FORESIGHT AND STI GOVERNANCE

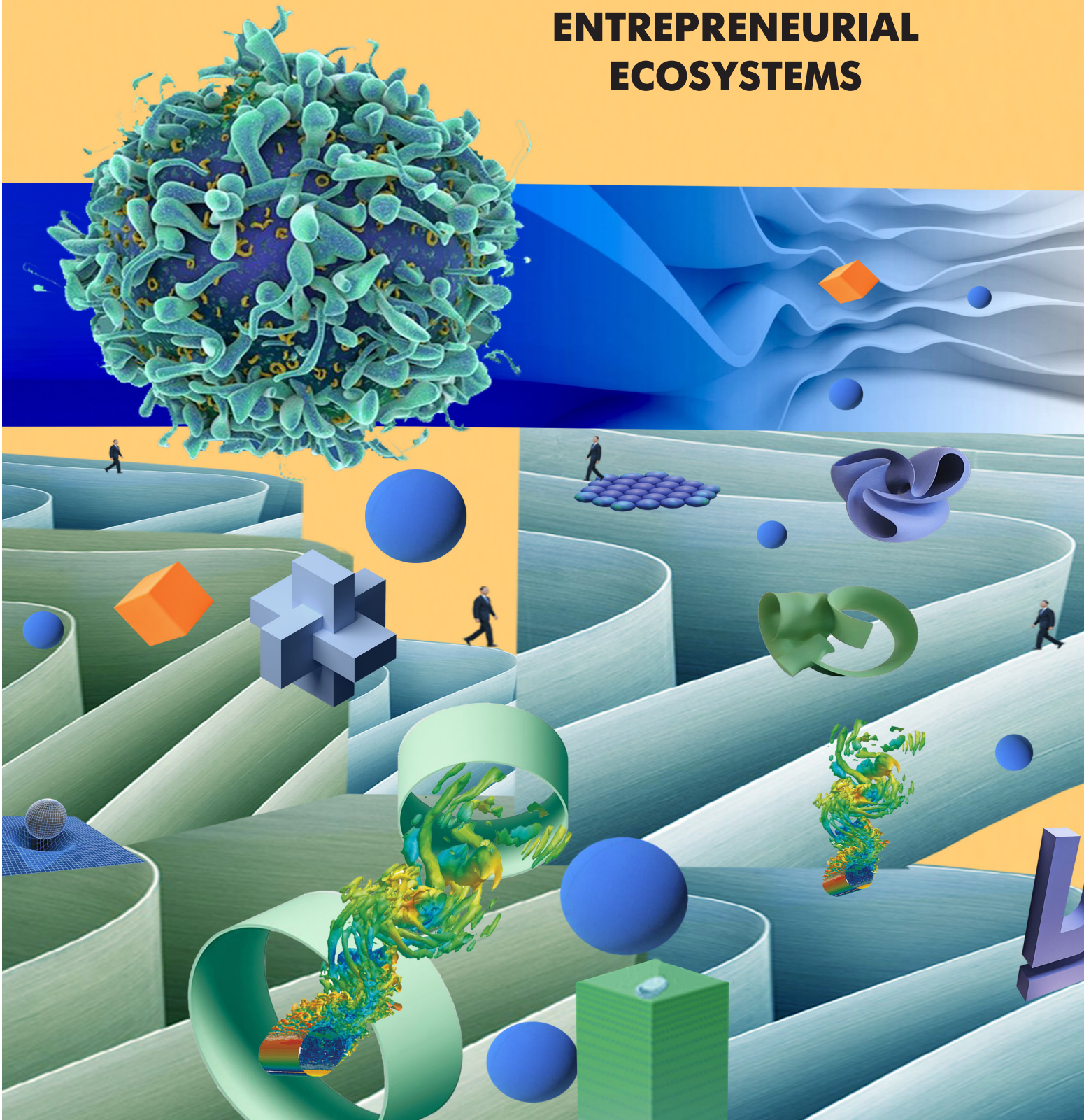
ISSN 2500-2597

2019
Vol.13 No 4

JOURNAL OF THE NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS

SPECIAL ISSUE

ENTREPRENEURIAL ECOSYSTEMS



ABOUT THE JOURNAL

Foresight and STI Governance is an international interdisciplinary peer-reviewed open-access journal. It publishes original research articles, offering new theoretical insights and practice-oriented knowledge in important areas of strategic planning and the creation of science, technology, and innovation (STI) policy, and it examines possible and alternative futures in all human endeavors in order to make such insights available to the right person at the right time to ensure the right decision.

The journal acts as a scientific forum, contributing to the interaction between researchers, policy makers, and other actors involved in innovation processes. It encompasses all facets of STI policy and the creation of technological, managerial, product, and social innovations. *Foresight and STI Governance* welcomes works from scholars based in all parts of the world.

Topics covered include:

- Foresight methodologies and best practices;
- Long-term socioeconomic priorities for strategic planning and policy making;
- Innovative strategies at the national, regional, sectoral, and corporate levels;
- The development of National Innovation Systems;
- The exploration of the innovation lifecycle from idea to market;
- Technological trends, breakthroughs, and grand challenges;
- Technological change and its implications for economy, policy-making, and society;
- Corporate innovation management;
- Human capital in STI;

and many others.

The target audience of the journal comprises research scholars, university professors, post-graduates, policy-makers, business people, the expert community, undergraduates, and others who are interested in S&T and innovation analyses, foresight studies, and policy issues.

Foresight and STI Governance is published quarterly and distributed worldwide. It is an open-access electronic journal and is available online for free via:
https://foresight-journal.hse.ru/en/

The journal is included into the 2nd quartile (Q2) of Scopus Scimago Journal & Country Rank in the following fields:

- Economics, Econometrics and Finance
- Social Sciences
- Business, Management and Accounting
- Decision Sciences

INDEXING AND ABSTRACTING

WEB OF SCIENCE™ CORE COLLECTION EMERGING SOURCES CITATION INDEX

SCOPUS™

RePEc RESEARCH PAPERS IN ECONOMICS

SSRN ProQuest

GENAMICS™ JOURNALSEEK

EBSCO Academic Search Premier

OAJI.net Open Academic Journals Index

ECONSTOR

DOAJ DIRECTORY OF OPEN ACCESS JOURNALS

FORESIGHT AND STI GOVERNANCE

National Research University
Higher School of Economics

Institute for Statistical Studies
and Economics of Knowledge

Address:
National Research University Higher School of Economics
20, Myasnitskaya str., Moscow, 101000, Russia
Tel: +7 (495) 621-40-38
E-mail: foresight-journal@hse.ru

http://foresight-journal.hse.ru/en/

Periodicity — quarterly

ISSN 2500-2597
ISSN 2312-9972 (online)
ISSN 1995-459X (Russian print version)

Publisher:
National Research University
Higher School of Economics

NOTES FOR AUTHORS

Before submitting your article, please prepare your manuscript using the following guidelines:

Articles should be topical and original, should outline tasks (issues), describe the key results of the author's research and his/her conclusions;

Manuscripts are to be submitted via e-mail: foresight-journal@hse.ru

Format

All files should be submitted as a Word document.

The text should be in Times New Roman 14 pt, 1.5 spaced and fit to the width, all margins should be 20 mm.

Article Length

Articles should be between 20000 and 60000 characters (incl. spaces). Optimal size is 40 000 characters.

Article Title

To be submitted in native language and English. A title of not more than eight words should be provided.

Author Details (in English and native language)

Details should be supplied on the Article Title Page, including:

- Full name of each author
- Position, rank, academic degree
- Affiliation of each author, at the time the research was completed
- Full postal address of the affiliation
- E-mail address of each author

Abstract

An abstract should be: informative (no general words), original, relevant (reflects your paper's key content and research findings); structured (follows the logics of the results presented in the paper), concise (between 250 and 300 words).

- Purpose (mandatory)
- Design/methodology/approach (mandatory)
- Findings (mandatory)
- Research limitations/implications (if applicable)
- Practical implications (if applicable)
- Social implications (if applicable)
- Originality/value (mandatory)

It is appropriate to describe the research methods/methodology if they are original or of interest for this particular research. For papers concerned with experimental work describe your data sources and data processing techniques.

Describe your results as precisely and informatively as possible. Include your key theoretical and experimental results, factual information, and any interconnections and patterns shown. Give special priority in your abstract to new results and data with long-term impact, important discoveries and verified findings that contradict previous theories as well as data that you think have practical value.

Conclusions could be associated with recommendations, estimates, suggestions, and hypotheses described in the paper.

Information contained in the title should not be dublicated in the abstract . Try to avoid unnecessary introductory phrases (e.g. 'the author of the paper considers…').

Use language typical of research and technical documents to compile your abstract and avoid complex grammatical constructions.

The text of the abstract should include the key words of the paper.

Keywords

Please provide up to 10 keywords on the Article Title Page, which encapsulate the principal topics of the paper.

Headings

Headings must be concise, with a clear indication of the distinction between the hierarchy of headings.

Figures

All figures should be of high quality, legible, and numbered consecutively with arabic numerals. All figures (charts, diagrams, line drawings, web pages/screenshots, and photographic images) should be submitted in electronic form preferably in color as separate files, that match the following parameters:

Photo images — JPEG or TIFF format. Minimum resolution 300 dpi, image size not less than 1000x1000 pix

Charts, diagrams, line drawings- EXCEL or EPS format

CONTENTS

SPECIAL ISSUE
«ENTREPRENEURIAL ECOSYSTEMS»

Entrepreneurship Ecosystems in Post-Socialist Economies

Alexander Chepurenko
Professor of Economic Sociology, achepurenko@hse.ru

National Research University Higher School of Economics, 101000 Myasnitskaya str., 20, Moscow, Russian Federation

Citation: Chepurenko A. (2019) Entrepreneurship Ecosystems in Post-Socialist Economies. *Foresight and STI Governance*, vol. 13, no 4, pp. 6–8.
DOI: 10.17323/2500-2597.2019.4.6.8

The concept of entrepreneurial ecosystems (EE) is not new. In the literature on entrepreneurship, this concept was introduced by Moore in 1993 [*Moore,* 1993], who suggested that entrepreneurship develops through a system of relations and interaction. There are different approaches to defining EE (for more details see the paper by Chepurenko et al. in this issue).

Albeit EEs are context-dependent and have different structures, Isenberg (2011) stressed that in spite of their uniqueness, all EEs have the same core elements related to the respective groups of factors. Later, Foster et al. [*Foster et al.,* 2013] came up with the nine pillars approach to the EE: accessible markets; human capital/workforce; education and training; cultural support; funding and finance; regulatory framework and infrastructure; legislation/policies and access to basic infrastructure; and major universities as catalysts.

Most research papers dealing with the EE are based on the empirical data of established market economies. There is still little known about the construction, design, and driving forces of EE under transition or in new EU member countries.

The present issue is trying to somehow fill in this gap. This journal edition consists of two sections dealing with two aspects of the EEs in post-socialist economies and societies: (1) Entrepreneurial Opportunities and Innovations in the Context of an Entrepreneurial Ecosystem, (2) Entrepreneurial Ecosystems and Universities in Transitional Environments.

The first section consists of three papers: "Entrepreneurial Ecosystem and the Origin of Entrepreneurial Opportunities" by Julia Trabskaja and Tõnis Mets from Estonia, "The Role of Innovation in the Entrepreneurial Ecosystem: an Analysis of Countries at Different Stages of Development" by Éva Komlósi, Balázs Páger, and Gábor Márkus from Hungary, and "Improving Local Entrepreneurial Ecosystems by Supporting Foreign Investors: Factors Contributing to the Favorable Investment Climate in a Transition Setting" by Alise Mačtama and Arnis Sauka (Latvia). The contributors are focusing on the interplay of the EE and the entrepreneurial opportunity as another important matter of the contemporary entrepreneurship theory [*Shane, Venkataraman,* 2000]. To date, only the first steps have been made in the exploration of the relationship between entrepreneurial opportunity and the EE. Both should be seen as dynamic developments rather than something static, but how does one explain the connection between the evolution of a given EE and the developmental trajectory of entrepreneurial opportunities there? The paper by Trabskaja and Mets seeks to investigate this question, developing their own understanding of the interaction between the developmental trajectories of the opportunity and of the EE. Namely, the authors are studying the situation based on the example of the ICT sector as one of the fastest growing spheres, which supports the significant number of start-ups in an advanced economy. They explore the role of the EE in the identification of entrepreneurship opportunities and their realization by Estonian IT firms.

The paper by Éva Komlósi, Balázs Páger and Gábor Márkus focuses on the crucial factors of entrepreneurial performance of countries based on the concept of the Global Entrepreneurship Index (GEI), which is an appropriate instrument for measuring the quality of national and regional EEs and comparing the strong and weak aspects of the related EEs [*Acs et*

al., 2014]. When calculating the GEI, the authors apply the so-called Penalty for Bottleneck algorithm to provide a systemic assessment of the EE in the respective country. The paper concludes that the quality of the entrepreneurial ecosystem reflects the level of economic development. Generally, the scores of these countries are significantly below the potential performance determined by level of economic development. According to the GEI scores, only Baltic countries and some Central European countries (Slovenia, Czech Republic and Slovakia) demonstrate the successful development of their EEs.

Furthermore, in general the innovation-related aspects have an important role within the entrepreneurial ecosystem. However, some countries like China, Turkey, or India show higher score values in these innovation-related pillars of the GEI than could be expected based on their position within the GEI. Hence, these countries with a strong role played by state-financed R&D might have a relatively good performance in research and development, but the entrepreneurial components of their EE are too weak to enable high performance.

The role of foreign direct investment (FDI) in shaping the market economy and strengthening its actors in transition economies, especially in smaller countries, was very important, and thus FDI became an important driver for the local EEs. The paper by Alise Mačtama and Arnis Sauka seeks to explore foreign investors' satisfaction with the factors that should contribute to the development of local businesses as well as those that generate further foreign investment flow. The paper is based upon a series of mini case studies with the managers of key FDI companies in Latvia in 2015–2018.

The authors focus on the perception by foreign investors of such factors as the quality of the labor force, efficiency of the public sector and tax regimes as well as unfair behavior, the availability of labor, and risks of uncertainty. Their paper shows that the Latvian EE made progress in most of the related issues during the period of 2015-2018, however, in such areas as demography, the availability of a skilled work force, unfair behavior of counterparts, and the effectiveness of public sector, it was relatively low. The authors make a contribution to developing a customized and well-targeted policy for improving the investment climate as an inevitable part of the local EE in the transition setting of Latvia.

The second part of the special issue starts with the paper "Universities' Role in Regional Entrepreneurial Ecosystems in Russia: the Need for a Historically-Driven Institutional Approach" by Alexander Chepurenko, Maria Kristalova, and Michael Wyrwich. It focuses on the importance of EE for the emergence of new ventures. It belongs to the common view that now institutions play a key role within ecosystems. However, the historical roots and origins of the key institutions are still not adequately represented in the current literature. Moreover, most of the literature focuses on Western countries while the specifics of developing and transitional economies are still less investigated. This paper traces some steps at developing what the authors call "a historically-driven institutional approach to entrepreneurial ecosystems" in the transitional context. Specifically, they stress the role of local universities in the transition regions, particularly Russia. From a methodological point of view, the paper seeks to observe how historical trajectories influence the present state of the underlying framework conditions and shape the specifics of the EE in transition.

This paper emphasizes the role of factors relating to path dependence (such as the socialist mental and infrastructural legacy) as well as the specific institutional setting which emerged during the transition itself and is moderating the interplay between universities and other local actors in EE (actors and institutions) there. This helps one understand whether and how universities in such transitional EEs can promote entrepreneurial activities and become actors of socioeconomic development.

The establishment of entrepreneurial courses and educational platforms play a key role in the local universities' transition towards entrepreneurial education and therefore in the development of local EEs. Two papers in this issue are devoted to this theme. The exploratory study by Marina Z. Solesvik and Paul Westhead entitled "The Fostering of Entrepreneurship Competencies and Entrepreneurial Intention in a Weak Ecosystem: Exploratory Study of Business and Engineering Students in Ukraine" explores whether students drawn from a supportive entrepreneurial education reported a higher intensity of entrepreneurial intention (IOEI) than students that did not participate in any forms of the entrepreneurial education. Further, it explores what specific competencies improved within the context of a supportive entrepreneurial education were associated with students reporting high IOEI. Guided by the competency theory, based on a sample of 125 business students engaged in entrepreneurial education, and 64 engineering students that had never participated in entrepreneurial education, the authors found that business students drawn from a supportive entrepreneurial education showed significantly higher IOEI. However, of the 13 competencies honed by entrepreneurship only three competencies (i.e., the ability to identify high quality opportunities, computer literacy, and networking) were weakly significantly associated with higher IOEI. This might be the result of the importance of modern approaches to entrepreneurial education developed in favorable EEs of Western economies, while the weak and fragile EEs of some former Soviet republics do not support entrepreneurial education in the attempt to establish

or grow new businesses. Sure, this pioneering study of students in the Ukraine does not provide conclusive evidence for the government to more proactively support entrepreneurial education with regard to its current content and delivery. Hence, additional research in several former Soviet contexts is needed to provide a rigorous evidence base to guide the development of entrepreneurial education in universities.

The concluding paper "Entrepreneurial Ecosystems of Russian Universities: Role, Challenges, and Development Opportunities for Entrepreneurial Education" by Margarita Zobnina, Anatoly Korotkov, and Aleksandr Rozhkov explores the development of entrepreneurial education in the context of what they define as an "University Entrepreneurial Ecosystem" (UEE) at 21 Russian universities. In particular, the authors focus on the role of these tracks in the development of entrepreneurial mindsets and skillsets, the commercialization of technologies, and the promotion of new venture launches.

The authors observe the UEE formation at different development stages while showing the role of entrepreneurial courses in UEEs. They combine a general analysis with four case studies of different Russian universities. They conclude that the implementation of entrepreneurial courses fosters the development of the UEE, with all the elements of an UEE then centering on the entrepreneurial education. As the related course impresses an entrepreneurial mindset and related skills upon students, it attracts also entrepreneurs and business angels as mentors and thus leads to the shaping of a network. To support it, institutions like incubators and accelerators are either established from scratch or already existing ones start assisting student business start-ups.

Furthermore, the case analysis suggests that the professors' lack of entrepreneurial experience, as well as the course format (e.g. elective or compulsory) might hamper the successful launch and development of UEE. But in case of an evolving UEE, professors' skills can be complemented through other ecosystem actors. It is also obvious that some universities diminish the impact of the entrepreneurial education upon the establishment of an UEE through the inconsistent development of infrastructure or by implementing a purely formal entrepreneurial course. The introduction of entrepreneurial courses does influence the efficiency of these other institutions, even if these courses are not necessarily the starting point of the UEE formation.

References

Foster G., Shimizu C., Ciesinski S., Davila A., Zahoor Hassan S., Jia N., Plunkett S., Pinelli M., Cunningham J., Hiscock-Croft R., McLenithan M., Rottenberg L., Morris R., Lee D. (2013) *Entrepreneurial Ecosystems Around the Globe and Company Growth Dynamics*, Geneva: World Economic Forum.

Isenberg D. (2011) T*he entrepreneurship ecosystem strategy as a new paradigm for economy policy: Principles for cultivating entrepreneurship*, Babson Entrepreneurship Ecosystem Project, Babson Park, MA: Babson College.

Moore J.F. (1993) Predators and prey: A new ecology of competition. *Harvard Business Review*, vol. 71, no 3, pp. 75–86.

Shane S., Venkataraman S. (2000) The Promise of Entrepreneurship as a Field of Research. *The Academy of Management Review*, vol. 25, no 1, pp. 217–226.

Ecosystem as the Source of Entrepreneurial Opportunities

Julia Trabskaja
Research Fellow, trabskaya@gmail.com

Tõnis Mets
Professor, tonis.mets@ut.ee

University of Tartu, Ülikooli 18, 50090 Tartu, Estonia

Abstract

The present paper aims to develop an understanding of interconnections between the entrepreneurial ecosystem and entrepreneurial opportunity. The first step of this research was to disclose the development of the ecosystem within two higher (efficiency- and innovation-driven) stages of economic development and the transition between them according to the World Economic Forum, based on the model by Dutch researcher Erik Stam. The Estonian entrepreneurial ecosystem was analyzed as an example. Secondary data on Estonian entrepreneurial ecosystems were collected and analyzed.

In its second step, this research follows a case-study design. The start-up period of the studied Estonian companies represents different degrees of the maturity of the ecosystem: Regio and Mobi Solutions – efficiency-driven, GrabCAD – the transition from efficiency to innovation-driven, and Bolt (Taxify) – an innovation-driven economy.

The example of the Estonian ICT sector proves that the most important contributors to the talent growth, the knowledge base, and framework conditions of the entrepreneurial ecosystem are the state through its infrastructure decisions and educational programs along with successful entrepreneurs who shape the role models known in Estonia today as the Skype-effect. Decisions on digital telecom infrastructure and e-society in the early stage of the transition in tandem with enterprise encouragement created a subsequent boom in ICT-based ventures in Estonia 10-15 years later. The processes resulted in achieving an innovation-driven society and the highest level of opportunity-driven entrepreneurship in Europe in 2017. With that, new venture funding has replaced the former development engine – foreign direct investment (FDI).

Examples of ICT-based new ventures have demonstrated that the growing maturity of the ecosystem increased venture investment from "bootstrapping" to millions of euros of seed-funding and shortened new product development cycles from 5-7 to 1-3 years. The study shows that maturing ecosystems shorten business development processes, thereby increasing the integration of different ecosystems. The start-up success stories enhance trust in the particular business environment, and they both increase investments and accelerate the entry of new ventures, making better use of the emerging windows of opportunities.

Keywords: entrepreneurial ecosystem; opportunity identification and transformation; window of opportunity; innovation economy; ICT sector

Citation: Trabskaja J., Mets T. (2019) Ecosystem as the Source of Entrepreneurial Opportunities. *Foresight and STI Governance*, vol. 13, no 4, pp. 10–22. DOI: 10.17323/2500-2597.2019.4.10.22

One of the roles of the ecosystem's functioning is the creation of a base for the identification of entrepreneurial opportunities. As Shane and Venkataraman [*Shane, Venkataraman,* 2000, p. 220] assert, "to have entrepreneurship, you must first have entrepreneurial opportunities." However, twenty years after this publication, there still has been no agreement on the most basic questions among scholars. To date, there has been little agreement on how entrepreneurial opportunity and the entrepreneurial ecosystem are interconnected. Researchers [*Shane,* 2003; *Dimov,* 2011] argue that opportunities are "born" from fertile soil, develop under the influence of an entrepreneurial ecosystem, and depend upon the entrepreneurial ecosystem's characteristics and idiosyncrasies. However, there are numerous aspects and gaps left mostly ignored on this topic, among them the question of the connection between the evolution of the ecosystem and entrepreneurial opportunity as well as the matching role of a particular window of opportunity.

This paper aims to close this research gap, specifically to develop an approach to understanding the interaction between the ecosystem and the opportunities therein and to further identify connections between the trajectories of the opportunity and the evolutional paths of the ecosystem.

To achieve the aim, the Estonian ICT sector was chosen as the research subject. In a short period of time (since regaining independence in 1991), Estonia has come a long way from a resource-driven[1] country to an innovation-driven one, from zero innovation (entrepreneurship was banned during the Soviet era) to the creation of a smart economy and a highly developed entrepreneurial ecosystem. This has resulted in the creation of a whole series of global start-ups that, in turn, have reached the status of unicorns.[2] These developments, including the boom of start-ups in Estonia, were largely due to the introduction of the educational Tiger Leap Program [*Mets,* 2018], which has led to a focus on human capital and upon the development of competence in the ICT industry.

In order to identify the connection between the ecosystem and opportunity, this paper contains an analysis of the Estonian ecosystem in terms of dynamics and an analysis of the connection between the ecosystem's evolution and the trajectories of opportunity identification (using case studies).

This paper contributes to existing approaches to ecosystems by examining the understanding of an ecosystem's role as an origin of opportunity identification and the transformation process.

From the Entrepreneurial Ecosystem to a Window of Opportunity

In recent years, there has been increasing interest in entrepreneurial ecosystems among policy makers, researchers [*Cohen,* 2006; *Foster et al.,* 2013; *Isenberg,* 2010; *Venkataraman,* 2004], and international organizations (WEF, OECD, World Bank).

Isenberg [*Isenberg,* 2011] suggests that in spite of the uniqueness of ecosystems, it is possible to distinguish key elements of ecosystems and arrange them into groups of factors. An entrepreneurial ecosystem is therefore defined "as a system of interrelated pillars that impact the speed and ability with which entrepreneurs can create and scale new ventures in a sustainable way" [WEF, 2014]. Foster et al. [*Foster et al.,* 2013], in further developing Isenberg's ideas, introduced the pillars of an entrepreneurial ecosystem. Stam [*Stam,* 2015] further developed the ideas of his predecessors [*Foster et al.,* 2013] and suggested a synthetic model. However, the series of factors influencing the development of the ecosystem has not been widely discussed.

First, the proposed models are frequently concentrated on the regional (or national) ecosystem. However, in the modern world, no one entrepreneurial ecosystem can exist in a vacuum and be separate from the global ecosystem. Global processes have an impact upon almost every pillar of the ecosystem – for example, culture (due to the development of technology and the accessibility of information), talents (an open labor market, an education system based upon international student exchange, online courses, etc.) and so on. This is especially typical of the ICT sector, as it is involved in global trends and processes. Companies can belong to different ecosystems, such as having a headquarters (HQ) in one country but working globally [*Mets,* 2018]. Therefore, we suggest adding the global ecosystem context to the Stam model.

Second, the models fail to disclose the integration of and interactions between different ecosystems. The entrepreneurial ecosystem is comprised of a series of sub-ecosystems, which can be systematized according to the sphere of activity (ecosystems of different sectors, including education). Thus, we suggest studying the interactions between global and local ecosystems as well as sectoral ecosystems.

A group of researchers has addressed the question of the ecosystem's dynamic character. Mason and Brown [*Mason, Brown,* 2014 p.19] argue that, "much of the discussion of entrepreneurial ecosystems has lacked a time dimension". The entrepreneurial ecosystem

[1] Authors' estimation for the period of 1991-1994.

[2] Unicorn – a start-up valued at 1 billion USD or more.

evolves and changes its form drastically along the temporal scale, reacting to changing political, economic, and cultural factors.

A dynamic view of the ecosystem is closely connected with the question of path dependence. Is it possible to overcome "the narrow trajectory because of historical experience" [*Roundy et al.,* 2018, p. 5]? Is the ecosystem sensitive to initial conditions? In the next section, we argue that path dependence is not always a necessary attribute of ecosystem evolution.

Researchers who study ecosystems focus on describing and evaluating elements of the ecosystem, indicators of the ecosystem's performance. However, the connection between the ecosystem and the opportunity together with the ecosystem in its capacity as a source of the entrepreneurial opportunity is almost entirely not addressed, although the policies of the governments developing an entrepreneurial ecosystem are directed towards creating better opportunities for entrepreneurs.

Despite the considerable amount of material published on the entrepreneurial opportunity [*Alvarez, Barney,* 2007; *Davidsson,* 2015], the nature of this opportunity is still one of the issues of discussion, particularly in the context of ecosystem dynamics and the opportunity window.

Entrepreneurial opportunity is an entrepreneur's ability to undertake an entrepreneurial journey [*Mets et al.,* 2019], to transform an idea into specific results, bring an idea to life and create new value. This topic is replete with debated questions. The nature of the opportunity itself is still vague [*Davidsson,* 2015; *Shane, Venkataraman,* 2000; *Dimov,* 2011]. One of the reasons why research on opportunities is still in the early stages is that the dynamic approach to the opportunity is mostly not addressed. Opportunity is mainly studied at the new venture creation stage. Within the conditions of the rapidly changing market, consumer practices, competitive offers, and a series of other factors, an entrepreneur is constantly forced to redefine opportunities and at times radically transform the product, the developmental trajectory of the company, and the entrepreneurial idea itself. Thus, we can discuss both the identification of the opportunity and the constant and long re-identification of it. Consequently, we examine the development of the ecosystem and the identification of the opportunity in action.

A necessary condition of opportunity identification is the creation or appearance of a window of opportunity. In interpreting the understanding of opportunity as proposed by [*Casson,* 1982], we suggest that the window of opportunity [*Messica, Mehrez,* 2002; *Suarez et al.,* 2015] is a collection of situations and conditions that allow for identifying and implementing an opportunity. In other words, an entrepreneurial ecosystem and its pillars together with timing form the window of opportunity. The construct of a window of opportunity is a mechanism that links the trajectory of the opportunity's identification and the entrepreneurial ecosystem. The creation or appearance of a window is one of the most important occurrences in an entrepreneurial ecosystem.

By using the case of Estonia, we have focused on the question of how the ecosystem and the opportunity are connected and how the collection of an ecosystem's pillars form a window of opportunity at a particular stage of economic development.

Methodology

Our approach is based upon a phase model of economic development [*Rostow,* 1962], a model of an ecosystem [*Stam,* 2015], a dynamic view for studying an ecosystem [*Mason, Brown,* 2014], and upon seeing the opportunity as a phenomenon in a temporal dimension [*Dimov, Muñoz,* 2015].

In the first part of the empirical section, the analysis of the entrepreneurial ecosystem with examples of Estonian origin start-ups is discussed. The theoretical basis of the empirical part is the ecosystem model developed by [*Stam,* 2015]. An essential proponents of the study is a dynamic view of the ecosystem. The development of the Estonian ecosystem has been systematized since 1995, as follows, according to the World Economic Forum [WEF, 2014] – the efficiency-driven stage; the transition from the efficiency stage to the innovation-driven stage; and the innovation-driven stage. Estonia is the most successful example of an entrepreneurial ecosystem's development among both the post-Soviet countries and a large part of the former Warsaw Pact [Startup Blink, 2019].

Empirical research is based on data from different sources: official databases, data provided by international organizations (World Economic Forum (Global Competitiveness Index); the World Bank; Eurostat; Global Entrepreneurship Monitor (GEM); Global Entrepreneurship Index (GEI); OECD (Country statistical profiles); Freedomhouse), data provided by Estonian organizations and platforms (Statistics Estonia; Estonian Development Fund; Business Register; Bank of Estonia; Startup Estonia); other secondary data, as well as on the personal knowledge and experience of the authors who have witnessed the transformation of the Estonian ecosystem.

The second part of the empirical section follows a case-study design with an in-depth analysis of the role of the entrepreneurial ecosystem in opportunity identification and transformation processes, and it illustrates the dynamic development of the entrepreneurial ecosystem. The investigated companies have demonstrated different paths and trajectories for development, and they have made various contributions to the entrepreneurial ecosystem of Estonia.

The study is conducted using mainly ICT-based companies as an example. First, the study of this sphere has practical importance – understanding the laws of development for one of the most rapidly growing sectors, which provides a significant number of innovative ideas to start-ups (including unicorns) and actively changes consumer practices [*Venkataraman,* 2004]. Second, "the ICT sector was considered the one with the greatest potential" [EDF, 2013], as it contains a significant number of rapidly growing firms and so-called "ambitious entrepreneurs." Many countries today are focused on the support of ambitious entrepreneurs, "policymakers across the OECD are now strongly focused on promoting high growth firms" [*Mason, Brown,* 2014. p. 2]. It should be noted that in the section devoted to the case studies, we focus specifically on "ambitious entrepreneurs" who are attaining internationalization from inception.

The criteria for selecting cases:

1) the Estonian origin of idea creation;
2) the companies are success stories belonging to the ICT-based sector;
3) the selected companies belong to the 30 start-ups that have raised the most capital;
4) the correspondence of cases to the studied periods of the transformation of the Estonian entrepreneurial ecosystem (each company was established in the corresponding period of the Estonian entrepreneurial ecosystem's development — GrabCAD, the late 2000s; Bolt, since 2013-14).

The cases of Regio and Mobi Solutions related to the first period of development for the entrepreneurial ecosystem have not been fully examined since being presented in previous publications [*Mets,* 2008, 2016]. Some start-ups belonging to the top 30 for investments are not ICT companies, but also briefly analyzed in order to indicate some new trends. The case studies of the start-ups are based mainly on public information from the media, the companies' web pages, the official Commercial Registry databases, and the companies' annual reports. A search for research publications was also carried out using Google Scholar®, which helped provide an overview of which aspects of the studied companies researchers have already covered. Personal and public interviews as well as online talks, aside from the published texts, were used to interpret and code the illuminating information in answering the research questions. Start-ups were analyzed in the context of the entrepreneurial process of opportunity development in the entrepreneurial ecosystem framework.

The Entrepreneurial Ecosystem in Dynamics

Below, general data related to the Estonian entrepreneurial ecosystem in dynamics are presented: the stages are divided according to the WEF (efficiency-driven, transition from efficiency- to innovation-driven, innovation-driven). The structure of the data is based upon the model by Stam [*Stam,* 2015] in our interpretation (Table 1).

Systemic Conditions

Networks

In the 1990s, networking was still being predominantly formed through personal connections. In the 2000s, a whole string of success stories of Estonian origin had a significant influence on forming a positive image of entrepreneurship (e.g., Regio, Skype, Playtech, MicroLink, Delfi). An active network of investors in domestic start-up companies began, for example, Ambient Sound Investments (2003, former Skype developers), supported by the Estonian Development Fund (EDF) state initiative (2006) and a representative office of Enterprise Estonia in Silicon Valley (2007). The early 2010s saw another series of inspiring examples (CrabCad, Transferwise, Pipedrive, etc.) and start-up accelerators were launched, for example, Garage48 (2010) and Wise Guys (2012). Since that period, we can speak in terms of a developed Estonian start-up community integrating personal as well as institutional networks.

Leadership

In a planned economy, as under the Soviet regime, any private entrepreneurial initiative was suppressed, and a negative attitude towards entrepreneurs was created. In the 1990s, the first generation of entrepreneurs began operating on the market. During this period, it was difficult to talk about innovation project leaders, because innovative projects were rare and did not define the "direction of collective action" [*Stam,* 2015, p. 4]. In the 2000s and early 2010s, new leaders emerged (former owners – Skype, MicroLink, etc.). Also, it is worth noting the so-called Skype-effect. The success of this company has had a significant impact as a role model for entrepreneurs. In the period since 2014, leadership has shifted to the globally oriented, successful start-up entrepreneurs mentioned above.

Finance

Since the 1990s, FDI has been promoted by the Estonian government. FDI has targeted industries utilizing comparatively cheap labor. In the 1990s, the primary sources of investment in start-ups were bootstrapping and the Regional Development Agency.

In the 2000s and early 2010s, the development of SMEs was partly supported by European Structural Funds. However, 100% of the first investments in most growth-oriented start-ups were of Estonian origin (€5.7 million in 2006) (Figure 1). The Estonian Development Fund played an essential role in the financial support of start-ups during this period.

Despite the efforts undertaken, according to a GEDI [GEDI, 2014] assessment, some bottlenecks have been identified in the Estonian entrepreneurial ecosystem. They included finances.

Since 2014, a significant trend has been the growth of annual investments in start-ups, which reached €272.2M in 2017 and €327.7M in 2018. The largest amount is invested in ICT-based start-ups – TransferWise 335.6 million euros, Bolt (Taxify) 152 million euros, AdCash 20 million euros, GrabCAD 11.3 million euros. The fintech company TransferWise received investments of an additional 292 million dollars in May 2019, reaching a value of $3.5 billion [*Härma,* 2019].

Of the top 30 investments, only four companies are focused on manufacturing, with two of them combining ICT and software with the production of equipment: Defendec (surveillance technology) and Click & Grow (hydroponics), and two university R&D-based energy technology companies, Skeleton and Elcogen. Both energy technology companies have patented technologies that require a long period (over 10 years) of product development and particular production competencies. Skeleton has already moved its production to Germany. This raises the question of whether Estonia is prepared for the appearance of new revolutionary high potential technologies. This is also a question of the professional educational sustainability of the Estonian high-tech industry. To a certain extent, a similar situation exists in the biotech field, where Estonians have been successful in R&D but have no mainstream industry for the application of their own achievements.

In 2017, about 98% of investments in Estonian start-ups were of foreign origin (but it should be mentioned that foreign investments are often made after the movement of the HQ of a start-up company abroad; 20 start-ups that received significant international funding have HQs outside Estonia; two bankrupt firms among the start-ups have HQs in Estonia). The growth in the share of foreign capital in Estonian start-ups, including those with a HQ in Estonia, is an essential indicator of growing trust, and of the integration of local and global ecosystems.

Talent

The level of the population's education in the 1990s was high: about 30 percent of the population had a higher education. However, there was an acute shortage of entrepreneurial education.

In the 2000s and 2010s, entrepreneurial education became an essential part of higher education for students of all specialities.

In addressing IT education, we have to note that Estonia has had a strong position in this field since the Soviet era. The launch of the Tiger Leap Program in 1996 enabled, inter alia, internet access and computer classes at virtually all schools by the year 2000. The early period of 2000-2005 saw an increase in the ICT competence of teachers at all levels as well as those of students.

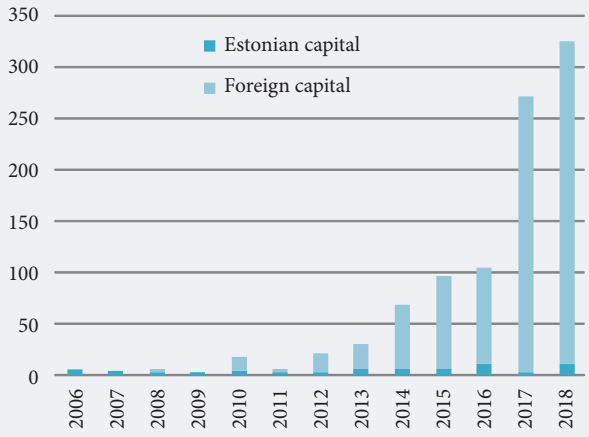
The Study IT in Estonia program operates under the auspices of the government and brings together academic organizations and practitioners in the IT field. In Estonia, the number of ICT students has been steadily increasing and is now over 10% of the entire student population at the higher education level. Overall, it is possible to talk generally about the integration of entrepreneurial and educational ecosystems.

Knowledge

Over the years, the education system has been harmonized with the European system. Today, there are several academic and research institutions in Estonia with high positions in the international rankings (Tallinn University of Technology, University of Tartu). Universities are not only a source of knowledge and innovation but also a supplier of talent (the founders of some highly successful companies have emerged from the university environment) and a source of R&D-based start-ups.

In 2018, Estonia occupied 21st position for the Quality of Scientific Research Institutions, 17th position for the Quality of Education and 8th position for the Quality of Math and Science Education (among 137 countries) [WEF, 2018]. A warning sign is the lagging R&D expenses behind strategic goals (see Table 1) and the decline of country's innovativeness according to the European Innovation Scoreboard [European Commission, 2017].

Figure 1. **Funding of Estonian Start-ups in m€, 2018**



Source: calculated by the authors basing on Garage48.org, 2019.

Table 1. **Evolution of the Estonian Entrepreneurial Ecosystem**

Feature	1990s	2000s & early 2010s	Since 2014	Remarks
Development stage	Efficiency-driven	The transition from efficiency- to innovation-driven	Innovation-driven	[WEF, 2014]
Systemic conditions	Individual initiatives primarily	Policy-supported	Integration with global ecosystems	
1. Networks (+ role models)	First generation entrepreneurs	Success stories: Regio, Skype, Playtech, MicroLink, Delfi, etc.	Organized Estonian start-up community integrated into global ecosystems	
2. Leadership (+ role models)		New entrepreneurial leaders (former owners – Skype, MicroLink, etc.) + hiring foreigners on boards and as executive managers	Globally-oriented start-up entrepreneurs	
3. Finance	FDI supported by policy	European structural funds	The growth of international start-up funding	Frequent investment in Estonian start-ups after moving HQ to abroad
FDI balance, million euro*	*140.2 (1995)*	*450.6 (2008)*	*-1,115.4 (2015, max value)*	The balance of FDI turned negative after 2011
Start-up investment, million euro	*Founder, family, friends + small funds of the Regional Development Agency and the unemployment office*	*5.69 (2006, started by the Estonian Development Fund)*	*327.7 (2018, max value, Estonian share 3.7 %)*	8% of accumulated 2006-2018 start-up funding is Estonian capital
4. Talent (education + entrepreneurial training)	About 30% of 25-64 yr olds have third-level education (1997) *	Third-level education (2010): 35% of 25-64 year olds	Third-level education (2016): 39% of 25-64 year olds; entrepreneurship education program for universities, 2013	[OECD, 2018]
5. (New) knowledge	Weak university-industry linkages; restructuring of university and research system	The rapid growth of ICT applications; globalization of knowledge-base	Development units of globalized Estonian start-ups remain in Estonia	The growth of start-ups is based on design-based tech (ICT) development primarily (conclusion from the top 30 start-up investments)
Public R&D costs, % GDP	0.52 (1999)	0.72 (2008)	0.8 (2015)	Lags behind strategic goal of 1.4%
6. Support services/ intermediaries	Entrepreneurship development centers and consultants' network (since 1992, supported by NUTEK); Tartu Science Park 1992	Enterprise Estonia (2000); science parks; business incubators; Estonian Development Fund (2006); mature business services	Established an entrepreneurial society. Active operation of accelerators. Participation of Estonian entrepreneurs in Estonian and global accelerators and start-up support programs	
Framework conditions	The transition from the legacy of a Soviet command economy to a market economy; liberal economic policy; ICT strategy	Integration into the European Union; a normal market economy	Smart specialization strategy	
1. Formal institutions	Privatization, simple tax system, 0% income tax on invested profit, attracting FDI	The strategy "Knowledge-based Estonia", since 2002	Rules and policy supporting start-ups' employment and funding	
2. Entrepreneurship culture	Entrepreneurial capitalism	Facilitation entrepreneurship	Strong emphasis upon start-ups	Cultural and social norms ranked 3rd after Israel and USA [GEM, 2018]
TEA index	*NA*	*5 (2004)*	*16.2 (2016)*	[GEM, 2018; *Lepane, Kuum,* 2005]

Table 1 continued

Feature	1990s	2000s & early 2010s	Since 2014	Remarks
High status to entrepreneurs, %*	*NA*	*NA*	*63.6 (2016)*	[GEM, 2017]
Career choice – self-employment/ entrepreneur, %	*NA*	*28.5 (2004)*	*53.2 (2016)*	[GEM, 2017; *Lepane, Kuum,* 2005]
3. Physical infrastructure	Poor telecom infrastructure and roads; oil shale-based energy sector	The rapid growth of telecom networking and the internet; reconstruction of roads	Ranked 2nd after Hong Kong [GEM, 2016]	
4. Demand	Small domestic market with low purchasing power; fast re-orientation from the former Soviet market to the West	Estonia developed into an export-oriented economy, exports: 75% of GDP, 2011	The growth of value added from services (ICT, building, declining logistics); services: 66% of GDP and 33% of exports	[*Mets,* 2018]
GDP per capita, euro	*1,935 (1995)*	*12,353 (2008)*	*16,476 (2016)*	Following the crisis, the 2008 level was reached in 2011
Population, million	*1.437 (1995)*	*1.337 (2008)*	*1.316 (2016)*	Trend of emigration has been partially replaced by re-migration since 2015 [Statistics Estonia, 2018]

* [OECD, 2017], the legacy of the Soviet period mainly (5-year studies). European educational regulations implemented since the end of the 1990s (3+ years studies).

** High status – Percentage of the adult population between the ages of 18 and 64 years who believe that high status is afforded to successful entrepreneurs.

Source: developed by authors.

Support Services and Intermediaries

In the 1990s, the development of Estonian support services was backed up by Sweden (NUTEK), Finland, and the European Union (PHARE).

In the 2000s, a group of organizations was established to support entrepreneurial activity, which included Enterprise Estonia (2000) and the Estonian Development Fund (2006). In this period, science parks and business incubators also emerged.

Since 2010, a whole string of organizations have helped establish entrepreneurship and friendly conditions for start-ups (Startup Estonia, SmartCap, Ministry of Economic Affairs and Communications). Incubators also play an active role in cultivating an entrepreneurial mindset – Tartu Science Park (BuildIt), Tallinn Business Incubators, and University of Tartu's Idea Lab.

Framework Conditions

Formal Institutions

From the 1990s until now, Estonia has come a long way in developing an entrepreneur-friendly business environment. A low level of corruption and the significant simplification of bureaucratic procedures characterize this environment. In 2017, Estonia was ranked 12th on the Ease of Doing Business Index [World Bank, 2017].

Today, 99% of public services are available online. Bureaucratic procedures are brought to a minimum. Also, Estonia provides opportunities for foreign residents to start a business in Estonia online – the Startup Visa program (about 21,000 e-residents) [Freedomhouse, 2017].

The WEF [WEF, 2018] has indicated that tax rate regulations are among the most problematic factors for doing business. In the 2014 GEDI report, recommendations for overcoming bottlenecks in the ecosystem were presented. Among the recommendations was to "create tax incentives to encourage business angels and crowdfunding investors" [GEDI, 2014, p. 7].

Entrepreneurial Culture

The 2000s and early 2010s were marked by facilitation entrepreneurship, the start-up culture became highly developed. The TEA index grew from 5 in 2004 to 16.2 in 2016. The desire to be an entrepreneur has become more widespread in society (career choice – self-employment/entrepreneur grew from

28.5% (2004) to 53.2% (2016)) [GEM, 2017; *Lepane, Kuum,* 2005].

Physical Infrastructure

One of the remarkable decisions by the Estonian government was an abandonment of the analogue telecommunication system and giving the telecom concession to a private company AS Eesti Telekom in 1992. In the 2000s, there was rapid development of telecom networking and the internet, as well as the reconstruction of roads with the support of the EU. Among the government's priorities was the development of the ICT sector.

Since 2014, Estonian infrastructure has been ranked second after Hong Kong [GEM, 2016]. More than 99% of the territory is covered by an internet connection. According to the evaluation of Freedomhouse [Freedomhouse, 2017], Estonia is a model for open internet. Estonia ranks first in the Freedom of the Internet.

Demand and Accessible Markets

Estonia is a small country (population: 1.4M 1995; 1.3M 2008; 1.3M 2016), and the internal market is small. According to the WEF [WEF, 2018], Estonia ranks 98th of 137 countries for market size estimate. The 1990s were characterized by the low purchasing power of the population (GDP per capita, in 1995 was 1,935 euro). With the combination of these two factors, the country's economic development largely depended and continues to depend upon the openness of the economy. In the 2000s and early 2010s, Estonia was developed into an export-oriented economy (one third of which were services), which comprised 75% of GDP in 2011. With its entry into the European Union and the harmonization of the economic processes and norms with those of the EU, the global market opened up to Estonian entrepreneurs. The combination of a small domestic market and an open global market led many companies to choose the global development path. The push factors are the need to cover the costs for R&D and limited demand from the domestic market. However, for the ICT sector, it is typical to focus on the global market strategy.

This tendency raises some debate as far as the development of the IT sector in many areas focused on the global market and creates positive effects for the country (hiring of foreign workers, transfer of companies abroad, etc.).

The Estonian experience can be used as an example of how an economy can avoid a typical small market path. Against the backdrop of a limited domestic market, it is imperative for the government to focus on supporting national globally oriented industries.

For a better understanding of the development of an ecosystem, it is important and more illustrative to analyze the development of particular cases. Their paths provide a clear demonstration of principal trends and changes in the entrepreneurial ecosystem as a whole that are reflected in the stories of some IT companies as actors embedded in the entrepreneurial ecosystem.

GrabCAD – a Revolutionary in the Engineering Industry

Both GrabCAD founders, Hardi Meybaum and Indrek Narusk, were mechanical engineers who founded their engineering services company Futeq in 2007. Indrek Narusk describes the start, as follows: "We ran a small engineering services office back then, and as there was more work coming in than the two of us could handle, we started thinking about how to expand. As everything around us was moving to the web, this seemed like the only option for us too. So, we started building the library as a first step" [*Curram,* 2011].

Very soon, they had the idea to invite all the engineers into the same virtual space to exchange resources, meet clients and 'grab' CAD designs and models. So, starting from their own needs as engineers, the idea of GrabCAD was born. A three-page business plan was presented to the Estonian Development Fund (EDF) at the end of 2009. Two local investors, Astrec Baltic and EDF, made the first seed investment of €260,000 into the new body, GrabCAD[3], in 2010.

The free CAD 3D-model library was launched in September 2010. Engineers could share ready components and products there. This was a step that enabled engineers to cut routine work and focus on unique technical solutions. Further developments took place very rapidly, and although the platform software development remained in Estonia, the headquarters of the (holding) company with its business development unit moved to Boston, USA in 2011. The engineering technology unit was established in Cambridge, UK. These steps were necessary to be near top-level competencies, clients, and funding. GrabCAD won the SeedCamp and TechStars competitions, which enabled it to receive seed investment of $1.1M in 2011, followed by $4M and $8.15M in 2012. Narusk left the company in 2012.

GrabCAD has become a cloud-based virtual collaboration environment for mechanical engineers and the industry. Workbench was launched in 2013 as an appropriate means for this. Its online community grew

[3] See: https://grabcad.com, accessed 10.06.2018.

rapidly from 8,000 engineers in June 2011 to one million users in January 2014. GrabCAD has made it much easier to find team members for engineering projects in the public domain and enabled the collaboration of global teams in private environments. It has shortened new product cycle by two, three, or even more times, linking new ideas to production. The largest customers became General Electric and NASA. In such a way, they created an open innovation platform that breaks the logic of the traditional engineering industry.

In September 2014, it was announced that 3D printing giant Stratasys had acquired GrabCAD, with the value of the deal being around $100 million. The investors were happy and the community of users in GrabCAD reached 1.5 million. It was the most outstanding start-up sales for Estonians since Skype. Hardi Maybaum stayed on as CEO of the company. His visionary management has led to the most significant change in engineering design in the last 20-30 years. Although he continued to work at the company with the new owner, we do not know if that was a continuation of his entrepreneurial journey. In October 2015, a press release announced that Meybaum had left CrabCAD. It already had 2.5 million members. He started a new job in the Cambridge office of the venture capital company Matrix Partners, USA. Matrix was his advisor on his entrepreneurial journey with GrabCAD.

Bolt — a New Global Giant in the Sharing Economy

Bolt (earlier: Taxify) was founded on February 7, 2013 and is one of the success stories of Ajujaht (Brain Hunt), an Estonian business idea competition, although it did not in fact win the competition that year (it came in second). However, by June 2013, the Bolt taxi ordering application won a competition for mobile apps in Estonia. Bolt is aimed at consumers and drivers and represents a sharing economy business.[4]

To some extent, Bolt could be considered a "child" of the Estonian start-up community and ecosystem. The initial idea came from Martin Villig, a member of the Skype team from the inception of the company and before its rapid growth [*Pashchynska,* 2018]. In 2012, he visited Kiev in Ukraine and saw how locals were ordering taxis via a web service [*Treija,* 2016]. There were no similar services in Tallinn and Riga, which had quite fragmented taxi markets with over 25 taxi companies operating [*ibid.*].

Martin's younger brother, Markus, who was 19 at the time, applied to found a company under the name mTakso (renamed Taxify in January 2014 and Bolt in 2019) at the Commercial Registry in February 2013. Besides the family members, Oliver Leisalu was also among Bolt's first owners and founders.

In 2014, on receiving recognition for its business concept, Bolt expanded its activities to Finland, Latvia, Lithuania, Belarus, the Netherlands, and Georgia, by which time it had received 1.4 million euros in investor capital. At the end of the year, the company had 14 employees. The circle of shareholders widened with investors of Estonian origin, including Adcash, Mobi Solutions, and Rain Johanson from the former Skype team.

2015 was a year of further (product) development and the growth of sales increased approximately five-fold up to 700,000 euros.

In 2016, the company's growth continued, with sales reaching 2.8 million euros, and cash flow became positive in the last quarter. Bolt also began operating in Africa. Markus Villig, the CEO, was named Young Entrepreneur of the Year.

At the end of 2017, Bolt operated in 30 cities in 23 countries and employed 150 people in Estonia and 350 globally, with subsidiaries in 19 countries, including Australia, Egypt, Kenya, South Africa, Mexico, Canada, the UK, the Netherlands, France, Finland, and others. Sales grew from 2.8 million in 2016 to 18 million euros in 2017 (but it was still not profitable, according to an annual report). Eight months later, it was operating in 47 cities in 27 countries[5], which means that rapid growth was likely to be expected in 2018.

The years 2017-2018 also saw more rapid changes and growth. Bolt brought the Chinese (Hong Kong) company Didi Chuxing (a leading IT platform for transport) into the list of shareholders and began strategic collaboration in China (August 1, 2017)[6]. The founders moved the registration of their holding companies from Estonia to Latvia. Daimler Mobility Services GmbH joined the list of shareholders in May 2018. FORBES named Markus Villig among the 30 most influential young people under 30 in technology in Europe – Technology in 2018[7] [Forbes, 2018].

In May 2018, it was announced that an investment of over 150 million euros was made in the company. Following this round, the value of Bolt became second to TransferWise, and a candidate for fourth position among the so-called 'unicorns' of Estonian origin. With this step, Bolt differed from Estonian start-ups

[4] See: Annual reports and data of the Estonian Commercial Registry, 2013-2018. https://www.rik.ee/en/company-registration-portal/annual-report, accessed 25.06.2019.

[5] See https://taxify.eu/cities/, accessed 21.06.2019.

[6] See https://geenius.ee/uudis/taxify-sai-investeeringu-ja-alustab-strateegilist-koostood-didi-chuxingiga/ , accessed 21.06.2019.

[7] See https://www.forbes.com/profile/markus-villig/?list=30under30-europe-technology#2bc7db8f1230, ccessed 10.06.2018.

that move their headquarters to global centers (California, Boston, and London) before larger international funding rounds. Bolt remains in Estonia. This is a sign that Estonia has become a global start-up center (as a member of global ecosystem).

Discussion

This paper aimed to understand the interaction between the ecosystem and the opportunity, and to identify interconnections between the developmental trajectories of the opportunity and evolutionary trajectories of the ecosystem.

We focused on the question of the connection between the ecosystem and the opportunity, and upon which set of pillars of the ecosystem form a window of opportunity at a certain stage of economic development. We consider a window of opportunity to be a combination of particular conditions and situations. An important task was to identify key aspects in the ecosystem (Table 1) that result in the creation of a window of opportunity.

We found that the more an economy is developed, the wider the boundaries of the ecosystem are around the start-up, therefore reaching different ecosystems in both geographical and business senses. The transfer and integration of technological competencies across borders between different ecosystems have a two-way significance in the example of GrabCAD. First, in order to create an engineering crowdsourcing platform, entrepreneurs involve software, mechanical engineering, and design, as well as marketing competencies originating from and dispersed between different geographical regions of Estonia, the UK, and the USA by founding company development branches in these countries. Second, GrabCAD currently integrates more than half of the six million communities of mechanical engineers worldwide, by linking them with potential customers and the production industry in a knowledge and collaboration platform, which takes the form of a kind of new worldwide ecosystem. GrabCAD links engineers and their customers with the industries (producers) worldwide by accelerating team building, project management and any (idea generation, 3D-design, production) collaboration on a common platform. As a result, the productivity of engineers is increasing and the production cycle and market launch of new products are shortening remarkably. All these achievements have already been proven by its major clients: General Electric and NASA. In this way, GrabCAD sourcing a new network – a virtual ecosystem – revolutionizes the entire structure of and the processes used by the engineering industry. Besides using the right opportunity window itself, the platform of GrabCAD became an "opportunity window" for millions of engineers and companies.

Bolt demonstrates how a widespread and seemingly simple mobile-based taxi service can be customized by scaling the technology globally. The product development period was much shorter than that of GrabCAD. However, all the necessary competencies for Bolt, in comparison with GrabCAD, already existed in Estonia and the global investors trusted this ecosystem enough to fund (€152M) the further development of the company with its HQ in Estonia.

The case of GrabCAD also demonstrates the contradictory and dynamic nature of the engineering ecosystem. GrabCAD lost its independence by being acquired by Stratasys for $100 million in September 2014. Venture capital investors were happy. GrabCAD, by creating a new collaboration platform for the industry, became the object of an open innovation ecosystem where industry giants deal with innovations. There, one could ask about the happiness of stakeholders, aside from venture capitalists, including those in GrabCAD's homeland. Fostering start-up processes and the concentration of hi-tech start-ups, such as GrabCAD, can be a challenge for the further economic development of Estonia, the country of origin. This raises the question of whether the intensive production of (ideas for) hi-tech start-ups can be an engine to restructure a traditional country into a 'smart economy'. Also, is an acquisition the best or optimal solution for a hi-tech company such as GrabCAD?

There is no doubt that GrabCAD, in securing international venture funding, channelled this cash flow into the development of competencies and software and relevant employment that has contributed to the socioeconomic welfare of Estonia. International investors forced the faster launch and globalization of the company. The entrepreneurs paid for success by losing control over the business. That was a certain step for them in reaching a competitive advantage. Meybaum later met a man developing a similar platform, but in Spanish, after the sale of GrabCAD. In effect, this means only a slight head start in networking and English language usage facilitated the breakthrough. It also means that aside from the usual 'push-pull' factors of early internationalization, the intensity and speed of the development process appear to be critical in meeting the timing aspect of the opportunity window. The case of GrabCAD is proof of the 'first mover' advantage and that the winner-takes-all in the platform business.

Bolt, in turn, shows that there is an opportunity to establish a challenger in a field with a global competitor as strong as Uber. The speed of development is still a competitive advantage to exploiting a window of opportunity on a massive customer service market that is not yet fully saturated.

Behind these phenomena is the globally integrated Estonian entrepreneurial ecosystem, which accelerated the whole venture development process for both GrabCAD and Bolt, features that did not exist 10-20 years ago for Mobi Solutions or Regio [*Mets,* 2016]. The case of GrabCAD also shows how hi-tech start-ups can implement global networking and knowledge crowdsourcing for their success. Both cases together demonstrate how different interactions and impacts can exist between the entrepreneurial ecosystem and opportunity.

The overview of the Estonian ecosystem generally indicated that, in addition to the prosperous ICT sector, domestic university R&D-based high-tech manufacturing is still only in its infancy.

Conclusions

The development of the Estonian entrepreneurial ecosystem is different from the traditional trajectory completed by the majority of Western European countries. Estonia lacked entrepreneurial traditions, infrastructure, and experience. However, despite this, Estonia has achieved impressive results in a short period of time, partly thanks to joining the European Union (EU) and opening up the Structural Funds, which supported changes. Estonia did start from scratch as did other transition countries and it drastically altered the structure of its industries and infrastructure. Another unique feature is that to create a thriving ecosystem, it did not take a huge amount of investment, rather it required human capital. Therefore, the development trajectory of the Estonian entrepreneurial ecosystem defied the theory of path dependence [*Roundy et al.*, 2018]. In most cases, an ecosystem is sensitive to starting conditions. However, Estonia, despite its historical background, developed a new path (i.e., implementing a wide range of e-services and e-government) and, moreover, skipped several stages (e.g., digital vs analogue telephony, mobile vs cash-machine parking system, etc.) of "traditional" ecosystem evolution in Western countries.

It can be suggested that it is easier in many respects for small economies to overcome path dependence. However, we assume that the most decisive factor for Estonia was not the size of its economy but the political focus on entrepreneurial values, the economic policies of the state and political entrepreneurs who could overcome a short-term perspective and path dependence.

The conducted analysis showed that different stages of an ecosystem's evolution present different entrepreneurial opportunities. Thus, for instance, the speed of an entrepreneurial journey and the speed of the development of a product have changed significantly.

For companies, these developments in the ecosystem mean a drastic shortening of the period of product development. In the 1990s and at the beginning of the 2000s, this period could last 7-10 years, for example, the development periods for Regio or Mobi Solutions [*Mets*, 2008, 2016] were mainly "bootstrapping" their product development. GrabCAD and Taxify present much faster developments – one to four years with much larger investments accelerating the processes. This characterizes growing competition for exploiting entrepreneurial opportunities. It also means the temporal narrowing of the opportunity window – the ecosystem aspect. However, this is also a sign of the growing maturity of the entrepreneurial ecosystem in Estonia as well as globally.

First, the integration and cooperation of sectoral ecosystems (educational, entrepreneurial, engineering, design, etc.) can be noted. The integration partly succeeded due to the development and introduction of long-term programs for the development of the ecosystem (digital telecom), education (ICT), and entrepreneurial skills at all levels, a long-term vision, and the development of human capital. GrabCAD is proof of the integration trend by the company transforming knowledge from entrepreneurial, educational, engineering, and design ecosystems to the global ecosystems of industries.

Second, the integration of local and global entrepreneurial ecosystems is important. This happened due to Estonia joining international and global organizations that oversee political, trade, security, educational and industrial matters, and introducing western social and economic standards, role models, and open innovations. This helped Estonian companies enter the global market, facilitating a positive image. The examples of GrabCAD and Bolt prove this trend. The companies were initially supported by local ecosystem stakeholders and, as a result, had the opportunity to enter the global market, use global networking, and exploit knowledge.

Third, a growing confidence level manifests itself through increasing foreign investment in general and a share of foreign investment in start-ups specifically. At the beginning of Estonian entrepreneurial ecosystem development, 100% of investments in Estonian start-ups originated from Estonia. In 2017, the share of foreign investments reached 98%. Also, Estonian start-ups have begun to keep their HQs in Estonia (as in the case of Bolt), instead of moving abroad, which shows that trust is increasing among both foreign investors and entrepreneurs.

Fourth, the formation of an entrepreneurial mindset or the creation of a brand of entrepreneurship in Estonia can be seen. Thus, a very positive image of entrepreneurs has been established, making entrepreneurs the new heroes and role models. Estonia is among the top 15 countries on the Entrepreneurial Spirit Index and one of the places for the most intensive birth of start-ups in the world.

Fifth, besides the combination and maturity of pillars within the window of opportunity, the timing of all the components of both the entrepreneurial and other ecosystems together is the most important.

Despite the ICT success stories to date, Estonia's challenge is to transform into a knowledge-based economy, to find out how it can develop high-tech manufacturing based on its ideas in the best possible way. This requires the more effective implementation of the R&D results of universities and the transformation of traditional industry. The prerequisites for this include the better preparation of labor and infrastructure for all sectors and integration with ICT achievements. Currently, public-private collaboration and smart decisions by the government in the short term are the most urgent challenges.

In concluding the paper, we assert that a small (post-) transition Estonia with its start-ups demonstrates a solid synchronism of globally oriented new venture creation and entrepreneurial ecosystem development. This enabled the integration of different ecosystems into global networks and the implementation of entrepreneurial opportunities within this framework. The factors behind these enthusiastic processes in a small society have been less studied. Whether the factor is that the phenomenon has a greater ability to mobilize in a small society, the will of independence in a broader meaning, or any other mechanism remains a topic for further studies.

References

Alvarez A., Barney B. (2007) Discovery and creation: Alternative theories of entrepreneurial action. *Strategic Entrepreneurship Journal*, vol. 1, pp. 11–26.

Casson M. (1982) *The Entrepreneur: An Economic Theory*, Oxford: Martin Robertson.

Cohen B. (2006) Sustainable Valley Entrepreneurial Ecosystems. *Business Strategy and the Environment*, vol. 15, no 1, pp. 1–14.

Curram B. M. (2011) *An Interview of GrabCAD's Indrek Narusk*. Available at: http://www.draftingservices.com/blog/aninterviewofgrabcadsindreknarusk, accessed 27.10.2015.

Davidsson P. (2015) Entrepreneurial opportunities and the entrepreneurship nexus: A re-conceptualization. *Journal of Business Venturing*, vol. 30, no 5, pp. 1–22.

Dimov D. (2011) Grappling with the unbearable elusiveness of entrepreneurial opportunities. *Entrepreneurship Theory and Practice*, vol. 35, no 1, pp. 57–81.

Dimov D., Muñoz P. (2015) The call of the whole in understanding the development of sustainable ventures. *Journal of Business Venturing*, vol. 30, no 4, pp. 632–654.

EDF (2013) *Smart Specialization – Qualitative Analysis*. Available at: http://www.arengufond.ee, accessed 03.06.2019.

European Commission (2017) *European Innovation Scoreboard 2017,* Brussels: European Commission. Available at: http://www.eustat.eus/elementos/ele0014400/Methodology_Report_EIS_2017/inf0014422_c.pdf, accessed 10.06.2018.

Foster G., Shimizu C., Ciesinski S., Davila A., Hassan S.Z., Jia N., Plunkett S., Pinelli M., Cunningham J., Hiscock-Croft R., McLenithan M. Rottenberg L., Morris R., Lee D. (2013) *Entrepreneurial Ecosystems Around the Globe and Company Growth Dynamics,* Geneva: World Economic Forum.

Freedomhouse (2017) *Freedom on the Net*. Available at: https://freedomhouse.org/report/freedom-net/2017/estonia, accessed 01.05.2019.

GEDI (2014) *Towards a More Entrepreneurial Estonia. Call for Action*, Washington, D.C.: Global Entrepreneurship and Development Institute.

GEM (2016–2018) *Reports of the Global Entrepreneurship Monitor*. Available at: www.gemconsortium.org, accessed 31.05.2019.

Härma K. (2019) TransferWise'i väärtus tõusis 3,5 miljardi dollarini: oma osa saavad töötajad ja investorid [The value of TransferWise rose to $ 3.5 billion: employees and investors get their share]. Äripäev [*Business Daily*], 22.05.2019. Available at: https://www.aripaev.ee/uudised/2019/05/22/transferwisei-vaartus-tousis-35-miljardi-dollarini-oma-osa-saavad-tootajad-ja-investorid, accessed: 23.06.2019 (in Estonian).

Isenberg D.J. (2010) How to start an entrepreneurial revolution. *Harvard Business Review*, June, pp. 41–50.

Isenberg D. (2011) *The entrepreneurship ecosystem strategy as a new paradigm for economy policy: Principles for cultivating entrepreneurship*, Babson Park: MA: Babson College.

Lepane L., Kuum L. (2004) *Enterprise of Estonian Population*, Tallinn: Estonian Institute of Economic Research (in Estonian).

Mason C., Brown R. (2014) *Entrepreneurial ecosystems and growth oriented entrepreneurship* (LEED Working Paper), Paris: OECD. Available at: https://www.oecd.org/cfe/leed/Entrepreneurial-ecosystems.pdf, accessed 22.05.2019.

Messica A., Mehrez A. (2002) Time-to-Market, Window of Opportunity, and Salvageability of a New Product Development. *Managerial and Decision Economics*, vol. 23, pp. 371–378.

Mets T. (2018) Entrepreneurial developments toward a knowledge-based economy in Estonia. The case of Fits.me – venture-capital-backed startup going global. *Entrepreneurship in Central and Eastern Europe: Development through Internationalization* (eds. T. Mets, A. Sauka, D. Purg), London, New York: Routledge, pp. 89–111.

Mets T. (2016) Is Estonia becoming better home for 'born globals'? *Entrepreneurship, Innovation and Regional Development* (eds. D. Smallbone, M. Virtanen, A. Sauka), Cheltenham: Edward Elgar, pp. 101–124.

Mets T. (2008) Regio – a learned global knowledge company: Case from Estonia. *The Cutting Edge: Innovation and Entrepreneurship in New Europe* (eds. R. Aidis, F. Welter), Cheltenham: Edward Elgar, pp. 54–73.

Mets T., Trabskaja J., Raudsaar M. (2019) The entrepreneurial journey of venture creation: Reshaping process and space. *Revista de Estudios Empresariales. Segunda* Época, no 1, pp. 61–77.

OECD (2017) *Entrepreneurship at a Glance*, Paris: OECD. Available at: https://www.oecd-ilibrary.org/employment/entrepreneurship-at-a-glance-2017_entrepreneur_aag-2017-en, accessed 25.05.2019.

OECD (2018) Country statistical profile: Estonia 2018. Available at: https://www.oecd-ilibrary.org/economics/country-statistical-profile-estonia-2018-3_csp-est-table-2018-3-en, accessed 25.05.2019.

Pashchynska M. (2018) *The Role of Work Experience in The New Business Success in Estonia: The Skype Effect and Beyond* (Master's thesis), Tartu: University of Tartu.

Rostow W.W. (1962) *The Stages of Economic Growth*, London: Cambridge University Press.

Roundy P., Bradshaw M., Brockman B. (2018) The emergence of entrepreneurial ecosystems: A complex adaptive systems approach. *Journal of Business Research*, vol. 86, pp. 1–10.

Statistics Estonia (2018) *Quarterly Bulletin of Statistics Estonia*, issue 2, Tallinn: Statistics Estonia. Available at: https://www.stat.ee/publication-download-pdf?publication_id=44735&publication_lang=en, accessed 21.06.2019.

Shane S. (2003) *A General Theory of Entrepreneurship: The Individual-Opportunity Nexus*, Cheltenham: Edward Elgar.

Shane S., Venkataraman S. (2000) The Promise of Enterpreneurship as a Field of Research. *The Academy of Management Review*, vol. 25, no 1, pp. 217–226.

Stam E. (2015) Entrepreneurial Ecosystems and Regional Policy: A Sympathetic Critique. *European Planning Studies*, vol. 23, no 9, pp. 1759–1769.

Startup Blink (2019) *Startup Ecosystem Rankings 2019.* Available at: https://www.startupblink.com/blog/startup-ecosystem-rankings-report-2019-by-startupblink/, accessed 27.06.2019.

Suarez F., Grodal S., Gotsopoulos S. (2015) Perfect timing? Dominant category, dominant design, and the window of opportunity for firm entry. *Strategic Management Journal*, vol. 36, pp. 437–448.

Treija I. (2016) *Uber, what? Taxify is the most popular taxi startup in the Baltics*. Available at: http://www.eu-startups.com/2016/02/uber-what-taxiy-is-the-most-popular-taxi-startup-in-the-baltics/, accessed 22.04.2019.

Venkataraman S. (2004) Regional transformation through technical entrepreneurship. *Journal of Business Venturing*, vol. 19, pp. 153–167.

WEF (2014) *Global Competitiveness Report 2014–2015*, Geneva World Economic Forum.

WEF (2018) *Global Competitiveness Report 2018*, Geneva: World Economic Forum.

World Bank (2017) *World Development Report 2017*, Washington, D.C.: World Bank.

Entrepreneurial Innovations in Countries at Different Stages of Development

Éva Komlósi

Research Fellow, MTA-PTE Innovation and Economic Growth Research Group, Regional Innovation and Entrepreneurship Research Center (RIERC)[a], komlosieva@ktk.pte.hu

Balázs Páger

Visiting collaborator, Institute for Regional Studies [b], and external collaborator, RIERC[a], pagerb@rkk.hu

Gábor Márkus

Adjunct Professor, Faculty of Business and Economics, Department of Finance and Accounting, and Research Fellow, RIERC[a], markus@ktk.pte.hu

[a] University of Pécs, Pécs, 48-as tér 1, 7622, Hungary

[b] Centre for Economic and Regional Studies(CERS), Hungarian Academy of Sciences, 1097 Budapest Tóth Kálmán u. 4, Hungary

Abstract

The aim of our paper is to provide a comprehensive picture of the role of innovation within the entrepreneurial ecosystem in certain countries. In this way, we propose the following research question as to what kind of interrelatedness can be observed between the innovation capability of a country and other elements of its entrepreneurial ecosystem. Ninety-five countries have been involved in our analysis, which initially have been grouped by their level of economic development and a group of transition countries has been created as well. In order to measure these relations, the Global Entrepreneurship Index (GEI) was applied. This index measures the qualitative aspects of the entrepreneurial ecosystem in a national context. The index consists of fourteen pillars covering the relevant aspects of the entrepreneurial ecosystem. Out of the pillars, there are three pillars associated with three different aspects of innovation: Technology Absorption, Product Innovation, and Process Innovation. After analyzing the pillars, we conducted a k-means cluster analysis in order to demonstrate whether countries with the same level of development are ranked in a common group if they are clustered by the values of the three innovation pillars. Our results suggest that the quality of the entrepreneurial ecosystem reflects the level of economic development. Regarding the role of innovation, it seems that the innovation-related pillars have an important role within the entrepreneurial ecosystem. Technology Absorption is highly related to the GEI score and the level of economic development since the most developed countries have the highest values for this pillar. While the Product and Process Innovation pillars have a relatively strong relationship with GEI score as well, it seems that a couple of countries have higher pillar values in these innovation-related pillars than the position of their GEI scores would lead one to expect. This may indicate that these countries have relatively good performance in research and development, but other components of their entrepreneurial ecosystem may hamper the exploitation of the results achieved by new firms.

Keywords: entrepreneurial ecosystem; Global Entrepreneurship Index (GEI); innovation; economic development; technology absorption

Citation: Komlósi E., Páger B., Márkus G. (2019) Entrepreneurial Innovations in Countries at Different Stages of Development. *Foresight and STI Governance*, vol. 13, no 4, pp. 23–34. DOI: 10.17323/2500-2597.2019.4.23.34

There is a general consensus that *knowledge* is the most fundamental source of the modern economy [*Jaffe, Trajtenberg*, 2002] and that innovation has become a *"ubiquitous phenomenon"* [*Lundvall*, 1992].

It follows from the above that the literature dealing with innovation and technological change has become enormous. This literature, on the one hand, primarily tries to answer the following fundamental question: *what role does innovation play in economic growth?* The *New* (*Endogenous) Growth Theory* (initiated by [*Romer*, 1986; *Lucas,* 1988; *Rebelo,* 1991]) tries to answer this question. Initially, it was assumed that knowledge is freely available to anyone and technological opportunities are equally available in all countries. However, it has been convincingly proven in the literature of *knowledge spillovers* that the accessibility of some types of knowledge is bounded by *geographic proximity* [*Jaffe*, 1989; *Acs et al.* 1994; *Anselin et al.* 1997; *Varga* 1998, 2000; *Acs, Varga* 2002; *Feldman*, 1999; *Audretsch, Feldman*, 2004; *Boschma*, 2005] and that an excludable or imperfectly accessible part of knowledge exists, which is characterized by novel, tacit elements and it is accessible only *by interactions among agents in a system of innovation* [*Dosi*, 1988].

The other, vast part of the innovation literature concentrates on the identification of conditions or factors that determine *knowledge creation* (especially new technological knowledge, as it is the most valuable type of knowledge in innovation) and its *diffusion.* The pivotal question that needs to be answered here is the following: *how does technological change occur, and what are the key processes and institutions involved*? The *New Economics of Innovation* (initiated by [*Nelson*, 1993; *Lundvall,* 1988, 1992; *Freeman,* 1982, 1995]) tries to give an answer to this question by focusing on the *institutional arrangements* in which the innovative processes take place. Innovation economics has been influenced by different theories of innovation such as *interactive learning theories* [*Lundvall*, 1992] and *evolutionary theories*, most importantly the *New Institutional Economics* (NIE, initiated by [*Coase*, 1992, 1998; *North,* 1989, 1990, 1991; *Williamson,* 1985, 2000]). NIE states that informal social and formal legal norms and rules (i.e. institutions) underlie economic activity and leads researchers of innovation economics to posit that the interactive, iterative, and cumulative process of learning is a *socially embedded* process, therefore it cannot be understood without taking into consideration the *institutional and cultural context* [*Carlsson et al.*, 2002].

The *National Systems of Innovation (NSI, or elsewhere National Innovation System – NIS)* seemed to be a fruitful approach for the study of innovation and technical change in the economy [*Edquist*, 1997]. According to NSI, knowledge is the most fundamental resource in the economy, and *"knowledge is produced and accumulates through an interactive and cumulative process of innovation that is embedded in a national institutional context, and that the context, therefore, matters for innovation outcomes"* [Ács *et al.*, 2014, p. 477].

Paradoxically, because of the strengthening of globalization, regional scientists, economic geographers, and innovation analysts noticed that the concept of the National System of Innovation may be questionable given that recognition has increased that important elements of the process of innovation tend to become *regional* rather than national [*Cooke*, 2001]. The importance of the national level as social agreements that influence learning and technology is further emphasized by [*Freeman*, 2002; *Lundvall et al.,* 2002]. At the same time, the sub-national level, which includes clusters and regions, has increasingly become an area of interest. National institutions may influence innovation systems at regional, sectoral, or technological levels differently, and not all institutions are national [*Carlsson*, 2006]. For large firms, national institutions may be more important, while for SMEs, regional institutions play a crucial role [*Wixted*, 2009]. All the aforementioned theories (in fact the whole innovation literature) can be integrated to develop a model of *technology-led regional economic development* by channeling those into a more general regional economic growth model [*Acs, Varga*, 2002]. Consequently, the concept of the *Regional Innovation System* (RIS) broke away relatively quickly [*Cooke*, 2001].

Meanwhile, the *system perspective* appeared in the field of *strategic management* as well, where the so-called *business-system approach* has become very popular. The *National Business System* (NBS) examines important structural and strategic factors that affect a firm's ability to capture a large share of the total value created by the ecosystem when organizing economic activity among their ecosystem partners [*Whitley,* 1994, 1996]. The fundamental difference between the two approaches is the focus of the analysis: while the NBS explains international differences in firm organization and behavior, the NSI is taking innovation as its focal point by emphasizing the limited mobility of technical competencies. However, both theoretical concepts, in spite of these differences, share the common idea that the national institutional framework appears at the center of the analysis.

In sum, we can note that economic development literature (which comprises a family of related concepts, including the National System of Innovation as well), on the one hand and the National Business System (NBS) have largely *ignored the role of entrepreneurs* [*Acs et al.,* 2018], only referring to the '*firm*' or '*enterprise*' as a black box [*Spigel, Harrison,* 2018; *Malecki,* 2018] from the point of strategic management. An *entrepreneur* is the one who creates innovation through new combinations of former

knowledge elements and creating new value (*output*). On the other hand, the entrepreneur contributes to employment and economic growth (*outcome*) due to his/her entrepreneurial activity (establishing and organizing a firm).

Both theories ignore the fact that, in spite of the abundance of resources, the extent of access to them can be severely limited by the entrepreneur's *knowledge absorption ability*, which on the one hand refers to the personal traits of the entrepreneur and on the other, indicates the degree of his/her social embeddedness [*Qian, Acs,* 2013; *Qian, Jung*, 2017; *Qian*, 2018].

In recent years, the concept of the *Entrepreneurial Ecosystem* (EE, or elsewhere *System of Entrepreneurship*) has become a hot topic in entrepreneurial research. The number of scientific publications dealing with this concept has spectacularly multiplied recently and the term itself has become a buzzword [*Spigel, Harrison, 2018*; *Ritala, Gustafsson*, 2018].

Briefly, the EE concept is based on what the other two concepts – NSI and NBS – have ignored: the *entrepreneur*. In contrast to the institutional emphasis of the National Systems of Innovation frameworks, where institutions engender and regulate action, *Systems of Entrepreneurship* are driven by individuals, with institutions regulating who acts and the outcomes of individual action [*Acs et al*., 2014]. The main feature of the EE concept is that it reflects the *multi-dimensional nature* of entrepreneurship. It assumes that a large number of different factors have an effect on entrepreneurship and emphasizes the importance of *their interrelatedness* as the main qualitative determinant for entrepreneurial performance.

The *Global Entrepreneurship Index (GEI)* has been elaborated upon to measure this *qualitative aspect* of the entrepreneurial ecosystem in a national context [*Acs, Szerb,* 2011, 2012; *Acs et al.,* 2014]. Our index is based on the theoretical considerations of the EE concept, because it reflects the *multi-dimensional nature* of entrepreneurship by combining the individual entrepreneurial feature and the contextual institutional factors. The index consists of 14 pillars that can cover many, but not all, relevant aspects of the entrepreneurial ecosystem. Furthermore, by calculating the index, we apply a novel methodology, the *Penalty for Bottleneck* algorithm that incorporates the *system perspective*, therefore interactions between the pillars is expressed.

An Overview of the Evolution of the EE Concept

Nine studies have been identified as exhausting reviews providing a comprehensive overview of the entrepreneurial ecosystem published in the last few years in high impact peer-reviewed journals (see them in Table 1). These papers also formulate some critical remarks in order to draw attention to some controversial and unanswered aspects of the concept.

Despite the popularity of the EE concept, the literature underlines only a few relevant results: although the concept is very *"seductive"* [*Stam*, 2015, p. 1764], it is still very *"chaotic"* [*Spigel, Harrison*, 2018, p. 152], as it is based on only a few systematic and consistent empirical results, and has developed without any accepted clear definition or unambiguously proven theoretical framework [*Stam*, 2015; *Mason, Brown*, 2014; *Motoyama, Knowlton,* 2017].

The different definitions of the concept point out the divergent views on the EE concept. Despite the different definitions, a common feature of ecosystems is that they are *heterogeneous*. The main advantage of the EE concept that it can reflect the *multi-dimensional nature* of entrepreneurship. It is assumed that a huge number of different agents and factors have an effect upon entrepreneurship and *their interrelatedness* is the main qualitative determinant of entrepreneurial performance. However, researchers still do not know what the most important determining factors are or how these factors can be identified. It is now clear that ecosystems are *complex* systems, therefore they cannot be copied or simply adapted for other systems [*Neck et al.*, 2004] and cannot be reproduced elsewhere because the development of an ecosystem is shaped by many *unpredictable events* (external and internal shocks). Therefore, one of the basic features of the ecosystems that they are sensitive to *initial conditions* [*Roundy et al.*, 2017]. These conditions, besides the aforementioned general rules, cause the uniqueness of every ecosystem. However, many authors point out that studies do not provide a sufficient explanation about the evolution of the ecosystems. Recording those factors that presumably influence ecosystems does not offer useful knowledge since the importance of the factors can change over time. Therefore, if we want to understand how an ecosystem works as a system, causality among other factors should be explained.

There is also a consensus among researchers that the *entrepreneur* is the key player in the creation and operation of the ecosystem. The other players are more likely to be so-called *'feeders'* [*Cavallo et al.,* 2018], that is, a person who supports the ecosystem or provides different resources. At present, the examination of the *relationships between actors* is a central issue in ecosystem research [*Zhang, Guan,* 2017]. This is the area where the least progress has been made over the past 25 years [*Roundy et al.*, 2017]. Some researchers mention the lack of a *holistic approach* suggesting that all relevant factors should be taken into account in measuring ecosystems. Others point out to the undesirable phenomenon of the "holistic approach" and they presume that each fac-

tor has its own relative weight [*Roundy et al.*, 2017]. This uncertainty can only be mitigated by exploring the causal relationship between the influencing factors [*Stam, Spigel*, 2016; *Spigel, Harrison*, 2018].

Several researchers suggest applying the *process approach* instead of identifying different factors influencing the ecosystems. Two processes can be identified here: the process of generating resources and the flow of resources between different actors. Initially, we can assume that only a few links exist among the actors, they rely only on some resources and operate without a supportive business culture. However, early entrepreneurial success can reinforce a positive social attitude towards entrepreneurship. Consequently, new resources accumulate within the region, the skills of the local workforce increase, new companies, human and financial resources appear increasingly frequently. All this contributes to the evolution of a positive entrepreneurial culture, which offers new impetus for the processes. In order to analyze these processes, some researchers have recommended *network analysis* as a potential methodology to explore the relationships between the actors [*Roundy et al.,* 2017, 2018; *Roundy,* 2019].

The identification of the appropriate level of ecosystems is also an iportant issue. The local nature of the phenomenon is clear [*Stam*, 2015]. While ecosystems could have boundaries, these borders are not too sharp and remote. The main problem is to idetify the distinctive criteria of belonging to an ecosystem based on the notion that ecosystems are *open systems*, as they can attract resources from in and out. *Multi-scalar analysis* seems to be a proper tool to be able to understand the local-global relationships of ecosystems [*Alvedalen, Boschma*, 2017].

Ultimately, these review studies summarize the problematic issues of the entrepreneurial ecosystem and try to point out the areas that require further research. The Global Entrepreneurship Index can offer a solution for some of these fields by identifying the most important constituents and most hindering bottlenecks of the ecosystem, while taking into consideration the connection of the elements as well.

GEI: Measuring the Performance of the Entrepreneurial Ecosystem

While earlier analyses often focused on single indicators such as startup rates or Total Early-phased Entrepreneurial Activity (TEA), more recent entrepreneurial research has shifted to a more systemic and multidimensional understanding of entrepreneurship at the national level. Based on the inconsistencies of the definition, measurement, and the policy domain of entrepreneurship, the *Global Entrepreneurship Index* (GEI) was developed to measure country level entrepreneurship [*Acs, Szerb*, 2011, 2012; *Acs et al.*, 2014].

The GEI is an annual index that measures the health of entrepreneurial ecosystems at the country level and ranks the performance of 137 countries against one another. The index is based on the theoretical concept of the *National System of Entrepreneurship* that *"(…) is the dynamic, institutionally embedded interaction between entrepreneurial attitudes, abilities, and aspirations by individuals, which drives the allocation of resources through the creation and operation of new ventures"* [*Acs et al.,* 2014, p. 479] that requires a complex measure. Instead of using an output-related quantitative approach to entrepreneurship, a proper measure should focus on the *qualitative aspects* of entrepreneurship. The GEI includes both the individual efforts and capabilities and the environmental and institutional aspect of entrepreneurship as well as the fact that these different components constitute a system where the relationship between the elements is vital.

The first version of the GEI was initially called the *Global Entrepreneurship and Development Index (GEDI)* and has been followed by yearly reports since 2011. The GEI has gone through many smaller changes since its introduction and was extensively reviewed and renewed in 2016 [*Acs, Szerb*, 2016]. Our composite index proposes five levels of index building. This includes the GEI super index[1] measuring entrepreneurship at the country level, the three subindexes (*Entrepreneurial Attitudes, Entrepreneurial Abilities, and Entrepreneurial Aspirations*), 14 pillars, 28 variables, and 49 indicators. All pillars were created by using an individual and an institutional (contextual) variable component (Table 2). The GEDI methodology collects data on the entrepreneurial attitudes, abilities and aspirations of the local population and then weights these against the prevailing social and economic "infrastructure" [*Acs et al.*, 2018]. Entrepreneurial attitudes reflect the attitudes of the adult population toward entrepreneurship. Entrepreneurial abilities include some of the important characteristics of entrepreneurs that determine the extent to which new start-ups will have the potential for growth. Entrepreneurial aspirations refer to the distinct, qualitative, and strategy-related nature of the entrepreneurial activity [*Acs et al.*, 2014].

The aim of our paper is to provide a comprehensive picture of the role of innovation within the entrepreneurial ecosystem in the involved countries. In

[1] Acs et al. [*Acs et al.*, 2018] provide a detailed description of the contents of the pillars, their variables and indicators as well as the methodology and calculation in the Technical Annex of latest version of GEI: https://thegedi.org/wp-content/uploads/dlm_uploads/2017/12/2018-GEI-Technical-Annex.pdf

Table 1. **Literature Review of Works on EE**

Author(s)	Title	Journal	Year of publication	Reference
Zoltan Acs, Erik Stam, David Audretsch, Allan O'Connor	The Lineages of the Entrepreneurial Ecosystem Approach	Small Business Economics	2017	[*Acs et al.,* 2017]
Janna Alvedalen, Ron Boschma	A Critical Review of Entrepreneurial Ecosystems Research: Towards a Future Research Agenda	European Planning Studies	2017	[*Alvedalen, Boschma,* 2017]
Angelo Cavallo, Antonio Ghezzi, Raffaello Balocco	Entrepreneurial Ecosystem Research: Present Debates and Future Directions	International Entrepreneurship Management Journal	2018	[*Cavallo et al.,* 2018]
Elizabeth Mack, Heike Mayer	The Evolutionary Dynamics of Entrepreneurial Ecosystems	Urban Studies	2016	[*Mack, Mayer,* 2016]
Edward Malecki	Entrepreneurship and the Entrepreneurial Ecosystem	Geography Compass	2018	[*Malecki,* 2018]
Philip Roundy, Beverly Brockman, Mike Bradshaw	The Resilience of Entrepreneurial Ecosystems	Journal of Business Venturing Insights	2017	[*Roundy et al.,* 2017]
Philip Roundy, Mike Bradshaw, Beverly Brockman	The Emergence of Entrepreneurial Ecosystems: A Complex Adaptive Systems Approach	Journal of Business Research	2018	[*Roundy et al.,* 2018]
Ben Spigel, Richard Harrison	Toward a Process Theory of Entrepreneurial Ecosystems	Strategic Entrepreneurship Journal	2018	[*Spigel, Harrison,* 2018]
Erik Stam	Entrepreneurial Ecosystem and Regional Policy: A Sympathetic Critique	European Planning Studies	2015	[*Stam*, 2015]

Source: compiled by the authors.

this way, we propose the following research question: *what kind of interrelatedness can be observed between the innovation capability of a country and the other elements of its entrepreneurial ecosystem?*

In order to answer this question, the GEI and its three innovation-related pillar values were investigated in this paper. Since GEI is an annually calculated index, here, we applied the average values for 2012–2016 to filter out annual variations and potential sampling errors. First, we analyze the connection between GEI scores and the level of development. Second, to have a deeper insight into the role of innovation within different ecosystems, we compare the three GEI sub-indexes and the three innovation-related pillars of GEI (technology absorption, product innovation, and process innovation) (Table 3). The *Technology Absorption* pillar reflects the technology-intensity of a country's start-up activity combined with a country's capacity for firm-level technology absorption. The *Product Innovation* pillar captures the tendency of entrepreneurial firms to create new products weighted by the technology transfer capacity of a country. Finally, the *Process Innovation* pillar refers to the use of new technologies by start-ups combined with the potential of a country to conduct applied research.

Although the latest version of the GEI report contains 137 countries, our investigation applies average data for a five-year period. Therefore, some countries have been excluded due to missing data so our analysis includes 95 countries altogether. Countries are classified based on their level of economic development as *resource-*, *efficiency- and innovation-driven* economies (see the list of countries in Table 4). The first group (19 countries) involves countries whose GDP per capita is in the lowest third. Their economies are based mostly on the exploitation of different natural resources. Efficiency-driven countries have a moderate level of economic development (42 countries). They show a higher level of economic development compared to resource-driven economies. Innovation-driven countries (34 countries) represent a relatively high level of economic development, as their economies operate relatively efficiently compared to the other groups. Their development path is based on innovation and new products mostly. This suggests that innovation may have a more important role in those countries' entrepreneurial ecosystems, who have higher level of development. A fourth group is a special cluster that has been created involving post-socialist transition countries[2] (16 countries). Most of its members belong to efficiency-driven economies, a few

[2] "Transition" refers to those countries whose political and economic systems changed from the socialist political system and planned economy to a democratic political structure and market economy.

Table 2. **The Structure of the Global Entrepreneurship Index (GEI)**

Sub-indexes	Pillars	Variables (individual/institutional)
Attitudes sub-index	Opportunity perception	*Opportunity recognition*
		Freedom and property
	Startup skills	*Skill perception*
		Education
	Risk acceptance	*Risk perception*
		Country risk
	Networking	*Know entrepreneurs (knowent)*
		Connectivity
	Cultural support	*Carrier status (carstat)*
		Corruption
Abilities sub-index	Startup opportunities	*Opportunity motivation*
		Tax governance
	Technology absorption	*Technology level (techsect)*
		Technology absorption
	Human capital	*High education*
		Labor market
	Competition	*Competitors*
		Competitiveness and regulation
Aspirations sub-index	Product innovation	*New product*
		Technology transfer
	Process innovation	*New technology*
		Science
	High growth	*Gazelle*
		Finance and strategy
	Internationalization	*Export*
		Economic complexity
	Risk capital	*Informal investment*
		Depth of the capital market

Note: Individual variables are highlighted in italics, while institutional ones in bold.

Source: compiled by the authors.

members are innovation-driven countries (Czech Republic, Estonia, Slovakia, and Slovenia) and only one member can be considered a resource-driven country (Kazakhstan).

Results: Analyzing Innovation's Role in National Entrepreneurial Ecosystems

First, we analyzed the relationship between GEI and the innovation-related pillar scores. We conducted a correlation analysis between the GEI super index and its three innovation-related pillars. The results suggest that all coefficients are relatively high (strong-medium) and indicate the relationship between the pillars of the entrepreneurial ecosystem. Only small differences among the coefficients of the innovation-related pillars can be observed (Table 5).

In order to obtain a deeper understanding of the role of innovation within the entrepreneurial ecosystem, the aforementioned four groups of the countries were compared to each other by the scores of innovation GEI pillars[3]. The values of innovation pillars in the four groups were compared to each other (Figure 1). The resource-driven countries have the

[3] While GEI and its sub-index scores are measured on a 0 to 100 scale, a 0 to 1 scale is applied in the case of the pillars.

Table 3. **The Innovation-Related Pillars of GEI**

Pillar	Components of individual variables	Components of institutional variables
Technology Absorption	Technology Level: Percentage of the nascent and young firms that are active in technology sectors (high or medium) (Source: Global Entrepreneurship Monitor)	Firm-level technology absorption capability (Source: World Economic Forum)
Product Innovation	Percentage of the nascent and young firms offering products that are new to at least some customers (Source: Global Entrepreneurship Monitor)	A complex measure of innovation including investment in research and development (R&D) by the private sector, the presence of high-quality research institutions, collaboration in research between universities and industry, and the protection of intellectual property. (Source: World Economic Forum)
Process Innovation	Percentage of the TEA businesses using new technology that is less than five years old on average (including one year) (Source: Global Entrepreneurship Monitor)	A complex measure of national conditions of science including Gross domestic Expenditure on Research & Development (GERD) as a percentage of GDP, the quality of scientific research institutions, and the availability of scientists and engineers. (Sources: World Economic Forum and Eurostat)

Source: compiled by the authors.

lowest values for all three pillars. However, this group is relatively closer to the other clusters in product innovation than in the case of the two other pillars. A similar trend could be observed in the case of efficiency-driven countries. The values of *Technology Absorption* and *Process Innovation* pillars are higher than those of resource-driven countries, but these are relatively low compared to the value of *Product Innovation*. Innovation-driven countries have the highest innovation pillar scores compared with the other groups. In our case, the transition countries have moderate scores in *Technology Absorption* and *Process Innovation*, albeit they are higher than the values of resource- and efficiency-driven groups. In the case of *Product Innovation*, the same trend can be observed in other groups. The value of transition countries is almost equal to the value of efficiency-driven countries, but it lags behind the score of the innovation-driven group.

We compared the GEI and its pillar scores of certain countries in each of the four groups (Table 6). *Resource-driven* countries are mostly in the lowest third of the sample. *For them, innovation seems to be a hindering bottleneck*. This is the case in Botswana and Kazakhstan since their GEI scores are relatively higher than their innovation pillar scores. India suggests a slightly different pattern since its *Technology Absorption* score is one of the lowest in the whole Asian region, which may indicate the underdeveloped industry structure of the economy. However, the *Product* and *Process Innovation* pillars imply that India has a relatively strong performance in innovation.

Efficiency-driven countries have *moderate GEI scores* compared to the other groups and *their pillar values suggest a mixed picture*. It can be observed that all of the involved countries demonstrate *outstanding performance in Product Innovation*, but the position of the two other innovation pillars lag behind. *Technology Absorption* seems to be one of the bottlenecks in the Chinese entrepreneurial ecosystem. The *innovation-driven countries have the best GEI scores* within the whole sample which suggests that their entrepreneurial ecosystems and their components demonstrate relatively good performance. However, a few outlier pillars can be observed in their case as well, as it is suggested by Australia's position in *Product Innovation*. Our special group, the *transition countries* also indicate *a mixed picture*, since there are relatively large differences in

Table 4. **Countries According to Their Level of Development**

Type of economy	Countries
Resource-driven countries	Algeria, Angola, Bolivia, Botswana, Burkina Faso, Cameroon, Ethiopia, Ghana, India, Kazakhstan, Libya, Malawi, Nigeria, Pakistan, Philippines, Senegal, Uganda, Vietnam, Zambia
Efficiency-driven countries	Argentina, Barbados, Belize, Bosnia and Herzegovina, Brazil, Bulgaria, Chile, China, Colombia, Costa, Rica, Croatia, Ecuador, Egypt, El Salvador, Georgia, Guatemala, Hungary, Indonesia, Iran, Jamaica, Jordan, Latvia, Lebanon, Lithuania, Macedonia, Malaysia, Mexico, Morocco, Namibia, Panama, Peru, Poland, Romania, Russia, Saudi, Arabia, South, Africa, Suriname, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uruguay
Innovation-driven countries	Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong (China), Ireland, Israel, Italy, Japan, Korea, Luxembourg, Netherlands, Norway, Portugal, Puerto Rico, Qatar, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Taiwan, United Arab Emirates, United Kingdom, United States
Transition countries	Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Latvia, Lithuania, Macedonia, Poland, Romania, Russia, Slovakia, Slovenia

Source: compiled by the authors.

Table 5. **The Results of Correlation Analysis between the GEI Score and Three Innovation Pillars**

	GEI score	Technology Absorption	Product Innovation	Process Innovation
GEI score	1			
Technology Absorption	0.869	1		
Product Innovation	0.724	0.601	1	
Process Innovation	0.761	0.778	0.659	1

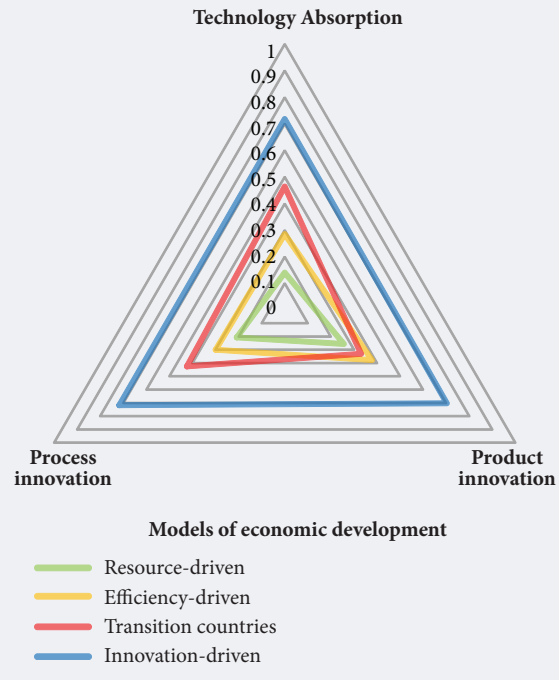
Source: compiled by the authors.

the performance of the entrepreneurial ecosystem despite having the same level of GDP per capita. It can, however, be observed across the sample that the *Product Innovation pillar has a much lower position than other innovation pillars and GEI scores*. This suggests that *Product Innovation is a general bottleneck* in the entrepreneurial ecosystem of transition countries, and it may indicate to the low performance in research and development at private firms in transition countries.

Finally, we conducted k-means cluster analysis to demonstrate whether countries with the same level of development are ranked in a common group if they are clustered by the values of the three innovation pillars. We ran the cluster analysis with different configurations and tested[4] them. In the end, we selected the solution with four groups (Table 7, Table 8).

Cluster 1 involves about the half of the countries. Its members are only *resource- and efficient-driven countries*. This group has the lowest values in all of the innovation pillars and according to the GEI score. This low value can be explained by the lack of basic conditions for innovative capacities. However, the score of entrepreneurial attitudes is relatively high compared to the other sub-index values. *Cluster 2* is a quite mixed group in terms of the level of economic development. Its Aspirations sub-index value is relatively high compared to the two other sub-indexes and its score in *Product Innovation* is significantly higher than the values of other innovation pillars. Besides the score of the Product Innovation pillar, the values of the High Growth pillar contribute to the relatively high sub-index score. Indeed, a couple of efficiency-driven countries like China or Turkey have an outstanding score in Product Innovation even though their overall GEI scores represent only a moderate entrepreneurial ecosystem. Cluster 3 represents the opposite trend. Its *Technology Absorption* and *Process Innovation* scores are relatively high, but the *Product Innovation* value is relatively low. Although there is not too much variation in the economic performance of Cluster 2 and 3, the role of innovation in these groups seems to be quite different. *Technology Absorption* and *Process Innovation* refer to the high-tech firms and employment in high tech and knowledge-intensive sectors, as well as the technology level of firms and the availability of scientists. *Product Innovation* indicates the number of patents. It may mean that countries in Cluster 2 focus rather on research and development, but the results of this effort cannot be exploited by new and productive firms. On the other hand, *Product Innovation* seems to be a bottleneck in countries of Cluster 3. Cluster 4 involves only innovation-driven countries, which are the most developed ones. Their innovation pillar values are relatively in balance, which may mean

Figure 1. **The Values of GEI Innovation Pillars of Country Groups Based on Varying Levels of Economic Development**



Source: compiled by the authors.

[4] Three different tests have been run: Calinski-Harabasz pseudo F-test, analysis of variance (ANOVA), and Bartlett test.

Table 6. **Country-Level Comparison within the Development Groups (Values)**

	Resource-driven countries			Efficiency-driven countries			Innovation-driven countries			Transition countries		
	Botswana	India	Kazakhstan	Chile	China	Turkey	Australia	Switzerland	United States	Estonia	Hungary	Russia
GEI	34.3	26.3	30.0	59.0	35.9	45.0	74.9	78.9	82.5	56.0	39.4	24.7
1. Opportunity Perception	0.753	0.288	0.272	0.925	0.132	0.399	0.957	0.732	0.875	0.828	0.314	0.133
2. Startup Skills	0.276	0.198	0.427	0.894	0.184	0.688	1.000	0.688	1.000	0.657	0.335	0.353
3. Risk Perception	0.635	0.385	0.132	0.751	0.509	0.250	0.705	0.922	0.936	0.620	0.406	0.273
4. Networking	0.393	0.125	0.547	0.770	0.461	0.390	0.580	0.563	0.521	0.515	0.338	0.419
5. Cultural Support	0.760	0.184	0.213	0.719	0.299	0.414	0.769	0.680	0.838	0.540	0.364	0.150
6. Startup Opportunities	0.384	0.292	0.369	0.684	0.250	0.365	0.867	0.925	0.753	0.567	0.438	0.215
7. Technology Absorption	0.232	0.045	0.114	0.504	0.200	0.490	0.847	0.939	0.852	0.664	0.519	0.276
8. Human Capital	0.408	0.310	0.791	0.577	0.419	0.336	0.931	0.836	1.000	0.485	0.471	0.683
9. Competition	0.365	0.626	0.239	0.433	0.300	0.361	0.594	0.950	0.983	0.615	0.269	0.185
10. Product Innovation	0.204	0.644	0.215	1.000	0.878	0.925	0.560	0.828	0.804	0.569	0.278	0.151
11. Process Innovation	0.146	0.574	0.167	0.301	0.647	0.402	0.772	0.856	0.922	0.681	0.441	0.310
12. High Growth	0.510	0.187	0.554	0.702	0.607	0.797	0.651	0.599	1.000	0.586	0.456	0.379
13. Internationalization	0.273	0.288	0.303	0.480	0.252	0.391	0.675	1.000	1.000	0.697	0.748	0.066
14. Risk Capital	0.131	0.144	0.329	0.608	0.756	0.762	1.000	1.000	1.000	0.333	0.342	0.221
GDP per Capita	15 271	5578	23 509	22 160	12 765	21 871	43 881	56 395	51 884	26 772	23 946	24 732

Note: Innovation-related pillars are written italics. The better a country performs in a certain pillar, the darker the shade of green.
Source: compiled by the authors.

that innovation does not serve as a bottleneck in their entrepreneurial ecosystem. In summary, it can be concluded that innovation has an important role in the entrepreneurial ecosystem, but the intensity of this role can be very varied among countries.

Conclusion

The aim of our paper was to examine the role of innovation within the national Entrepreneurial Ecosystem. In this way, we aimed to uncover the differences in the innovative performance of the selected countries. The GEI index and its three innovation pillars (Technology Absorption, Product Innovation, and Process Innovation) were applied for this investigation. Altogether 95 countries were involved in our analysis. Countries were initially grouped by their level of development and one special group was created that involved transition countries.

Our results suggest that the quality of the entrepreneurial ecosystem reflects the level of economic development. Innovation-driven countries have the highest GEI scores. Besides the high level of GEI

Table 7. **Groups of Countries according to their Cluster Membership**

Cluster 1	Algeria, Angola, Argentina, Barbados, Belize, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina, Faso, Cameroon, Costa, Rica, Ecuador, Egypt, El Salvador, Ethiopia, Georgia, Ghana, Indonesia, Iran, Jamaica, Kazakhstan, Libya, Macedonia, Malaysia, Mexico, Namibia, Nigeria, Pakistan, Panama, Peru, Philippines, Puerto, Rico, Romania, Russia, Saudi Arabia, Senegal, Suriname, Thailand, Trinidad and Tobago, Uganda, Uruguay, Vietnam, Zambia
Cluster 2	Bolivia, Chile, China, Colombia, Cyprus, Guatemala, Hong Kong, India, Jordan, Lebanon, Malawi, Morocco, Poland, Qatar, South Africa, Turkey, United Arab Emirates
Cluster 3	Croatia, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Norway, Portugal, Slovakia, Slovenia, Spain, Tunisia
Cluster 4	Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Netherlands, Singapore, Sweden, Switzerland, Taiwan, United Kingdom, United States

Source: compiled by the authors.

Table 8. **Clustering of Countries by their Innovation Pillar Values**

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Number of Members	44	17	13	21
Technology Absorption	0.199	0.287	0.615	0.831
Product Innovation	0.233	0.744	0.384	0.798
Process Innovation	0.208	0.437	0.541	0.824
Attitudes	27.5	36.6	42	61.3
Abilities	25.2	34.7	45.6	67.9
Aspirations	21.7	43.8	45.8	67.5
GEI score	24.8	38.4	44.5	65.6
GDP per Capita	12 928	25 133	27 607	46 345

Source: compiled by the authors.

scores, *their pillar values seem to be relatively balanced* and *this points to the high quality of the entrepreneurial ecosystem*. Despite having a similar level of economic development, the efficiency-driven countries have *rather heterogeneous entrepreneurial ecosystems*. They have moderate performance in their GEI scores. The resource-driven countries involve the lowest level of development and have the lowest GEI scores. Most of the pillar values are in the lowest third of the sample as well, o*nly a few pillars occupy a higher position than the GEI score*. The transition countries offer the most variegated picture in the entrepreneurial ecosystem due to *the very different development paths of these countries since the 1990s.* Not any pillar or group of pillars (including innovation-related pillars) have a dominant role in these countries, but the pillar scores in these countries are significantly below the potential performance determined by the level of economic development. According to the GEI scores, Baltic countries and a few Central European countries (Slovenia, Czech Republic, and Slovakia) have rather successful development paths.

Regarding the role of innovation, it seems that the innovation pillars have an important role within the entrepreneurial ecosystem. *Technology Absorption* is highly related to the GEI score and level of economic development since the most developed countries have the highest values for this pillar. The *Product and Process Innovation* pillars have a relatively strong relationship with the GEI score as well. However, it seems that a couple of countries have higher pillar values than their GEI scores might suggest (like China, Turkey, or India). *This may indicate that these countries have relatively good performance in research and development, but other components of their entrepreneurial ecosystem hamper the exploitation of the results by new firms.*

Although GEI serves as an adequate basis for assessing a country's entrepreneurial ecosystem, it has to be noted that the GEI three sub-indexes of attitudes, abilities, and aspiration, their 14 pillars, 28 variables, and 49 indicators only partially capture the National System of Entrepreneurship, which limits its general use for policy purposes. Besides the analysis with the application of GEI, further case studies and empirical research might be useful in order to investigate those strengths and weaknesses that were identified in detail.

Eva Komlosi was supported by the Higher Education Institutional Excellence Programme of the Ministry for Innovation and Technology in Hungary, within the framework of the fourth thematic program "Enhancing the Role of Domestic Companies in the Reindustrialization of Hungary" of the University of Pecs. Balazs Pager and Gabor Markus were supported by OTKA-K-120289 entitled "Entrepreneurship and competitiveness in Hungary based on the GEM surveys 2017-2019", the authors give thanks for it.

References

Acs J.Z., Stam E., Audretsch D.B., O'Connor A. (2017) The lineages of the entrepreneurial ecosystem approach. *Small Business Economics*, vol. 49, no 1, pp. 1–10.

Acs Z.J., Audretsch D.B., Feldman M. (1994) R&D Spillovers and recipient firm size. *Review of Economics and Statistics*, vol. 76, no 2, pp. 336–340.

Ács Z.J., Autio E., Szerb L. (2014) National Systems of Entrepreneurship: Measurement issues and policy implications. *Research Policy*, vol. 43, no 3, pp. 476–494.

Acs Z.J., Szerb L. (2011) *Global Entrepreneurship and Development Index 2011*, Cheltenham (UK), Northampton, MA (US): Edward Elgar.

Acs Z.J., Szerb L. (2012) *Global Entrepreneurship and Development Index 2012*, Cheltenham (UK), Northampton, MA (US): Edward Elgar.
Acs Z.J., Szerb L., Lafuente E., Lloyd A. (2018) *Global Entrepreneurship and Development Index 2018*, Heidelberg, Dordrecht, London, New York: Springer.
Acs Z.J., Varga A. (2002) Geography, endogenous growth and innovation. *International Regional Science Review*, vol. 25, no 1, pp. 132–148.
Acs Z.J., Szerb L. (2016) *Extension of the GEDI-indicator* (FIRES report), Utrecht: University of Utrecht. Available at: https://projectfires.eu/wp-content/uploads/2018/07/d4.1-report-on-extension-of-the-gedi-indicator.pdf, accessed 24.02.2019.
Alvedalen J., Boschma R. (2017) A critical review of entrepreneurial ecosystems research: Towards a future research agenda. *European Planning Studies*, vol. 25, no 6, pp. 887–903.
Anselin L., Varga A., Acs J.Z. (1997) Local geographic spillovers between university research and high technology innovations. *Journal of Urban Economics,* vol. 42, no 3, pp. 422–448.
Audretsch D., Feldman M.P. (2004) Knowledge spillovers and the geography of innovation. *Handbook of Regional and Urban Economics, Cities and Geography* (eds. J.V. Henderson, J.-F.Thisse), vol. 4, Amsterdam: Elsevier, pp. 2713–2739.
Boschma R. (2005) Proximity and Innovation: Critical Assessment. *Regional Studies*, vol. 39, no 1, pp. 61–74.
Carlsson B. (2006) Internationalization of innovation systems: A survey of the literature. *Research Policy,* vol. 35, no 1, pp. 56–67.
Carlsson B., Jacobsson S., Holmén M., Rickne A. (2002) Innovation systems: Analytical and methodological issues. *Research Policy*, vol. 31, no 2, pp. 233–245.
Cavallo A. Ghezzi A., Balocco R. (2018) Entrepreneurial ecosystem research: Present debates and future directions. *International Entrepreneurship Management Journal.* DOI: 10.1007/s11365-018-0526-3. Available at: https://www.researchgate.net/profile/Angelo_Cavallo/publication/325563401_Entrepreneurial_ecosystem_research_present_debates_and_future_directions/links/5b1909ec45851587f2986cc4/Entrepreneurial-ecosystem-research-present-debates-and-future-directions.pdf?origin=publication_detail, accessed 15.02.2019.
Coase R.H. (1992) The Institutional Structure of Production. *American Economic Review,* vol. 82, no 4, pp. 713–719.
Coase R.H. (1998) The New Institutional Economics. *American Economic Review*, vol. 88, no 2, pp. 72–74.
Cooke P. (2001) Regional Innovation Systems, Clusters, and Knowledge Economy. *Industrial and Corporate Change*, vol. 10, no 4, pp. 945–974.
Dosi G. (1988) The Nature of the Innovation Process. *Technical Change and Economic Theory* (eds. G. Dosi, C. Freeman, R. Nelson, G. Silverberg, L. Soete), London: Pinter, pp. 221–238.
Edquist C. (ed.) (1997) *Systems of Innovation: Technologies, Institutions and Organizations*, London: Pinter Publishers.
Feldman M.P. (1999) The New Economics of Innovation, Spillovers and Agglomeration: A Review of Empirical Studies. *Economics of Innovation and New Technology*, vol. 8, no 12, pp. 5–25.
Freeman C. (1982) *The Economics of Industrial Innovation* (2nd ed.), Cambridge, MA: MIT Press.
Freeman C. (1995) The 'National System of Innovation' in historical perspective. *Cambridge Journal of Economics*, vol. 19, no 1, pp. 5–24.
Freeman C. (2002) Continental, National and Sub-national Innovation Systems – Complementarity and Economic Growth. *Research Policy,* vol. 31, no 2, pp. 191–211.
Jaffe A.B. (1989) Real Effects of Academic Research. *American Economic Review*, vol. 79, no 5, pp. 957–970.
Jaffe A.B., Trajtenberg M. (2002) *Patents, Citations, and Innovations: A Window on the Knowledge Economy*, Cambridge, MA: MIT Press.
Lucas R. (1988) On the Mechanics of Economic Development. *Journal of Monetary Economics*, vol. 22, no 1, pp. 3–42.
Lundvall B.-Å. (1988) Innovation as an Interactive Process – from User-Producer Interaction to the National System of Innovation. *Technical Change and Economic Theory* (eds. G. Dosi, C. Freeman, R. Nelson, G. Silverberg, L. Soete), London: Pinter, pp. 349–370.
Lundvall B.-Å. (1992) (ed.) *National Systems of Innovation: Toward a Theory of Innovation and Interactive Learning*, London: Pinter.
Lundvall B.-Å., Johnson B., Sloth E., Dalum A.B. (2002) National systems of production, innovation and competence building. *Research Policy*, vol. 31, no 2, pp. 213–231.
Mack E., Mayer H. (2016) The evolutionary dynamics of entrepreneurial ecosystems. *Urban Studies,* vol. 53, no 10, pp. 2118–2133.
Malecki E.J. (2018) Entrepreneurship and entrepreneurial ecosystem. *Geography Compass,* vol. 12, pp. 1–21.
Mason C., Brown R. (2014) *Entrepreneurial ecosystems and growth oriented entrepreneurship* (Background paper prepared for the workshop organised by the OECD LEED Programme and the Dutch Ministry of Economic Affairs on Entrepreneurial Ecosystems and Growth Oriented Entrepreneurship, The Hague, Netherlands), Paris: OECD.
Motoyama Y., Knowlton K. (2016) From resource munificence to ecosystem integration: The case of government sponsorship in St. Louis. *Entrepreneurship & Regional Development*, vol. 28, no 5–6, pp. 448–470.
Neck H.M., Meyer G.D., Cohen B., Corbett A.C. (2004) An entrepreneurial system view of new venture creation. *Journal of Small Business Management*, vol. 42, no 2, pp. 190–208.
Nelson R.R. (1993) *National Innovation Systems: A Comparative Analysis*, Oxford: Oxford University Press.
North D. (1989) Institutions and economic growth: A historical introduction. *World Development,* vol. 17, no 9, pp. 1319–1332.
North D. (1990) *Institutions, Institutional Change and Economic Performance,* Cambridge: Cambridge University Press.

North D.C. (1991) Institutions. *Journal of Economic Perspective*, vol. 5, no 1, pp. 97–112.
Qian H. (2018) Knowledge-Based Regional Economic Development: A Synthetic Review of Knowledge Spillovers, Entrepreneurship, and Entrepreneurial Ecosystems. *Economic Development Quarterly*, vol. 32, no 2, pp. 163–176.
Qian H., Jung H. (2017) Solving the knowledge filter puzzle: Absorptive capacity, entrepreneurship and regional development. *Small Business Economics*, vol. 48, pp. 99–114.
Qian H., Acs Z.J. (2013) An absorptive capacity theory of knowledge spillover entrepreneurship. *Small Business Economics*, vol. 40, pp. 185–193.
Rebelo S. (1991) Long Run Policy Analysis and Long Run Growth. *Journal of Political Economy,* vol. 99, no 3, pp. 500–521.
Ritala P., Gustafsson R. (2018) Q&A. Innovation and Entrepreneurial Ecosystem Research: Where Are We Now and How Do We Move Forward?. *Technology Innovation Management Review,* vol. 8, no 7, pp. 52–57.
Romer M.P. (1986) Increasing returns and long-run growth. *Journal of Political Economy*, vol. 94, no 5, pp. 1002–1037.
Roundy P.T. (2019) Rust belt or revitalization: Competing narratives in entrepreneurial ecosystems. *Management Research Review*, vol. 42, no 1, pp. 102–121.
Roundy P.T., Bradshaw M., Brockman B.K. (2018) The emergence of entrepreneurial ecosystems: A complex adaptive systems approach. *Journal of Business Research*, vol. 86, pp. 1–10.
Roundy P.T., Brockman B.K., Bradshaw M. (2017) The resilience of entrepreneurial ecosystems. *Journal of Business Venturing Insights*, vol. 8, pp. 99–104.
Spigel B., Harrison R. (2018) Toward a process theory of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal*, vol. 12, no 1, pp. 151–168.
Stam E. (2015) Entrepreneurial Ecosystem and Regional Policy: A Sympathetic Critique. *European Planning Studies*, vol. 23, no 9, pp. 1759–1769.
Stam E., Spigel B. (2016) *Entrepreneurial Ecosytem* (USE Discussion Paper 16-13), Utrecht: University of Utrecht.
Varga A. (1998) *University research and regional innovation: A spatial econometric analysis of academic knowledge transfer*, Boston, MA: Kluwer Academic Publisher.
Varga A. (2000) Local academic knowledge spillovers and the concentration of economic activity. *Journal of Regional Science*, vol. 40, no 2, pp. 289–309.
Whitley R. (1994) Societies, Firms and Markets: The Social Structuring of Business Systems. *European Business Systems* (ed. R. Whitley), London: Sage Publications, pp. 5–45.
Whitley R. (1996) The Social Construct of Economic Actors: Institutions and Types of Firms in Europe and Other Market Economies. *The Changing European Firm* (ed. R. Whitley), London: Routledge, pp. 39–66.
Williamson O.E. (1985) *The Economic Institutions of Capitalism*, New York: Macmillan.
Williamson O.E. (2000) The New Institutional Economics: Taking Stock, Looking Ahead. *Journal of Economic Literature*, vol. 38, no 3, pp. 595–613.
Wixted B. (2009) *Innovation System Frontiers: Cluster Networks and Global Value*, Berlin, Heidelberg: Springer Verlag.
Zhang C., Guan J. (2017) How to identify metaknowledge trends and features in a certain research field? Evidences from innovation and entrepreneurial ecosystem. *Scientometrics*, vol. 113, no 2, pp. 1177–1197.

Developing Local Entrepreneurship Ecosystems by Foreign Investment

Alise Mačtama
PhD student, alise.mactama@inbox.lv

RISEBA University College of Business, Arts and Technology; Meza street 3, Riga, LV 1048, Latvia

Arnis Sauka
Professor of Entrepreneurship and Business Management, Head of the Centre for Sustainable Business, arnis.sauka@sseriga.edu

Stockholm School of Economics in Riga; Strelnieku street 4a, Riga, LV 1002, Latvia

Abstract

The importance of foreign direct investment in transition economies has significantly increased over the last several decades. Foreign investors are recognized as important drivers shaping the local entrepreneurial ecosystem. This paper aims to explore investors' satisfaction with the factors previously identified as important for improving entrepreneurial ecosystems, that is, factors that both positively contribute to the development of local businesses as well as generate further foreign investment flow. Empirically we draw upon small case studies with managers of 38-42 key foreign investor companies in Latvia conducted in 2015, 2016, 2017, and 2018. In the first data collection wave, we identify key challenges that foreign investors face in Latvia. In the following data collection waves, we measure the development in the identified areas of concern and thus the overall entrepreneurial ecosystem of Latvia. Given that Latvia is a transition country in the advanced stage of development, the focus is on issues related to productivity and value added, including the availability of high quality labor force, the efficiency of public sector, and favorable tax regimes as well as challenges posed by unethical and illegal behavior, labor shortages, and elements of uncertainty. Our results suggest that foreign investors see a number of challenges within the all afore-mentioned areas that are important parts of the entrepreneurial ecosystem. Moreover, our findings suggest that progress with regards to the improvement of certain areas such as those mentioned previously from the viewpoint of foreign investors, was relatively slow during the period of 2015-2018. Our key contribution is providing with an in- depth analysis of factors shaping the entrepreneurial ecosystem in an advanced transition economy-from the viewpoint of foreign direct investors. We explore investors' opinions with regard to the investment climate to summarize investors' suggestions on how the entrepreneurial ecosystem in Latvia could be further developed. Our findings provide a scope for tailor-made, targeted policy recommendations to achieve these goals.

Keywords: foreign direct investment; entrepreneurship ecosystem; investment climate; transition economies

Citation: Mačtama A., Sauka A. (2019) Developing Local Entrepreneurship Ecosystems by Foreign Investment. *Foresight and STI Governance*, vol. 13, no 4, pp. 35–46. DOI: 10.17323/2500-2597.2019.4.35.46

The entrepreneurial ecosystem is a very complex system where various resources complement one another. For example, entrepreneurial education may support capital formation and capital formation may support government reform [*Isenberg,* 2010]. In transition economies, entrepreneurial ecosystems may also differ because certain resources were not available in various countries during the Soviet period. In this context, foreign direct investment plays a significant role in helping to fill the gaps and building an environment where such an entrepreneurial ecosystem can develop sustainably.

Each entrepreneurial ecosystem emerges under a unique set of conditions and circumstances. Often the same factors are equally important for the development of a sustainable foreign direct investment climate. Namely, the entrepreneurial ecosystem and foreign direct investment development may stimulate each other, because many entrepreneurial ecosystems are heavily mediated by foreign direct investment, which strongly resembles a truncated model [*Mason, Brown,* 2014].

The creation of regimes that encourage a sustainable and healthy investment environment has been set as a key priority for numerous countries around the globe [*Coe, Helpman,* 1994]. This includes countries that were formerly under Soviet control and only relatively recently regained their independence, some of them moving toward well-functioning market economies (see [*Sauka, Chepurenko,* 2017] for further discussion). It has been recognized that in such environments foreign direct investment plays a particularly significant role in reinforcing insufficient domestic funds to finance both ownership alteration and capital composition. Furthermore, foreign direct investment, as sound long-term capital inflow, may significantly contribute to introducing technology, managerial know-how and skills required for restructuring companies in transition economies [*Popescu,* 2014]. Needless to say, all these aspects are critical for the development of local entrepreneurial ecosystems.

Transition environments, depending on the stages of development, are often associated with uncertainty [*Smallbone, Welter,* 2006], constantly changing formal institutions, and not properly adapted informal norms [*North,* 1990]. This makes attracting and retaining foreign investors more challenging. Recognizing entrepreneurship as a context-specific phenomenon [*Davidsson,* 2004; *Smallbone, Welter,* 2001], this exploratory paper aims to contribute to the ongoing debate by exploring the key factors influencing the entrepreneurial ecosystem and investment climate in Latvia, a country that was formerly a part of the Soviet Union and joined the European Union in 2004.

Similar to many other countries, foreign investors play a significant role in Latvia with regard to the development of the local entrepreneurial ecosystem and thus economic development. According to official statistics [CSB, 2017], one fifth of all companies in Latvia can be classified as foreign-owned.[1] The revenue of these companies is approximately one half of the total turnover of all companies in Latvia. They employ 27% of the total workforce and contribute 48% of all tax payments. According to Bank of Latvia, the inflow of foreign investment in Latvia has been increasing relatively slowly since 2013[2]. One of the reasons for this could be the dissatisfaction of existing and potential foreign investors with factors shaping a favorable investment climate and entrepreneurial ecosystem, including human capital (education and labor), support services (infrastructure, etc.), and culture (social norms, etc.), as identified by [*Isenberg,* 2011]. In this study we aim to explore investors' satisfaction with those factors, with the assumption that improving foreign investors' satisfaction in certain problem areas will lead to both more investment and a better entrepreneurial ecosystem.

Empirically this paper draws on mini case studies: in-depth expert interviews with major foreign investors in Latvia, conducted in 2015, 2016, 2017, and 2018. We aim to explore investors' opinions with regard to the Latvian investment climate[3]. We also address investors' viewpoints on the strengths of the investment climate in Latvia and summarize investors' suggestions on how the investment climate could be improved.

More specifically, during the first data collection wave we identified the key challenges foreign investors face in Latvia, that is, the potential shortcomings within the entrepreneurial ecosystem of Latvia from an investment standpoint. In the following three data collection waves, we then assessed whether there are any positive developments in areas of concern and the overall entrepreneurial ecosystem of Latvia. Latvia is a transition country in an advanced stage of development [*Sauka, Chepurenko,* 2017] with a relatively mature market economy, which is arguably a result of entering the EU and NATO (2004) as well as joining OECD (2016). Therefore our proposal is that investors will mostly be concerned with issues related to productivity and value added, including the availability of a high quality workforce, the efficiency of the public sector (such as using e-tools in the communication, etc.), and favorable tax regimes. Yet we also

[1] Foreign investors here are defined as companies with at least 145,000 EUR revenue and at least a 50% share of foreign ownership.

[2] See: http://www.liaa.gov.lv/en/invest-latvia/investor-business-guide/foreign-direct-investment, accessed 29.05.2019.

[3] As 'investment climate' is a more appropriate term for use in non-academic conversation, we are using this term as a substitute for a more complex term, 'entrepreneurial ecosystem'.

expect issues such as unethical and illegal behavior [*Putnins, Sauka,* 2015], labor shortages, and elements of uncertainty, especially with regards to the tax system [EBRD, 2016; 2017]. Finally, given that Latvia is a small and open economy, we propose that over the period of four years when data was collected, we will see the significant development of the entrepreneurial ecosystem of Latvia from the viewpoint of foreign investors.

The paper proceeds as follows. The next section reviews existing studies that address the state and development of the investment climate in various contexts. We first explore literature that addresses the impact of foreign investment on economic growth and local entrepreneurial ecosystems, then summarize key studies on the incentives for attracting foreign investors. We then proceed by exploring the impact of the economic environment on foreign direct investment and conclude with a brief description of the development of the investment climate in Latvia. In the third section we introduce the methodology, which is followed by the results section. The paper concludes with suggestions and policy implications. By doing so, we aim to provide up-to-date empirical evidence on the state of the investment climate in Latvia, thus providing scope for context-specific policy suggestions on the improvement of the investment climate and the development of the local entrepreneurial ecosystem in Latvia and other transition countries.

Conceptual Framework

Foreign Investment, the Local Entrepreneurial Ecosystem and Economic Growth

Daniel Isenberg categorizes factors contributing to a favorable entrepreneurial ecosystem into six domains: (i) politics (government, R&D, leadership), (ii) finance (capital), (ii) culture (social norms, success stories), (iv) support services (non-governmental institutions, support professions, infrastructure, geo-location), (v) human capital (education, labor) and (vi) markets (entrepreneurs, network) [*Isenberg,* 2011]. These factors are connected in formal or informal way [*Mason, Brown,* 2014].

A large number of studies [*Blomstrom, Kokko,* 2003; *Gorg, Hijzen,* 2004; *Liu,* 2008; *Barbosa, Eiriz,* 2009] have aimed to explore the impact of foreign direct investment upon the development of local entrepreneurial ecosystems and economic growth. The findings reported by various studies are, however, somewhat mixed. Namely, some studies argue that countries with a relatively high dependence upon foreign capital exhibit slower economic growth than less dependent countries. Foreign investment has an initial positive effect on growth but in the long run the dependence on foreign investment exerts a negative effect on economic development [*Dixon, Boswell,* 1996]. In other words, it can lead to a situation where foreigners want to control the economy and influence national security [*Rivera-Batiz, Oliva,* 2003]. Negative externalities such as unemployment, over-urbanization, and income inequality perpetuate the problem [*Almfraji, Almsafir,* 2014].

Some studies, however, have not found evidence of any significant impact of foreign direct investment upon economic growth and thus consider the effect either neutral or weak [*de Mello,* 1999; *Manuchehr, Ericsson,* 2001; *Carkovic, Levine,* 2002]. Yet some recent studies find that foreign investment has a major positive impact on the development of the local entrepreneurial ecosystem. Creating new, often better jobs, bringing in know-how and generating innovations, and offering better products at lower prices, especially if the market allows investors to produce at lower prices or in greater volumes [*Lipsey, Sjoholm,* 2004] – these are the key benefits of foreign investors. Other arguments for inviting foreign investors to a particular country include providing access to human resources and the possibility of increasing efficiency and effectiveness [*Devajit,* 2012], thus strengthening the core components of the entrepreneurial ecosystem.

Characteristics of the Entrepreneurial Ecosystem that Attract Foreign Investors

A recent model by Cerrato et al. [*Cerrato et al.,* 2016] identifies the main dimensions or indicators of firms' internationalization: internationalization from the demand side, resources located abroad, geographical scope, international orientation, internationalization of the business network, and financial internationalization.

The legal framework is often highlighted as one of the most important factors determining such choices. But, as the experience of some transitional economies shows, overemphasizing the formal legislation without paying attention to other important aspects of the entrepreneurial ecosystem may lead to poor investment decisions. Moreover, such factors as the cost of resources and the cost of labor in particular might be no less important especially for foreign direct investors seeking to locate manufacturing operations in a global supply chain for a worldwide market [*Bevan et al.,* 2004].

Previous studies also show that physical, cultural and institutional factors matter [*Choi et al.,* 2016]. In particular, such formal institutions as a stable banking sector, foreign exchange and trade liberalization, and the rule of law are all critical elements of the entrepreneurial ecosystem [*Bevan et al.,* 2004].

The knowledge demonstrated by a potential investor about the 'market of interest' has also been emphasized as another factor that can foster investment flow [*Eriksson et al.,* 1997]. One way to attract both internationally oriented companies and firms that may also decide to invest in particular countries is by supplying them with the necessary information about the host country [*Fletcher, Harris,* 2012].

A very important distinction, recently introduced by some scholars, is made between two types of assets – created and natural – which are both important factors for creating a better ecosystem to attract foreign investment. 'Created assets' are factors directly related to the institutional environment, while 'natural assets' include, for instance, the availability of raw material or cheap labor. Several studies show that in most cases 'created assets' are more important for investors than 'natural assets' when it comes to making an investment decision [*Narula, Dunning,* 2000; *Bevan et al.,* 2004]. Namely, existing evidence suggests that foreign investments flow into countries with better institutional infrastructure [*Choi et al.,* 2016]. Thus, speculation about the crucial role of path dependence in establishing entrepreneurial ecosystems is counterproductive, since in developing economies there is still work being done on improving education, research, legal, and regulation systems. Countries, especially transitional ones, may compensate for a deficit of natural assets by improving the conditions for foreign investors.

Foreign Investment and Entrepreneurial Ecosystems: Developed vs. Developing Countries

Transition economies are an interesting and relevant setting to explore the impact of institutions as the entire set of formal and informal institutions was built anew in the early 1990s [*Smallbone, Welter,* 2001]. Even now, in many CIS and CEE countries, including Latvia, the quality of institutions reflects both the legacy of communism and a newly developed ecosystem with private ownership, capital markets, and legal and institutional infrastructure [*Bevan et al.,* 2004].

Indeed, initially the radical economic and political reforms caused virtually all members to experience economic recession at different levels. In many cases, the growth of CEE (and also CIS) countries was driven particularly with the help of external funding [*Sauka, Chepurenko,* 2017]. Also, much of the know-how was 'imported', often arriving in the form of foreign investment, thus considerably improving the local entrepreneurial landscape.

Yet in many countries, including Latvia, the flow of foreign investment became substantial and relatively stable only with the enlargement of the European Union (EU) in the early 2000s, that is, the adoption of many legal norms and higher transparency. These elements are both core aspects of the entrepreneurial ecosystem for investors in the West and lower the transaction costs for 'western' companies entering the CEE or CIS markets [*Bevan et al.,* 2004].

The inflow of foreign investment can facilitate technology transfers from developed to developing countries, which is particularly important within a transition setting. Domestic firms located in transition countries tend to benefit more from the presence of multinational firms because of factors such as the higher absorptive capacity, better technology, and superior marketing skills [*Anwar, Nguyen,* 2011].

A large number of studies explore foreign direct investment's impact upon economic growth, but only some focus on the synergy between foreign direct investment companies and local firms in transitional environments. Recent studies [*Giroud, Scott-Kennel,* 2009; *Anwar, Nguyen,* 2011] show that these two factors together are the real economic drivers that help countries improve the quality of the entrepreneurial ecosystem and thus to increase their competitiveness in the global arena. Local firms have access to local resources, information, and valuable people with innovative ideas, while foreign corporations can provide enormous capital and R&D opportunities to develop businesses across borders. This synergy appears not only within one country, but nowadays can easily be seen between highly developed countries and emerging markets.

Economic liberalization has led many local firms in emerging economies to actively acquire foreign technological and managerial knowledge in order to strengthen their competitive positions [*Chen et al.,* 2016; *Chittoor et al.,* 2009; *Elango, Pattnaik,* 2007; *Xu, Meyer,* 2013]. Factors that enhance competitiveness are connected with more highly skilled employees, more capital intensity, differences in the scale of production and factor combination choices, knowledge, technology development, and other aspects. Overall this fosters the entrepreneurial ecosystem of the respective country and helps foreign direct investment companies develop their businesses and better use locally available resources. For instance, a number of studies on Indonesia show that foreign plants have higher productivity than locally owned plants [*Takki, Ramstetter,* 2003] and that plants that change ownership from local to foreign increase their level of productivity. This means that local firms also 'take advantage' of FDI while increasing their competitiveness and improving their productivity [*Bevan et al.,* 2004].

Methodology

This paper draws on mini case studies – in-depth expert interviews with the CEOs of key foreign investors in Latvia and members of the Foreign Investors' Council of Latvia. The interviews were conducted in four waves: in 2015, 2016, 2017, and 2018. Namely, from September to early November 2018, we interviewed the same 38 (out of 42) companies that took part in the 2017 study. In addition, two new companies joined the sample in 2018. Twenty-eight CEOs took part in the survey in 2015, while 32 took part in 2016. Altogether, the companies (including their

subsidiaries) that were interviewed in 2018 represent more than 30% of the total foreign direct investment in Latvia and contribute to 9% of Latvia's total tax revenue and 18% of total profit while they employ 4% of the total workforce of companies with turnover above EUR 145,000 and 50% foreign capital [CSB, 2017].

In the first wave, in 2015, we started out by asking foreign investors to identify three to five key areas of concern with respect to the sustainable economic development of the investment climate in Latvia (open question). Respondents were also asked to specify any immediate of short-term priorities for development as well as long-term one. Discussion then proceeded with the following question: "Why have you invested in Latvia and, apart from solving the concerns mentioned previously, what would other potential drivers be for you to increase investment in this country?" Whenever possible, the respondents were asked to provide examples illustrating their opinions.

The interviews then continued with investors' evaluations of the key drivers of Latvia's economic competitiveness. We provided investors with a list of the most important factors affecting companies as derived from discussions within the Foreign Investment Council of Latvia Sustainable Economic Development Working Group. Respondents were asked to evaluate these factors on a scale from 1 to 5, where 1 means that Latvia is not competitive with regard to this factor and 5 means that Latvia is very competitive in this area.

Drawing on the results of the 2015 survey, the next three waves aimed to address the following three issues: (i) Do investors see progress with regard to policy initiatives to meet the main challenges identified in 2015?; (ii) What has been done and what still remains to be done (according to the viewpoint of foreign investors in Latvia) to improve the investment climate in Latvia?; (iii) Are there any new (emerging) challenges that policymakers should be made aware of?

Additionally, in all three waves (2016, 2017, and 2018) we asked investors for their perspective on whether the investment attractiveness of Latvia has improved over the past 12 months. We also asked whether investors see progress with regard to policy initiatives to meet the main challenges identified in the 2015 study and how investors evaluate the government's efforts and current policy initiatives aimed at improving the investment climate in Latvia. As in the 2015 survey, we also asked foreign investors whether, and under what conditions, they plan to increase their investment in Latvia. Finally, in the 2018 survey, we asked foreign investors to identify the best and worst decisions or policy initiatives that have been introduced by the Latvian government over the last five years and whether they had a positive or negative impact upon the business environment of Latvia.

The Viewpoints of Foreign Investors on the Investment Climate in Latvia: Results from 2015, 2016, 2017, and 2018

The Evaluation of the Investment Climate in Latvia by Foreign Investors

This section presents an assessment of the economic competitiveness of Latvia, more specifically, an evaluation of the investment climate in Latvia by foreign investors operating in the country. The main factors that could potentially influence Latvian competitiveness were derived by reviewing the relevant academic literature or emerged from in-depth discussions with the Foreign Investors' Council in Latvia (FICIL) Sustainable Economic Development Working Group in 2015. Foreign investors' assessments of the drivers of Latvia's competitiveness consist of the following indicators: the availability of labor, the efficiency of labor, the demand for products and services, the attitude towards foreign investors, the quality of business legislation, the quality of education and science, the quality of health and social security, hard infrastructure, investment incentives, soft infrastructure, and demography. Additionally, foreign investors were asked to evaluate the standard of living in Latvia. All the aforementioned factors are also important components of the entrepreneurial ecosystem.

During the 2015 study, 28 randomly selected foreign investors in Latvia evaluated each of these indicators or potential drivers of Latvia's economic competitiveness. The same 28 respondents as well as four new companies participated in the evaluation of the same indicators in 2016, while in 2017 an additional 10 companies joined the sample. In 2018, we interviewed the same 38 (out of 42) companies that took part in the 2017 study. In addition, two new companies joined the sample in 2018.

We provided respondents with an evaluation scale from 1-5, where 1 means that the indicator is not competitive and 5 means that the indicator is very competitive. Some indicators included one item, while some included several items. We calculated a simple average for each indicator. Twenty-six of the 28 investors interviewed provided an evaluation for most of the indicators in 2015: all 32, 42, and 40 respondents took an active part in evaluating the indicators in the 2016, 2017, and 2018 studies, respectively. The results are presented in Table 1.

As illustrated by Table 1, for all four years (2015, 2016, 2017 and 2018) foreign investors in Latvia mostly evaluated the potential drivers of the economy as above average. Similarly to previous years, in 2018 investors were also relatively satisfied with the 'soft infrastructure', measured as 'business culture in Latvia' (3.5 out of 5 in 2018 compared to 3.4 in 2015-2017) and 'demand for products and services' (3.4 out of 5 in 2018 and 2017). In 2018, however, the 'attitude

towards foreign investors' was evaluated as highly as 3.6 out of 5 (compared to 3.1 in 2017 and 3.2 in 2015 and 2016), which was the best assessment by foreign investors as explored in all four data collection waves. Investors were, however, least satisfied with 'demography'. The evaluation of this factor gradually decreased from 2015-2017 (i.e., 2.0 out of 5 in 2015, 1.8 in 2016 and 1.6 in 2017), yet increased slightly in 2018 (1.7 out of 5).

The investors' assessment of the quality of the 'health and social system' improved in 2018 compared to 2015-2017 (2.6 in 2015, 2.5 in 2016 and 2017, 2.9 in 2018). However, a decrease can be observed in 'efficiency of labor' (3.1 in 2017 to 2.9 in 2018), whereas the 'availability of labor' remained at the level of 2017 (2.7 out of 5). It is important to note that there was a decrease in the component 'availability of blue-collar labor' (from 2.5 in 2017 to 2.3 in 2018). 'Quality of business legislation' and 'investment incentives', however, were assessed at the same level by foreign investors in 2018 and 2017 (3.2 and 2.8, respectively).

The assessment of 'hard infrastructure' decreased from 3.4 in 2017 to 3.2 in 2018 and was driven by a decrease in the assessment of 'energy resources' (3.0 in 2018 compared to 3.4 in 2017) as well as 'low production costs' (2.9 in 2018 compared to 3.2 in 2017). Also, the assessment of the 'quality of education and science' decreased slightly (from 3.1 in 2017 to 3.0 in 2018) following an increase from a low of 2.6 in 2016 to 3.1 in 2017. Finally, the standard of living in Latvia was evaluated at 3.9 out of 5 in 2018, which is a 0.2 increase compared with 2017 and at the same level as 2016. (See Table 1)

By increasing the satisfaction of foreign investors with regards to aforementioned factors, a country such as Latvia potentially stimulates and maintains the involvement of foreign investors in the entrepreneurial ecosystem. This is important since investors tend to reinvest their experience and wealth as mentors, capital investors, and serial entrepreneurs [*Mason, Brown,* 2014].

The Attractiveness of the Investment Climate in Latvia

One of the key aims of this study is to measure the progress of the development of the investment climate in Latvia. To do so, similarly to 2016 and 2017, investors in the 2018 survey were also asked for their perspective on whether the investment attractiveness of Latvia had improved over the past 12 months. Investors could evaluate the investment attractiveness of Latvia using a 5-point scale, where 1 means that investment attractiveness had not improved at all, 2 means that there have only been minor improvements, 3 means that there have been some positive improvements, 4 means yes, investment attractiveness has improved and 5 means yes, investment attractiveness has improved significantly.

All 40 respondents answered this question, in most cases evaluating the development of investment attractiveness with either 2 (there have only been minor improvements) or 3 (some positive improvements). No respondents, however, answered with a 5, that is, that investment attractiveness had improved significantly. On average, the development of the investment climate in Latvia over the past year was evaluated with 2.5, which is at the same level as the evaluation a year earlier and 0.5 higher in comparison to answers to the same question in 2016 (see Table 2).

In this context it is important to highlight that the attractiveness of a specific entrepreneurial ecosystem stimulates the interest of large and international companies, which is very crucial for its development. Even a small improvement in investment attractiveness may lead to the interest of new companies and foreign investors in Latvia. This in turn could potentially generate some benefits, including the increase of recruitment levels, the provision of training for employees, and sources for various spin-offs providing commercial opportunities for local business and thus further contributing to the development of the national entrepreneurial ecosystem [*Mason, Brown,* 2014].

Key Challenges Faced by Foreign Investors in Latvia: Progress or Regression?

During the 2015 and 2016 surveys, a number of key challenges were identified that foreign investors in Latvia faced while developing their businesses. These included demography, access to labor, level of education and science, quality of business legislation, quality of the tax system, support from the government and communication with policymakers, unethical or illegal behavior by entrepreneurs, unfair competition, uncertainty, the court system, and the healthcare system in Latvia. In the 2018 survey, we asked the 40 largest foreign investors in Latvia whether, in their opinion, there had been any progress during the previous 12 months within these areas of concern. The findings from the 2018 study are summarized in Figure 1a, while, for comparison, the findings from the 2017 study are displayed in Figure 1b.

As exemplified by Figure 1b, foreign investors interviewed in the 2017 survey did not see any progress with regard to *access to labor*. On the contrary, *access to labor* seems to be an even greater challenge in 2018 than 2017. In 2018, however, the situation looks somewhat more positive with regard to *demography* and *the healthcare system,* with substantially more investors (compared to 2017) answering that progress in these areas has been made at least 'partly'.

A large number of the foreign investors interviewed were also not satisfied with the improvements in *uncertainty* (22 saw no improvements in 2018 as well as in 2017). The situation with regard to the *court system* and *quality of business legislation* is also still far from

Table 1. **Foreign Investor Satisfaction with Factors Impacting the Inflow of Foreign Investment and the Entrepreneurial Ecosystem, 2015-2018**

	2015	2016	2017	2018
Number of observations (n)	28	32	42	40
Soft infrastructure	**3.4**	**3.4**	**3.4**	**3.5**
Business culture in Latvia	3.4	3.4	3.4	3.5
Efficiency of labor	**3.2**	**3.2**	**3.1**	**2.9**
Attitude towards foreign investors	**3.2**	**3.2**	**3.1**	**3.6**
Investment incentives	**2.8**	**2.8**	**2.8**	**2.8**
Quality of business legislation	**3.2**	**3.1**	**3.2**	**3.2**
Monetary policy	4.0	4.1	3.9	3.7
Tax system	3.1	2.8	2.8	3.1
Legal system	2.6	2.6	2.8	2.9
Hard infrastructure	**3.2**	**3.3**	**3.4**	**3.2**
Defense	3.4	3.6	3.6	3.6
Low production costs	3.3	3.2	3.2	2.9
Infrastructure (roads, electricity, etc.)	3.1	3.1	3.3	3.2
Energy resources	2.8	3.3	3.4	3.0
Demand for products and services	**3.1**	**3.1**	**3.4**	**3.4**
Domestic demand	2.8	2.6	2.9	2.8
External demand (exports)	3.3	3.3	3.7	3.8
Industry traditions	3.4	3.5	3.5	3.6
Availability of labor	**3.0**	**3.1**	**2.7**	**2.7**
Availability of labor at the management level	3.4	3.5	2.9	3.0
Availability of blue-collar labor	2.7	2.8	2.5	2.3
Quality of education and science	**2.8**	**2.6**	**3.1**	**3.0**
Education, science, and innovation	2.8	2.6	3.1	3.0
Quality of health and social security	**2.6**	**2.5**	**2.5**	**2.9**
Health system	2.5	2.4	2.4	2.7
Social security	2.8	2.5	2.6	3.0
Demography (population growth)	**2.0**	**1.8**	**1.6**	**1.7**
Standard of living in Latvia	**3.4**	**3.9**	**3.7**	**3.9**

Note: Evaluation scale from 1-5, where 1 means that the indicator is not competitive and 5 means that the indicator is very competitive.

Source: authors' own calculations.

satisfactory in the viewpoint of foreign investors, yet progress in 2018 was evaluated as somewhat better than in 2017.

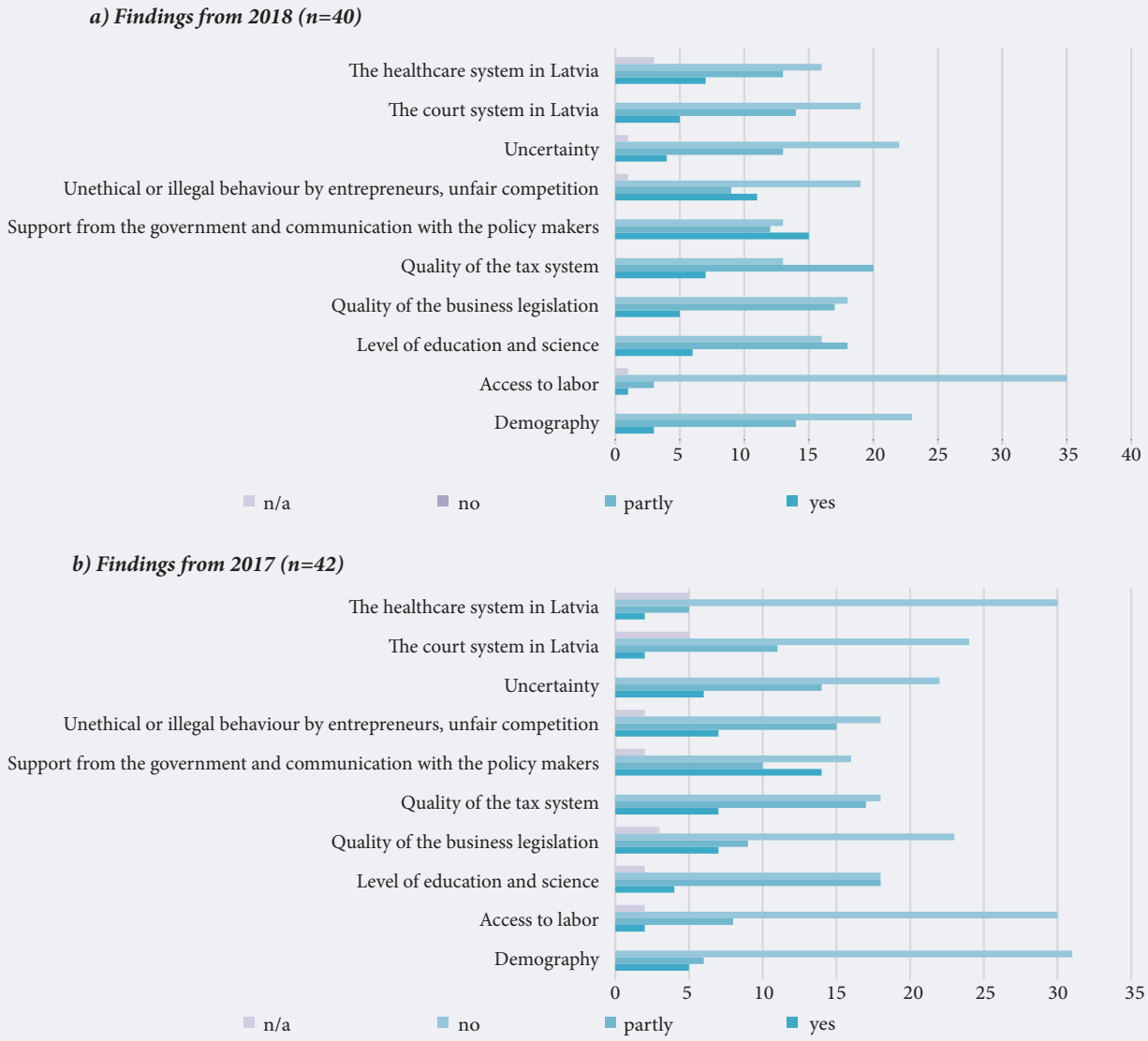
Also, the evaluation of progress with regard to the *tax system* improved slightly in 2018 compared to the 2017 study, with more respondents in 2018 indicating that progress has been achieved at least 'partly'. Slightly more foreign investors also see progress with regard to *unethical or illegal behavior by entrepreneurs and unfair competition* in 2018 compared to 2017, even though approximately half of the respondents still report that no progress had been achieved in this area in 2018 (see Figure 1).

Finally, approximately the same number of respondents in 2017 and in 2018 answered that they had seen progress in the *support from the government and communication with policymakers*, or answered that progress has been achieved 'partly', or mentioned that there has been no progress in this area over the past 12 months.

Three Key Challenges Identified: Problems and Solutions

Of all the issues that were raised by the 2015-2017 studies, arguably three stand out. These are (i) the availability and quality of the workforce in Latvia, (ii) corruption in the public sector and the shadow economy, and (iii) the effectiveness of the public sector with regard to improving the business environment in Latvia. In the 2018 study, we thus aimed to address all three issues in somewhat greater depth, asking the 40 largest foreign investors in Latvia that participated in the study to comment and, even more importantly, provide potential solutions that might help achieve better progress with regard to solving these areas of concern. The key findings are summarized below.

Figure. 1. **Foreign Investors' Assessment of the Progress over the Past 12 Months for Key Areas of Concern Identified in 2015 and 2016**



Note: Evaluation scale from 1-5, where 1 means that the indicator is not competitive and 5 means that the indicator is very competitive.
Source: authors' own calculations.

Availability and Quality of the Workforce, including the Quality of Education and Science for Achieving Productivity Growth

On a positive note, a number of foreign investors in Latvia that we interviewed actually argued that the situation had improved with regard to the quality of labor as well as education and science. However, the following excerpts from interviews show that the availability and quality of the workforce is still a major problem in Latvia.

"*Workforce availability is a problem in Latvia; you could say that nothing is being done to improve the situation.*

Table 2. **Progress of Investment Climate Development in Latvia over the Past 12 Months: 2016, 2017, and 2018 studies**

Year	Number of observations	Rank
2018	40	2.5
2017	42	2.5
2016	32	2.0

Note: Scale of 1-5 where 1 means investment attractiveness has not improved at all and 5 means investment attractiveness has improved significantly.

Source: authors' own calculations.

To be honest, it seems like the government doesn't even acknowledge that there is a major problem." (Consultancy and IT company)

"*We are preparing ourselves for a situation where the availability of labor will become even worse, when low-skilled labor will be even more scarce and more expensive at the same time.*" (Retail trade and service company)

"*No major change in the last few years. Regarding quality – it feels okay. The biggest problem is productivity.*" (Wholesale and retail company)

"*We cannot really complain about the unavailability of a low-quality workforce; however, the quality of education in Latvia is an issue, it's a real challenge to keep up with, and there are some pockets of interest in this area but no visible improvements yet.*" (Consultancy and IT company)

A number of suggestions were provided by foreign investors to solve this challenge with regard to labor. The suggestions on *availability* were as follows:

"*With regard to labor availability and quality, potential improvements can be divided into two main directions:*

1. Choosing a career before starting a career

It is necessary to encourage pupils to understand the various possibilities of further study and the types of work each day in different occupations, in order to reduce the number of students who make poorly considered choices.

2. Quality and practical experience of higher education

"*One needs to think about ways to support regional mobility, housing, better transport systems locally. Also, one needs to promote regional development – strengthen the regional centers. I haven't heard any evaluation of the operation of tax-free zones – maybe there should be something else to incentivize business?*" (Retail trade and service company)

"*We need to open borders for both skilled and low-skilled labor. And there are opportunities. Otherwise, soon you will have to wash your own dishes in the restaurant after eating your lunch.*" (Finance and banking company)

As to suggestions on *quality*, one can name the following:

"*In the education sector there is a tendency towards segmentation and inequality, which is dangerous and bad for such a small country. It is good that there was the decision about optimizing – the same should be done in higher education.*" (Finance and banking company)

"*It is important to strengthen technical and engineering studies in Latvia, develop educational programs in cooperation with employers in Latvia and consider reasonable opportunities for the migration of workers.*" (Manufacturing company)

"*Sick leave is a huge problem and there should be better control over who grants it and on what conditions, etc. Employees are abusing it and my suspicion is that not all doctors are honest in this area!*" (Manufacturing company)

"*Streamlined procedures for importing high-quality labor.*" (Consultancy and IT company)

In the context of developing a sustainable entrepreneurial ecosystem, higher education is indeed a very important factor. What is especially important is the development of R&D at higher education institutions, which can create disruptive technologies and innovative ideas, contributing to both the quantity and quality of entrepreneurship [*Carvalho et al.,* 2010]. Furthermore, knowledge exchanges between industry and the academic system is very crucial [*Etzkowitz,* 2008]. The results of this study suggest that quality of education and science, involvement in R&D, and collaboration with various stakeholders still have potential for further development.

Corruption in the Public Sector and the Shadow Economy

Overall, foreign investors argue that the situation is also improving with regard to corruption in the public sector and the shadow economy. However, investors also clearly emphasized that many things should still be done in this regard. The following solutions were provided during the 2018 interviews:

"*Currently in our country there's a feeling that you don't get punished if you break the law.*" (Finance and banking company)

"*A number of actions have been taken and we can see some results. Having said that, we lack transparency on the actions taken and activities implemented, with particular examples of actions and their consequences.*" (Retail trade and service company)

"*The only thing left to do is to bring the cases to court and prosecute. If the courts are really corrupt, then it's very sad. It (corruption) won't go away by itself.*" (Consultancy and IT company)

"*This takes a generation to change. The situation has improved compared to twenty years ago. The current generation and new politicians that we saw in the last election have a more honest agenda. The corruption prevention office is working better, the State Revenue Service is also doing better: they have improved control mechanisms. But corruption is still there.*" (Real estate company)

"*Non-bank crediting and 'payday loans' are huge in Latvia and are politically safeguarded. This is not normal. Hundreds of thousands of those who should never have received loans have received them. Do we really want a 25-year-old to get addicted to this system?*" (Finance and banking company)

The Effectiveness of the Public Sector with Regard to Improving the Business Environment in Latvia

The effectiveness of the public sector with regard to improving the business environment in Latvia has often been emphasized by foreign investors in Latvia and is reflected in the findings of all four interview waves. In the 2018 study, investors also highlight a number of challenges:

"*It seems that bureaucracy is the main issue that hinders the business environment in Latvia. Everyone can invest in Latvia, but they have to be ready to come up against heavy red tape.*" (Finance and banking company)

"*The major thing that Latvia needs to improve is automation and digitalization. IT has the tools for Latvia to become more efficient. Estonia is a great example.*" (Consultancy and IT company)

"*There are still a lot of things to improve in this regard. If you build something in Riga, construction permits take a lot of time and energy. Different Latvian government institutions have 30 days to answer a message, and then it becomes a kind of ping-pong game where they always take their time to answer company questions. Not at all effective when trying to get construction permits. Thirty days should be the maximum for them to answer; they take it as a minimum.*" (Retail trade and service company)

The following are suggestions for improving the effectiveness of the public sector in Latvia:

"*Structural reforms in the whole public sector by reviewing the existing activities and designing the most efficient future public processes, which are client-oriented and as digital as possible.*" (Professional assurance and advisory services company)

"*Cooperation among ministries is very poor and should be improved. It seems that the entire system of how the government operates and how legislation is written in Latvia is based on the principle "Catch the thief!" But I do not think I deserve to be perceived as a thief!*" (Finance and banking company)

"*The public sector remains largely inefficient, where, to our knowledge, the reasons are a lack of qualified labor resources that would be willing to work in the public sector and, on the other hand, the slow speed to market, i.e., the time required to adopt new technologies, approaches, or ideas.*" (Retail trade and service company)

"*The main problem with digitalization is that we are trying to implement it in a corrupt environment, so there are not many supporters for it, which is slowing down the whole process. Certain public procurement projects are carried out with elections in mind, so this is not always done in the best interests of the country, but rather with the number of votes in mind. We need to increase transparency.*" (Manufacturing company)

As also exemplified by the results of this study, there are different components of the means and instruments governments can use to foster the entrepreneurial ecosystem. These include improving legislation and the regulatory environment, tax law, labor rights, bankruptcy laws, the business formation process, the educational system, awareness building, access to finance and financial support, technology exchange, and networking. Furthermore, it should be taken into account that the emphasis on improving the ecosystem might change from reducing the unemployment rate to how to achieve the needed qualifications for employees so that foreign companies can invest more and, thus, further make their contribution to improving the entrepreneurial ecosystem [*Fuerlinger et al.*, 2015].

Conclusions and Implications

This paper aims to provide an assessment of the investment climate and entrepreneurial ecosystem in Latvia from the perspective of foreign investors, drawing on both the conceptual framework and empirical evidence from interviews with key foreign investors in Latvia, conducted in 2015, 2016, 2017, and 2018. The results of the 2018 study suggest that the investment attractiveness of Latvia, according to foreign investors, has remained the same compared to the situation one year earlier. Also, the investors' assessment with regard to policymakers' efforts to improve the investment climate in Latvia over the past year has also been evaluated at the same level as the 2017 study. The overall conclusion is that there is still substantial potential to increase both policymakers' efforts and the resulting overall foreign investment climate in Latvia.

Similarly to the 2016 and 2017 studies, foreign investors were once again asked to evaluate whether there has been any progress within key areas of concern identified back in 2015. The results of the 2018 study suggest that, compared to the findings of the 2017 study, the situation looks somewhat more positive with regard to demography and the healthcare system, that is substantially more investors highlighted that progress in these areas had been made at least 'partly', which was rarely the case in previous data collection waves. Access to labor, however, seems to be an even larger challenge in 2018 compared to 2017.

The foreign investors were also not satisfied with the improvements in uncertainty. The situation with regard to the court system and the quality of business legislation is also still far from satisfactory according to foreign investors, yet progress in 2018 was evaluated as slightly better than in 2017. Finally, slightly more foreign investors have also seen progress with regard to unethical or illegal behavior by entrepreneurs and unfair competition in 2018 compared to 2017.

To summarize, of all the issues highlighted by the results of the 2015, 2016, and 2017 survey waves, arguably three stand out. These are (i) the availability and quality of the workforce in Latvia, (ii) corruption in the public sector and the shadow economy, and (iii) the effectiveness of the public sector with regard to improving the business environment in Latvia.

The factors that drive foreign investors to choose Latvia seem to be similar to factors that are crucial for a sustainable entrepreneurial ecosystem. Overall, however, of the six domains classified by [*Isenberg,* 2011], factors such as politics, human capital, and the market should be significantly improved to develop a sustainable ecosystem and at the same time increase foreign direct investment attractiveness in Latvia. In this context, it is very important for policymakers to have one strategy for the whole country, instead of offering different conditions in each region and city.

We believe that our findings provide scope for further research. Deeper analysis could be made regarding the unused potential of countries from the CIS or CEE, including Latvia, to increase overall competitiveness, including by further developing the business climate. This means that local firms should be a stimulating factor for foreigners to enter, and that they should learn from each other. There is also a lack of research that compares local and foreign companies in the context of CEE and the CIS as regards their roles in shaping an entrepreneurial ecosystem.

References

Almfraji M.A., Almsafir M.K. (2014) Foreign direct investment and economic growth, literature review from 1994 to 2012. *Social and Behavioral Sciences,* vol. 129, pp. 206–213.

Anderson E., Gatignon H. (1986) Modes of entry: A transactions cost analysis and propositions. *Journal of International Business Studies*, vol. 17, no 3, pp. 1–26.

Anwar S., Nguyen L.P. (2011) Foreign direct investment and export spillovers: Evidence from Vietnam. *International Business Review*, vol. 20, pp. 177–193.

Barbosa N., Eiriz V. (2009) Linking corporate productivity to foreign direct investment: An empirical assessment. *International Business Review*, vol. 18, pp. 1–13.

Bevan A., Estrin S., Meyer K. (2004) Foreign investment location and institutional development in transition economies. *International Business Review*, vol. 12, pp. 43–64.

Blomstrom M., Kokko A. (2003) The economics of foreign direct investment incentives. *Foreign Direct Investment in the Real and Financial Sector of Industrial Countries* (ed. H. Herrmann), Heidelberg, Dordrecht, London, New York: Springer, pp. 37–60.

Carkovic M., Levine R., (2002) *Does Foreign Direct Investment Accelerate Economic Growth?* (University of Minnesota Working Paper), Minneapolis, MN: University of Minnesota.

Carvalho L., Costa T., Dominguinhos P. (2010) Creating an entrepreneurial ecosystem in higher education. *New achievements in technology education and development* (ed. S. Soomro), New York: InTech, pp. 1–20. Available at: https://www.intechopen.com/books/new-achievements-in-technology-education-and-development/creating-an-entrepreneurship-ecosystem-in-higher-education, accessed 23.03.2019.

Cerrato D., Crosato L., Depperu D. (2016) Archetypes of SME internationalization: A configurational approach. *International Business Review*, vol. 26, pp. 286–295.

Chen P., Danchi T., Jean R.B. (2016) Foreign knowledge acquisition through inter-firm collaboration and recruitment: Implications for domestic growth of emerging market firms. *International Business Review*, vol. 25, pp. 221–232.

Chittoor R., Sarkar M.B., Ray S., Aulakh P.S. (2009) Third-world copycats to emerging multinationals: Institutional changes and organizational transformation in the Indian pharmaceutical industry. *Organization Science*, vol. 20, no 1, pp. 187–205.

Choi J.J., Lee S.M., Shoham A. (2016) The effects of institutional distance on FDI inflow: General environmental institutions (GEI) versus minority investor protection institutions (MIP). *International Business Review*, vol. 25, pp. 114–123.

Coe D.T., Helpman E. (1994) International R&D spillovers. *European Economic Review*, vol. 39, pp. 859–887.

CSB (2017) *Statistical Yearbook of Latvia 2017*, Riga: Central Statistical Bureau of Latvia.

Davidsson P. (2004) *Researching Entrepreneurship*, Heidelberg, Dordrecht, London, New York: Springer.

De Mello L.R. (1999) Foreign direct investment-led growth: Evidence from time series and panel data. *Oxford Economic Papers*, vol. 51, no 1, pp. 133–151.

Devajit M. (2012) Impact of Foreign Direct Investment on Indian economy. *Research Journal of Management Sciences*, vol. 1, no 2, pp. 29–31.

Dixon W.J., Boswell T. (1996) Dependency, disarticulation, and denominator effects: Another look at foreign capital penetration. *American Journal of Sociology,* vol. 102, no 2, pp. 543–562.

EBRD (2016) *EBRD transition report 2015-16. Rebalancing finance,* London: European Bank of Reconstruction and Development.

EBRD (2017) *EBRD transition report 2016-17. Transition for all: Equal opportunities in an unequal world,* London: European Bank of Reconstruction and Development.

Elango B., Pattnaik C. (2007) Building capabilities for international operations through networks: A study of Indian firms. *Journal of International Business Studies*, vol. 38, no 4, pp. 541–555.

Eriksson K., Johanson J., Majkgard A., Deo Sharma D. (1997) Effect of Variation on Knowledge Accumulation in the Internationalization Process. *International Studies of Management and Organization,* vol. 30, no 1, pp. 26–44.

Etzkowitz H. (2008) *The Triple Helix: University–Industry–Government Innovation in Action*, London: Routledge.

Fletcher M., Harris S. (2012) Knowledge acquisition for the internationalization of the smaller firm: Content and sources. *International Business Review*, vol. 21, no 4, pp. 631–647.

Fuerlinger G., Fandl U., Funke T. (2015) The role of the state in the entrepreneurial ecosystem: Insights from Germany. *Triple Helix,* vol. 2, no 1, article 3. Available at: https://doi.org/10.1186/s40604-014-0015-9, accessed 14.05.2019.

Giroud A., Scott-Kennel J. (2009) MNE linkages in international business: A framework for analysis. *International Business Review*, vol. 18, pp. 555–566.

Gorg H., Hijzen A. (2004) *Multinationals and productivity spillovers* (GEP Research Paper 04/41), Nottingham: University of Nottingham.

Isenberg D.J. (2010) How to start an entrepreneurial revolution. *Harvard Business Review*, vol. 88, no 6, pp. 41–50.

Isenberg D.J. (2011) Introducing the Entrepreneurial ecosystem: Four Defining Characteristics. *Forbes*, 25.05.2011. Available at: http://www.forbes.com/sites/danisenberg/2011/05/25/introducing-the-entrepreneurshipecosystem-four-defining-characteristics/, accessed 17.04.2019.

Lipsey R.E., Sjoholm F. (2004) *Host country impacts of inward FDI: Why such different answers?* (EIJS Working Paper 192), Stockholm: Stockholm School of Economics.

Liu Z. (2008) Foreign direct investment and technology spillovers: Theory and evidence. *Journal of Development Economics,* vol. 85, pp. 176–193.

Manuchehr I., Ericsson J. (2001) On the causality between foreign direct investment and output: A comparative study. *The International Trade Journal*, vol. 15, no 1, pp. 1–26.

Mason C., Brown R. (2014) *Entrepreneurial ecosystems and growth orientated entrepreneurship* (Background paper prepared for the workshop organised by the OECD LEED Programme and the Dutch Ministry of Economic Affairs), Paris: OECD.

Narula R., Dunning J.H. (2000) Industrial development, globalization and multinational enterprises: New realities for developing countries. *Oxford Development Studies*, vol. 28, no 2, pp. 141–167.

North D. (1990) *Institutions, institutional change and economic performance*, Cambridge: Cambridge University Press.

Popescu G.H. (2014) FDI and Economic Growth in Central and Eastern Europe. *Sustainability*, vol. 6, pp. 8149–8163.

Putnins T., Sauka A. (2015) Measuring the shadow economy using company managers. *Journal of Comparative Economics,* vol. 43, pp. 471–490.

Rivera-Batiz A.L., Oliva M. (2003) *International trade, theory, strategies and evidence*, New York: Oxford University Press.

Sauka A., Chepurenko A. (2017) (eds.) *Entrepreneurship in transition economies. Diversity, trends and perspectives*, Heidelberg, Dordrecht, London, New York: Springer.

Smallbone D., Welter F. (2001) The distinctiveness of entrepreneurship in transition economies. *Small Business Economics*, vol. 16, no 4, pp. 249–262.

Smallbone D., Welter, F. (2006) Conceptualising entrepreneurship in a transition context. *International Journal of Entrepreneurship and Small Business*, vol. 3, no 2, pp. 190–206.

Takki S., Ramstetter E.D. (2015) Exporting and foreign ownership in Indonesian manufacturing, 1990-2000. *Ekonomi dan Keuangan Indonesia,* vol. 54, no 3, pp. 315–343. DOI: 10.7454/efi.v54i3.102.

Xu D., Meyer, K.E. (2013) Linking theory and context: 'Strategy research in emerging economies' after Wright et al. (2005). *Journal of Management Studies*, vol. 50, pp. 1322–1346.

Historical and Institutional Determinants of Universities' Role in Fostering Entrepreneurship

Alexander Chepurenko [a]
Professor of Economic Sociology, achepurenko@hse.ru

Maria Kristalova
Postdoctoral Fellow, Chair of Business Dynamics, Innovation and Economic Change [b]; Affiliated Researcher, Chair of Economics of Innovation and Structural Change [c], maria.kristalova@uni-jena.de

Michael Wyrwich [d]
Associate Professor for Small Business & Entrepreneurship, Innovation Management & Strategy, m.wyrwich@rug.nl

[a] National Research University Higher School of Economics, 101000 Myasnitskaya str., 20, Moscow, Russian Federation
[b] Friedrich Schiller University Jena, Carl-Zeiss-Strasse 3, 07743 Jena, Germany
[c] University of Bremen, Bibliothekstraße 1, 28359 Bremen, Germany
[d] University of Groningen, Nettelbosje 2, 9747 AE Groningen, PO Box 800, 9700 AV Groningen, Netherlands

Abstract

Institutions play a key role in building entrepreneurial ecosystems (EEs). However, the academic literature does not well represent the historical roots of these institutions and most works are devoted to developed countries. This article examines the institutional conditions for the development of scientific and entrepreneurial activities at universities in the context of the transition to a market economy. It considers the «path dependence» (mentality and infrastructure inherited from the past), as well as specific mechanisms for regulating the interaction of universities and other subjects of EE developed during the transition period. Such an approach allows us to assess the potential of universities for the development of entrepreneurship in countries with a transition economy and the impact of historical development paths upon the current structural conditions and the specific features of the EE.

Keywords: entrepreneurial ecosystems; transition; entrepreneurship; universities; institutions

Citation: Chepurenko A., Kristalova M., Wyrvich M. (2019) Historical and Institutional Determinants of Universities' Role in Fostering Entrepreneurship. *Foresight and STI Governance*, vol. 13, no 4, pp. 48–59. DOI: 10.17323/2500-2597.2019.4.48.59

Although the concept is not new, there is still a growing amount of literature on entrepreneurial ecosystems [*Cavallo et al.,* 2018; *Ghio et al.,* 2019; *Roundy,* 2017; *Roundy, Fayard,* 2019]. The theoretic foundation of the entrepreneurial ecosystem (EE) concept is grounded in the literature on regional innovation systems, academic spin-offs, the triple helix model, and also in the literature on the interplay between institutional context and entrepreneurship. However, the theoretical richness of most of the literature is "tuned" to established Western market economies. Thus, to become relevant for transitional economies, it should be 'reframed' in the context of the dominant institutional environments that are to a significant extent predetermined by the former development and partially by the institutional traps of the transition itself in these countries. There are, however, only some exceptional attempts in the literature to explore the entrepreneurial ecosystems of some Central and Eastern European (CEE) economies and the Community of Independent States (CIS).

In general, the transition economies provide a picture of the huge differences in the quality of higher education and the development of market and democratic institutions, which might play an important role in the contemporary structure and embeddedness of the EE in these societies. The socialist mental and infrastructural legacy should be still taken into consideration when speaking about the interplay between actors in the EE (people, institutions) who reuse and recombine their "socioeconomic heritage" as measured by experience, network relationships, and social capital within EEs. This context helps one understand whether and how such human capital accelerators like universities can promote entrepreneurial activities and enrich EEs in transition.

The entrepreneurial patterns across transitional economies are quite different: The Global Entrepreneurship Monitor (GEM) shows lower levels of entrepreneurship in Russia compared to other transition economies.[1] Russia compared to CCEs demonstrated an overall GEI underperformance by 1.8 times (Table 1) [*Acs et al.,* 2018]. Such low values provide a strong indication that the current institutional environment hinders potential Russian entrepreneurs. Existing entrepreneurs are more often driven by necessity than by opportunity, the businesses either do not intend to grow or do not have the respective capacity and exhibit great distance from the world technological frontier. Operating on a large domestic market, entrepreneurs do not intend to enter the global market – which, in turn, is another reason for the low level of innovativeness.

One reason for the existing bottlenecks in Russia's EE could be a distinct institutional environment, which is a mix of new institutions and actors, which emerged over the past 30 years, and the arrangement of older institutions (norms, values) inherited from the Soviet period. In particular, the structure, corporate culture and embeddedness of local universities in the emerging EE could explain different level of innovativeness of entrepreneurship and, thus, different outcomes of entrepreneurial development there.

This paper aims to describe the peculiarities of entrepreneurship relevant in post-socialist economies and its implications for the development of entrepreneurial ecosystems. We focus on Russia to understand the interplay between the (re)-emergence of entrepreneurship and the evolution of EE. We illustrate how the (re)emergence of entrepreneurship in the transition process affected the EE and its bottlenecks.[2]

The EE Approach and Institutions

There are several definitions of the concept entrepreneurial ecosystems (see Table 2). The literature on EE is closely related to the discourse on innovation, including the early studies on innovation systems, the debate around territorial innovation milieus such as industrial districts, clusters, and technopoles; the triple helix model, and, more recently, the literature on entrepreneurial ecosystems [*Zahra, Nambisan,* 2012].

The EE approach adopts a multi-level perspective by stressing self-perpetuating mechanisms, close relationships, interdependencies, supporting effects, and forward and backward linkages among the elements. Furthermore, the EE approach clearly distinguishes between the entrepreneurial environment (ecosystem) and the entrepreneurial outcomes. Of the different kinds of entrepreneurial outcomes, the EE focuses on those opportunity recognition activities that are likely to result in ambitious start-ups with high growth potential. The performance of the EE is determined by the interplay of the entrepreneur, the organizations, and the institutions [*Alvedalen, Boschma,* 2017; *Spigel,* 2017; *Stam,* 2015] where the entrepreneur is the most important agent assuming his several roles (e.g., leader, mentor, and investor).

Generally, networks of different institutions are needed to trigger research development and innovation processes, with networking and cooperation supporting innovative activities at the regional level [*Hewitt-Dundas,* 2013]. There are three possible network configurations fostering regional entrepreneurial ecosystems, namely science-led, industry-led, and

[1] In 2014, only 8.63% of Russian population between 18-64 years were entrepreneurially active, 50% or more below other (post-)transition economies: Hungary (16.93%), Romania (18.35%), Poland (15.99%), Lithuania (18.62%), Estonia (15.03%), Slovakia (18.20%), or even Kazakhstan (20.63%).

[2] See the paper by Pager et al. in this issue.

Table 1. **GEI Component Values: Comparisons between Russia and Some CEE Countries**

Indicator	Russia	CEE average
Opportunity perception	0.128	0.406
Start-up opportunity	0.219	0.548
High growth	0.355	0.568
Internationalization	0.055	0.715
Risk acceptance	0.193	0.392
Cultural support	0.162	0.334
Product innovation	0.158	0.321
Risk capital	0.186	0.383

Note: The group of CEEs Russia is compared to includes Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia.

Source: compiled by the authors using [*Acs et al.,* 2018].

policy-led (Table 3) [*Diez,* 2000; *Schätzl,* 1999]. From this point of view, Russia represents a rather unique fourth case where the main driver of the local entrepreneurial ecosystem was a large business supported by the state to establish among other things a new university that could act as a hub attracting students and entrepreneurs to form an innovative environment (Skolkovo) or by regional authorities (Innopolis in Tatarstan).

The EE approach stands in line with a larger vein of literature suggesting that regional differences in place-based conditions imply huge spatial variation of entrepreneurial activities [*Acs, Storey,* 2004; *Acs et al.,* 2014; *Fritsch, Storey,* 2014; *Sorenson,* 2017]. The range of factors influencing entrepreneurship that are identified in this literature comprises agglomeration forces, industry structure, regional knowledge, and local entrepreneurship cultures and institutions. In large countries like Russia, the variety of these factors might be especially great [*Chepurenko et al.,* 2017].

An important part of the regional knowledge stock is represented by universities which are therefore also a key actor of EEs. Universities of the third generation [*Etzkowitz,* 2001, 2003; *Thursby, Thursby,* 2002; *Ulhøi et al.,* 2012] might play an especially important role for the absorption, storage, and diffusion of knowledge and are also engaged in the generation of new knowledge within the triple helix model approach. First of all, they provide innovation-related inputs and contribute to the regional stock of human capital [*Schubert, Kroll,* 2016] that plays an important role in identifying entrepreneurial opportunities. Second, entrepreneurial universities as institutional players are key actors – brokers and gatekeepers – in local innovation systems [*Fritsch et al.,* 2018; *Graf,* 2011; *Kauffeld-Monz, Fritsch,* 2013].

The EE approach is also rooted in the culture and institutional tradition [*North,* 1990] of entrepreneurial research. The key formal institutions that affect the supply and level of productive entrepreneurship are property rights enforcement, savings policies, taxation, and labor market regulation [*Elert et al.,* 2017] as well as the structure and innovation potential of such local drivers as universities. An informal institution that determines the level of entrepreneurship is the extent to which entrepreneurship is socially accepted [*Beugelsdijk,* 2007; *Mueller, Thomas,* 2001; *Smallbone, Welter,* 2006]. An entrepreneurial culture is typically defined as the collective programming of the mind in favor of entrepreneurship [*Beugelsdijk,* 2007; *Freytag, Thurik,* 2007]. Our own research shows that entrepreneurial culture can be highly persistent over time [*Fritsch, Wyrwich,* 2014, 2017a; *Stuetzer et al.,* 2018; *Wyrwich,* 2012] and differ even among different regions of the same country, such as West and East Germany [*Fritsch et al.,* 2014; *Wyrwich,* 2013, 2015]. Institutions, which play an important role, might be structured differently. However, these differences are the result of a historical development or are path dependent.

The Institutional Context for Entrepreneurial Ecosystems in Post-Socialist Economies and Russia in Particular

Transition reforms in former planned economies have been believed to lead to better firm performance, resulting mainly from structural transformations, the support of market institutions, and openness to international trade and investment. The transition paths were not uniform across all countries undergoing the transformation. Empirical evidence indicates that the transition path of Russia and some other CIS countries was different from CEE countries.

It is widely accepted that the legacy effects of the socialist past determine entrepreneurship long after the start of the systemic transition [*Estrin, Mickiewicz,* 2011; *Manolova et al.,* 2008; *McMillan, Woodruff,* 2002; *Welter,* 2005]. This is in line with the general literature on the distinctiveness of entrepreneurship in transition countries [*Ovaska, Sobel,* 2005; *Smallbone, Welter,* 2001; *Welter,* 2005].

However, over the course of the systemic transition itself, a set of country-specific factors and even institutional traps [*Polterovich,* 2017] occurred which predetermined a growing variety of post-transitional institutional settings in different transitional countries and regions [*Aidis, Welter,* 2008a, 2008b; *Estrin, Mickiewicz,* 2011; *Welter,* 2011]. Therefore, some authors argue in favor of a 'diverging paths' approach [*Sauka, Chepurenko,* 2017] differentiating the former socialist economies according to the inclusive vs. extractive institutions concept by Acemoglu and Robinson [*Acemoglu, Robinson,* 2012] as well as dominant types of entrepreneurial activity [*Sauka, Welter,* 2007].

Weaker institutions, path dependence, and vested interest groups have been argued to define the spe-

Table 2. **Definitions of Entrepreneurial Ecosystem**

Definition	Source
Dynamic, institutionally embedded interaction between entrepreneurial attitudes, ability, and aspirations by individuals, which drives the allocation of resources through the creation and operation of new ventures	[Ács *et al.,* 2014]
An interdependent set of actors that is governed in such a way that it enables entrepreneurial action	[*Stam,* 2014]
Dynamic community of inter-dependent actors (entrepreneurs, supplies, buyer, government, etc.) and system-level institutional, informational and socioeconomic contexts	[*Audretsch, Belitski,* 2017]

Source: compiled by the authors using the abovementioned sources.

cific transition trajectory of Russia [*Aidis et al.,* 2008; *Bessonova, Gonchar,* 2015; *Bruton et al.,* 2010; *Gurvich,* 2016]. More specifically, institutional traps [*Polterovich,* 2017] which occurred as a result of the voucher privatization there [*Boycko et al.,* 1995] led to a massive distortion of market signals and manifested itself in an exorbitant proportion of the state-owned enterprises (SOEs), a policy of industrial paternalism (e.g. soft budget constraints and a non-functioning creative destruction mechanism), which implies the unreasonable backing of inefficient industries and companies as well as an inefficient public administration mechanisms, weak property rights protection, the vulnerability of property, and an ongoing struggle for rents as the key institutional constraints [*Gurvich,* 2016]. This resulted in a dominant role of 'predatory entrepreneurs' [*Feige,* 1997] and of 'unproductive entrepreneurship' [*Baumol,* 1990] in the EE. A broad consensus in the literature exists that Russia's current deficiencies in its entrepreneurial activity can be explained by institutional imperfections or obstacles, such as high borrowing costs, red-tape, high levels of corruption, insufficient rule of law, and issues with property rights [*Chepurenko et al.,* 2017; *Volchek et al.,* 2013; *Yukhanaev et al.,* 2015; *Zhuplev, Shtykhno,* 2009].

In recent years, a continuous decline of Russian democratic institutions has been taking place [*Lamberova, Sonin,* 2018] and coincided with an all-encompassing trend of political and economic centralization [*Alexeev, Mamedov,* 2017], which probably also had an impact upon the emergence of regional EEs in a negative way.

Szerb and Trumbull [*Szerb, Trumbull,* 2018] analyze Russia's EE over the period of 2006-2016 considering both its individual and institutional dimensions and conclude that the country lags significantly behind other transition as well as similar efficiency-driven economies. Informal investment, obsolete technologies, and low levels of internationalization as well as the lack of opportunity perception and startup skills within the population are among the factors still standing in the way of building a successful EE.

Although the literature shows a variety of EE on national, regional, and even global levels, the best studied are regional EEs, most of which are located in developed economies: Silicon Valley, Route 158, Boston, and Stanford clusters in the US, Aalto area near Helsinki, Finland, London Roundabout and the Thames Valley Business hub in Berkshire, England [*Audretsch, Belitski,* 2017], the Malopolskie region in Poland [OECD, 2019], and Skolkovo in Moscow. The favorable EE conditions of the region include a growing number of start-ups in the digital economy, accelerators, and venture capital funds as well as effective knowledge transfer centers (KTCs).

Using Estonian data, Velt et al. [*Velt et al.,* 2018] identify seven key factors impacting the launch of global startups within a successful EE in transition economies: entrepreneurial talent, informal loans, bootstrapping, leadership, knowledge, engagement ser-

Table 3. **Types of Regional Entrepreneurial Networks**

Type of network	Description	Examples
Science-led	Universities or research institutions trigger regional development with a particular focus on knowledge transfer and innovation	Silicon Valley, Route 128 (US) or Cambridge and Oxford in the UK
Industry-led	Research-intensive large firms are the innovation hub, with close links to university research	Volkswagen automobile cluster in Wolfsburg (Germany)
Policy-led	To be observed in regions where policymakers initiated successful science parks	Silicon Glen (Scotland)

Source: compiled by the authors.

vices, and networks. For their growth, worker talent, formal equity (venture capital and angel investors), bootstrapping, professional services and intermediaries play an important role as well.[3] Heller [*Heller,* 2013] attempts to evaluate the Russian innovation ecosystem and concludes that while there is some rapid development, for instance in infrastructure, the culture that was formed during the Soviet period remains the major drawback.

The current EE in Russia has shown shortages of coherent reforms of the R&D and innovation systems since the early 1990s [*Gokhberg,* 2004; *Gokhberg, Kuznetsova,* 2011], all of which results in a low level of innovation spillovers from universities. In some recent years, for instance, the Russian government and regional authorities tried to rebuild the regional EEs of Moscow, St. Petersburg, Tomsk, Tatarstan, and some other regions. The first nationwide cluster program was launched in 2012, with support for pilot innovative clusters being the first step [*Kutsenko, Meissner,* 2013]. However, the process of developing and implementing special economic zones (SEZs) and industrial parks in Russia has not delivered the desired results so far [*Sosnovskikh,* 2017].

Other elements in promoting regional EE include the technology parks, business incubators, technology transfer centers, prototyping and design centers, engineering centers, subsidized participation at fairs, and educational support. For instance, in his 2019 message to the Federal Assembly, President Putin announced that 15 scientific and educational centers, which are designed to integrate all levels of education and capabilities of scientific organizations and businesses at the regional level to boost technological development in Russian regions are supposed to be founded in the next three years. Three of these centers are to be launched already in 2019. However, all these attempts are typically top-down, both the role and motivation of industry and universities to participate are still scarcely researched.

Therefore, in the following section we would like to describe the role of the higher education institutions in Russia as prospective core elements of regional EEs and the historically rooted institutional constraints.

Russian Universities as Actors in EEs

A modern strand of an entrepreneurial research defines entrepreneurial universities, around which the EEs evolve, as key elements in promoting regional economic growth [*Fuster et al.,* 2019; *Guerrero et al.,* 2016]. Accompanying this development, spin-off entrepreneurship, patenting, licensing and other activities of knowledge and technology transfer from universities to the private sector have attracted considerable scholarly attention [*Astebro, Bazzazian,* 2011; *Gianiodis et al.,* 2016; *Meissner, Shmatko,* 2017; *Perkmann et al.,* 2013; *Rothaermel et al.,* 2007]. An important part of this literature has sought to explain the institutional differences in technology transfer [*Bijedic et al.,* 2015; *Bruneel et al.,* 2010; *Grimpe, Fier,* 2010; *Leydenm, Link,* 2013]. For example, it has been found that the level of industry funding and the nature of research within the university [*O'Shea et al.,* 2005; *Powers, McDougall,* 2005], the size and quality of the research faculty [*Di Gregorio, Shane,* 2003; *O'Shea et al.,* 2005], and a university's entrepreneurial tradition [*D'Este, Perkmann,* 2011; *Lockett et al.,* 2005; *Shane,* 2004] all are strong predictors of the probability and number of spin-off companies.

Moreover, as it is shown in the literature, a significant share of knowledge flows related to the creation and commercialization of novel ideas occurs in geographically limited areas [*Audretsch,* 2003; *Hassink, Wood,* 1998; *Keeble et al.,* 1998]. Our own research in this realm shows that knowledge spillovers within universities, but also into the region, are conducive for entrepreneurship [*Fritsch, Wyrwich,* 2017b; *Goethner, Wyrwich,* 2017]. This finding is in line with the knowledge spillover theory of entrepreneurship (e.g., [*Carlsson et al.,* 2009]). That is knowledge generated within universities and commercialized via the establishment of entrepreneurial firms.

The empirical research on the position of universities and their prominent role [*Korosteleva, Belitski,* 2017] within entrepreneurial ecosystems in transitional economies has been rather scarce so far. Although some CEE regions are already successful in implementing an entrepreneurial university – a few examples include *Entrepreneurship Home*® and *IdeaLab* at the University of Tartu as well as *Mectory* at the Tallinn University of Technology (both in Estonia) or the *Startup Campus* at the Technological University of Budapest (in Hungary) – a truly working knowledge transfer through entrepreneurial universities seems to be a general bottleneck of EEs there. The patterns of research commercialization in transition economies (Azerbaijan, Belarus and Kazakhstan) are somewhat different from established market economies: the existence of technology transfer offices and other institutions does not correlate with research commercialization, contrary to the direct industrial funding of university research [*Belitski et al.,* 2019]. This might be caused by institutional inertia (traditionally, the higher education structure and objectives in the former USSR were different than in the West) as well by some institutional arrangements which occurred already during the systemic transition.

First of all, it is the scope and quality of research at Russian universities. Since the beginning of the in-

[3] See also Trabskaja and Mets in the current issue.

dustrialization policy under Stalin, there has been a strong differentiation between higher schools as institutions to enable the mass education of engineers for huge Soviet plants and construction projects, and research institutes of the Academy of Sciences where highly qualified researchers worked. R&D activities at the universities were restricted, an institutional separation of higher education from research persisted over the decades [*Froumin et al.,* 2014; *Smolentseva et al.,* 2018]. Only exceptionally, the oldest centers like St. Petersburg and Moscow State universities obtained a more or less developed research infrastructure. In early 1960s, the newly established Novosibirsk State University joined this small group of researching universities. Besides, there were some technical universities (Bauman higher technical school[4], Moscow Physical-Technical higher school, etc.) where applied research was an obligatory part of education. In recent years, the aforementioned Program 5–100 of the Russian government[5], partly supported the establishment of research and education clusters of excellence at about 25 universities, but it hardly changed the general situation among the approximately 1,150 other higher schools and universities. Taking into consideration the historical origins and the current context, most of the higher schools are simply not able to become triggers for regional EEs due to a lack of pioneering research units and qualified personal [*Froumin et al.,* 2014; *Gershman et al.,* 2018].

Second, it is the role of the historically overcentralized location of the leading research and education institutions. In the Russian Empire in the beginning of the 20th century, there were only 12 universities, three of them on the territory of modern Ukraine, and one each in Estonia, Lithuania, Finland, and Poland. In Russia itself, there were only five universities – in St. Petersburg, Moscow, Kazan, Tomsk, and Saratov. This means that most of Russian regions had no established centers of research and education. Even now, about 30% of all Russian universities are located in the two capitals (approximately 270 in Moscow and another 90 or so in St. Petersburg). The majority of research institutes of the Russian Academy of Sciences and many EE infrastructure units (industrial parks, business incubators, engineering and prototyping centers etc.) are concentrated in Moscow and St Petersburg [*Sivak, Yudkevich,* 2017]. There, the partly overlapping networks of several universities, research institutes, and industrial enterprises form a synergetic effect and, thus, a dense regional EE. Outside of these capital cities, there are only a few 'research cities' (like Kazan, Tomsk, Tyumen, Novosibirsk, and so on.) where first-class universities and other institutions might form the core of a local EE [*Aldieri et al.,* 2018].

After the collapse of the Soviet Union, universities in Russia were caught in a situation of high uncertainty and a lack of funding. Due to large problems with the higher education system during the 1990-2000s, the research equipment and education infrastructure even at the most advanced Russian universities were often old or outdated. Some of them try to avoid these constraints by focusing on promoting and funding a few centers of excellence, but under the current trend of the general reduction of state funding for education in the country and a lack of private donators who could fill in the financial gap, the innovation potential of most of Russian universities remains rather restricted [*Gokhberg, Kuznetsova,* 2011]. Ever since this transformation process started, fostering research commercialization became one of the priority issues for policymakers and the public authorities. Starting in the mid-2000s, some measures directed at underpinning the role of higher education institutions (HEI) within the EE were implemented in Russia [*Gokhberg,* 2004]. Federal and National Research Universities were established, innovative education programs (IEPs) were launched, and the so-called Program 5–100, which intended the inclusion of at least five Russian universities in international rankings, was launched in 2013. These measures were intended to strengthen the national innovation system [*Gokhberg, Kuznetsova,* 2011] and the position of the universities within EEs.

Third, the corporate culture of Russian universities, partly inherited from the past, partly established during the transition itself [*Yudkevich,* 2014], is another obstacle to impeding the transformation of them into crucial actors in regional EEs. It is known from the literature that to become a driver of the local EE, the university should transform into a third generation or entrepreneurial university [*Astebro, Bazzazian,* 2011; *Clark,* 1998; *Gianiodis et al.,* 2016; *Meissner,* 2018]. Unfortunately, most Russian higher schools and universities do not feel inspired to transform the organizational structure, corporate spirit, personal renewal, and so on. [*Froumin et al.,* 2014].

Finally, important stakeholders of entrepreneurship at universities are students, both in form of an on-site-campus entrepreneurship and in form of an IT-startup activity, which play an important role in the development of regional entrepreneurship ecosystems, but also need to be supported by the latter during the initial stage. The entrepreneurial engagement of students in Russia (and some other CIS countries) is rather high: the proportion of potential entrepre-

[4] Current name is the Bauman Moscow State Technical University (BMSTU).

[5] Program 5-100 is aimed at promoting a small group of universities to place in the top 100 universities in the world in their area of expertise.

neurs (i.e., those who already try to start their own business) among students is 27%, which is 6 percentage points higher than in the international sample, and the share of active entrepreneurs (i.e., those who already manage their own business) is up to 8%. Compared to 2011, the number of potential entrepreneurs among Russian students increased by 5 percentage points [*Bergmann, Golla,* 2016]. These data do not reflect the character of the entrepreneurial activity of students (opportunity vs. necessity driven; innovative or rather on campus business activities etc.) but says much about the entrepreneurial spirit of young prospective entrepreneurs.

However, the engagement of the teaching staff of universities in entrepreneurial activity is very moderate. One of the reasons is the median age of universities' fellows. As a result of the degradation of science and education in early 1990s, younger cohorts left Russian universities and either moved to the commercial sector, public administration, or settled in the West [*Korobkov, Zayonchkovskaya,* 2012], therefore the age structure of a typical Russian university is dominated by older cohorts raised under the Soviet system who are not inclined to commercialize their research outputs.

One of the tools to establish an innovative entrepreneurial community within the universities was the governmental plan to enable educational institutions and their fellows to establish new small innovative ventures according to the Federal Law Nr. 217 adopted in 2009. Innovators received taxation preferences and universities received 33% of companies' stock capital, as well as the right to the intellectual property of start-ups. However, the initial enthusiasm soon declined. To compare, in 2010-2011 in Russia more than 1,300 small innovative enterprises (SIE) were established, in 2012-2013 – only about 1,000, in 2014-2015 slightly more than 350, while in 2016-2018 this figure was also about 350, but within a three-year period.[6] There were several typical problems that occurred and showed that the innovative potential of Russian universities to become triggers of regional EEs was very limited. First, it came out that it was an extremely complicated problem to identify the intellectual property as a contribution to share capital of the SIE. Second, universities' fellows were not ready to take responsibility for creating SIEs as founders or act as managers. Third, due to bureaucratic reasons, universities could not provide them rent for free – most of the SIEs would rent rooms outside of the universities. Lastly, the rather few private business angels and venture capitalists were prepared to deal with start-ups led by novice entrepreneurs and supported by inexperienced innovation infrastructure officers of the universities. Thus, the entrepreneurial enthusiasm of students is not linked with the commercialization of know-how of teaching staff at most Russian universities.

Some additional reasons for this phenomenon are also evident: the primitive structure of the national economy does not support any demand for innovative start-ups, while high risks, weak or absent financial and legal support infrastructure, and a low level of horizontal networking between universities and industry in regional EEs [*Bruneel et al.,* 2010; *D'Este, Perkmann,* 2011] shape additional constraints for academics and students motivated to create a commercial spin-off of their know-how.

Conclusions and Implications

Due to historical reasons and the transition experience, regional EEs in Russia are characterized by a weak institutional frame, the marginal role of innovations, a lack of horizontal cooperation between key stakeholders, and the restricted influence of universities upon regional EEs.

Although Russia has a high level of overall education and students' willingness to become entrepreneurs is rather high, a stronger embeddedness of universities into the EEs is required. To achieve this goal, in recent years the Russian government launched several initiatives to support the emergence of a group of world class universities and to promote entrepreneurship in academia. However, there are two groups of factors which are lowering the ability of higher education institutions to become important actors in regional EEs – first of all, this includes the rigid institutional framework (the low level of pioneering research activities, the weakness of an innovation support infrastructure within and on the periphery of the university, the lack of an entrepreneurial mindset among professors, etc.) and second, the unfavorable macro conditions (the low innovation absorption capability of the economy, the dominance of the state-owned large corporations on the domestic market, insecure property rights, and so on).

To support this positive trend, entrepreneurial research should focus on investigating cases of success of single university-led regional EEs in Russia and other CIS countries – to learn which strategies could be benchmarked and widespread. Moreover, a comparison of Russia with the CEE and other CIS countries would be of particular interest, as any entrepreneurial policy needs to be tailor-made to the specific regional and country-specific conditions. This includes the acceptance of the historical roots of these conditions which are similar in these countries. Thus, further research could, for instance, deal with the his-

[6] For more details see: https://mip.extech.ru/, access date 23.07.2019.

torically evolved role of the Russian government with respect to scientific organizations and knowledge transfer [*Gershman et al.,* 2018] to better understand some present-day bottlenecks of Russian regions' EEs.

In order to build a sustainable EE in Russia, the fostering of synergies between the EE actors, among them the university-business collaboration, is needed. The bridging role of alumni and practitioners as business angels and coaches should be supported. For this reason, tax reductions for business angels and private venture funds, including international ones, should be implemented. This could also strengthen the weak internationalization pillar of Russian EEs.

Another measure could be strengthening entrepreneurial education at universities.[7] Further elements of the overall university strategy might be increasing the number of chairs in entrepreneurship, business incubators, and engineering and prototyping centers as well as attracting business representatives who would coach and mentor start-ups and promote entrepreneurial culture to help universities establish an EE from the bottom-up.

References

Acemoglu D., Robinson J.A. (2012) *Why nations fail: The origins of power, prosperity, and poverty* (1st ed.), New York: Crown Publishers.

Acs Z., Storey D. (2004) Introduction: Entrepreneurship and Economic Development. *Regional Studies*, vol. 38, no 8, pp. 871–877. DOI: 10.1080/0034340042000280901.

Acs Z.J., Autio E., Szerb L. (2014) National Systems of Entrepreneurship: Measurement issues and policy implications. *Research Policy*, vol. 43, no 3, pp. 476–494. DOI: 10.1016/j.respol.2013.08.016.

Acs Z., Szerb L., Lloyd A. (2018) *Global Entrepreneurship Index 2018*, Washington, D.C.: Global Entrepreneurship and Development Institute (GEDI).

Aidis R., Estrin S., Mickiewicz T. (2008) Institutions and entrepreneurship development in Russia: A comparative perspective. *Journal of Business Venturing*, vol. 23, no 6, pp. 656–672. DOI: 10.1016/j.jbusvent.2008.01.005.

Aidis R., Welter F. (2008a) *Innovation and entrepreneurship: Successful start-ups and businesses in emerging economies* (eds. R. Aidis, F. Welter), Cheltenham: Edward Elgar.

Aidis R., Welter F. (2008b) The cutting edge: Innovation and entrepreneurship in New Europe (eds. R. Aidis, F. Welter), Cheltenham: Edward Elgar.

Aldieri L., Kotsemir M.N., Vinci C.P. (2018) Knowledge spillover effects: Empirical evidence from Russian regions. *Quality & Quantity*, vol. 52, no 5, pp. 2111–2132. DOI: 10.1007/s11135-017-0624-2.

Alexeev M., Mamedov A. (2017) Factors determining intra-regional fiscal decentralization in Russia and the US. *Russian Journal of Economics*, vol. 3, no 4, pp. 425–444. DOI: 10.1016/j.ruje.2017.12.007.

Alvedalen J., Boschma R. (2017) A critical review of entrepreneurial ecosystems research: Towards a future research agenda. *European Planning Studies*, vol. 25, no 6, pp. 887–903. DOI: 10.1080/09654313.2017.1299694.

Astebro B.T., Bazzazian N. (2011) *Universities, Entrepreneurship and Local Economic Development // Handbook of Research on Entrepreneurship and Regional Development. National and Regional Perspectives* (ed. M. Fritsch), Cheltenham (UK), Northampton, MA: Edward Elgar Pub.

Audretsch D.B. (2003) Innovation and Spatial Externalities. *International Regional Science Review*, vol. 26, no 2, pp. 167–174. DOI: 10.1177/0160017602250973.

Audretsch D.B., Belitski M. (2017) Entrepreneurial ecosystems in cities: Establishing the framework conditions. *Journal of Technology Transfer*, vol. 42, no 5, pp. 1030–1051. DOI: 10.1007/s10961-016-9473-8.

Baumol W.J. (1990) Entrepreneurship: Productive, Unproductive, and Destructive. *Journal of Political Economy*, vol. 98, no 5, pp. 893–921.

Belitski M., Aginskaja A., Marozau R. (2019) Commercializing university research in transition economies: Technology transfer offices or direct industrial funding? *Research Policy,* vol. 48, no 3, pp. 601–615. DOI: 10.1016/j.respol.2018.10.011.

Bergmann H., Golla S. (2016) *Unternehmertum an Hochschulen in Deutschland: Ergebnisse des Global University Entrepreneurial Spirit Students' Survey (GUESSS) 2016*, St. Gallen: Universitat St. Gallen, Hochschule Fulda. Available at: http://www.guesssurvey.org/resources/nat_2016/GUESSS-Bericht-Deutschland-2016_30Sept2016.pdf, accessed 23.04.2019.

Bessonova E., Gonchar K. (2015) Bypassing weak institutions in a large late-comer economy. *Journal of Institutional Economics*, vol. 11, no 4, pp. 847–874.

Beugelsdijk S. (2007) Entrepreneurial culture, regional innovativeness and economic growth. *Journal of Evolutionary Economics*, vol. 17, no 2, pp. 187–210. DOI: 10.1007/s00191-006-0048-y.

Bijedic T., Maass F., Schröder C., Werner A. (2015) Der Einfluss institutioneller Rahmenbedingungen auf die Gründungsneigung von Wissenschaftlern an deutschen Hochschulen. *IfM-Materialien*, vol. 233. Bonn: Institut für Mittelstandsforschung.

[7] See the paper by Zobnina et al. in this issue.

Boycko M., Shleifer A., Vishny R. (1995) *Privatizing Russia*, Cambridge, MA., London: MIT Press.

Bruneel J., D'Este P., Salter A. (2010) Investigating the factors that diminish the barriers to university–industry collaboration. *Research Policy*, vol. 39, no 7, pp. 858–868. DOI: 10.1016/j.respol.2010.03.006.

Bruton G.D., Ahlstrom D., Li H.-L. (2010) Institutional Theory and Entrepreneurship: Where Are We Now and Where Do We Need to Move in the Future? *Entrepreneurship Theory and Practice*, vol. 34, no 3, pp. 421–440. DOI: 10.1111/j.1540-6520.2010.00390.x.

Carlsson B., Acs Z.J., Audretsch D.B., Braunerhjelm P. (2009) Knowledge creation, entrepreneurship, and economic growth: A historical review. *Industrial and Corporate Change*, vol. 18, no 6, pp. 1193–1229. DOI: 10.1093/icc/dtp043.

Cavallo A., Ghezzi A., Balocco R. (2018) Entrepreneurial ecosystem research: Present debates and future directions. *International Entrepreneurship and Management Journal*, vol. 43, no 3, pp. 476–507. DOI: 10.1007/s11365-018-0526-3.

Chepurenko A., Popovskaya E., Obraztsova O. (2017) Cross-regional Variations in the Motivation of Early-Stage Entrepreneurial Activity in Russia: Determining Factors. *Entrepreneurship in transition economies. Diversity, trends, and perspectives* (eds. A. Sauka, A. Chepurenko), vol. 23, Heidelberg, Dordrecht, London, New York: Springer, pp. 315–342.

Clark B.R. (1998) The entrepreneurial university: Demand and response. *Tertiary Education and Management*, vol. 4, no 1, pp. 5–16. DOI: 10.1080/13583883.1998.9966941.

D'Este P., Perkmann M. (2011) Why do academics engage with industry? The entrepreneurial university and individual motivations. *Journal of Technology Transfer*, vol. 36, no 3, pp. 316–339. DOI: 10.1007/s10961-010-9153-z.

Di Gregorio D., Shane S. (2003) Why do some universities generate more start-ups than others? *Research Policy,* vol. 32, no 2, pp. 209–227. DOI: 10.1016/S0048-7333(02)00097-5.

Diez J.R. (2000) The Importance of Public Research Institutes in Innovative Networks — Empirical Results from the Metropolitan Innovation Systems. Barcelona, Stockholm and Vienna. *European Planning Studies*, vol. 8, no 4, pp. 451–463. DOI: 10.1080/713666418.

Elert N., Henrekson M., Stenkula M. (2017) *Institutional Reform for Innovation and Entrepreneurship: An Agenda for Europe*, Stockholm: Research Institute of Industrial Economics.

Estrin S., Mickiewicz T. (2011) Entrepreneurship in Transition Economies: The Role of Institutions and Generational Change. *The Dynamics of Entrepreneurship. Evidence from the Global Entrepreneurship Monitor Data* (ed. M. Minniti), Oxford: Oxford University Press, pp. 181–208.

Etzkowitz H. (2001) The Second Academic Revolution and the Rise of Entrepreneurial Science. *IEEE Technology and Society Magazine*, vol. 20, no 2, pp. 18–29. DOI: 10.1109/44.948843.

Etzkowitz H. (2003) Research groups as 'quasi-firms': The invention of the entrepreneurial university. *Research Policy*, vol. 32, no 1, pp. 109–121. DOI: 10.1016/S0048-7333(02)00009-4.

Feige E.L. (1997) Underground Activity and Institutional Change: Productive, Protective and Predatory Behavior in Transition Economies. *Transforming Post-Communist Political Economies* (eds. J.M. Nelson, C. Tilly, L. Walker), Washington, D.C.: National Academy Press, pp. 21–35.

Freytag A., Thurik R. (2007) Entrepreneurship and its determinants in a cross-country setting. *Journal of Evolutionary Economics,* vol. 17, no 2, pp. 117–131. DOI: 10.1007/s00191-006-0044-2.

Fritsch M., Bublitz E., Sorgner A., Wyrwich M. (2014) How much of a socialist legacy? The re-emergence of entrepreneurship in the East German transformation to a market economy. *Small Business Economics*, vol. 43, no 2, pp. 427–446. DOI: 10.1007/s11187-014-9544-x.

Fritsch M., Storey D.J. (2014) Entrepreneurship in a Regional Context: Historical Roots, Recent Developments and Future Challenges. *Regional Studies*, vol. 48, no 6, pp. 939–954. DOI: 10.1080/00343404.2014.892574.

Fritsch M., Titze M., Piontek M. (2018) *Knowledge interactions in regional innovation networks: Comparing data sources* (Jena Economic Research Paper 2018-003), Jena: Friedrich-Schiller-University Jena. Available at: http://hdl.handle.net/10419/174380, accessed 13.03.2019.

Fritsch M., Wyrwich M. (2014) The Long Persistence of Regional Levels of Entrepreneurship: Germany, 1925–2005. *Regional Studies*, vol. 48, no 6, pp. 955–973. DOI: 10.1080/00343404.2013.816414.

Fritsch M., Wyrwich M. (2017a) The effect of entrepreneurship on economic development — An empirical analysis using regional entrepreneurship culture. *Journal of Economic Geography*, vol. 17, no 1, pp. 157–189. DOI: 10.1093/jeg/lbv049.

Fritsch M., Wyrwich M. (2017b) Persistence of Regional Entrepreneurship: Causes, Effects, and Directions for Future Research. *International Review of Entrepreneurship*, vol. 15, no 4, pp. 395–416.

Froumin I., Kouzminov Y., Semyonov D. (2014) Institutional diversity in Russian higher education: Revolutions and evolution. *European Journal of Higher Education*, vol. 4, no 3, pp. 209–234. DOI: 10.1080/21568235.2014.916532.

Fuster E., Padilla-Meléndez A., Lockett N., del-Águila-Obra A.R. (2019) The emerging role of university spin-off companies in developing regional entrepreneurial university ecosystems: The case of Andalusia. *Technological Forecasting and Social Change*, vol. 141, pp. 219–231. DOI: 10.1016/j.techfore.2018.10.020.

Gershman M., Gokhberg L., Kuznetsova T., Roud V. (2018) Bridging S&T and innovation in Russia: A historical perspective. *Technological Forecasting and Social Change*, vol. 133, pp. 132–140. DOI: 10.1016/j.techfore.2018.03.014.

Ghio N., Guerini M., Rossi-Lamastra C. (2019) The creation of high-tech ventures in entrepreneurial ecosystems: exploring the interactions among university knowledge, cooperative banks, and individual attitudes. *Small Business Economics*, vol. 52, no 2, pp. 523–543. DOI: 10.1007/s11187-017-9958-3.

Gianiodis P.T., Markman G.D., Panagopoulos A. (2016) Entrepreneurial universities and overt opportunism. *Small Business Economics*, vol. 47, no 3, pp. 609–631. DOI: 10.1007/s11187-016-9753-6.

Goethner M., Wyrwich M. (2017) *Cross-faculty proximity and academic entrepreneurship: The role of business schools* (Jena Economic Research Paper 2017-017), Jena: Friedrich-Schiller-University Jena. Режим доступа: http://hdl.handle.net/10419/174377, дата обращения 13.03.2019.

Gokhberg L. (2004) Russia's National Innovation System and the "New Economy". *Problems of Economic Transition*, vol. 46, no 9, pp. 8–34. DOI: 10.1080/10611991.2004.11049870.

Gokhberg L., Kuznetsova T. (2011) S&T and Innovation in Russia: Key Challenges of the Post-Crisis Period. *Journal of East-West Business*, vol. 17, no 2–3, pp. 73–89. DOI: 10.1080/10669868.2011.634769.

Graf H. (2011) Gatekeepers in regional networks of innovators. *Cambridge Journal of Economics*, vol. 35, no 1, pp. 173–198.

Grimpe C., Fier H. (2010) Informal university technology transfer: A comparison between the United States and Germany. *Journal of Technology Transfer*, vol. 35, no 6, pp. 637–650. DOI: 10.1007/s10961-009-9140-4.

Guerrero M., Urbano D., Fayolle A., Klofsten M., Mian S. (2016) Entrepreneurial universities: Emerging models in the new social and economic landscape. *Small Business Economics*, vol. 47, no 3, pp. 551–563. DOI: 10.1007/s11187-016-9755-4.

Gurvich E. (2016) Institutional constraints and economic development. *Russian Journal of Economics*, vol. 2, no 4, pp. 349–374. DOI: 10.1016/j.ruje.2016.11.002.

Hassink R., Wood M. (1998) Geographic 'clustering' in the German opto electronics industry. *Entrepreneurship & Regional Development*, vol. 10, no 4, pp. 277–296. DOI: 10.1080/08985629800000016.

Heller R. (2013) The Russian Innovation Ecosystem 2013. *International Journal of Innovation Science*, vol. 5, no 2, pp. 119–130. DOI: 10.1260/1757-2223.5.2.119.

Hewitt-Dundas N. (2013) The role of proximity in university-business cooperation for innovation. *Journal of Technology Transfer*, vol. 38, no 2, pp. 93–115. DOI: 10.1007/s10961-011-9229-4.

Kauffeld-Monz M., Fritsch M. (2013) Who Are the Knowledge Brokers in Regional Systems of Innovation? A Multi-Actor Network Analysis. *Regional Studies*, vol. 47, no 5, pp. 669–685. DOI: 10.1080/00343401003713365.

Keeble D., Lawson C., Smith H.L., Moore B., Wilkinson F. (1998) Internationalisation Processes, Networking and Local Embeddedness in Technology-Intensive Small Firms. *Small Business Economics,* vol. 11, no 4, pp. 327–342. DOI: 10.1023/A:1007942612220.

Korobkov A., Zayonchkovskaya Z.A. (2012) Russian brain drain: Myths v. reality. *Communist and Post-Communist Studies*, vol. 45, no 3–4, pp. 327–341.

Korosteleva J., Belitski M. (2017) Entrepreneurial dynamics and higher education institutions in the post-Communist world. *Regional Studies*, vol. 51, no 3, pp. 439–453. DOI: 10.1080/00343404.2015.1103370.

Kutsenko E., Meissner D. (2013) *Key Features of the First Phase of the National Cluster Program in Russia* (HSE Working Paper WP BRP 11/STI/2013), Moscow: HSE. Available at: http://www.clusterobservatory.eu/eco/uploaded/pdf/1366786413378.pdf, accessed 15.02.2019.

Lamberova N., Sonin K. (2018) Economic transition and the rise of alternative institutions. *Economics of Transition*, vol. 26, no 4, pp. 615–648. DOI: 10.1111/ecot.12167.

Leyden D.P., Link A.N. (2013) Knowledge spillovers, collective entrepreneurship, and economic growth: The role of universities. *Small Business Economics*, vol. 41, no 4, pp. 797–817. DOI: 10.1007/s11187-013-9507-7.

Lockett A., Siegel D., Wright M., Ensley M.D. (2005) The creation of spin-off firms at public research institutions: Managerial and policy implications. *Research Policy*, vol. 34, no 7, pp. 981–993.

Manolova T.S., Eunni R.V., Gyoshev B.S. (2008) Institutional Environments for Entrepreneurship: Evidence from Emerging Economies in Eastern Europe. *Entrepreneurship Theory and Practice*, vol. 32, no 1, pp. 203–218. DOI: 10.1111/j.1540-6520.2007.00222.x.

McMillan J., Woodruff C. (2002) The Central Role of Entrepreneurs in Transition Economies. *Journal of Economic Perspectives*, vol. 16, no 3, pp. 153–170. DOI: 10.1257/089533002760278767.

Meissner D. (2018) Entrepreneurial Universities: Towards a Revised Paradigm // Innovation and the Entrepreneurial University (eds. D. Meissner, E. Erdil, J. Chataway), Heildelberg, Dordrecht, London, New York: Springer, pp. 37–55.

Meissner D., Shmatko N. (2017) "Keep open": The potential of gatekeepers for the aligning universities to the new Knowledge Triangle. *Technological Forecasting and Social Change*, vol. 123, pp. 191–198. DOI: 10.1016/j.techfore.2016.03.012.

Mueller S.L., Thomas A.S. (2001) Culture and entrepreneurial potential. *Journal of Business Venturing*, vol. 16, no 1, pp. 51–75. DOI: 10.1016/S0883-9026(99)00039-7.

North D.C. (1990) *Institutions, Institutional Change and Economic Performance*, Cambridge: Cambridge University Press.

OECD (2019) *Local entrepreneurship ecosystems and emerging industries: Case study of Malopolskie, Poland* (LEED Working Paper 03), Paris: OECD. Available at: https://www.oecd-ilibrary.org/industry-and-services/local-entrepreneurship-ecosystems-and-emerging-industries-case-study-of-malopolskie-poland_d99ba985-en, accessed 16.05.2019.

O'Shea R.P., Allen T.J., Chevalier A., Roche F. (2005) Entrepreneurial orientation, technology transfer and spinoff performance of U.S. universities. *Research Policy*, vol. 34, no 7, pp. 994–1009.

Ovaska T., Sobel R. (2005) Entrepreneurship in Post-Socialist Economies. *Journal of Private Enterprise*, vol. 21, issue Fall, pp. 8–28.

Perkmann M., Tartari V., McKelvey M., Autio E., Broström A., D'Este P., Fini R., Geuna A., Grimaldi R., Hughes A., Krabel S., Kitson M., Llerena P., Lissoni F., Salter A., Sobrero M. (2013) Academic engagement and commercialisation: A review of the literature on university–industry relations. *Research Policy*, vol. 42, no 2, pp. 423–442. DOI: 10.1016/j.respol.2012.09.007.

Polterovich V. (2017) Institutional Trap. *The New Palgrave Dictionary of Economics* (eds. L.E. Blume, S.N. Durlauf), London: Palgrave Macmillan, pp. 1–7. Available at: https://www.researchgate.net/publication/311907319_Institutional_Trap, accessed 12.04.2019.

Powers J.B., McDougall P.P. (2005) University start-up formation and technology licensing with firms that go public: A resource-based view of academic entrepreneurship. *Journal of Business Venturing,* vol. 20, no 3, pp. 291–311.

Rothaermel F.T., Agung S.D., Jiang L. (2007) University entrepreneurship: A taxonomy of the literature. *Industrial and Corporate Change,* vol. 16, no 4, pp. 691–791. DOI: 10.1093/icc/dtm023.

Roundy P.T. (2017) Hybrid organizations and the logics of entrepreneurial ecosystems. *International Entrepreneurship and Management Journal*, vol. 13, no 4, pp. 1221–1237. DOI: 10.1007/s11365-017-0452-9.

Roundy P.T., Fayard D. (2019) Dynamic Capabilities and Entrepreneurial Ecosystems: The Micro-Foundations of Regional Entrepreneurship. *The Journal of Entrepreneurship*, vol. 28, no 1, pp. 94–120. DOI: 10.1177/0971355718810296.

Sauka A., Chepurenko A.Yu. (eds.) (2017) *Entrepreneurship in transition economies: Diversity, trends, and perspectives*, Heidelberg, Dordrecht, London, New York: Springer.

Sauka A., Welter F. (2007) Productive, unproductive and destructive entrepreneurship in an advanced transition setting: The example of Latvian small enterprises. *Empirical entrepreneurship in Europe. New perspectives* (eds. M.J. Dowling, J. Schmude), Cheltenham: Edward Elgar, pp. 87–105.

Schätzl L. (1999) Regionen: Kompetenzzentren und Globalisierung. *Vision und Verantwortung. Herausforderungen an der Schwelle zum neuen Jahrtausend* (eds. H. Hesse, B. Rebe), Hildesheim: Olms, pp. 97–107.

Schubert T., Kroll H. (2016) Universities' effects on regional GDP and unemployment: The case of Germany. *Papers in Regional Science*, vol. 95, no 3, pp. 467–489. DOI: 10.1111/pirs.12150.

Shane S. (2004) *Academic entrepreneurship: University spinoffs and wealth creation*, Cheltenham: Edward Elgar.

Sivak E., Yudkevich M.M. (2017) The academic profession in Russia's two capitals: The impact of 20 years of transition. *European Educational Research Journal*, vol. 16, no 5, pp. 626–644.

Smallbone D., Welter F. (2001) The Distinctiveness of Entrepreneurship in Transition Economies. *Small Business Economics*, vol. 16, no 4, pp. 249–262. DOI: 10.1023/A:1011159216578.

Smallbone D., Welter F. (2006) Conceptualising entrepreneurship in a transition context. *International Journal of Entrepreneurship and Small Business*, vol. 3, no 2, pp. 190–206. DOI: 10.1504/IJESB.2006.008928.

Smolentseva A., Huisman J., Froumin I. (2018) Transformation of Higher Education Institutional Landscape in Post-Soviet Countries: From Soviet Model to Where? *25 Years of Transformations of Higher Education Systems in Post-Soviet Countries. Reform and Continuity* (eds. J. Huisman, A. Smolentseva, I. Froumin), Basingstoke: Palgrave Macmillan, pp. 1–43.

Sorenson O. (2017) Regional ecologies of entrepreneurship. *Journal of Economic Geography,* vol. 17, no 5, pp. 959–974. DOI: 10.1093/jeg/lbx031.

Sosnovskikh S. (2017) Industrial clusters in Russia: The development of special economic zones and industrial parks. *Russian Journal of Economics,* vol. 3, no 2, pp. 174–199. DOI 10.1016/j.ruje.2017.06.004.

Spigel B. (2017) The Relational Organization of Entrepreneurial Ecosystems. *Entrepreneurship Theory and Practice*, vol. 41, no 1, pp. 49–72. DOI: 10.1111/etap.12167.

Stam E. (2014) The Dutch Entrepreneurial Ecosystem. *SSRN Electronic Journal.* Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2473475, accessed 15.06.2019.

Stam E. (2015) Entrepreneurial Ecosystems and Regional Policy: A Sympathetic Critique. *European Planning Studies*, vol. 23, no 9, pp. 1759–1769. DOI: 10.1080/09654313.2015.1061484.

Stuetzer M., Audretsch D.B., Obschonka M., Gosling S.D., Rentfrow P.J., Potter J. (2018) Entrepreneurship culture, knowledge spillovers and the growth of regions. *Regional Studies*, vol. 52, no 5, pp. 608–618. DOI: 10.1080/00343404.2017.1294251.

Szerb L., Trumbull W.N. (2018) Entrepreneurship development in Russia: Is Russia a normal country? An empirical analysis. *Journal of Small Business and Enterprise Development*, vol. 25, no 6, pp. 902–929. DOI: 10.1108/JSBED-01-2018-0033.

Thursby J.G., Thursby M.C. (2002) Who Is Selling the Ivory Tower? Sources of Growth in University Licensing. *Management Science*, vol. 48, no 1, pp. 90–104. DOI: 10.1287/mnsc.48.1.90.14271.

Ulhøi J., Neergaard H., Bjerregaard T. (2012) Beyond Unidirectional Knowledge Transfer. *International Journal of Entrepreneurship and Innovation*, vol. 13, no 4, pp. 287–299. DOI: 10.5367/ijei.2012.0093.

Velt H., Torkkeli L., Saarenketo S. (2018) The entrepreneurial ecosystem and born globals: The Estonian context. *Journal of Enterprising Communities*, vol. 12, no 2, pp. 117–138. DOI: 10.1108/JEC-08-2017-0056.

Volchek D., Henttonen K., Edelmann J. (2013) Exploring the Role of a Country's Institutional Environment in Internationalization: Strategic Responses of SMEs in Russia. *Journal of East-West Business*, vol. 19, no 4, pp. 317–350. DOI: 10.1080/10669868.2013.851140.

Welter F. (2005) Entrepreneurial Behaviour in Differing Environments. *Local Heroes in the Global Village. Globalization and the New Entrepreneurship Policies* (eds. D. Audretsch, H. Grimm, C.W. Wessner), Boston, MA: Springer Science, Business Media Inc, pp. 93–112.

Welter F. (2011) Contextualizing Entrepreneurship-Conceptual Challenges and Ways Forward. *Entrepreneurship Theory and Practice,* vol. 35, no 1, pp. 165–184. DOI: 10.1111/j.1540-6520.2010.00427.x.

Wyrwich M. (2012) Regional Entrepreneurial Heritage in a Socialist and a Postsocialist Economy. *Economic Geography*, vol. 88, no 4, pp. 423–445. DOI: 10.1111/j.1944-8287.2012.01166.x.

Wyrwich M. (2013) Can socioeconomic heritage produce a lost generation with regard to entrepreneurship? *Journal of Business Venturing*, vol. 28, no 5, pp. 667–682.

Wyrwich M. (2015) Entrepreneurship and the intergenerational transmission of values. *Small Business Economics*, vol. 45, no 1, pp. 191–213. DOI: 10.1007/s11187-015-9649-x.

Yudkevich M.M. (2014) The Russian University: Recovery and Rehabilitation. *Studies in Higher Education*, vol. 39, no 8, pp. 1463–1474.

Yukhanaev A., Fallon G., Baranchenko Y., Anisimova A. (2015) An Investigation into the Formal Institutional Constraints that Restrict Entrepreneurship and SME Growth in Russia. *Journal of East-West Business*, vol. 21, no 4, pp. 313–341. DOI: 10.1080/10669868.2015.1092190.

Zahra S.A., Nambisan S. (2012) Entrepreneurship and strategic thinking in business ecosystems. *Business Horizons*, vol. 55, no 3, pp. 219–229. DOI: 10.1016/j.bushor.2011.12.004.

Zhuplev A., Shtykhno D. (2009) Motivations and Obstacles for Small Business Entrepreneurship in Russia: Fifteen Years in Transition. *Journal of East-West Business*, vol. 15, no 1, pp. 25–49. DOI: 10.1080/10669860902900347.

Fostering of Entrepreneurship Competencies and Entrepreneurial Intentions in a Weak Ecosystem

Marina Solesvik
Professor, mzs@hvl.no

Western Norway University of Applied Sciences, Inndalsveien 28, 5063 Bergen, Norway

Paul Westhead
Professor, paul.westhead@durham.ac.uk

Durham University, Durham DH1, United Kingdom

Abstract

This exploratory study conducted in the transitional context of Ukraine explores whether students drawn from a supportive entrepreneurship education (EE) reported higher intensity of entrepreneurial intention (IOEI) than students that did not participate in EE. Further, this study explores what specific competencies honed within a supportive EE are associated with students reporting high IOEI. Guided by competency theory, two hypotheses were tested with regard to a representative sample of 125 business EE students, and a further 64 engineering students that had never participated in EE. EE students drawn from a supportive educational entrepreneurial ecosystem were found to be associated with significantly higher IOEI. With regard to 13 competencies honed by EE, it was found that only three competencies (the ability to identify high quality opportunities, computer literacy, and networking) were significantly albeit to a weak degree associated with higher IOEI. Additional studies are warranted in several former Soviet Union contexts to provide a rigorous evidence base to guide resource allocation decisions of the government with regard to supporting EE and entrepreneurial ecosystems. This exploratory study relating to the sample of students in one entrepreneurial ecosystem in the Ukraine does not provide conclusive evidence for the government to more proactively support the educational entrepreneurial ecosystem with regard to its current content and delivery.

Keywords: entrepreneurial ecosystem; entrepreneurship education; skills; competencies; entrepreneurial intention

Citation: Solesvik M., Westhead P. (2019) Fostering of Entrepreneurship Competencies and Entrepreneurial Intentions in a Weak Ecosystem. *Foresight and STI Governance*, vol. 13, no 4, pp. 60–68. DOI: 10.17323/2500-2597.2019.4.60.68

Increasing the stock of entrepreneurs is assumed to promote job generation, wealth creation, economic diversity, competition, innovation, and social well-being [*Westhead et al.,* 2011]. Prospective entrepreneurs need to accumulate and mobilize several resources from their internal [*Colombo, Grilli,* 2005] and external ecosystems [*Man, Lau,* 2005; *Westhead et al.,* 2011] to facilitate enterprise and to address barriers to new firm formation [*Chepurenko,* 2015; *Kwapisz,* 2019]. Several governments recognize that they may have a role to play in promoting a wider enterprise culture, particularly the formation of new knowledge and technology-based firms that can have a global sustained competitive advantage [*Schwens et al.,* 2018; *Weerawardena et al.,* 2019]. Governments recognize that universities have a role in promoting the fostering of supportive entrepreneurial ecosystems [OECD, 2011; *Malecki,* 2018; *Zahra, Nambisan,* 2012]. Whilst there is no agreed upon definition of an entrepreneurial ecosystem, Malecki [*Malecki,* 2018, p. 1] has suggested that an entrepreneurial ecosystem relates to "dynamic local, social, institutional, and cultural processes and actors that encourage and enhance new firm formation and growth". Many universities are seeking to commercialize their knowledge and they are providing entrepreneurship education (EE) to encourage more students to become entrepreneurs [European Commission, 2008]. An EE seeks to provide a positive ecosystem for enterprise and address the uncertainty associated with a career in enterprise [*Gibb et al.,* 2009]. Notably, an EE seeks to encourage students to accumulate the competencies assumed to be required to become entrepreneurs at private, corporate, and social enterprises [NESTA, 2008]. However, governments need an evidence base to guide their direct (and indirect) resource allocations towards supporting EE and entrepreneurial ecosystems at universities.

Entrepreneurship is a process [*Low, MacMillan,* 1988]. Most EE [*Neck, Greene,* 2011; *Ploum et al.,* 2018] and entrepreneurial competency [*Fiet,* 2001; *Man et al.,* 2002; *Rasmussen et al.,* 2011; *Burnette,* 2016] studies have been conducted in countries with strong and long-standing enterprise cultures (i.e., North American and European Community countries) and supportive entrepreneurial ecosystems. The external validity of the findings from the latter studies conducted in generally resource munificent entrepreneurial ecosystems need to be explored [*Capaldo et al.,* 2004] in resource-sparse and hostile entrepreneurial ecosystems. Studies are warranted relating to transition economies where there can be cultural, institutional, and/or resource barriers to careers in enterprise.

EE can be viewed as a pedagogical process [*Fayolle et al.,* 2006] that "… develops individuals' intentions, behaviors, skills, and capabilities and can be applied to create value in a range of contexts and environments…" [NESTA, 2008, p. 12]. Notably, EE can be viewed as an entrepreneurial ecosystem that enables students to accumulate competencies [*Neck, Greene,* 2011] that increase their intensity of entrepreneurial intention (IOEI). Debate surrounds who should teach EE, who should receive EE, and what EE should teach [OECD, 2011]. Nevertheless, it is generally assumed that EE should focus upon honing student competencies [*Lackeus, Middleton,* 2018] that can enable them to discover, create, and exploit opportunities in resource munificent as well as resource sparse entrepreneurial ecosystems where they reside [*Volery et al.,* 2015].

Scholars have called for more studies to monitor the outcomes associated with EE [*Neck, Greene,* 2011; *Martin et al.,* 2013; *Walter et al.,* 2013]. Previous entrepreneurial intention studies have been guided by the theory of planned behavior [*Kolvereid,* 1996; *Solesvik et al.,* 2012], the entrepreneurial event model [Fitzsimmons and Douglas, 2011], or a combination of these two theories [*Iakovleva, Kolvereid,* 2009]. Despite the growing plethora of EE courses and studies focusing on EE [*Solesvik,* 2013; *Westhead, Solesvik,* 2016], there is still a lack of clarity relating to the links between an individual's *specific* competencies [*Mitchelmore, Rowley,* 2010] enhanced by EE and high IOEI. As intimated above, EE that hones an individual's competencies and can be assumed to be a mechanism to enable students to discover, create, and exploit business opportunities, as well as the ability to more quickly address barriers to business formation in resource-sparse and hostile ecosystems where they reside.

Guided by insights from competency theory [*Man, Lau,* 2000; *Man et al.,* 2002], this exploratory study provides fresh insight relating to this research gap. This study explores two research questions: (1) Are students drawn from a supportive EE and entrepreneurial ecosystem more likely to report high IOEI than students not drawn from a supportive entrepreneurial ecosystem in Ukraine? (2) What *specific* competencies honed within a supportive EE and entrepreneurial ecosystem is associated with students reporting high IOEI in Ukraine?

This exploratory study replicates and extends studies conducted in North American and European Community contexts. The research questions were explored in a distinct entrepreneurial ecosystem context in the Ukraine. Data was gathered from students drawn from three universities in the city of Nikolaev, which has a population of 500,000 people. This city was the center for shipbuilding in the Soviet Union, but after its collapse the role of shipbuilding dramatically declined. Communist governments widely sought to provide people with employment positions and stable conditions where prices for goods and services exhibited limited variability. Entrepreneurial activity was legally prohib-

ited, and individual risk-taking was not encouraged. To promote economic development, the Ukrainian government is now supporting EE to increase the quantity and quality of entrepreneurs, particularly those engaged in knowledge and technology-based activities [*Parsyak et al.,* 2014; *Iarmosh, Lototskaya,* 2019].

This article is structured as follows. The theoretical case for EE and entrepreneurial ecosystems to focus on honing participants' human capital competency assets is presented in the next section. Hypotheses are then derived. In the following section, the data are collected and the research methodology is discussed. The results are then presented. In the final section, conclusions and implications are presented.

Theoretical Insights

Competency Theory

Several definitions of competency have been presented [*Hoffmann,* 1999]. With reference to the entrepreneur, Iandoli et al. [*Iandoli et al.,* 2007, p. 17] suggested that entrepreneurial competency relates to "the capability of entrepreneurs to face effectively a critical situation by making sense of environmental constraints and by activating relational and internal specific resources." Moreover, Morris et al. [*Morris et al.,* 2013, p. 353] asserted that competency is "the knowledge, skills, attitudes, values, and behaviors that people need to successfully perform a particular activity or task."

Studies have made a distinction between industrial, management, strategic planning, and organizational resource competencies [*Lerner, Almor,* 2002]. Scholars generally assume that the accumulation of one or more competency will facilitate opportunity discovery, creation and exploitation [*Man et al.,* 2002; *Inyang, Enuoh,* 2009; *Kyndt, Baert,* 2015] as well as allow business development barriers to be addressed [*Bogatyreva, Shirokova,* 2017; *Morris et al.,* 2013]. Studies also recognize the importance of dynamic competencies. Several EE courses now focus on honing entrepreneurial and managerial competencies. Notably, the teaching of competencies needs to be contextualized for the entrepreneurial ecosystems where students reside. The external environment can provide a pool of resources required for business formation and development. Students need to appreciate those cultural norms and values as well as formal and informal rules and regulations that can facilitate and/or retard entrepreneurial behavior [*Morris et al.,* 2013].

Consequently, students drawn from the EE entrepreneurial ecosystem need to accumulate and mobilize competencies that enable them to interact with external actors (i.e., financial institutions, consultants, government advisers, etc.) that can provide the resources (i.e., human capital, financial, technological and legitimacy, etc.) required for opportunity discovery, creation, and exploitation. In hostile and resource-constrained entrepreneurial ecosystems, such as the former Soviet Union, students need to accumulate competencies that enable them to gain access to and efficiently use the "limited resources at hand" [*Baker, Nelson,* 2005].

Entrepreneurial Education

A distinction has been made between five broad levels of learning [*Johannisson,* 1991]. The EE entrepreneurial ecosystem can focus on: 'why entrepreneurs act' (i.e., motivation), 'what needs to be done' (i.e., knowledge competency), 'how to do it' (i.e., entrepreneurial and management competencies), 'who should we know' (i.e., network competencies), and 'when to act' (i.e., experience competencies). A key focus of EE is to improve the dynamic human capital assets [*Gimeno et al.,* 1997] of students [*Matlay,* 2008], particularly their competencies [*Miller et al.,* 2012; *Morris et al.,* 2013; *Sanchez,* 2013] required to engage in the entrepreneurial process.

Derivation of Hypotheses

Drawing upon competency theory and insights from EE studies, we present hypotheses relating to the links between EE students' competencies and high IOEI.

Participation in EE

Diversity has been noted in relation to the links between student participation in EE and high IOEI. Some studies have found no statistically significant link between participation in EE and high IOEI reported by students [*Oosterbeek et al.,* 2008, 2010]; whilst other studies have detected that EE students were significantly more likely to report high IOEI [*Sanchez,* 2013; *Bae et al.,* 2014; *Morris et al.,* 2017]. Drawing upon insights from competency theory, we assume that students drawn from the EE entrepreneurial ecosystem will hone the human capital competencies required to pursue careers in enterprise. This discussion suggests the following hypothesis:

H_1: Students participating in EE will be more likely to report high IOEI.

Participation in EE Promoting Specific Types of Competency Accumulation

The EE entrepreneurial ecosystem encourages students to improve several *specific* types of competencies required to discover, create, and exploit business opportunities. Drawing upon competency theory, we assume EE will facilitate the enhancing of a diverse array of different *specific* types of human

capital competencies required to pursue careers in enterprise. Hence:

H_2: Students participating in EE that hone their (a) achievement motivation, (b) communication, (c) decisiveness, (d) self-confidence, (e) ability to identify high quality opportunities, (f) computer literacy, (g) project management, (h) negotiation, (i) ability to seize high quality opportunities, (j) technical knowledge, (k) ability to achieve results, (l) ability to make resource allocation decisions that achieve maximum results with limited resources, (m) technical knowledge, or (n) networking competency will report high IOEI.

Data Collected and Research Methodology

Sample, Data Collection, and Respondents

EE is compulsory for economics and business administration students in Ukraine. Information was gathered from a random sample of second year economics and business administration Master's students that participated in EE. EE students were drawn from the European University, the National University of Shipbuilding, and the Petro Mohyla Humanitarian University in the city of Nikolaev, Ukraine. Information was also gathered from a random control group sample of engineering Master's students that were not allowed to participate in EE.

A questionnaire was designed in English. It was then translated into Russian, and then back into English. Russian is an official language in the southern part of the Ukraine. To explore the content and deal with validity issues, a pilot study was conducted with five business and five engineering students at the National University of Shipbuilding. No problems with the questionnaire were detected.

At the European University, 280 business students had taken an EE course by April 2012. A random sample of 45 business EE students were given a paper-based questionnaire during a class and 29 responses were obtained (i.e., 64% response rate). Information was also gathered from a random sample of 17 engineering students. At the National University of Shipbuilding, 536 business students had taken and EE course by February 2012. A random sample of 100 business EE students were given a paper-based questionnaire during a class and 75 responses were obtained (i.e., 75% response rate). In addition, data was gathered from a random sample of 47 engineering students. At the Petro Mohyla Humanitarian University, 320 business students had taken an EE course by February 2012. A random sample of 30 business EE students were given a paper-based questionnaire during a class and 21 responses were obtained (i.e., 70% response rate). No engineering students were contacted due to difficulties relating to access. In total, data was gathered from 125 business EE students and a further 64 engineering students.

The profiles of the 125 business EE student respondents (i.e., 71% response rate) and the 50 business EE student non-respondents were compared. Chi-square tests failed to detect any significant differences between the business EE student respondents and the business EE student non-respondents with regard to university origin, age, and gender at the 0.05 level of significance. Thus, we have no cause to suspect this sample of EE students is not a representative sample of the population of EE students at the three universities.

Measures

Dependent Variable

Liñan and Chen's [*Liñan, Chen,* 2009] entrepreneurial intention measure was operationalized. Each respondent was presented with six statements relating to the intention to become an entrepreneur. The following statements were presented: I am ready to do anything to be an entrepreneur; my professional goal is to become an entrepreneur; I am determined to create a business venture in the future; I have very seriously thought about starting a firm; I have the intention to start a firm one day; and I intend to start a firm within five years of graduation. Respondents reported their agreement with each statement on a seven-point scale ranging from 'absolutely disagree' (1), 'neither agree nor disagree' (4) and 'absolutely agree' (7). A principal component analysis (PCA) detected that all six statements loaded on a single component. This component had a Cronbach's alpha of 0.92. Varimax rotated component scores were computed relating to the intention (IOEI) dependent variable.

Independent Variables

Respondents that participated in EE were allocated a score of '1', whilst other respondents were allocated a value of '0' (EE). Moreover, each respondent was presented with thirteen statements relating to their perceived competencies. The 13 competencies monitored related to: achievement motivation (Achievement), communication (Communication), decisiveness (Decisiveness), self-confidence (Confidence), ability to identify high quality opportunities (Identify), computer literacy (Computer), project management (Project), negotiation (Negotiation), ability to seize high quality opportunities (Seize), technical knowledge (Technical), ability to achieve results (Results), ability to make resource allocation decisions that achieve maximum results with limited resources (Resources), and networking (Networking). Respondents reported their

Table 1. **Descriptive Statistics and Correlation Matrix (n = 189)** [(a) (b)]

Variables	Mean	SD	VIF	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Female	1.56	0.50	1.01	1.00																	
2. Age	20.35	1.59	1.02	–0.12	1.00																
3. Parents	0.42	0.49	1.01	0.04	–0.06	1.00															
4. EE	0.66	0.47	1.47	0.58**	0.02	0.16*	1.00														
5. Achievement	3.62	1.11	2.06	0.15*	0.02	–0.04	0.26**	1.00													
6. Communication	3.86	1.13	2.35	0.20*	–0.12	–0.05	0.31**	0.56**	1.00												
7. Decisiveness	3.82	1.14	2.90	0.19*	0.06	0.01	0.25**	0.57**	0.62**	1.00											
8. Confidence	3.72	1.08	2.53	0.16*	0.10	0.01	0.23**	0.53**	0.48**	0.68**	1.00										
9. Identify	3.57	1.04	2.74	0.08	0.03	0.15*	0.13	0.53**	0.44*	0.65**	0.63	1.00									
10. Computer	3.85	1.19	1.57	0.19*	–0.01	0.14	0.18*	0.42**	0.51**	0.57**	0.45**	0.52**	1.00								
11. Project	3.59	1.09	2.58	0.14	–0.03	0.20**	0.16*	0.49**	0.43**	0.52**	0.45**	0.62**	0.66**	1.00							
12. Negotiation	3.64	1.26	2.02	0.14	0.01	0.14	0.28**	0.45**	0.40**	0.52**	0.47**	0.55**	0.54**	0.57**	1.00						
13. Seize	3.60	1.14	2.93	0.14	–0.03	0.11	0.21**	0.46**	0.48**	0.54**	0.52**	0.58**	0.59**	0.61**	0.58**	1.00					
14. Technical	3.72	1.07	2.23	–0.02	–0.02	0.15	0.19**	0.45**	0.43**	0.49**	0.41**	0.56**	0.50**	0.54**	0.57**	0.51**	1.00				
15. Results	3.66	1.14	2.77	0.13	0.04	0.09	0.20**	0.46**	0.52**	0.53**	0.46**	0.59**	0.51**	0.55**	0.53**	0.69**	0.59**	1.00			
16. Resources	3.65	1.07	2.55	0.11	–0.01	0.12	0.22**	0.51**	0.47**	0.53**	0.42**	0.60**	0.56**	0.62**	0.57**	0.63**	0.58**	0.66**	1.00		
17. Networking	3.83	1.13	2.78	0.15*	–0.01	0.12	0.25**	0.44**	0.41**	0.58**	0.51**	0.56**	0.54**	0.50**	0.53**	0.69**	0.53**	0.61**	0.63**	1.00	
18. Intention (IOEI)	0.044	0.98		0.04	0.16*	0.16**	0.21**	0.31**	0.23**	0.30**	0.27**	0.38**	0.24**	0.34**	0.26**	0.37**	0.23**	0.38**	0.28**	0.38**	1.00

Notes: (a) Means and standard deviations (SD), (b) IOEI relates to a summative scale, (c) * p<005 (two-tailed), ** p<0.01 (two-tailed).

Source: authors.

agreement with each statement on a five-point scale ranging from 'absolutely disagree' (1), 'neither agree nor disagree' (3) and 'absolutely agree' (5).

Control Variables

Human capital variables considered in previous studies were selected as control variables. Female respondents were allocated a value of '1', whilst male respondents were allocated a value of '0' (Female). Investments in human capital may decrease exponentially with age [*Cressy,* 1996]. The age of the respondents was measured in years (Age). Respondents from family firm backgrounds were allocated a value of '1', whilst others were allocated a value of '0' (Family).

Data Analysis

Table 1 provides means, standard deviations, and correlations. The variance inflation factor (VIF) scores suggest that multicollinearity is not a problem. To test the hypotheses, hierarchical ordinary least squares (OLS) regression models are reported. A base model relating to the control variables is presented. Participation in EE was then added to the base control variable model. The next model included all 13 *specific* types of competencies honed by EE. The significance of the adjusted R^2 coefficients relating to each model was checked. Further, the change in R^2 relating to the sequential inclusion of the alternative EE measures was monitored.

Results

Model 1 included the control variables and is not significant at the 0.1 level (Table 2). Model 2 focusing on participation in EE had an adjusted R^2 of 0.08 and is significant at the 0.01 level. One of the three control variables was significant. Respondents drawn from family firm backgrounds reported weakly significantly higher IOEI at the 0.1 level. Notably, EE respondents reported significantly higher IOEI at the 0.05 level. Consequently, hypothesis 1 was confirmed.

Independent variables relating to the competencies were included in Model 3. This model has an adjusted R^2 of 0.31 and is significant at the 0.001 level. None of the control variables were significant. EE respondents reported significantly higher IOEI at the 0.05 level. Three out of the 13 competencies were weakly significant the 0.1 level. Respondents that reported the ability to identify high quality opportunities (Quality), computer literacy (Computer), or networking (Networking) reported higher IOEI. Consequently, hypotheses H2e, H2f and H2n were weakly supported.

Conclusions and Implications

This exploratory study adds to the understanding of the growing EE entrepreneurial ecosystem phenomenon by providing novel insights from a representative sample of students reporting higher intensity of entrepreneurial intention (IOEI). Supporting the

Table 2. **Entrepreneurial Education and Competencies Associated with Intensity of Intention (IOEI): Ordinary Least Squares (OLS) Hierarchical Regression Models Estimating the Direct Effects (OLS) (n = 189)**

	Model 1	Model 2	Model 3
Control variables			
Female	0.02	-0.13	-0.17
Age	0.04	0.02	0.02
Parents	0.20**	0.16*	0.09
Independent variables			
EE		0.27**	0.25**
Achievement			0.22*
Communication			-0.09
Decisiveness			-0.10
Confidence			-0.13
Identify			0.24*
Computer			-0.13
Project			0.21*
Negotiation			-0.11
Seize			0.19
Technical			-0.14
Results			0.10
Resources			-0.18
Networking			0.24*
R^2	0.04	0.08	0.31
Adjusted R^2	0.02	0.06	0.23
F value	2.32	3.19	4.03
Sig. F value	0.091	0.006	0.000
Adjusted R^2 change	0.02	0.04	0.17
F change		7.99	3.69
Sig. F change		0.005	0.000

Note: * p < 0.10; ** p < 0.05.
Source: *authors.*.

external validity of findings from EE studies conducted in developed economies, this study focusing upon the transitional context of Ukraine confirmed that students drawn from a supportive EE entrepreneurial ecosystem were associated with higher IOEI. This study also provides novel insights relating to the focus of EE. Developed economy studies generally suggest that the honing of competencies will promote higher student IOEE. With regard to 13 competencies, this study interestingly detected that only three competencies (i.e., ability to identify high quality opportunities, computer literacy, and networking) were weakly significantly associated with higher student IOEI. Additional research is warranted surrounding this disappointing finding from an EE entrepreneurial ecosystem perspective. In part, this finding could be due to the EE method of improving of competencies. EE teachers may need to appreciate the fact that the competencies honed in developed economies may not be the competencies required to promote higher student IOEI in resource sparse and hostile entrepreneurial ecosystems as are in former USSR republics. In the latter entrepreneurial ecosystems, there still may be significant ingrained cultural barriers to enterprise despite the recent efforts of governments to highlight the benefits associated with a free market economy. Further, in some entrepreneurial ecosystems there can be powerful existing entrepreneurs that do not want to face competition from additional entrepreneurs with novel ideas ('predatory entrepreneurs' according to [*Feige*, 1997]). For example, there may be a need for the content and deliveries of EE to be contextualized in the entrepreneurial ecosystems where students reside relating to local resource availability and barriers to enterprise. Former Soviet entrepreneurial ecosystems are not a homogeneous entity. The external validity of the findings from this sample of EE and non-EE students needs to be explored in more studies in Ukraine. Also, they need to be explored in several diverse entrepreneurial ecosystems (i.e., resource munificent as well as resource sparse and hostile) in former Soviet republics.

The student population is diverse in terms of gender and family background. Governments in developed economies are seeking to address social and regional inequality with regard to the pursuit of careers in enterprise. This exploratory study found that students drawn from family firm backgrounds reported weakly significantly higher IOEI. It could be assumed that students not drawn from a family firm background, female students, and those that reside in localities with limited resources for enterprise may markedly benefit more from EE. To better contextualize EE, additional studies are warranted surrounding the backgrounds of students and links with higher IOEI. Results from the recent Global University Entrepreneurial Students' Spirit Survey (GUESSS) relating to EE and non-EE students will provide additional insights surrounding the benefits associated with the EE entrepreneurial ecosystem in Ukraine and in a diverse array of former Soviet and Western contexts.

Governments require a rigorous evidence base to guide their resource allocation decisions to support the EE entrepreneurial ecosystem or not. Evidence from this exploratory study suggests the jury should be still out. Governments need to be presented with conclusive evidence that the EE entrepreneurial ecosystem and the competencies and knowledge honed by EE significantly foster higher IOEI reported by students. This exploratory study relating to a sample of EE students in one region in Ukraine does not provide conclusive evidence for a government to more proactively support the EE entrepreneurial ecosystem with regard to its current content and delivery.

References

Bae T.J., Qian S., Miao C., Fiet J.O. (2014) The relationship between entrepreneurship education and entrepreneurial intentions: A meta-analytic review. *Entrepreneurship Theory and Practice*, vol. 38, no 2, pp. 217–254.

Baker T., Nelson R.E. (2005) Creating something from nothing: Resource construction through entrepreneurial bricolage. *Administrative Science Quarterly*, vol. 50, no 3, pp. 329–366.

Bogatyreva K., Shirokova G. (2017) From entrepreneurial aspirations to founding a business: The case of Russian students. *Foresight and STI Governance*, vol. 11, no 3, pp. 25–36.

Burnette D.M. (2016) The renewal of competency-based education: A review of the literature. *The Journal of Continuing Higher Education*, vol. 64, no 2, pp. 84–93.

Capaldo G., Iandoli L., Ponsiglione C. (2004) *Entrepreneurial competencies and training needs of small firms*. Paper presented at the 14th Annual IntEnt Conference, 4–7 July, 2004, Napoli, Italy.

Chepurenko A. (2015) Entrepreneurship theory: New challenges and future prospects. *Foresight and STI Governance*, vol. 9, no 2, pp. 44–57.

Colombo M.G., Grilli L. (2005) Founders' human capital and the growth of new technology-based firms: A competence-based view. *Research Policy*, vol. 34, no 6, pp. 795–816.

Cressy D. (1996) Gender trouble and cross-dressing in early modern England. *Journal of British Studies*, vol. 35, no 4, pp. 438–465.

European Commission (2008) *Entrepreneurship in Higher Education, Especially in Non-Business Studies*, Brussels: European Commission. Available at: http://ec.europa.eu/ enterprise/policies/sme/files/support_measures/training_education/entr_highed_en.pdf, accessed 04.03.2019.

Fayolle A., Gailly B., Lassas-Clerc N. (2006) Assessing the impact of entrepreneurship education programmes: A new methodology. *Journal of European Industrial Training*, vol. 30, no 9, pp. 701–720.

Feige E. (1997) Underground Activity and Institutional Change: Productive, Protective and Predatory Behavior in Transition Economies. *Transforming Post-Communist Political Economies* (eds. J. Nelson, C. Tilly, L. Walker), Washington, D.C.: National Academy Press, pp. 21–35.

Fiet J.O. (2000) The theoretical side of teaching entrepreneurship. *Journal of Business Venturing,* vol. 16, no 1, pp. 1–24.

Fitzsimmons J. R., Douglas E. (2011) Interaction between feasibility and desirability in the formation of entrepreneurial intentions. *Journal of Business Venturing*, vol. 26, no 4, pp. 431–440.

Gibb A., Haskins G., Robertson I. (2009) *Leading the Entrepreneurial University: Meeting the Entrepreneurial Development Needs of Higher Education Institutions*, Coventry: National Council for Graduate Entrepreneurship.

Gimeno J., Folta T.B., Cooper A.C., Woo C.Y. (1997) Survival of the fittest? Entrepreneurial human capital and the persistence of underperforming firms. *Administrative Science Quarterly*, vol. 42, no 4, pp. 750–783.

Hoffmann T. (1999) The meanings of competency. *Journal of European Industrial Training*, vol. 23, no 6, pp. 275–286.

Iakovleva T., Kolvereid L. (2009) An integrated model of entrepreneurial intentions. *International Journal of Business and Globalisation*, vol. 3, no 1, pp. 66–80.

Iandoli L., Landström H., Raffa M. (2007) Introduction: Entrepreneurship, competitiveness and local development. *Entrepreneurship, Competitiveness and Local Development: Frontiers in European Entrepreneurship Research* (eds. L. Iandoli, H. Landström, M. Raffa), Cheltenham: Edward Elgar Publishing, pp. 1–24.

Iarmosh O., Lototskaya E. (2019) New opportunities for youth entrepreneurship development and youth self-employment increase. *Adaptive Management: Theory and Practice. Economics*, vol. 6, no 12, pp. 1–19.

Inyang B.J., Enuoh R.O. (2009) Entrepreneurial competencies: The missing links to successful entrepreneurship in Nigeria. *International Business Research*, vol. 2, no 2, pp. 62–71.

Johannisson B. (1991) University training for entrepreneurship: Swedish approaches. *Entrepreneurship & Regional Development*, vol. 3, no 1, pp. 67–82.

Kolvereid L. (1996) Prediction of employment status choice intentions. *Entrepreneurship Theory and Practice*, vol. 21, no 1, pp. 47–58.

Kwapisz A. (2019) Do government and legal barriers impede entrepreneurship in the US? An exploratory study of perceived vs. actual barriers. *Journal of Business Venturing Insights*, vol. 11, article e00114. Available at: https://doi.org/10.1016/j.jbvi.2019.e00114, accessed 15.09.2019.

Kyndt E., Baert H. (2015) Entrepreneurial competencies: Assessment and predictive value for entrepreneurship. *Journal of Vocational Behavior*, vol. 90, no 1, pp. 13–25.

Lackéus M., Middleton K.W. (2018) Assessing experiential entrepreneurship education: Key insights from five methods in use at a venture creation programme. *Experiential Learning for Entrepreneurship* (eds. D. Hyams-Ssekasi, E. Caldwell), Basingstoke (UK): Palgrave Macmillan, pp. 19–49.

Lerner M., Almor T. (2002) Relationships among strategic capabilities and the performance of women-owned small ventures. *Journal of Small Business Management,* vol. 40, no 2, pp. 109–125.

Liñán F., Chen Y.W. (2009) Development and cross–cultural application of a specific instrument to measure entrepreneurial intentions. *Entrepreneurship Theory and Practice*, vol. 33, no 3, pp. 593–617.

Low M.B., MacMillan I.C. (1988) Entrepreneurship: Past research and future challenges. *Journal of Management*, vol. 14, no 2, pp. 139–161.

Malecki E.J. (2018) Entrepreneurship and entrepreneurial ecosystems. *Geography Compass*, vol. 12, no 3, article e12359. Available at: https://doi.org/10.1111/gec3.12359, accessed 15.09.2019.

Man T., Lau T. (2000) Entrepreneurial competencies of SME owner/managers in the Hong Kong service sector: A qualitative analysis. *Journal of Enterprising Culture*, vol. 8, no 3, pp. 235–254.

Man T., Lau T. (2005) The context of entrepreneurship in Hong Kong: An investigation through the patterns of entrepreneurial competencies in contrasting industrial environments. *Journal of Small Business and Enterprise Development*, vol. 12, no 4, pp. 464–481.

Man T., Lau T., Chan K.F. (2002) The competitiveness of small and medium enterprises: A conceptualization with focus on entrepreneurial competencies. *Journal of Business Venturing,* vol. 17, no 2, pp. 123–142.

Martin B.C., McNally J.J., Kay M.J. (2013) Examining the formation of human capital in entrepreneurship: A meta-analysis of entrepreneurship education outcomes. *Journal of Business Venturing,* vol. 28, no 2, pp. 211–224.

Matlay H. (2008) Vocational education, training and learning in smaller businesses. *Education + Training*, vol. 50, no 8/9, pp. 1–2.

Miller T.L., Wesley C.L., Williams D.E. (2012) Educating the minds of caring hearts: Comparing the views of practitioners and educators on the importance of social entrepreneurship competencies. *Academy of Management Learning & Education*, vol. 11, no 3, pp. 349–370.

Mitchelmore S., Rowley J. (2010) Entrepreneurial competencies: A literature review and development agenda. *International Journal of Entrepreneurial Behavior and Research*, vol. 16, no 2, pp. 92–111.

Morris M.H., Shirokova G., Tsukanova T. (2017) Student entrepreneurship and the university ecosystem: A multi-country empirical exploration. *European Journal of International Management*, vol. 11, no 1, pp. 65–85.

Morris M.H., Webb J.W., Fu J., Singhal S. (2013) A competency based perspective on entrepreneurship education: conceptual and empirical insights. *Journal of Small Business Management*, vol. 51, no 3, pp. 352–369.

Neck H.M., Greene P.G. (2011) Entrepreneurship education: Known worlds and new frontiers. *Journal of Small Business Management*, vol. 49, no 1, pp. 55–70.

NESTA (2008) *Developing Entrepreneurial Graduates: Putting Entrepreneurship at the Center of Higher Education,* London: NESTA.

OECD (2011) *Partnering for Success in Fostering Graduate Entrepreneurship. OECD LEED Forum on Partnerships and Local Governance. Handbook No. 5*, Paris: OECD.

Oosterbeek H., van Praag M., Ijsselstein A. (2008) *The impact of entrepreneurship education on entrepreneurship competencies and intentions* (Tinbergen Institute Discussion Paper 08-038/3), Amsterdam: Tinbergen Institute.

Oosterbeek H., Van Praag M., Ijsselstein A. (2010) The impact of entrepreneurship education on entrepreneurship skills and motivation. *European Economic Review*, vol. 54, no 3, pp. 442–454.

Parsyak V.N., Solesvik M., Parsyak K.V. (2014) Economic aspects of formation and development of entrepreneurship education. *Actual Problems of Economics,* vol. 15, no 5, pp. 126–133.

Ploum L., Blok V., Lans T., Omta O. (2018) Toward a validated competence framework for sustainable entrepreneurship. *Organization & Environment*, vol. 31, no 2, pp. 113–132.

Rasmussen E., Mosey S., Wright M. (2011) The evolution of entrepreneurial competencies: A longitudinal study of university spin-off venture emergence. *Journal of Management Studies*, vol. 48, no 6, pp. 1314–1345.

Sánchez J.C. (2013) The impact of an entrepreneurship education program on entrepreneurial competencies and intention. *Journal of Small Business Management*, vol. 51, no 3, pp. 447–465.

Schwens C., Zapkau F.B., Bierwerth M., Isidor R., Knight G., Kabst R. (2018) International entrepreneurship: A meta–analysis on the internationalization and performance relationship. *Entrepreneurship Theory and Practice*, vol. 42, no 5, pp. 734–768.

Solesvik M. (2013) Entrepreneurial motivations and intentions: Investigating the role of education major. *Education + Training*, vol. 55, no 3, pp. 253–271.

Solesvik M., Westhead P., Kolvereid L., Matlay H. (2012) Student intentions to become self-employed: The Ukrainian context. *Journal of Small Business and Enterprise Development,* vol. 19, no 3, pp. 441–460.

Volery T., Mueller S., von Siemens B. (2015) Entrepreneur ambidexterity: A study of entrepreneur behaviors and competencies in growth-oriented small and medium-sized enterprises. *International Small Business Journal*, vol. 33, no 2, pp. 109–129.

Walter S.G., Parboteeah K.P., Walter A. (2013) University departments and self-employment intentions of business students: A cross-level analysis. *Entrepreneurship Theory and Practice,* vol. 37, no 2, pp. 175–200.

Weerawardena J., Salunke S., Knight G., Mort G.S., Liesch P.W. (2019) The learning subsystem interplay in service innovation in born global service firm internationalization. *Industrial Marketing Management* (forthcoming). Available at: https://doi.org/10.1016/j.indmarman.2019.05.012, accessed 15.09.2019.

Westhead P., McElwee G., Wright M. (2011) *Entrepreneurship: Perspectives and Cases*, London: Pearson Education.

Westhead P., Solesvik M. (2016) Entrepreneurship education and entrepreneurial intention: Do female students benefit? *International Small Business Journal*, vol. 34, no 8, pp. 979–1003.

Zahra S.A., Nambisan S. (2012) Entrepreneurship and strategic thinking in business ecosystems. *Business Horizons*, vol. 55, no 3, pp. 219–229.

Structure, Challenges and Opportunities for Development of Entrepreneurial Education in Russian Universities

Margarita Zobnina [a]
Associate Professor, mzobnina@hse.ru

Anatoly Korotkov [b]
Lecturer, Department of Innovative Pharmaceutics, Medical Technology and Biotechnology, korotkov.av@phystech.edu

Aleksandr Rozhkov [a]
Associate Professor, arozhkov@hse.ru

[a] National Research University Higher School of Economics, 20, Myasnitskaya str., Moscow 101000, Russian Federation

[b] Moscow Institute of Physics and Technology (MIPT), 9, Institutsky per., Dolgoprudny 141701, Moscow Region, Russian Federation

Abstract

This study explores the creation and development of entrepreneurial education tracks in the formation of a University Entrepreneurial Ecosystem (UEE) in certain Russian universities. In particular, the ways in which these tracks promote new venture launches, the commercialization of technologies, and the development of entrepreneurial mindsets and skillsets will be explored.

A panel of 21 Russian Universities was used to verify the integrated UEE model using the method of co-operative inquiry. The role of entrepreneurial courses in UEEs is illustrated herein with the use of 4 cases of Russian universities.

Among the key findings of this research is that the implementation of entrepreneurship education courses configures the UEE development model centered around the education course. UEE formation begins with the personal development of individuals as the course ingrains an entrepreneurial mindset and related skills in students, and attracts entrepreneurs and business angels for mentoring roles and project development activities. Next, supporting institutions like incubators and accelerators are established from scratch, or existing ones are engaged to assist further student project development. As a result, emerging elements of UEE are actively engaged around the development of student startups.

Further case analysis suggests that the professors' academic background and entrepreneurial experience, as well as the course format (e.g. elective or compulsory) are not a necessary prerequisite for the successful initiation and development of UEE, provided the course is project based and generates a stream of student startups. Professors' skills are complemented through the ecosystem, and some cases describe successful course launches by other ecosystem actors. It is also apparent that many universities pursue entrepreneurship education through sporadic infrastructure development, or through a more detached entrepreneurship course implementation.

Keywords: entrepreneurship development; university entrepreneurial ecosystem; entrepreneurial education

Citation: Zobnina M., Korotkov A., Rozhkov A. (2019) Structure, Challenges and Opportunities for Development of Entrepreneurial Education in Russian Universities. *Foresight and STI Governance*, vol. 13, no 4, pp. 69–81. DOI: 10.17323/2500-2597.2019.4.69.81

Entrepreneurial Education Development

Entrepreneurial education has been a growing area at least since modern societies began to transform into entrepreneurial societies [*Audretsch, Thurik,* 2001]. In 2008, the Global Education Initiative of the World Economic Forum initiated the massive promotion of entrepreneurial education. This was considered to be a key driver for sustainable social development and economic recovery [WEF, 2009]. Further, the EU Commission's Entrepreneurship 2020 action plan includes three action points, the first of which is the development of entrepreneurial education [European Commission, 2013]. It is designed to introduce more entrepreneurship classes to increase the entrepreneurial skills of students [*Gorman et al.,* 1997; *Pittaway, Cope,* 2007]. As a result, entrepreneurial education is gaining momentum at universities around the world [*Katz,* 2003, *Valerio et al.,* 2014].

Entrepreneurial education is delivered in various formats, such as separate courses including blended and massive open online courses (MOOCs), certification programs, and full-time bachelor's and master's degree programs. Most programs are heavily embedded in the university infrastructure, enabling students to have access to all kinds of resources and expertise for their business development. The availability of certain practical resources and other support mechanisms can facilitate the adoption of entrepreneurial behaviors, especially by STEM students [*Luthje, Kranke,* 2003] as well as promote the perception of entrepreneurship as a career option [*Johannisson,* 1991; *Autio et al.,* 1997]. Entrepreneurial education can motivate students to initiate business projects and spark great ideas. However, such ideas and projects often cannot be developed without further support beyond the course, especially on emerging markets [*Alaref et al.,* 2019]. Hence, the development of entrepreneurial education should be embedded in a contiguous system of institutions, norms, and actors, which are collectively known as university entrepreneurial ecosystems (UEE). Thus, a combination of entrepreneurial actors emerges (both individuals and organizations), institutions, processes, values, and mind-sets interact, which drive the local entrepreneurial environment [*Mason, Brown,* 2014].

It has been shown in the literature that various forms of entrepreneurial education are an inherent element of a university entrepreneurial ecosystem's origin and development. However, current research lacks evidence regarding whether entrepreneurial education is a significant catalyst for the steady development of a full-fledged entrepreneurial ecosystem. In this paper we explore how introducing entrepreneurial education urges the stakeholders to create coherent entrepreneurial ecosystems at their respective universities. We use Russian universities, which are at the beginning of the ecosystem formation process as the object of this research.

In Russia, entrepreneurial culture and education have been rapidly developing and exhibit great diversity, which enables researchers to observe and analyze emerging ecosystems. In 2010, the Russian government initiated innovation infrastructure development at state universities. A total of 8 billion rubles were allotted among 56 universities over the span of three years from 2010 to 2012. This initiative was expected to boost applied research projects and incentivize universities to participate in startup creation and the training of specialists for innovative industries. As a result, many universities created business incubators and other innovation infrastructure elements. That funding program was designed for three years, with the anticipated results to be revealed over the span of the following five years until 2017. In 2015, the Russian Venture Company (RVC) conducted research [RVC, 2016] into the development of innovative ecosystems at the universities and research centers. It achieved substantial growth (50%-200%) for most elements of infrastructure associated with innovation, including labs, business incubators, innovation development departments, and so on. Further research [RVC, 2016] discovered over 50 business incubators and accelerators actively engaged in cooperation with universities.

Despite the substantial development of the innovative infrastructure, RVC reports low awareness of the programs among potential participants and underdeveloped relationships among partners as common issues in the observed ecosystems [RVC, 2017]. This hinders the impact and inhibits the performance of the investments made in establishing some elements of the UEE.

To foster the development of innovation infrastructure, certain institutional actors promoted the entrepreneurial curriculum at universities. The Internet Initiative Development Fund (IIDF)[1] developed and distributed a blended learning-based (online and offline) 'Internet Entrepreneurship'[2] course in 2014. The idea was to combine online lectures and offline project discussion and tracking in order to facilitate

[1] The Internet Initiative Development Fund (IIDF) is the largest venture fund for IT startups in Russia, established by the Agency for Strategic Initiatives in 2013. The IIDF invests in early-stage IT startups, offers acceleration programs, and contributes to the development of venture legislation. A total fund of 6 billion rubles was used to secure investments in over 300 companies, with over 10,000 startups involved in various development, education and acceleration programs.

[2] The 'Internet Entrepreneurship' course was developed by Margarita Zobnina at IIDF in 2014. This was a mixed-method (online lectures and offline seminars) and project-based class, aimed at the creation and development of student startups. At the time of writing, it had been implemented into over 150 Russian universities including Lomonosov, MSU, MIPT, ITMO, HSE, and others. Total student intake of the internet entrepreneurship course exceeded 7000, with a completion rate of over 80% for the online portion and over 1460 student projects registered on the course platform.

the development of students' projects. Course content was provided to the partner universities for free after faculty members completed an offline "train the trainer" program. After the pilot course implementations, over 163 universities countrywide introduced the course in their curricula. Soon after the course launch, participating universities started to implement various measures to improve output results, including student startup survival rates, funding application success, and so on. Another course, 'Technological Entrepreneurship' was introduced and distributed by the RVC in 2017 to the universities in the same way.

Hence, the implementation of entrepreneurial education pushed the participating universities in Russia to establish and develop a full-fledged entrepreneurial ecosystem within some of the institutions. These initiatives brought new momentum to the startup and entrepreneurial ecosystems present at Russian universities.

To discuss the role of entrepreneurial courses in UEE development at Russian universities in more detail, the paper is structured as follows: first, we consider the available literature on the role of entrepreneurial education in UEEs; second, we explain our research methods; third, we discuss the case studies' findings; and fourthly we present the results and recommendations.

Entrepreneurial Ecosystems at Universities and the Role of Entrepreneurial Courses

Modern universities are engaged [*van de Ven,* 1993] in innovations and entrepreneurship, accumulating scientific research through financing and insurance arrangements and through the development of human competence. Some researchers emphasize the importance of the educational component, which differentiates the university entrepreneurial ecosystem from other environments. They emphasize that the UEE framework may be comprised of entrepreneurial courses in different formats targeting various audiences as well as extracurricular studies and discussion options. Such a difference is derived from the fact that UEE display a great structural and compositional variability due to the differences in internal and external factors and their development process [*Greene et al.,* 2010; *Isenberg,* 2014].

Entrepreneurial education embraces concepts around new venture creation and also has a broad output, including both entrepreneurial mindsets and developing skill sets for entrepreneurs as well as customers, suppliers, and policymakers [*Fayolle, Gailly,* 2015; *Greene et al.,* 2010; *Chepurenko,* 2017]. Graduates with entrepreneurial mindsets are more open to new opportunities in many cases. Besides delivering entrepreneurial activities and groups to the general entrepreneurial community [*Feld,* 2012], student projects initiated in classes can keep local accelerators and incubators occupied. Given that only a relatively small share of students would continue their projects and become entrepreneurs, it can still help one reach tipping points in the formation of entrepreneurial ecosystems. A critical mass of participants enables 'entrepreneurial recycling' [*Mason, Brown,* 2014]. This means that entrepreneurs are constantly involved in the ecosystem regardless of their performance. As such, successful founders cash out and invest in the new ventures and failing entrepreneurs also stay in the ecosystem getting another try while the resources are 'recycled' back into high potential ventures [*Isenberg,* 2011].

As a result, entrepreneurial education becomes an integral part and in some sense the driving motor of the university entrepreneurial ecosystem, along with new venture creation and technology transfer and so on. Does it happen at Russian universities or are there any other specific aspects that need to be considered in the development of the entrepreneurial ecosystem in transitional environments?

Research Methodology and Data Collection

In order to promote entrepreneurial courses at some universities, we utilized the cooperative inquiry method [*Heron, Reason,* 2006]. This method suggests the active involvement of the research participant, transferring them from objects of research to active subjects (co-researchers).

The cooperative inquiry method is typically implemented in four stages. Stage 1 requires co-actors to explore the area of interest. In our case, this stage was conducted during the IIDF 'Internet Entrepreneurship' course 'Train the Trainer' in three-day sessions. During the training, academics and university management personnel discussed student entrepreneurship, startups, and drivers of entrepreneurial ecosystem development. As the result of Stage 1, co-researchers developed ideas about implementing entrepreneurial education at their universities. The 'Train the Trainer' sessions for the entrepreneurial course have been conducted six times a year since 2015 with 627 participants in total.

Stage 2 suggests that participants become subjects of the research immersing themselves in the action and also recording their own and peers' results. After the training sessions, participants launched the same entrepreneurship course at their universities and promoted the development of an entrepreneurial ecosystem.

Stage 3 is about full immersion into the problem and active engagement. Some of the settings and preconceptions may be expected to change at this point. At

this stage, co-researchers will have already acquired extensive teaching experience of Entrepreneurship and will have championed certain changes at their universities as well as established external connections. Certain deviations from the original entrepreneurial ecosystem frameworks were recorded.

Stage 4 allows participants to reassemble and share their ideas and findings on the research problem. In order to exchange findings and observations, co-researchers were invited to the Youth Internet Entrepreneurship Forum[3] (held on May 22, 2017) and to verify the findings, in-depth interviews with the representatives of 21 universities from 12 regions were conducted. All of the respondents were involved both in teaching and UEE development.

The analysis was conducted as follows. All of the respondents' answers were distributed among the previously described elements of the entrepreneurial ecosystem (see Figure 1). Next, we outlined key concepts and qualitative characteristics of ecosystem development mentioned by the respondents. Each of these suggested elements were then supplemented by a set of qualitative descriptors and quantitative indicators. In order to cross-validate the suggestions received, we completed a set of additional interviews to achieve consistency of the indicators in the model (Tables 1 and 2).

The cases of Russian universities we collected should help to test our following research questions:

1) What is the role of entrepreneurial education in the development of the university entrepreneurial ecosystem?
2) What are the drivers of entrepreneurial ecosystem development at Russian universities?
3) What is the role of the professor who introduces entrepreneurial courses?
4) What are the main challenges and barriers for UEE development at Russian universities?

Russian Universities' Ecosystems in Emergence: Research Findings of the Case Studies

The primary goal of the University Entrepreneurial Ecosystem (UEE) is to enable and facilitate student startup development. This vision is shared by all of the university representatives participating in the study. Based on an analysis of the interviews and university observations, we validated the University Entrepreneurial Ecosystem Model, which embodies and illustrates the key elements for UEE composition and functioning (Figure 2).

Using the case analysis, we explored the activation and development of the UEE, paying attention to entrepreneurial education as the catalyst for this process. First, we describe several development patterns for different types of universities (Table 3) and programs, as well as development drivers.

Case A. Individual Efforts

This is a typical example of how a course professor (Professor A) became the driver for entrepreneurship mainstreaming, entrepreneurial event organization, and a student startup support system.

The 'Entrepreneurship' course was first taught in the fourth year of a bachelor's degree program in physics in 2015 after Professor A completed a 'Train-the-Trainer' program. During the first year of implementation, the course was available as an elective module for the Faculty of Physics and Technology, with 22 students in total. In the second year (2016), the course became compulsory in the Faculty of Business Informatics and in 2017, for the Faculty of Management. The rapid advancement of the 'Internet Entrepreneurship' course was made possible due to several reasons besides the motivation and initiative of Professor A. When analyzing the course's performance, it became apparent that "Students from a single program deliver one-dimensional projects with a very weak business component. The course should become interdepartmental in the future." Another reason for the course's promotion was that it was in line with University A's strategic goals: "Our region[4] has a brain drain problem: talented students get their high USE (Unified State Exam) grades and leave for good. If we can engage them in startups they will stay."

Certain support events and initiatives were also launched. After the first year of course delivery, a student startup competition was organized with a partner university with over 70 participants. The best projects were invited to a startup summer school where they worked with their projects receiving expert tracking. Finally, startups entered pitch competitions, with grants awarded to the top three projects.

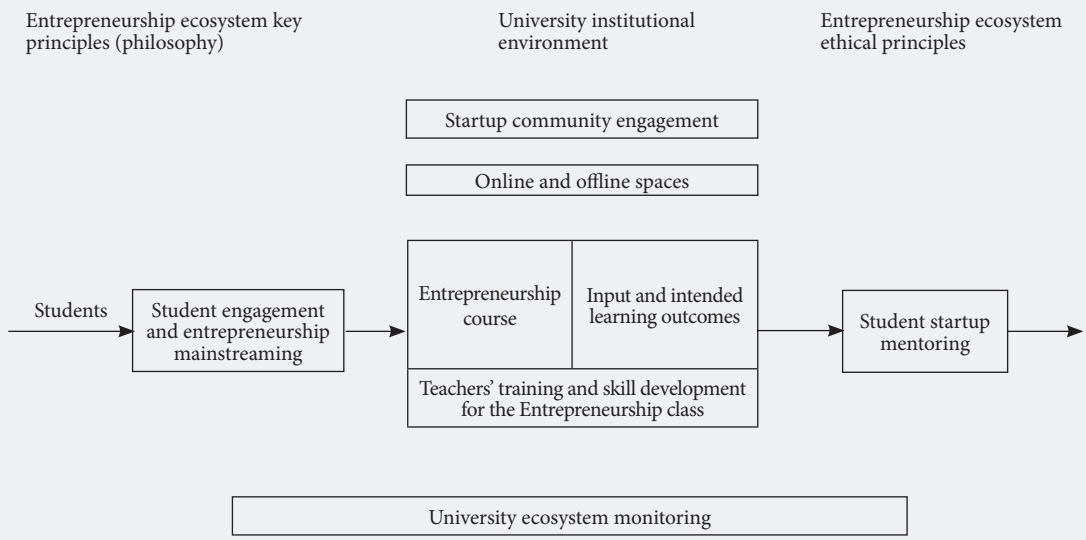
As the course progressed it became apparent that students were engaging in startup creation and development during the course, but abandoned these projects after the course was complete: "Students were interested, but it was the graduating class, with great diploma and internship commitments, so they just quit the projects."

In order to provide a nurturing environment for startup development, Professor A started a business incubator with a rolling program for residents and office space at the university. It was aimed at student proj-

[3] https://forum2017.iidf.ru/ (in Russian)

[4] This region belongs to underdeveloped regions of Russia as regards the RGDP per capita at 205 thousand rubles (ca. 3500 USD), ranking 50th-60th among Russian regions.

Figure 1. **Model of a University Entrepreneurial Ecosystem**



Source: adopted from [*Korotkov, Zobnina,* 2019], and CDIO standards.

Table 1. **Ecosystem Elements Development by University**

Indicator	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	U11	U12	U13	U14	U15	U16	U17	U18	U19	U20	U21
Number of students '000	14	35	25	35	20	15	17	4.3	22.8	18.4	0.33	21	9.7	29	2	8.9	2.7	11.1	30.6	33	7.5
University type [1]	T	C	E	E	C	T	T	E	T	C	E	T	C	T	A	C	E	T	E	T	T
Internet Entrepreneurship course (years)	2016	2015	2015	2015	2015	2016	2015	2016	2016	2015	2016	2015	2015	2016	2016	2015	2017	2015	2015	2016	2016
Region Population (mln)	12.6	4.3	12.6	12.6	1.3	3.9	12.6	1.4	1.3	0.97	1.3	12.6	0.98	12.6	12.6	0.3	3.2	5.4	12.6	5.4	12.6
Region GDP per capita, in thousand USD [2]	19.3	7.6	19.3	19.3	3.6	8.3	19.3	4.3	7.3	14.5	6.1	19.3	3.1	19.3	19.3	3.7	5.9	11.1	19.3	11.1	19.3
University institutional environment	0	++	+	++	++	++	++	++	++	++	++	++	++	+	+	++	++	++	++	++	++
Student engagement and entrepreneurship mainstreaming	+	++	++	+	++	+	+	++	+	++	++	++	++	++	++	+	++	++	++	++	+
Entrepreneurship course	0	++	0	+	+	0	+	++	0	++	+	+	++	++	–	++	++	++	+	++	+
Teachers' training and skill development for the Entrepreneurship class	+	++	+	+	+	+	+	+	+	++	++	+	+	+	+	+	+	+	++	+	+
Student startup mentoring	0	++	+	+	++	++	0	0	++	++	++	+	++	++	–	+	++	++	++	++	0
Startup community engagement	0	++	0	+	++	0	++	+	+	++	+	+	++	0	+	+	++	++	++	++	++
Online and offline spaces	+	++	0	+	+	0	+	+	+	++	–	++	++	++	–	0	++	++	+	+	++
University ecosystem monitoring	+	++	0	++	+	+	–	–	0	++	0	0	+	++	–	–	+	++	+	+	+

Notes: [1] T - technical university, C - classical university ("state universities"), E - Economics and management universities, A - art and/or design university; [2] – data from Rosstat. For the meanings of the codes "++", "+", "0" and "--" see at Table 2.

Source: authors.

Table 2. **Meaning of codes for some indicators provided at Table 1**

Indicator	++	+	0	—
University institutional environment	Entrepreneurship is supported on university level	Entrepreneurship is supported on faculty level	Considered important with no formal support	Not important
Student engagement and entrepreneurship mainstreaming	Organise events to engage students in entrepreneurship, share students' startup success stories at university webpage/blog, inform students about entrepreneurial events outside university	Organise events to engage students in entrepreneurship	Consider important but is not formally organised	Not important
Entrepreneurship course	University-wide course/minor	Course on one/several programs	Don't have entrepreneurial course	—
Teachers' training and skill development for the Entrepreneurship class	Course teacher had special training to deliver entrepreneurial course and works in startup incubator/ accelerator/venture fund	Course teacher had special training to deliver entrepreneurial course	Consider it important, but don't have a specially trained teacher/tutor	Not important
Student startup mentoring	Students startups are mentored & supported by special university unit and are introduced to the external accelerators/funds	Special university unit that mentors and supports student startups (incubator/ accelerator)	Consider it important, but mentoring and support is provided only by the course teacher	Not important
Startup community engagement	University regularly organises events with/for the startup community, course teacher is actively participating in the startup community	Entrepreneurs, investors, accelerators' representatives participate in the entrepreneurial course	Is important but is not formally organised/ systematic	Not important
Online and offline spaces	University has both online communities/blogs on entrepreneurship and offline spaces for entrepreneurs (fab labs, coworking etc.)	Have either online or offline space	Is important but are not formally organized	Not important
University ecosystem monitoring	Monitor number of students of entrepreneurial courses, course feedback and track startups after the course	Monitor number of students of entrepreneurial courses and course feedback	Is important but is not formally organised/ systematic	Not important

Source: authors.

ect support and mentoring after the course, and a soft handover to the regional business incubator, external accelerators, and related funds. In November 2017, the business incubator was created and Professor A took the lead.

During the initial course run in the spring of 2016, the first promotional and engagement events like 'hackathons' and 'harvests' were introduced to the mainstream entrepreneurial culture among students. Another advancement was made in 2017, as University A became the regional operator for the 'You are an Entrepreneur' federal program.[5] This gave a significant boost to entrepreneurial development with quite diverse results: "Many companies were registered, though not so many in the Internet business. Mostly cafes, bakeries, transport, and logistics. Someone is making soap, someone opened an art studio."

After becoming the business incubator leader, Professor A started to promote entrepreneurship beyond student audiences, targeting the general population broadly and secondary school students in particular: "We want to work with [school students] and engage them so that they become resident startups and stay at the university." School engagement events were launched in December 2017, including a business competition with a 50,000-ruble prize and 28 participant teams (over 130 students). Also in 2017, a total of 11 of the region's 21 districts were visited with demonstrative lessons and entrepreneurship talks.

Regional entrepreneurs were invited to participate in the course, including recognized restaurant owners and owners of media agencies.

Another challenge that shaped the further development of the entrepreneurial ecosystem was the rather small and low-density population of the region, with a substantial rural area (41%). This justified entrepreneurial and expert community coordination, as

[5] This is a federal program for entrepreneurship education and development by the Federal Agency for Youth.

Table 3. **Case Universities profiles**

Case	Type of University	Number of Students	Ratings
A	Classical regional university (2.0)	10 000+	No
B	Economics-centered, high profile research university, situated in a large city (1 mln +)	≈3000	No
C	Classic research university 2.0, regional	18 000	211–220 в QS World University Rankings: BRICS
D	Economics university 1.0	2500	No

Source: authors.

Professor A stated: "I see a goal to set up communication, to create a common environment. If we duplicate each other there will be not enough people to work with." University A's business incubator established partnerships with the Center for Business Education of the regional Chamber of Commerce and Industry and the Center for Youth Entrepreneurship Development. These centers held entrepreneurial workshops and training events as well as provided speakers and organizational support. As a result of these coordination efforts, every stakeholder had a complementary educational and development track. University courses and business incubators were at the pipeline entry and helped new entrepreneurs formalize their ideas. At the next stage, startups were sponsored by different stakeholders, including the Center for Business Education, the Center for Engineering, and the Regional Development Fund. Upon further development, startups could proceed without external funding or enter federal accelerators and access investments from federal funds.

Case B. External Project Commercialization

University B has had a Center for Entrepreneurship since 2011 with a youth club for student project development and entrepreneurial events. In October 2018, a business club for school students was established. The Center for Entrepreneurship attracted students from all the city's universities to attend entrepreneurs' talks, promoted entrepreneurship, and familiarized participants with the basic concepts of entrepreneurship. The youth club was an entry point for the master's program in venture business.

A course in entrepreneurship was launched in 2015 in the master's program. By design, the internet entrepreneurial course was project-based and students were expected to create startups as they progressed through the course. Professor B decided to engage external business companies to provide the students with 'real' projects.

Initially, the projects were selected by Professor B from the local business incubator or business angel association. Eventually, an agreement with the local research institute of the Russian Academy of Sciences was established in order to source prospective technological projects. Students were focused on the projects' development and commercialization, including market analysis and business model development as well as on turning it into business. As Professor B explained: "We pitch projects to the students enrolled into our specialization and they arrange themselves into teams of three to five people. After that we check if any skills and competencies are missing and invite relevant people to join the project. If we need a programmer skillset, we invite a student from the faculty of business-informatics. In general, the teams are made up of our students".

Every project had a company supervisor and external mentor. Early stage projects got an academic instructor and later stages involved actual entrepreneurs. If a project developed into a real business, the students continued working there after graduation. If a project team decided to leave after the course ended, the project could be offered for further development to the subsequent student teams.

Another step to enrich the entrepreneurial environment was the creation of University B's accelerator in 2018. With a team of 10, it functioned as a technology transfer center and provided consulting on sales and marketing. It also aided students with attracting financing through grants from The Foundation for Assistance to Small Innovative Enterprises (FASIE) and investments from venture funds and business angel associations. "Due to these activities we became a center of attraction for entrepreneurs", said Professor B.

Case C. Business Incubators Lead Generation and Promotion

This course was introduced in January 2016 as an optional class for bachelor's students from different departments with two study groups and 50 students in total.

The course in which Professor C was a staff member from the university's business incubator was introduced to generate an inbound flow of student projects: "It would be very beneficial for us to acquire

student projects started during the course as our residents. After the course ends, we support the projects through our business incubator programs."

Thanks to Professor C, the university's business incubator had a direct interface with the course and actively engaged in both project mentoring and course participant recruitment. The business incubator held various events twice a month including hackathons, business games, meetings with entrepreneurs, film screenings, and case championships. During these events, participants were recruited to enroll in the optional class.

Such a diversity of events allowed for the targeting of different groups at the same time: if a participant already had a startup he could apply to the incubator directly, if he had an idea or the motivation to study, course enrollment was offered.

Local and regional entrepreneurs joined class sessions, eager to share their experience and give feedback. In addition, staff members, incubator residents, and students from University C's business school also participated in the courses. As Professor C described it: "We had cases when a person would come to give a master-class and a student would start doing business with him."

The optional class format translated into flexible attendance and the absence of a compulsory exam or grading. Professor C had mixed feelings about this: "Optional class is difficult as sometimes they come and sometimes they do not. But they are much more motivated. During the course we discussed real examples and success stories so that students would believe that it is possible to succeed. Besides that, we watched and discussed movies on Saturdays and everyone enjoyed it. By the end of the course nearly half of the 50 students left but that group produced four valid projects." Students, however, did not apply to the regional venture fund: "Many of the students were not ready to take personal responsibility." They participated in different grant programs and competitions instead: Umnik (FASIE), Generation S (RVC), Startup Tour (Skolkovo), Preactum, and a regional techno park. As Professor C summarized: "We plan to create an acceleration program for our students next fall and include an internet entrepreneurial course in the curricula. But it will still be available to everybody."

Case D. The Development of External Connections

The course was implemented in 2016 as a compulsory course for the third year bachelor's students of the management department (three groups, 80+ students).

Professor D was an academic without entrepreneurship experience, but she completed the 'Train the Trainer' program for the course. After the first year of teaching the course, Professor D decided to start her own business to get a deeper understanding: "It is quite difficult to give students valid feedback after you have only completed a three-day instructors' course. I tried to launch my own internet project to immerse myself in this activity and applied for an IIDF accelerator."

Professor D also invited experienced entrepreneurs for mentoring during the course: "We need some mentoring if we want to get any results" and to motivate the students: "at some point they are disappointed and frustrated, their hypothesis collapsed and they do not know what to do. And someone has to shake them up."

University D did not have its own business incubator, but there were a regional business incubator and a corporation for SME development. They were ready to support students' projects at the later stages: "A business incubator told us – 'transfer projects to us and we will take care of them.'" After that, Professor D started to search for mentors and influencers in the entrepreneurial community around the course at her own initiative: "Currently I do it alone. I communicate with the entrepreneurial community by myself, and I managed to sign up 15 experts. We had a startup event in our region; I recruited mentors from its pitch session and some experts agreed. Now they join the classes. The expert board including IT entrepreneurs, government officials, and the business incubator's staff members judge the final pitches for the course."

It turned out that management students lacked important skills for project creation and Professor D tried to establish networks with the regional classic university (19,000 students, 35 educational tracks) that had IT students: "Recently I have been trying to communicate with University X that has IT students. No inter-university teams have been formed yet."

Discussion of Results and Recommendations

As we observed through the discussed cases, entrepreneurial course implementation is a great catalyst for the development of a UEE, but it can be easily inhibited by various internal and external factors that hinder or halt progress.

We combined the content according to the suggested ecosystem model elements. Relevant citations from the interview transcripts were provided. Please refer to the Table 1 for the course profiles.

The rigidity of the university institutional environment as a barrier to entrepreneurial education and UEE formation

Certain incoherence is evident between management levels at universities in terms of university entrepreneurship mainstreaming. In some cases, the university rector approved entrepreneurial course implementation but middle management was reluctant and gave no support. As a result, we identified

a heavy dependence upon proactive and ambitious individuals in cases where support from the middle management is lacking (U1, U2, U9, U17). To give an example: "I initiated the entrepreneurial course and the rector approved it. But they will not let me include it in the curriculum yet. The chairs of the departments and the deans approved the experiment. But it is not official yet. No order has been issued." (U9) Or: "I got this 'train the trainer' program invitation directly from the rector. We discussed it. But after that it has to be dealt with by middle management and they are not interested. The department head had some more important things to think about. He said 'Let us wait and see how it goes.'" (U1)

The inertia and rigidity in new format and new course adoption, reams of paperwork, and as a result, a lack of systematic work are the results (U1, U3, U9, U12, U16). As one interviewee mentioned: "They cannot adopt entrepreneurial courses into the study plan because of the curriculum design. Bachelor programs do not have such opportunities, nor do master's. We cannot adopt the course as the Federal State Education Standards for engineers do not include[6] entrepreneurial competencies" (U12).

Student engagement and entrepreneurship mainstreaming

The process of student engagement and entrepreneurship mainstreaming also required additional attention and development. As a result of this lack of prioritization, students did not understand why studying entrepreneurship was necessary for them (U1, U2, U5, U6, U7, U8, U9, U13, U14, U15, U16). As one informant said: "It turned out that exchange students are much more interested in the course. We tried to engage Russian students, but to no avail. Our students do not see themselves as entrepreneurs and do not understand why they need it" (U2) or: "We tried to launch it a second time as an open course so that everyone could attend. But we could not make a single team, as we had only four attendees. The course was not launched." (U9)

Students do not see entrepreneurship as a valid career option (U2, U6, U7, U10, U11, U16), therefore statements like the following two have been made: "Almost nobody started their businesses, including those who had big plans and promising results for their project. Students are not sure that entrepreneurship is something one can do" (U11); "We had over 100 [students] over the past two years. The result is always limited to a presentation. Students do not get engaged or believe that it is possible to earn money this way." (U16)

Entrepreneurial culture does not stigmatize failure and it stimulates project development. A lack of such a culture leads to lower commitment and fear of failure (U2, U6, U8, U10, U15). Hence, some respondents mentioned fear of failure or stigma as psychological obstacles on behalf of the students, such as: "They complete the assignment, but they treat it as a study project. I tried to learn what they want. It turned out they are afraid, even those who understand success is possible. They have a familiar place with minimal secure income and they are afraid to lose it and get nothing in return" (U2); "In general, students were not prepared for when their idea went wrong. Some of them accepted it and continued working but others stopped and gave up. I had to ask some students to do their homework for the course" (U15). On a related note, students tend to focus on minor goals and maintain a localized mindset: "Most students are focused on winning a grant with their project as opposed to building a global business. So I help them prepare grant applications and pitch presentations" (U12).

The entrepreneurial course requires new skills from both teachers and students

Tutors who experimented with different formats pointed out that a classical lecturing format does not work for entrepreneurial courses, as a representative of U2 stressed: "If you provide only lectures without projects, the course is not so lively." In one case, when the course was delivered without the practical aspect, students even took it upon their own initiative to provide it themselves: "Some of the students left the course after the first half and organized a hackathon." (U4)

When the tutor utilized the 'learning by doing' approach and the students were developing their startups, they faced another challenge: students from the same programs faced a lack of diverse skills and knowledge (U4, U13, U15, U19, U20). For such a barrier, the following statement is typical: "There are not enough techies to implement the projects. My students can create a business model, a financial model and promote customer development and write a marketing plan, but they do not know how to make a product, how to code, we do not teach them this" (U4). Some lacked the motivation to master an area far from their main specialization: "To achieve real results, to make startups out of projects, we need interaction between faculties. Engineers are not interested in the marketing part of business, and marketers are not interested in production. There must be internal interaction, they must meet and work together. Currently there is no interaction." (U1)

When combining students from different faculties in the same course, it is important for them to learn

[6] In fact, the Federal State Education Standards do include some entrepreneurial competencies: http://fgosvo.ru/fgosvo/151/150/24 .

how to communicate with each other: "It is hard for them to work together, because some are humanities scholars, some are engineers, and some are IT focused. They understand and develop in different ways." (U16)

Although this was not in the interview guide, quite a number of tutors (U2, U10, U13, U17, U19) noted that entrepreneurial education should be started from secondary school. For instance: "We tried to work with schoolchildren and we would like to get some help in this regard. Otherwise we have to explain the most basic concepts to students and lose time on that." (U2)

Many of the course tutors do not have entrepreneurial experience (17 universities) and they usually compensate for this through the use of guest speakers and mentors from the entrepreneurial community. However, some tried to establish their own startups in order to understand their students better (U8) and others founded their own startups because they were so inspired by what they had taught their students (U13, U14, U21).

With no regard to experience, the size of the university, or the number of students, tutors desire communication with each other (U8, U10, U13, U16, U18) with the most typically representative quote along the lines of the following: "I feel a need to communicate more with other entrepreneurship tutors and to exchange experiences and best practices" (U10).

When the course is finished: Requirements for student startup mentoring and support at the university

Twelve out of 21 universities reported that student startups are mentored and supported by a special university unit and are introduced to external accelerators and entrepreneurial support funds. In addition, seven respondents (U1, U7, U8, U11, U12, U16, U21) noted that when the entrepreneurial course ends, the vast majority of students quit their startups and confirmed the need for student startup support and the soft handover of startups from the course to a business incubator. "As long as they are organized according to some format (i.e. the course itself) all of them work- but as soon as the course ends, the connecting element dissolves and everyone runs away. As soon as they face problems, people scatter." (U2)

The challenges with the support of students' startups and mentoring fall into one of two categories: lack of demand for support and lack of supply of support. Setting aside the number of prospective startups that appear from the course, even those students who develop their startups do not apply for external funding (U6, U9, U10, U11). Partly, this is because they do not trust that the procedures are fair at state institutions. One of the teachers pointed out: "They do not want to apply; they do not believe that if they fulfill certain requirements, they will get a result. They think that the state machine is corrupt. I did not get such an impression while working with the Bortnik fund.[7] But it is difficult to fight prejudice." (U6) Several respondents noticed that students do not apply to the private funds and companies as they are afraid of responsibility (U6, U10, U9). "There was a project with good market potential - greenhouse management. We brought them to a corporation that was eager to use it. But when they understood that it would be not a test, but a real client and a real product, they got scared and the project fell apart." (U6) "We have a regional venture fund, it started to invest in IT-startups as well. Students do not apply as they are not ready to take on responsibility." (U10)

Some students just do not know about the financing and support opportunities: "There is lack of information on government support. Students do not know what the support options are, what a business incubator does, or how it can be useful for them." (U11)

As far as the support provided is concerned, there are various levels of representation. In some instances, there is no support or mentoring available after the course: "We finish the course with the startup pitch but we do not have a tradition of mentoring or supporting startups further. We have a goal to inspire them to continue by themselves. We do not track them and never planned or discussed doing that." (U15)

In some cases, the incubator formally exists, but it does not work in practice (U3, U12, U16). Such a situation was mentioned by respondents: "We have a business incubator, but nothing substantial happens there. There are two projects in the business incubator in total, they are more or less alive" (U3); "We had a startup support center, but it did not work. But it will soon restart." (U16)

A shortage of available experts and staff members is a frequent reason for why startup support at the university is considered insufficient (U9, U13, U14). Even those who have special startup support units note: "We have a one-person commercialization center that helps companies which receive grants to start production" (U5); "We have not yet a sufficient expert/mentor base and only one person at the university who is fully engaged in startup support." (U9)

In a number of cases there is no formal institution for students' startup support and the mentoring is provided by personally motivated individuals, but it ends after they quit their job at the university (U4, U7, U5, U7, U9, U16, U21). So far, "Students create their

[7] Fund for Assistance to Small Innovative Enterprises (FASIE) http://fasie.ru.

startups during the course and no one mentors them further. We worked with the center of entrepreneurship. But the head of the center quit and there is nothing left there." (U7)

Only a few universities have both online communities for the student-entrepreneurs and co-working spaces for startups (U2, U10, U12, U17, U18, U21), and some lack special spaces for students to work on their projects (U1, U5, U11, U15).

"We have an university incubator, but it does not have an office space where the students can work: the incubator is just a team of people who organize additional educational events and programs." (U5)

Some university representatives mention that their universities do not work with the startup community: "We do not as yet communicate with the startup community." (U14) Some representatives mention that this work is non-systematic or even chaotic (U1, U4, U8, U9, U11, U12, U13, U14, U15, U16), and even those who report regular communication with startups and bring them to students' classes believe that this work is still insufficient (U5, U6, U10, U17), for instance: "We have one representative of Opora Rossii[8], but he is a lone individual and there is no community." (U16)

Some hold accountable the lack of suitable entrepreneurs (U13, U16): "They are self-made and famous, but there is only few of them in the region." (U13)

Others claim a shortage of financing. As respondents mentioned: "We are limited in our budget. We do not have resources for events" (U7); "the number of members of our entrepreneurial club varies from year to year – from 50 to 200. Once the club membership reached 500 members, when we had financing. That was five to seven years ago. We were financed through the Federal Law-219 program and we advertised the club and paid performance fees to speakers. This lasted for three years and then stopped. Now we work without external financing. That is why number of members dropped." (U17)

There were also statements showing that students are not active: "Successful entrepreneurs from our city were ready to invest in a good business idea. We announced the startup ideas competition but failed – the students are apathetic." (U6)

Some blame the lack of coordination at the university level (U5, U11), for instance: "The issue is not to unite everyone, but to synchronize event schedules so as not to carry out similar events on the same day" (U5), or at the level of regional authorities and stakeholders: "There is no single space for the region. All separate departments have their own programs; there is no single strategy. As a result, we lack synergy and the overall effect is rather small. The administration of our region, the local union of young entrepreneurs, the business incubator, Opora Rossii, the chamber of commerce, and the university- everything is fragmented, everyone is interested in startup development, everyone is doing something, but separately." (U11)

Respondents also complain that lacking mutual consent among the startup ecosystem's stakeholders provokes "grant eaters" (U5, U9, U16). As one of the informants mentioned: "We do not have a value chain – we compete for the same startups, and as a result many activities convert startups into grant eaters. They get a grant, fill out the paperwork, spend the money and instead of working with clients and developing their startup to the next stage, they prepare it for the next competition." (U5)

University ecosystem monitoring

Only five universities out of 21 reported that they monitor the number of students in entrepreneurial courses, monitor the course feedback, and track the startups after the course ends (U2, U4, U6, U10, U14). Some of them are quite skeptical about the idea of monitoring: "Every university has its KPIs and we have a lot of paperwork to show the formal progress on those KPIs. Top management is happy adhering to their KPIs and we are trying to build a system that will persevere." (U2)

Others believe that the monitoring is unnecessary (U7, U8, U15, U16) or prefer to rely on their assumptions that if they do not see a problem, then it does not exist. For instance: "We do not monitor student entrepreneurs or students' startups. They remain at the ideation level." (U9)

Some universities do not monitor due to a lack of time or knowledge of how to properly implement it and would like some assistance with this: "If you will provide us with a questionnaire for monitoring, we will distribute it and collect the data." (U16)

Our respondents report a broad spectrum of problems indicating that course implementation is catalyzing change, but it is not sufficient to overcome existing issues. This illustrates problems at the university and calls for the consideration of a systematic ecosystem appraisal. The ecosystem framework can be used to diagnose the reasons for student startup failure and highlight areas should be addressed.

Conclusion

This paper explores how Russian universities implement entrepreneurial courses as accelerating elements for a prospective university entrepreneurial ecosystem.

[8] Russian Small and Mediums Sized Entrepreneurs' Association.

First, we identified two approaches to UEE development through case analysis. The systematic approach provides more balanced and holistic ecosystem development through stakeholder coordination and interaction. This approach enabled course promotion (from a single program elective to a compulsory module in several programs), relevant infrastructure development (university business incubator and external partnerships), broad engagement and promotion activities (from schools to university students), and events and support activity coordination among ecosystem stakeholders (case A). The situational approach is focused on solving immediate issues of particular stakeholders including student project development (case D) or loading the accelerator pipeline (case C).

Second, it was discovered that the lack of relevant academic background or entrepreneurial experience for the professors, or a variety of course formats did not impede UEE development. High motivation and networking capabilities were invaluable, but a lack of expertise was easily compensated for through ecosystem resources. The key role of a professor through the entrepreneurial course implementation and UEE development was identified as advocating and promoting entrepreneurship to different audiences and developing and enabling connections with the ecosystem actors.

Third, the catalyst function of entrepreneurial courses in student startup development can be dramatically decreased in the absence of other ecosystem elements, such as the university's institutional environment, student engagement and entrepreneurship mainstreaming, the presence of an entrepreneurial course, teachers' training and skill development for the entrepreneurship class, the availability of student startup mentoring and support, startup community engagement, and the systematized presence of university ecosystem monitoring. The highest number of problems were found in the following UEE elements: students' engagement and entrepreneurship mainstreaming and student startup mentoring. Intensive stakeholder interaction stimulates viable student startups, although it is inhibited by the fragmentation of the startup community, adverse institutional environment, and specific regional factors. Moreover, institutions like accelerators and incubators were successful in course implementation and the initiation of UEE development.

Finally, we identified the role of entrepreneurial education in UEE development. A project-focused entrepreneurial class was seen to provide participants with relevant experiences and skills, while also developing an entrepreneurial mindset. Aside from students, other entrepreneurial actors like serial entrepreneurs and business angels are attracted to such courses for mentoring and startup traction activities. Thus, it leads to the establishment of greenfield incubators and accelerators or the establishment of networking relationships with existing institutions. These connections can be established inside a university or with available external institutions.

References

Alaref J., Brodmann S., Premand P. (2019) *The Medium-Term Impact of Entrepreneurship Education on Labor Market Outcomes: Experimental Evidence from University Graduates in Tunisia*, Washington, D.C.: The World Bank.

Audretsch D.B., Thurik A.R. (2001) What's new about the new economy? Sources of growth in the managed and entrepreneurial economies. *Industrial and Corporate Change*, vol. 10, no 1, pp. 267–315.

Autio E., Keeley R.H., Klofsten M., Ulfstedt T. (1997) Entrepreneurial Intent among Students: Testing an Intent Model in Asia, Scandinavia and USA. *Frontiers of Entrepreneurship Research. Proceedings of the 17th annual Entrepreneurship Research Conference* (ed. P.D. Reynolds), Wellesley, MA: Babson College, pp. 133–147.

Chepurenko A. (2017) How and Why Entrepreneurship Should Be Taught to Students: Polemical Notes. *Educational Studies Moscow*, no 3, pp. 250–276.

European Commission (2013) *Entrepreneurship 2020 Action Plan*, Brussels: European Commission.

Fayolle A., Gailly B. (2015) The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence. *Journal of Small Business Management*, vol. 53, no 1, pp. 75–93.

Feld B. (2012) *Startup communities: Building an entrepreneurial ecosystem in your city*, Hoboken, NJ: Wiley.

Gorman G., Hanlon D., King W. (1997) Some research perspectives on entrepreneurship education, enterprise education and education for small business management: A ten-year literature review. *International Small Business Journal*, vol. 15, no 3, pp. 56–77.

Greene P., Rice M., Fetters M. (2010) University-based entrepreneurship ecosystems: Framing the discussion. *The development of university-based entrepreneurship ecosystems: Global practices* (eds. M. Fetters, P. Greene, M. Rice), Cheltenham: Edward Elgar Publishing.

Heron J., Reason P. (2006) The practice of co-operative inquiry: Research 'with' rather than 'on' people. *Handbook of Action Research*, vol. 2, Thousand Oaks, CA: Sage, pp. 144–154.

Isenberg D. (2011) *The entrepreneurship ecosystem strategy as a new paradigm for economic policy: Principles for cultivating entrepreneurship*, Dublin: Institute of International and European Affairs.

Isenberg D. (2014) What an entrepreneurship ecosystem actually is. *Harvard Business Review,* no 5, pp. 1–7.

Johannisson B. (1991) University Training for Entrepreneurship: A Swedish Approach // Entrepreneurship and Regional Development, vol. 3, no 1, pp. 67–82.

Katz J. (2003) The chronology and intellectual trajectory of American entrepreneurship education 1876–1999. *Journal of Business Venturing*, vol. 18, no 2, pp. 283–300.

Korotkov A., Zobnina M. (2019) *Standarty predprinimatel'skoi ekosistemy universiteta: Rekomendatsii po razvitiyu predprinimatel'skoi ekosistemy* [University entrepreneurial ecosystem standards: recommendations for the development of the entrepreneurial ecosystem], Moscow: HSE (in Russian).

Luthje C., Kranke N. (2003) The Making of an Entrepreneur: Testing a Model of Entrepreneurial Intent among Engineering Students at MIT. *R&D Management*, vol. 33, no 2, pp. 135–147.

Mason C., Brown R. (2014) *Entrepreneurial ecosystems and growth oriented entrepreneurship,* Paris: OECD.

Pittaway L., Cope J. (2007) Entrepreneurship education: A systematic review of the evidence. *International Small Business Journal*, vol. 25, no 5, pp. 479–510.

RVC (2016) *National report on innovations in Russia, 2016,* Moscow: RVC, Open Government, RF Ministry of Economic Development. Режим доступа: https://www.rvc.ru/upload/iblock/6c5/20161025_2200_Forum_OI_eng.pdf, дата обращения 10.07. 2019.

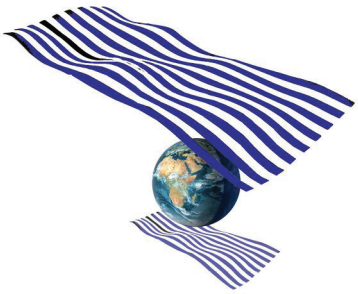
RVC (2017) *Impact assessment of university-linked business incubators and accelerators,* Moscow: RVC, UBI Global, HSE. Режим доступа: https://www.rvc.ru/upload/iblock/c78/UBI_Global-Russia-Impact_Assessment_University-Linked_Business_Incubators_Accelerators_EN.pdf, дата обращения 10.07. 2019.

Valerio A., Parton B., Robb A. (2014) *Entrepreneurship education and training programs around the world: Dimensions for success*, Washington, D.C.: The World Bank.

van de Ven A. (1993) The development of an infrastructure for entrepreneurship. *Journal of Business Venturing*, vol. 8, pp. 211–230.

WEF (2009) *Global Education Initiative. Educating the Next Wave of Entrepreneurs*, Geneva: World Economic Forum.

ISSN 1995-459X



Website

Download on the App Store

GET IT ON Google Play