake can harm or destroy the company. However, a large number of start-ups are

being involved in ecosystems to provide the company with a competitive advantage to succeed in uncertain times through the following factors: tax benefits and financial incentives; shared workspace to reduce costs; access to qualified employees and clients; availability of resources; collaboration and exchange of ideas; education and training; legal and regulatory assistance; balance between open innovation and intellectual property protection. Such ecosystems can enable start-up success, potentially reducing current failure rates by approximately 90%.

2. Literature review

Let’s analyse the reflection of the concerns on issues regarding the “start-up ecosystem” in the authoritative Scopus database. The number of publications reflecting this issue in scientific editions indexed in the Scopus scientometric database amounted to 995 articles. According to the Scopus database, researchers from the USA (175 publications), India (98) and Brazil (74) were the most active ones in their consideration of the issues that are of our interest (Figure 1).

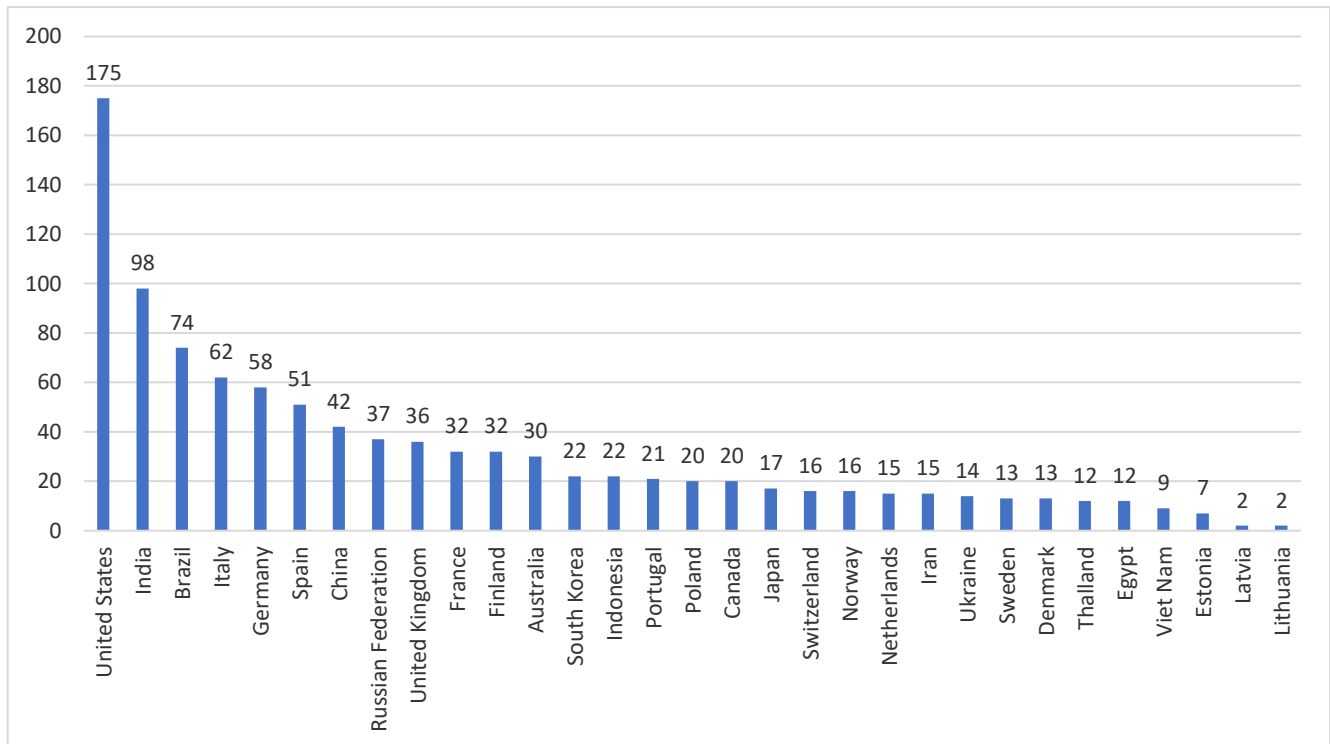


Figure 1. Number of publications in different countries, which contain the words “start-up ecosystems” in the title, abstract or keywords within the Scopus database from 2019 to 2023.

Source: elaborated by the authors based on SCOPUS database

In this distribution of scientific activity on the current research topic of “ecosystems” and “start-ups”, Estonia leads among the Baltic countries with 7 publications, while Latvia and Lithuania have 2 publications each. The results displayed in Figure 2 confirm the high interest of scientists from various fields of science in this particular topic.

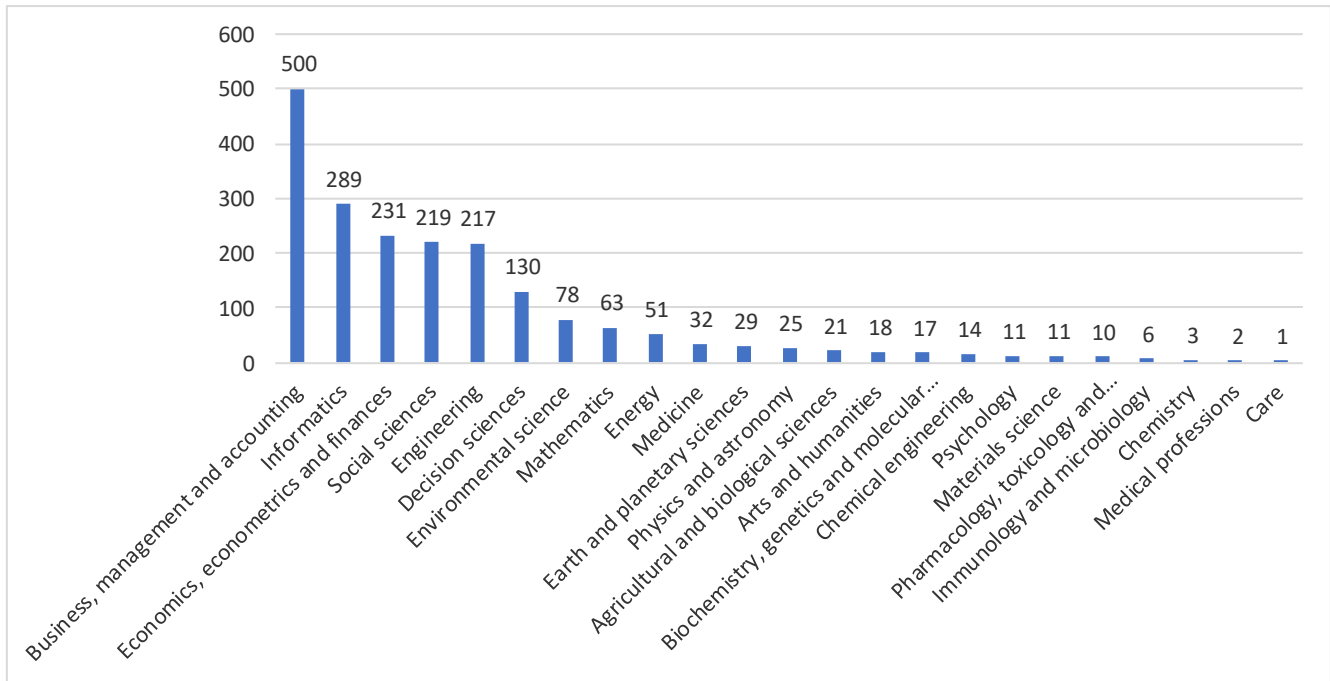


Figure 2. Subject areas reflecting ecosystem issues and start-ups in scientific publications indexed in the Scopus scientometric database in the period from 2019 to 2023.

Source: elaborated by the authors based on SCOPUS database

The majority of publications relate to business, management and accounting (25%), followed by computer science (15%). At the same time, 23% of the total number of publications are represented by economics and other social sciences.

The analysis of publications on the topic of *ecosystems* and *start-ups* showed that most often researchers of this topic cite the 2017 work by a group of authors that analyses the development of financial technology ecosystem using the example of a youth microcredit start-up in China (Leong Carmen et al., 2017). This study examines the development of a financial technology company in China that offers micro-loans to college students. The results show how digital technologies 1) provide a company with a strategic opportunity to fill a market niche in the financial sector, 2) enable the generation of alternative credit ratings based on non-traditional data, and 3) improve the financial inclusion of previously excluded market segments.

Researchers of the given issue also often cite the work published in 2017 by a group of scientists, which examines connections within the start-up ecosystem using the example of St. Louis in the USA (Motoyama & Knowlton, 2017). The researchers critically considered the way the entrepreneurial ecosystem is structured. Previous research in this area had discussed the presence of elements in the system or described the ecosystem as holistically as possible, extending to the social, cultural and institutional dimensions. However, it was found that such aggregate conceptualizations provided a limited understanding of how different elements are connected and constitute the system. In the 2017 study, the authors applied a social network approach to analyse ecosystem connections at multiple levels: (1) among entrepreneurs, (2) among support organizations, and (3) among entrepreneurs and key support organizations. Through a series of interviews with entrepreneurs and support organizations in St. Louis, the authors found out the following: the ways in which the support organizations in the

region interacted with each other and with the entrepreneurs, including explicit interorganizational collaboration and the strategic structuring of resources, significantly influenced the way the entrepreneurs interacted with each other, and with the organizations, thereby deepening the understanding of the connections and identifying intermediate points within the ecosystem.

Start-up ecosystems have a positive impact on the creation of new businesses and the entire economy and, accordingly, attract the attention of both scientists and policymakers. However, although entrepreneurial ecosystems reflect high levels of entrepreneurial activity, they vary significantly in the proportion of female founders, which means that some ecosystems are not realizing their true potential (Berger & Kuckertz, 2016). This study uses qualitative comparative analysis to examine the combinations of ecosystem characteristics that explain the high proportion of female founders in the 20 most successful start-up ecosystems around the world. The results suggest two different configurations that explain the high proportion of female founders and indicate which issues require attention at the metropolitan level and which may require the involvement of national policymakers. These results contribute to the ecosystem literature and relate to the flow of women's entrepreneurship.

Among the authors from the Baltic region, the most frequently cited article is the one by Nolte (2019) on the connection between software developers in a certain IT field and start-up founders attracted by a special format of competition between beginners and experienced professionals. Time-limited events such as hackathons (forums for developers, during which specialists from different areas of software development such as programmers, designers, managers work together to solve a problem), code festivals, and other relatively short-term events for the exchange of experience have become a global phenomenon. Entrepreneurial hackathons, in particular, have gained widespread popularity because of their potential to become the birthplace of the next potentially billion-dollar venture. However, there is limited understanding of whether and how hackathon participants and start-up founders are related beyond studies of individual events focusing on hackathons as an entry point for start-ups. To fill this gap, a study was conducted on a dataset covering 44 hackathons over three years and 489 start-ups in the north eastern European country - Estonia. The results show that hackathons are not always the start of entrepreneurial activity, but can still be useful in the later stages as a means to develop future products, find future employees, etc. The results presented in this article are based on the initial analysis of this large data set and thus represent the starting point of a larger study of the relationship between hackathons and start-up communities, which was still in the planning stages at the time of publication of the article.

3. Theoretical basis and methodology of the research

The study used general and special methods: historical – to study the degree of knowledge of the problem; analytical-synthetic, comparative – to identify trends in the field of start-up ecosystems based on the collected empirical material; inductive – for generalization, systematization of the conclusions. To differentiate the number of international studies, the typological analysis method was used, and the content analysis method was used to study documents. Particular attention is paid to the study of ecosystem factors that influence the success of start-ups. Knowing these factors helps one understand the context, in which start-ups develop and determine the aspects of the ecosystem that need to be improved. Ecosystem benchmarking allows one to compare start-up ecosystems in different countries or regions. Studying differences in connections, structure, and dynamics between ecosystems helps identify the strong and weak points of each ecosystem (Zaidi et al., 2023), learn from best practices (Audretsch et al., 2018), and facilitate the sharing of best practices (Lee & Shin, 2017).

4. Start-up ecosystems of the Baltic countries in the mirror of international research

A start-up is a company or project created by an entrepreneur to find, develop and test a scalable business model. While entrepreneurship refers to all new businesses, including self-employment and businesses that never intend to incorporate, start-ups refer to new businesses that intend to grow beyond the individual founder. Start-ups initially face high uncertainty and high failure rates, with only a few achieving success and impact (Gundolf, 2017).

The Kaggle dataset provides information on countries and cities with the best start-up ecosystem in 2021. Kaggle is a data science competition platform and online community for data scientists and machine learning scientists, operated by Google LLC. Kaggle gives users the ability to discover and publish datasets, explore and build models in a web-based data science environment, cooperate with other data scientists and machine learning engineers, and participate in competitions to solve data science problems.

In total, 100 countries and 983 cities are represented in the Kaggle ranking. Ranking metrics used: the overall score is equal to the sum of the quantity, quality and business score indicators. Quantity assessment: metrics related to quantity (e.g., number of start-ups, number of coworking spaces, etc.). Quality score: metrics related to quality. Business assessment: a combination of business and economic indicators (see Table 1 and Figure 3).

Table 1. Kaggle ranking of cities

Position	City	Country	Overall score	Number of points	Quality score	Business score indicator
1	San Francisco	USA	328.966	29.14	296.02	3.8
2	New York	USA	110.777	11.43	95.55	3.8
3	Beijing	China	66.049	5.01	58.61	2.43
4	Los Angeles (area)	USA	58.441	11.23	43.41	3.8
5	London	UK	56.913	15.77	37.44	3.7
6	Boston area	USA	49.835	5.5	40.53	3.8
7	Shanghai	China	42.162	3.57	36.17	2.43
8	Tel Aviv (district)	Israel	27.084	4.04	19.92	3.13
9	Moscow	Russia	25.401	7.37	15.64	2.39
10	Bangalore	India	25.367	5.04	17.95	2.38
155	Riga	Latvia	3.685	0.59	0.3	2.79
84	Vilnius	Lithuania	6.037	1.37	1.42	3.25
135	Kaunas	Lithuania	4.302	0.73	0.32	3.25
797	Klaipeda	Lithuania	0.176	0.02	0.02	0.14
66	Tallinn	Estonia	6.888	1.14	2.44	3.31
275	Tartu	Estonia	1.139	0.14	0.11	0.88

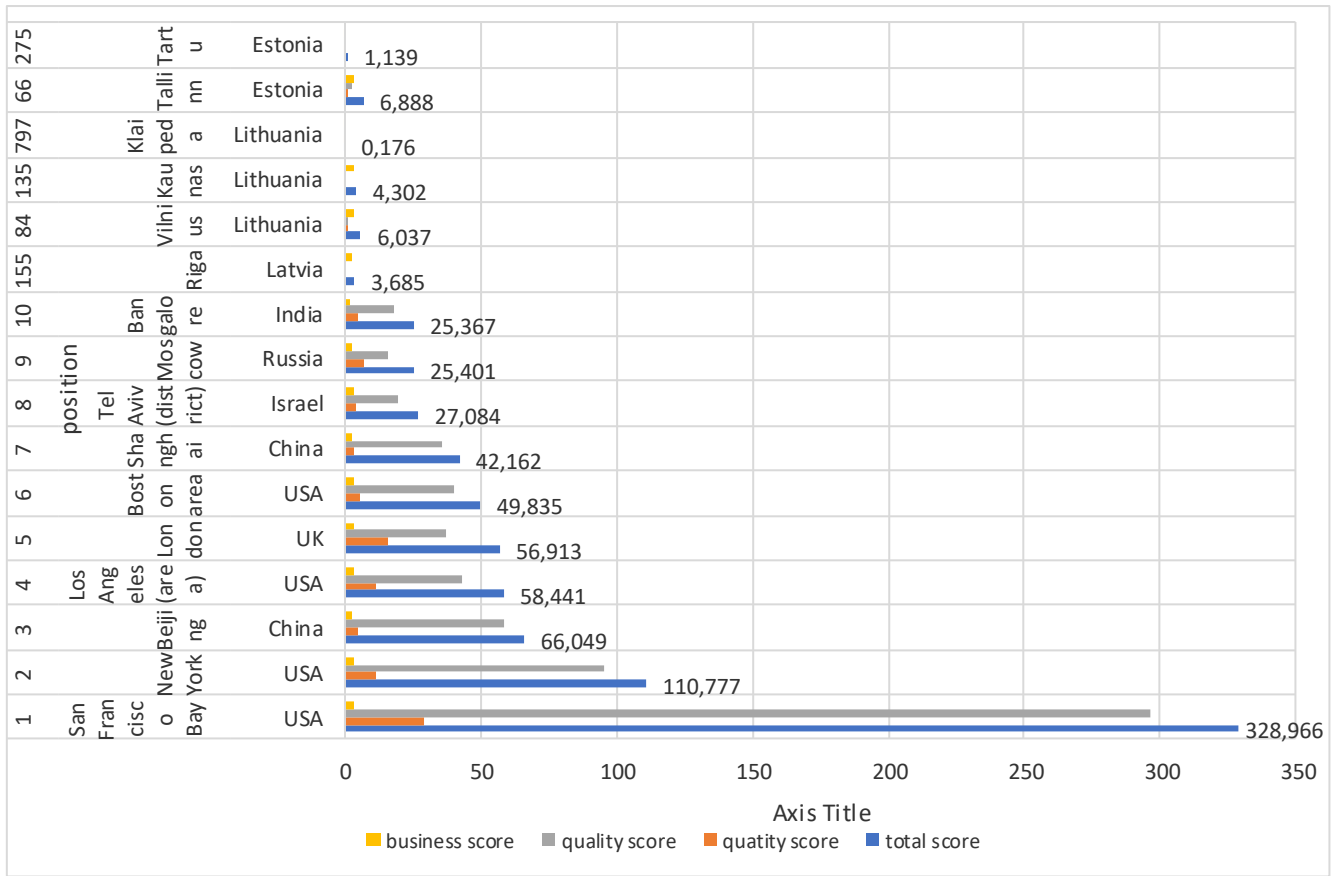


Figure 3. The best cities and countries for start-ups, including Latvia, Lithuania, and Estonia.

Source: elaborated by the authors based on Kaggle

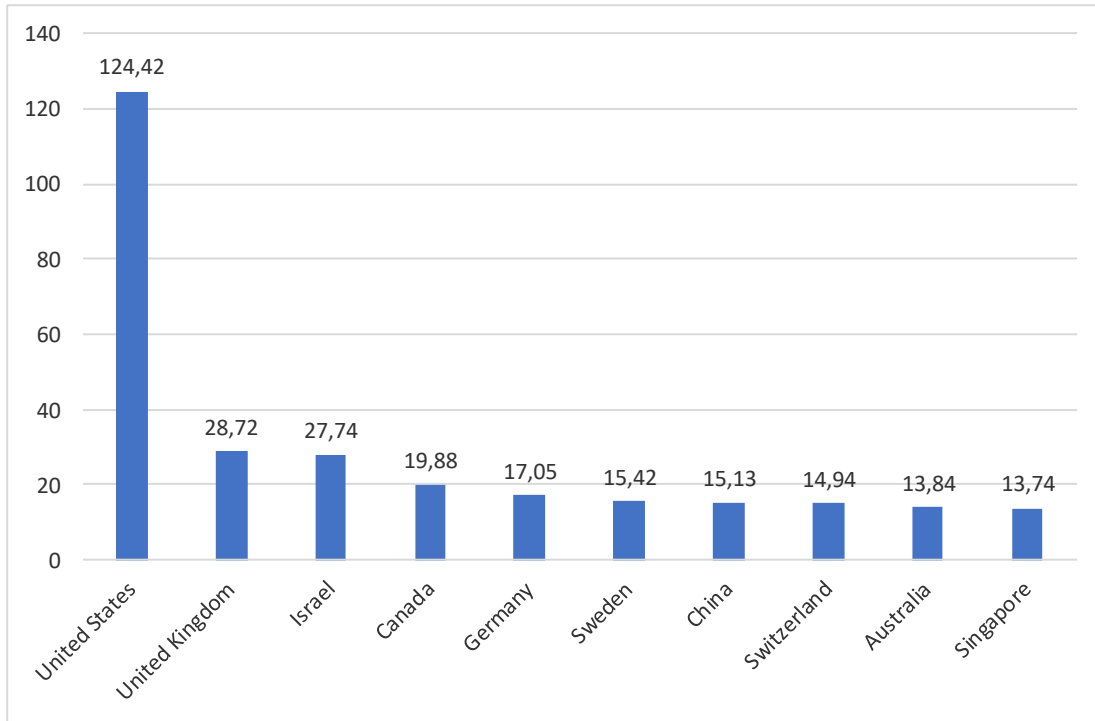


Figure 4. Top 10 countries for start-ups (3 indicators)

Source: elaborated by the authors based on Kaggle

Figure 4 shows that the USA dominates the rankings with an exceptionally high overall score of up to 124,42. The average overall score of all the countries (except the USA) is only 4,878. (Kaggle)

The overall score is calculated as the sum of three different indicators (quantity, quality and business), as each of these three indicators is taken into account when calculating the overall score. The bigger part of the overall score is due to the high-quality score. Quality Score and Overall Score have a bidirectional cause-and-effect relationship.

Overall score	1.000	0.959	0.988	0.481
Number of points	0.959	1.000	0.914	0.577
Quality score	0.988	0.914	1.000	0.351
Business score	0.481	0.577	0.351	1.000
	Overall score	Number of points	Quality score	Business score

Figure 5. Correlation matrix for a country dataset).

Source: elaborated by the authors based on Kaggle

The correlation graph provided above (Figure 5) confirms our assumptions that Overall Score and Quality Score have an extremely high level of correlation (0.988), while Business Score has the lowest level of correlation (0.481).

There are international studies of start-up ecosystems that examine and compare the ecosystems of different countries. Some of the most significant research studies are listed below.

Global Start-up Ecosystem Report: an annual study conducted by Start-up Genome that analyses and compares start-up ecosystems around the world. It evaluates various factors, including availability of funding, quality of resources, business culture and other indicators.

Global Entrepreneurship Monitor (GEM): the largest international study of entrepreneurship, including data on start-up ecosystems in different countries. It studies the factors influencing entrepreneurial activity such as potential opportunities, perception of opportunities, financing and others.

European Start-up Monitor (ESM): ESM focuses on research into start-up ecosystems in Europe. It provides information on start-ups, investments, incubators, accelerators and other factors influencing the start-up environment in the region.

Digital start-up ecosystems in the MENA region: this study conducted by the Organization for Economic Co-operation and Development (OECD) examines the Middle East and North Africa (MENA) start-up ecosystems. It analyses investments, legal frameworks, quality of education and other factors.

There is no central registry of start-ups in Europe, and national registries typically do not consider the degree of innovation, growth goals or sources of funding when starting a business. This makes it difficult to find data on these specific types of businesses. In fact, all start-ups are small and medium-sized enterprises (SMEs) (Adams et al., 2016) (Bereczki, 2019).

European Start-up Monitor (ESM): ESM focuses on research into start-up ecosystems in Europe. It provides information on start-ups, investments, incubators, accelerators and other factors influencing the start-up environment in the region. The EU Recommendations (2003/361) define Small Medium Enterprises (SMEs) by the number of employees, as well as by turnover or balance sheet amount. In the case of start-ups, this is difficult to measure because a start-up may have a large number of employees, and simultaneously it may have a not significant turnover of the employees (19.8%). In addition, the initial capital for business development is usually much higher (sometimes millions) for a start-up than for an SMEs. Sources of funding are also often very different (see Figure 6). Support from business-angels (29.0%), venture capital (26.3%) or crowd investors (18.1%) is more common among start-ups rather than SMEs, which often rely only on traditional bank loans or founders' savings.

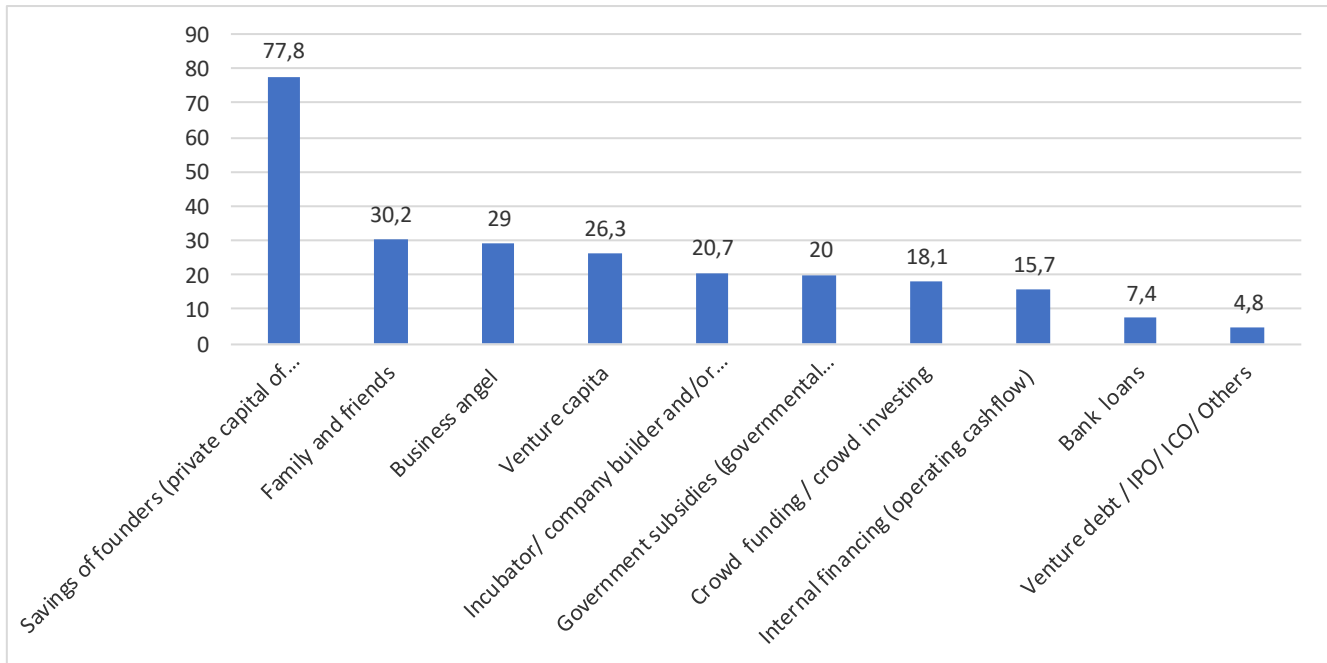


Fig. 6. Start-up funding sources

Source: elaborated by the authors based on EU-Start-up-Monitor-2018

The sectors in which start-ups are active can be described as very diverse. Most companies provide a product or service online. While sectors such as IT/software development (19.1%) or “Software as a Service” (18.5%) are still well represented, new companies have also been created in trending sectors such as “Green technology” (4.0%) and in the financial sector (5.1%). Geographically, the largest European start-up centres have been established in London, Berlin, Paris, Copenhagen and Lisbon. Typically, start-ups develop in five stages: the early stage, the start-up stage, the growth stage, the later stage and the sustainable stage. The majority of start-ups operate in business-to-business (B2B) markets (82.1%) and generate their revenue entirely (46.5%) or primarily (25.3%) through interactions with other companies. The main places where revenue is generated are mainly in continental Europe (84.2%), with a strong emphasis on the start-up's country of origin (62.4%), followed by other European Union countries that are part of the euro area (17.7%), USA (8.9%), which, among others, is the most popular international market (Gundolf et al., 2017).

This annual study conducted by Start-up Genome analyses and compares start-up ecosystems around the world. It evaluates various factors, including availability of funding, quality of resources, business culture and other indicators.

5. Research results and discussion

In the Baltic countries, the leadership in the development of start-up ecosystems belongs to Estonia, which, in 2023, occupied the 14th position in the world, overtaking Finland. Estonia continues to lead the Baltic countries with an overall score 23.8% higher than the one of Lithuania. Estonia tops the rankings compared to other countries with a population of less than 2 million people, and is significantly ahead of, for example, Latvia and Cyprus. Estonia now has 3 start-up ecosystems out of the top 1000; in 2022, it had only 2.

One of the most important milestones in the history of the Estonian start-up ecosystem was the success of Skype, an application developed mainly in Estonia. Skype's founders used this windfall to support new successful Estonian start-ups such as Skycam, Teleport and SpaceApe, to name a few. The "Skype Mafia," as they are called, shows that one single launching can seriously influence the culture of an entire start-up ecosystem. The Estonian public sector has also undertaken effective and aggressive marketing efforts, the likes of which we have not seen anywhere else in the world. Examples of this include several innovative projects that started in Estonia and are now being copied by dozens of governments around the world: Estonian e-Residency, visas for start-ups and digital nomads, and digital branding of companies. These efforts are resulting in increased country awareness and branding among digital nomads and small business owners in many developing countries, an impressive achievement for a country with a population of less than 2 million. The small population also means that start-ups in Estonia face strong competition for talent, and the public sector faces a difficult task in supplying the booming start-up scene with a constant flow of foreign workers. According to Statistics Estonia, every 56th person of Estonia's working population was involved in start-ups, and the top 20 start-ups created 59% of jobs in the sector in 2022, proving the country's need to attract talent from abroad. Work in Estonia programme, launched by the Estonian government, aims to attract new IT professionals, as well as talent in the field of natural and exact sciences. So far, the country seems attractive to foreigners and has managed to double its international talent pool over the past 5 years.

The country has successfully established itself as a leader in information technology, cybersecurity and public administration. Estonia positions itself as a start-up-oriented economy. However, Estonia still faces some challenges on its path to economic growth. First, initiatives such as e-residency and the digital nomad visa may attract lifestyle-oriented businesses to Estonia rather than start-ups that might be expanding globally or seeking access to capital and potential customers. Secondly, the country should also carefully move from being a development hub, where companies from richer countries can come to develop start-ups (e.g. Skype, Playtech), to creating its start-ups at the local level, especially taking into account that the cost of living in Estonia is rising in accordance with the economic success of the country. In addition, the country has proven that it can create global success stories such as Wise, Bolt and Pipedrive. According to Whitepaper of Start-up Estonia 2021-2027, the country continues to support its growing start-up ecosystem, has set several goals aimed at increasing the share of the Estonian start-up and technology sector to 15% of the national GDP by 2025, and is also actively promoting holistic start-up thinking. As the main government initiative for the Estonian ecosystem, Start-up Estonia is involved in policy development and promoting and strengthening the ecosystem. Additionally, through events such as Latitude59, the country continues to attract international attention and investment every year.

According to Start-up Estonia and Statistics Estonia, in the first half of 2023, the average gross salary of employees who worked at least one day in start-up companies reached 3,243 euros, which is almost double the average salary in Estonia. Compared to the same period last year, start-up employee salaries increased by 14 per cent. (Global Start-up Ecosystem Report, 2023).

Eve Peeterson, Start-up Estonia – CEO, said that competition for highly qualified labour in the Estonian technology sector is still high. "At the same time, it is clear that start-ups are looking for ways to save money and optimize costs, and, unfortunately, this has also led to layoffs. However, the number of employees in the start-up sector as a whole has not decreased, i.e., laid-off start-up employees usually quickly find jobs at other start-up companies. The role of foreign talent in the technology sector also remains important, as they fill positions that the local labour market cannot fill.

According to the Tax and Customs Board, the growth in the number of employees in Estonian start-ups has slowed down but has not gone into decline. At the end of the first half of 2023, the Estonian start-up sector employed 9,927 people, which is one per cent more than in the same period a year earlier. The average salary of Estonian employees in local start-ups was 3,163 euros, while the average salary of employees from abroad

reached 3,288 euros. Start-up employees aged 41-50 receive the highest average monthly gross salary, with an average salary of €3,921 per month in the first half of this year. They are followed by workers aged 31-40 with a monthly salary of 3,614 euros. The highest salaries are found in start-ups working in the cyber technology sector, where the average salary reaches 4,230 euros. This is followed by the communications services sector, where workers earn an average of 3,967 euros per month. The top three also included transport and logistics start-ups with an average monthly salary of 3,742 euros. 61% of employees of Estonian start-ups are men, 39% are women. The employees of Estonian start-ups are also relatively young: 44% of employees are aged 31-40 and another 41% are aged 21-30. (The average..., 2023).

As of the first half of 2023, the largest employer in the Estonian start-up sector was Wise with 1,899 employees. The company increased the number of employees by 114 people compared to the end of last year. The second largest employer in the Estonian start-up sector is Bolt, the start-up employs 1,290 people, which is 20 people more than at the end of 2022. The top three largest employers also include Swappie with 409 employees. The number of start-up employees decreased by 78 people compared to the end of last year. According to the Tax and Customs Board, in the first half of 2023, Estonian start-ups paid a total of 108 million euros in labour taxes to the state. This is a third more than a year ago. The largest payers of labour taxes were Bolt (17.5 million euros), Wise (17 million euros), Veriff (4.9 million euros), Monese (2.8 million euros), Glia (2.4 million euros).

Over the past few years, Estonia has emerged as a European leader in school education, which provides good preconditions for improving the quality of higher education and the development of start-ups. Estonian students are recognized as the best in Europe according to the PISA (Program for International Student Assessment) ranking, an international study that evaluates the quality of education of 15-year-olds in different countries every three years. Students are tested in three categories: reading, math and science. This time, 81 countries took part in the study. Asian countries traditionally rank high in the rankings, and this year, in addition to Singapore, the Chinese enclave of Macau, Taiwan, Japan and South Korea showed strong results. All of these states ranked among the top ten in the world in each of the three categories. This study has been conducted by the Organization for Economic Co-operation and Development (OECD) since 2000 (BBC NEWS.2023).

According to the Global Start-up Ecosystem Report, Lithuania consistently ranks 17th in the world. Lithuania remains close to the top ten in Europe (11th place) and ranks 9th in the EU. In the Baltics, Lithuania (2nd place) is closing the gap with Estonia (1st place), showing a score difference of 23.8% in 2023 compared to 28.5% in 2022. Lithuania has 3 cities in the world's top 1000, one city in the top 100 and one city in the top 200. This makes Lithuania the only country in the Baltics with two cities in the top 200. There are two cities in the country that enter the top 200. Well-known start-ups and champions of the Lithuanian ecosystem, already in the early 2020s attracted attention in the start-up world with several interesting developments and initiatives: *TransferGo*, a company created in Lithuania, became one of the successful start-ups in the field of finance and financial technology. The company provides international money transfer services. *Vinted* is a Lithuanian start-up created for clothing exchange and sale. In 2021, Vinted attracted significant investment, highlighting investor interest in technology companies in Lithuania. The *Qoorio* platform, also based in Lithuania, provides the opportunity to connect with experts in various fields and share knowledge. It is also actively attracting attention. The national agency *Start-up Lithuania* actively supports and develops the start-up ecosystem in the country by providing resources and programs for start-ups. Another interesting Lithuanian start-up is *Vlipsy*, a platform for searching and sharing GIF images that can be integrated into various instant messengers and social networks. *Nord Security* operates as an online privacy and security provider for individuals and businesses. *Eneba.com* – digital games store. *Eneba* is quickly becoming a popular place to find the best gaming deals. Through friendly business regulation, government funding support and an open data policy, Lithuania's public sector has created an environment conducive to the development of start-ups. Start-up Lithuania, a one-stop shop for start-ups in the country, promotes a start-up visa for foreign entrepreneurs and allows you to obtain a temporary residence permit for up to a year. In addition, Lithuania boasts a start-up worker visa, an initiative aimed at attracting highly skilled

workers. Other important players in the start-up ecosystem are Go Vilnius, an organization that attracts innovation to its ecosystem, and Kaunas University of Technology, which nurtures and trains talent. According to the Global Start-up Ecosystem Report, in terms of business assessment, Latvia ranks 11th in the EU and 24th in the world, which indicates a business environment favourable to start-ups. The country lags behind its Baltic rivals, with a score difference of more than 3 times that of Estonia and 2.5 times that of Lithuania. Riga, the only Latvian ecosystem included in the top 1000, was ranked 173rd in the world and ranked 13th in Eastern Europe.

Despite the slow pace, Latvia is starting to benefit from several public sector initiatives that make it an attractive destination, such as innovation vouchers and a start-up-friendly regulatory system. Latvia has also launched a Start-up Visa programme aimed at attracting foreign entrepreneurs. The key public sector organization supporting the ecosystem, Magnetic Latvia, operates under the Investment and Development Agency of Latvia (IDAL) and provides comprehensive services for foreign founders wishing to start a business in Latvia.

The Riga start-up ecosystem also boasts several private sector organizations that contribute to the development of the ecosystem, such as BuildIt Latvia, an accelerator that helps hardware start-ups and IoT start-ups. The programme started in Estonia but is ongoing in Latvia, demonstrating the promising potential of the ecosystem. Venture capital investment is essential to creating scalable start-ups. One of the organizations pursuing this goal is the Latvian Private Equity and Venture Capital Association (LVCA). The mission of the organization is to promote the development of the venture capital industry in Latvia and the Baltic region. A critical issue for Latvia is brain drain as skilled workers emigrate to other EU countries; the public sector should do more to demonstrate the benefits of staying in Latvia. Outstanding start-ups and champions of the ecosystem Mintos is an investment platform for the financial services sector. 4finance is Europe's largest online and mobile consumer finance group, providing convenient and responsible access to credit in 16 countries. Sonarworks is an innovative start-up in the field of audio technology. Several business support programmes are implemented in Latvia. The most popular support programmes mentioned by students in our sociological survey were those of the Latvian Investment and Development Agency (LIDA), primarily business incubators and investment incentive programmes, as well as assistance programmes for start-up entrepreneurs implemented by the financial institution Altum. Some students also mentioned local (municipal) support programmes.

Among the types of support that can be received within the framework of the programmes, the students noted the following: assistance in starting a business (both material and intangible), possible financing – partially or fully, risk assessment and management, office or production premises and equipment necessary for business, meetings with existing experienced entrepreneurs – assistance in exporting competitive products or services, preparation of necessary documents, filling out declarations and assistance from an accountant. At the same time, we need a state programme for at least a pilot project to create two or three entrepreneurial universities so far, which will allow us to have our own experience in removing economic, social and cultural barriers to the modernization of our higher education, and the emergence of our strong business leaders here (Menshikov et al., 2021).

Five leading organizations representing the Latvian financial technology sector have sent a joint letter to the Ministry of Finance and the Bank of Latvia calling for specific amendments to regulations to adapt the best practices of the fintech market from neighbouring countries to Latvia and thereby increase the attractiveness of Latvia for new entrants to the country and innovative enterprises, said Mārtiņš Puķe, board member of the Latvian Blockchain Development Association (Mixnews.lv, 2023). Representatives of the organizations Latvian Blockchain Development Association, Fintech Latvia Association, Latvian Start-up Association, Latvian Association of Payment and Electronic Money Institutions, as well as the Latvian Crowdfunding Service Providers Association call on decision makers to provide fintech service providers with the opportunity to access the international SEPA settlement system directly through the Bank of Latvia. It is also necessary to ensure the possibility of opening payment accounts at the Bank of Latvia for financial technology service providers.

Accessing the SEPA system directly through the Bank of Latvia would provide several benefits that would make Latvia an attractive choice for financial technology companies. A similar step was taken by the Central Bank of Lithuania, which, by developing the CENTROLink system, helped Lithuania rise to the status of a financial technology power. The Lithuanian fintech sector has shown remarkable development over the past decade, growing almost fivefold in seven years, from 55 fintech companies in 2014 to more than 260 companies in 2021, and creating more than 6,000 well-paying jobs. Latvia also has the opportunity to act to become more attractive to companies operating in the financial sector, including innovative start-ups, without investing huge amounts of money in creating infrastructure, by introducing modern regulation that is suitable for the modern business environment.

In recent years, the start-up ecosystem in the Baltic countries has shown some growth and attracted the attention of investors. However, as with any developing ecosystem, certain problems and challenges may arise. The following selection comprises emerging start-ups within start-up ecosystems, with a focus on those situated within the Baltic countries:

1. Many start-ups have difficulty raising enough funding to scale their businesses. This may be due to an insufficient number of investors or difficulties in the process of attracting investment.
2. Lack of experienced investors who can provide not only financial support but also valuable advice and connections.
3. Finding highly qualified specialists.
4. Legal and regulatory complexities can also create barriers to start-up development.

Many start-ups need a variety of funding sources to reduce risk and ensure sustainable growth.

The ChatGPT chatbot and similar platforms can play an important role in the start-up funding sector in the Baltics by providing support and information in various aspects. A chatbot can:

1. provide information about available grants, investment opportunities, competitions and support programmes for start-ups in the region.
2. give advice and consultation on financial strategies, business plans, and raising investments, which will help entrepreneurs effectively manage the finances of their start-ups.
3. provide educational content on financial literacy that will help entrepreneurs better understand and effectively manage their finances.
4. help entrepreneurs prepare the information necessary to attract investment and provide recommendations for creating attractive investment proposals.
5. ensure interaction between entrepreneurs and financial institutions, simplifying the process of obtaining financial support and assisting in establishing contacts with potential investors.

Overall, the chatbot can be a valuable tool for improving entrepreneurs' access to information and resources in the field of financing, which in turn contributes to the development of the start-up ecosystem in the Baltic countries.

Unfortunately, crowdfunding is little used outside the United States – a method of financing projects, enterprises or ideas in which funds are raised from a large number of people, usually via the Internet. Instead of depending on traditional sources of funding such as banks, investors or government agencies, projects or entrepreneurs can reach out to the general public and ask them for small monetary contributions. The idea behind crowdfunding is that many people, called “crowdfunders” or “backers,” can contribute small amounts of money to a project or venture that interests them. These small contributions can add up quickly and provide the funding you need. Crowdfunding can be used to support a variety of ideas and projects, including the creation of new products, films, music albums, books, research studies, charity events and much more.

There are several main crowdfunding models, including:

1. The most common type of crowdfunding, where projects are posted on specialized online platforms, such as Kickstarter, Indiegogo, and attract funding from those interested.
2. Share-Swap Crowdfunding: in this model, investors contribute funds in exchange for a share in future profits or shares of the company.
3. Crowdfunding is about loans, not investments or donations.

Crowdfunding allows developers and entrepreneurs to raise funds and gauge interest in their ideas before the production or implementation of a project begins, and it has gained popularity due to its ability to attract support from a wide audience. The USA, China and the UK are traditionally large markets for crowdfunding. Among the crowdfunding platforms that help budding entrepreneurs is Kickstarter. Kickstarter can help: *To host projects*: people who need funds to implement their ideas can create a project on Kickstarter. This project can be related to art, design, technology, film, music, gaming and many other fields. *To publish information*: the creators of the project describe their idea, fundraising goals, deadlines and rewards for sponsors. This allows potential donors to understand where they are spending their money. *To fundraise*: people from all over the world can become sponsors of the project by contributing money to the fundraiser. Kickstarter operates on an all-or-nothing basis, meaning that a project should meet or exceed its financial goal to receive funding. If the goal is not achieved, the money is returned to the sponsors. *To receive awards*: As gratitude for the support, the creators of the project offer awards to sponsors. Rewards can range from commendations and beta versions of the product to exclusive offers or even your own copies of the work. *To promote help*: Kickstarter also provides some tools and resources to help creators promote and promote their projects. This may include marketing tips, community support, and more.

Kickstarter helps people overcome financial barriers and turn their ideas into reality. It also allows donors to support projects and ideas they love and gain access to unique products and experiences. Of course, young people, including students, can also participate in obtaining funding on platforms similar to Kickstarter to finance their projects, ideas or research. However, there are some obstacles and restrictions that may arise if the platform refuses to cooperate:

1. Age restrictions: some Kickstarter platforms may require users to be a certain age (such as 18 years old) to create projects and raise funds.
2. Geographic restrictions: some platforms restrict access to their services to residents of certain countries or regions. This may create a barrier for students from some locations.
3. Legal and regulatory restrictions: some platforms may have restrictions on project types or fundraising due to legislation or platform policies. For example, some projects may involve illegal activities or copyright infringement.
4. Lack of project support: the platform may refuse cooperation if the project does not meet their criteria or does not provide sufficient information about the goals, budget and execution plan.
5. Insufficient funding: if a project does not attract enough funding from potential funders or does not reach its stated goal, the platform may close it or refuse to allocate funds.
6. Violating platform rules: if aspiring entrepreneurs or their projects violate platform rules and policies, they may be rejected or removed.

It is important to get acquainted with the rules and requirements of the specific platform on which the project proponents intend to raise funds and ensure compliance with them to increase the chances of a successful collaboration.

In our opinion, issues of financing and quality of education in schools, colleges and universities can also be considered key for the further development of start-up ecosystems in the Baltic countries. Among our most important arguments for this conclusion are the following:

1. Education serves as the basis for training the personnel needed for the start-up sector. Highly qualified and technically trained specialists can become engines of innovation and the successful development of start-ups.
2. Entrepreneurship-focused education can help students develop key skills such as creativity, mobility, leadership, analytical thinking and problem-solving - all qualities that are important for entrepreneurs and start-up workers.
3. Higher education also provides students with access to research and innovation opportunities, which can contribute to the emergence of new ideas and technological solutions.
4. Quality educational institutions actively collaborate with the business community, giving students the chance to participate in real projects and gain experience working in start-ups.
5. Adequate funding for educational programs is important to ensure high-quality teaching and support innovative research. Investments in education can help create an enabling environment for start-ups to thrive.

Thus, a balanced focus on the quality of education and the provision of financial resources in this area is an important element of a successful start-up ecosystem in any country, including the Baltic countries.

Conclusions

Summarizing the results of using start-up ecosystems in the Baltic countries, we note their identified strengths and weaknesses, differentiated by country. The strengths are as follows. Estonia is a leader in the field of e-government, which promotes the development of start-ups in the fields of cybersecurity and electronic services. In all three Baltic countries, there are technology parks, incubators and accelerators that provide support and resources for the development of start-ups. Programmes such as the Estonian Start-up Entrepreneur Visa help attract talented entrepreneurs and professionals from around the world. Low tax rates, relatively low living costs and government support create a favourable business environment. There is investor interest in start-ups in the region, especially in the fintech and e-commerce sectors.

Weaknesses of start-up ecosystems in the Baltic countries. Small national markets can create limited opportunities for start-ups to scale, forcing many companies to seek international expansion. A favourable business environment and attractive conditions for start-ups can lead to competition for talented personnel. In some industries, such as biotechnology or raw materials, expertise and resources are quite limited. Some countries may be heavily reliant on certain sectors, such as IT technology, which can make ecosystems vulnerable to changes in those industries. In some cases, certain industries may be underinvested, making it difficult for start-ups to develop in those areas.

Our analysis shows that over the past few years, the Baltic countries (Estonia, Latvia, Lithuania) have seen significant growth in start-up ecosystems. Here are some key features and trends: Estonia has become a leader in the field of e-government, which has contributed to the development of start-ups in the areas of electronic identification, cybersecurity, and e-government technologies. Estonia provides special visas for start-up entrepreneurs, which has become a magnet for talented people from all over the world.

Lithuania provides favourable conditions for entrepreneurship, including low taxes and relatively low living costs. Vilnius has become a popular place for investment in technology start-ups, and the city actively supports the development of innovative companies. Riga provides technology parks and incubators to support start-ups, such as TechHub Riga and the Latvian Start-up Association. Latvia is actively developing the financial technology sector, with many start-ups working in the field of digital payments, blockchain technologies, and other financial innovations. There are various initiatives in the region aimed at supporting start-ups, such as the Baltic Start-up Hub, which brings together the entrepreneurial communities of the Baltic countries. In all the Baltic countries, there is a noticeable strong investment activity in start-ups, especially in sectors such as technology, e-commerce, financial technology, medical technology.

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