

and growth of industries. The level of motivation of entrepreneurs plays significant role in increasing the number of SMEs and startups. For example, there is distinct about the Europe and North America region the low level of necessity motives. In fact, necessity is nearly absent in the Netherlands and Switzerland, while ‘improvement-driven opportunity’ accounts for over two-thirds of the drivers of start-up activity in these countries (GEM, 2018). The proportion of Total early-stage Entrepreneurial Activity (TEA) with Improvement-Driven Opportunity (IDO) motives accounts for an average of 37% of entrepreneurs in low-income economies, increasing to 42% in middle-income economies, and 51% in high-income economies. High rates in Canada and the United States are also due to IDO motives (GEM, 2018). Yet in many of the remaining countries, a lack of either motive can explain low rates. GEM National Experts’ Survey (NES) provides insights from experts in each economy on nine Entrepreneurial Framework Conditions (EFCs), i.e. factors that influence the overall climate for entrepreneurship and hence the level and nature of entrepreneurial activity.

Table 3. Horizon Europe 2021–2027: structure for research and innovation

Open science	Global challenges and industrial competitiveness	Open innovation
€25.8 billion	€52.7 billion	€13.5 billion
Supports frontier research projects defined and driven by researchers themselves through the European Research Council (€16.6 billion).	Supports research relating to societal challenges, reinforces technological and industrial capacities.	Aims to make Europe a frontrunner in market-creating innovation via the European Innovation Council (€10 billion).
Funds fellowships and exchanges for researchers through Marie Skłodowska-Curie Actions (€6.8 billion).	Includes activities pursued by the Joint Research Centre (€2.2 billion) which supports EU and national policymakers with independent scientific evidence and technical support.	Developing of the overall European innovation landscape, including by further strengthening the European Institute of Innovation and Technology (EIT) to foster the integration of business, research, higher education and entrepreneurship (€3 billion).
Invests in world-class research infrastructures.		

Each economy has its own specific entrepreneurship profile in terms of activity rates across various phases of the entrepreneurship process, characteristics of entrepreneurs and their businesses, and the attitudes and perceptions people hold toward this activity. The entrepreneurship environment in which entrepreneurs operate has its own profile, containing strengths entrepreneurs can leverage and constraints they must overcome in order to start their business. Change is an inherent feature of the economy, economics and management sciences. Traditional methods of market activities, based on a disciplined approach to planning and forecasting, and based on complex rules and forecasts, have lost their battle against the market and the chaos that currently prevails (Eisenhardt, Sull, 2001). A few decades ago, Ansoff came up with the concept of a turbulent (highly volatile and complex) environment. On the one hand he pointed out the multifaceted nature of the disturbances occurring in the business environment, on the other, the need to include such changes in strategy building (Ansoff, 1984). As already mentioned by the authors, any factor missing from the innovation ecosystem hinders new ideas from being generated or evolving into viable commercial products. At the same time, it should be noted, that a key indicator of EU innovation leaders is the effective commercialization of their technological innovations. The set of factors are creating the innovation ecosystem of the entrepreneurship. The interaction of these factors create own profile of the business ecosystem, taking into account the specific features of each country.

4. The ecosystem factors important for the development of technological startups in Latvia

The development of new businesses is an important link in the innovation system and contributes to a paradigm shift to a modern and innovative economy. For the past 3 years, the Ministry of Economics of Latvia and its subordinate institutions have been actively working on the creation of a single offer for a new ecosystem for startups. The ecosystem of Latvian start-ups has become more recognizable also in the international context. The key actors and stakeholders of a start-up ecosystem include policy makers, investors, academic institutions and business partners who are able to provide the necessary capacity and expansion opportunities (Edquist, 2006). In 2018, 3 acceleration funds were also launched (Overkill Ventures, Build IT, and Commercialization Reactor),

where each fund has been allocated ERDF funding of 5 million EUR out of a total of EUR 15 million. To increase the potential of Latvian scientists and companies during the next European programme period, connect to innovation platforms and attract public investment, proactive action is needed to identify strategic competitiveness factors and strengthen the triple helix model.

As of January 2019, there were 418 start-up companies registered in Latvia, according to the Ministry of Economics of Latvia. Over 350 of those companies are under five years old, and over 65 start-ups are younger than seven years. Approximately 100 new business ideas are still in the development stage. Figure 1 shows Latvian start-up field by the areas in percentage of the total number of start-ups. Over the last five years, the number of startups has increased from an average of 10–15 new businesses a year before 2010 to an average of 50 new startups each year between 2014 and 2018. The start-up ecosystem in Latvia is developing and its economic benefits are growing, both in terms of the number of new businesses and jobs created as well as the amount of investment. Latvia’s emerging startup ecosystem has three strongest areas – fintech, deeptech and drone technology.

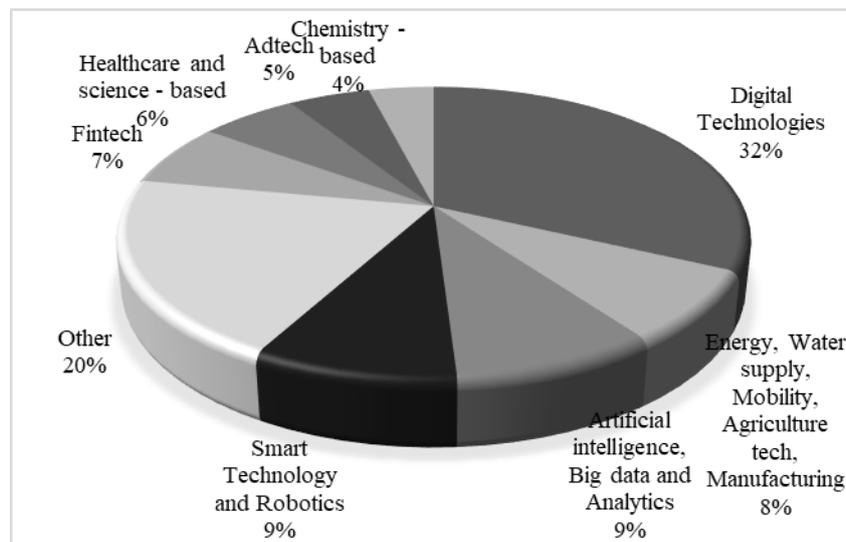


Fig.1. Latvian startup field by the areas in % of the total number of startups

Latvian startup-field includes digital technologies – 32%; energy, water, mobility, agricultural tech, manufacturing – 8%; artificial intelligence, big data and analytics – 9%; smart technologies and robotics – 9%; fintech – 7%; health and science – 6%; adtech – 5%; chemistry – 4%.

The purpose of the survey was to obtain information from CEOs of deep tech startup regarding which factors of business environment are important for technology startups, and which are less significant. The survey was conducted by the authors in January 2019. The data was obtained as a result of a survey of innovation entrepreneurs, representatives of Latvian technology start-ups who are engaged in technology commercialization projects and were created on the Commercialization Reactor platform. The technologies are to different fields of science, such as IT, Artificial Intelligence, Biotechnology, Industry & Engineering, Agriculture, Medical. The survey results demonstrate the importance of all factors of the business environment ecosystem, but, nevertheless, according to entrepreneurs, public policy and financing of entrepreneurship are the most important. It is important to remember that entrepreneurs are essentially at the centre of any start-up ecosystem. The survey was attended by the CEOs of 20 high-tech startups, which is about 50% of the 40 startups working on the Commercialization Reactor platform. Among 418 Latvian startups, there are about 70 – 80 (17 – 20%) of deep technological startups, which indicates the representativeness of the sample. Figure 2 shows the correlation among the startup ecosystem factors and in the Table 4 we can see the correlation coefficients which are calculated by the formula (1) using the software SPSS. The Pearson correlation coefficient r is a measure of linear correlation between two variables X and Y .

$$r = \frac{n \sum xy - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}} \quad (1)$$

Figure 2 shows the correlation among the startup ecosystem factors based on the calculated coefficients of correlation (Table 4). Correlation analysis shows the relationship among variables (columns). The correlation is positive, it has a value between +0.9 and 1.

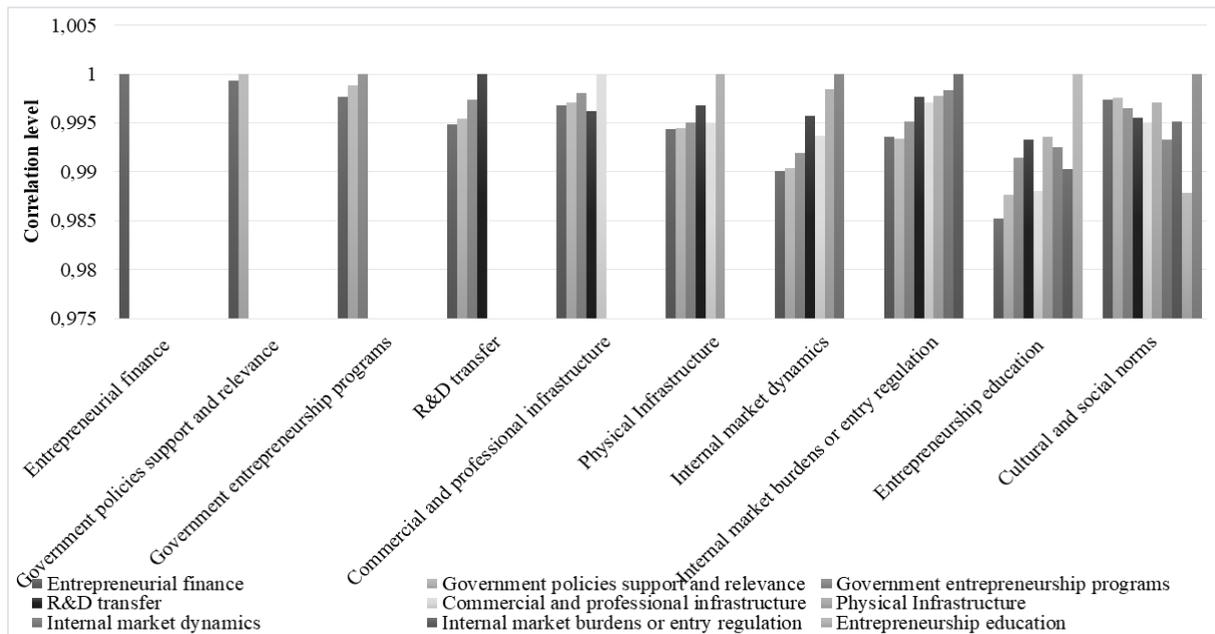


Fig. 2. The correlation among the startup ecosystem factors, calculated by the authors using the SPSS software

Table 4. The coefficients of correlation calculated by the authors using the SPSS software

Factors	Entrepreneurial finance	Government policies support and relevance	Government entrepreneurship programs	R&D transfer	Commercial and professional infrastructure	Physical Infrastructure	Internal market dynamics	Internal market burdens or entry regulation	Entrepreneurship education	Cultural and social norms
Entrepreneurial finance	1									
Government policies support and relevance	0,999345791	1								
Government entrepreneurship programs	0,997721923	0,9988726	1							
R&D transfer	0,994816263	0,9954167	0,997351	1						
Commercial and professional infrastructure	0,996768639	0,9970658	0,998088	0,9962632	1					
Physical Infrastructure	0,994396734	0,9944432	0,995082	0,996796	0,9949434	1				
Internal market dynamics	0,990128408	0,9903405	0,991932	0,9957117	0,9936942	0,9984814	1			
Internal market burdens or entry regulation	0,993599898	0,9933777	0,995114	0,99764	0,9971374	0,9977835	0,998327416	1		
Entrepreneurship education	0,985242871	0,9876444	0,991477	0,9933129	0,9880416	0,9935769	0,992515223	0,99025	1	
Cultural and social norms	0,997414848	0,9975849	0,996464	0,9954915	0,9950665	0,9971125	0,993334958	0,995155	0,987897	1

Based on the statistical analysis authors defined most important factors of the entrepreneurship innovation ecosystem that influence the development of the deep tech startups in Latvia. The survey of the CEOs of 20 high-tech startups defined factors such as entrepreneurial finance, government policies support and relevance; R&D transfer; cultural and social norms as more important for deep tech startups.

It is important to remember that entrepreneurs are essentially at the centre of any start-up ecosystem. When their companies succeed, investors get paid, economies grow, jobs are created, and communities evolve socially. Therefore, ecosystems are created where various players seek to collaborate with entrepreneurs and make them successful. In addition, entrepreneurs were asked to choose one factor, which is the most important for operating activities of a start-up CEO, after money. Among the factors in the questionnaire were the following:

- Mentoring;
- Marketing support;
- Co-working space;
- Investor meetings;
- Legal consulting;
- Access to new tech;

- Management and coaching.

Only four factors out of seven are represented in figure 3. The most important factor, according to the CEOs, is mentoring. 56% of respondents indicated that this factor has a significant impact on future business success.

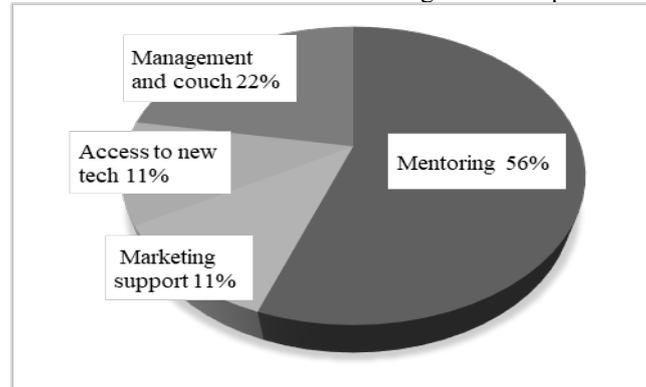


Fig. 3. Single most important factor for start-up, after money

It is necessary to continue a detailed and structured study of each of the factors indicated in the figure and to identify the weaknesses of the existing business environment, significant and specific components of the model, which could be deemed essential/key to Latvian startups ecosystem. Further research is also needed because technology start-ups, and all start-ups in general, are by themselves a factor of the business ecosystem. They have an impact on the innovative development of industrial sectors, businesses, and also launch processes at the level of government and education that contribute to building an economy based on knowledge. It is important to understand how the factors of entrepreneurship environment, which form the ecosystem of business environment, affect the quality of process at each stage of transfer and commercialization of technology. Moreover, a society needs entrepreneurs, who are growth-oriented, innovative, globally competitive, and or working in added-value industries. It is not enough to evaluate the effect of the external context solely on the performance of the startup. The relationship between the environment and entrepreneurship is complex, and this will provide further opportunities for research. When their companies succeed, investors get paid, economies grow, jobs are created, and communities evolve socially. Therefore, ecosystems are created where various players seek to collaborate with entrepreneurs and make them successful.

Conclusions

Based on the statistical analysis authors defined most important factors of the entrepreneurship innovation ecosystem that influence the development of the deep tech startups in Latvia. The survey of the CEOs of 20 high-tech startups defined factors such as entrepreneurial finance, government policies support and relevance; R&D transfer; cultural and social norms as more important for deep tech startups.

It is clear that most innovative economies exemplify the strong link between economy and science. A key indicator of EU innovation leaders is also the effective commercialization of their technology innovations.

It is important to understand how the environment influences the quality of entrepreneurship. Ideally, the mix of entrepreneurs in a society should include individuals who are growth-oriented, innovative, globally competitive, and/or operating in advanced sectors.

The relationship between the environment and entrepreneurship is complex, and one that will yield promising research opportunities for years to come.

The impact of an innovation startup ecosystem is manifold. A strong innovation ecosystem allows local economies to retain top talent in their countries. International Corporations call a successful startup ecosystem a good investment. This leads to the creation of more jobs and services and boosts local economy.

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