

# INNOVATION AND ENTREPRENEURSHIP ECOSYSTEM IN SERBIA: PERFORMANCE AND ACTORS

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**Abstract:** *Theory and practice have offered evidence that innovation and entrepreneurship are the engines of growth both in developing and developed economies. The ecosystem approach is a useful tool in assessing different aspects of a process in which innovative entrepreneurship contributes to the competitiveness and economic growth. The aim of this paper is to examine the performance and actors in Serbian innovation and entrepreneurship ecosystem (IEE). In particular, this paper focuses on exploring different domains of the IEE on the basis of selected components of the Global Competitiveness Index. The actors in Serbian IEE are explored from the perspective of establishing an innovative company in order to give an overview of the type and activities of different stakeholders. The research offers pathways that may activate changes in the infrastructures and processes affecting innovative and entrepreneurial activities in Serbia.*

**Keywords:** *innovation, entrepreneurship, ecosystem approach, performance, actors.*

## 1. INTRODUCTION

Innovation generation and entrepreneurial spirit have been widely acknowledged as depending on a complex set of economic, social and cultural factors. Exploring the framework for innovation and entrepreneurship can be done through the innovation and entrepreneurship ecosystem (IEE) framework.

The IEE concept is based on a premise that developing supportive environment is a key factor in nurturing innovation and entrepreneurial activities. The concept has become very popular among academics and policy makers focused on national and local economic development. Successful innovation and entrepreneurship ecosystem enables different actors (entrepreneurs, companies, universities, research organisations, investors and government) to interact effectively and maximise the economic impact and potential of their activities. They include combination of various economic, political, social and cultural elements which support innovative start-ups and encourage entrepreneurship. Efficient IEE enables increasing country output, increase of employment and exploiting technological breakthroughs.

Monitoring performance, actors and networks of the innovation and entrepreneurship ecosystem is an important activity for every national economy due to its effects on economic development. Results of this process give valuable information for decision makers in the area of economic and scientific and technology policy. Analysis of innovation, technology and entrepreneurship is relevant for planning, implementation and evaluation of policies and programs in these fields. Moreover, indicators of innovation and entrepreneurship are beneficial for companies or industry sectors when making decisions related to funds allocation, selection of areas for innovation or creating innovative strategies.

The paper is structured as follows. Section 2 explains evolution of the innovation and entrepreneurship ecosystem concept and it introduces different IEE models. Performance of Serbian innovation and entrepreneurship ecosystem is explored in the third section through the selected components of the Global Competitiveness index. The fourth section presents actors in Serbian IEE from the perspective of innovative company, i.e. in each phase in establishing innovative company. Final sections include concluding remarks and reference list.

## 2. CONCEPT AND MODELS OF INNOVATION AND ENTREPRENEURSHIP ECOSYSTEM

There are different theoretical and practical approaches in explaining the environment in which innovation and entrepreneurial activity is taking place. Some of them are: national innovation system, innovation

system, Triple/Quadruple Helix model, innovation ecosystem, entrepreneurship ecosystem. These approaches include different stakeholders and their relationships in the processes of research, development and innovation. One of the most comprehensive concepts is innovation and entrepreneurship ecosystem.

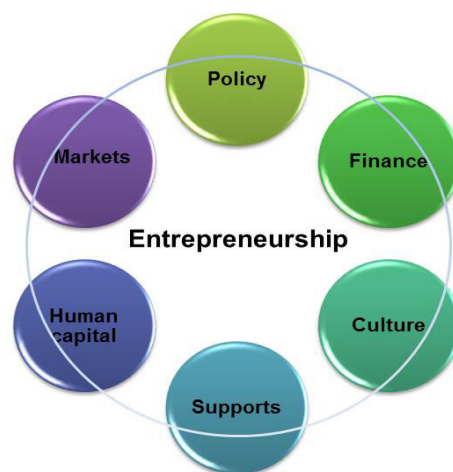
The term “ecosystem” is used in innovation studies in order to capture the interconnected nature of different actors and processes in academic, government and business sector. The ecosystem approach emerged in the 1990s when the concept of “business ecosystem” was developed. Business ecosystem is used to explain interactions between companies from different industries in the process of cooperative work and developing innovative products (Moore, 1993).

Innovation ecosystem is a framework used to encompass different participants, resources and their relationships in enabling technology development and innovation. Participants in the innovation ecosystem are researchers, entrepreneurs, investors, providers of business development, technical services or skills training. Each of these actors plays a significant role in creating value, enabling flow of information and resources, and launching new solutions which increase human well-being.

The first use of the innovation ecosystem concept emerged in 2006 when it was described in Harvard Business Review as “the collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution” (Adner, 2006, p. 2). One of the broadest definitions of the innovation ecosystem explains it as “the evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors” (Granstrand & Holgersoon, 2020, p. 3).

The entrepreneurial ecosystem concept includes different elements that affect the entrepreneurial activity. It can be defined as a set of interacting factors which moderate the effect of entrepreneurial activity on economic growth (Bruns, Bosma, Sanders & Schramm, 2017) or which enable productive entrepreneurship on a certain territory (Stam & Spigel, 2016). The entrepreneurship ecosystem offers not only the networking propensity, but also regional “communities of practice” and interactive learning from the ecosystem actors (Cooke, 2016). The comprehensive definition of the innovation and entrepreneurship ecosystem describes it as a set of interconnected entrepreneurial actors and processes in the three most important parts of the entrepreneurship: creating opportunity, innovation and organizations, and bearing responsibilities in developing policies, measures, instruments for connecting, mediating and governing the performance within the local innovation and entrepreneurial environment (Levi-Jakšić, Rakićević & Jaško, 2018).

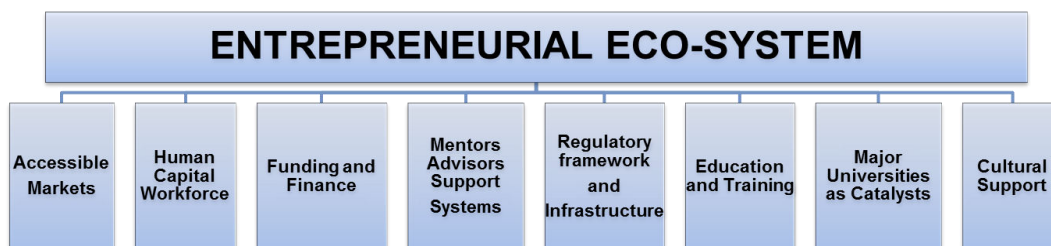
An important challenge in innovation and entrepreneurial ecosystem analysis is a conceptual ambiguity, due to its close resemblance to other network or system-level concepts (Ritala & Gustafsson, 2018). There are approaches similar to the entrepreneurship ecosystem, such as clusters, industrial districts or regional innovation systems. These approaches emphasise the importance of social, cultural and economic context of the entrepreneurial process, but they have different focal points. The focus of the entrepreneurship ecosystem is the individual entrepreneur or a start-up, rather than established companies or SMEs. The output of the entrepreneurial ecosystem is entrepreneurial activity based on creating opportunities for innovation. The innovation will bring new value to the society and it is the ultimate outcome of the entrepreneurial ecosystem (Stam & Spigel, 2016)



**Figure 1:** Domains of the entrepreneurship ecosystem (Source: Isenberg, 2011)

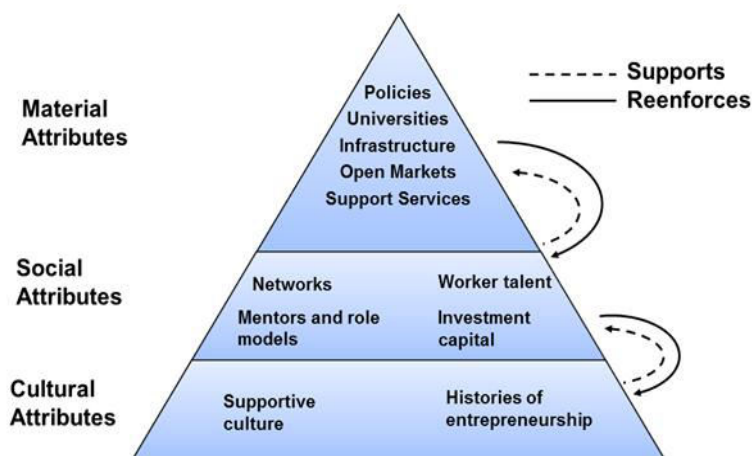
Entrepreneurship ecosystem includes six domains: policy, markets, finance, human capital, culture and support organisations. These domains interact in different ways and their analysis shows if the entrepreneurship is self-sustaining or not (Isenberg, 2011). Aspects of the entrepreneurship ecosystem are presented in Figure 1.

The World Economic Forum, in cooperation with Stanford University, Ernst & Young and Endeavor created an entrepreneurial ecosystem model in order to understand how companies conquer new markets and become successful. They surveyed more than 1,000 entrepreneurs from early-stage companies and after evaluating their answers the model was developed. The advantage of this methodology is the fact that it is developed on the basis of the opinions from all over the world. The model is shown in Figure 2. The research has shown that the three most crucial domains for entrepreneurs are accessible markets, funding & finance and human capital.



**Figure 2:** WEF Entrepreneurial Ecosystem (Source: World Economic Forum, 2013)

The relational model of the entrepreneurial ecosystem is starting from the premise that it is necessary to include relations between different elements. The entrepreneurial ecosystem is dynamic since there are different relations between cultural, social and material attributes. These characteristics of the entrepreneurial ecosystem determine the level of entrepreneurial activity as the output of the entrepreneurial ecosystem (Spigel, 2015). Cultural attributes include supportive culture and history of entrepreneurship, while social attributes are talent of workers, capital, networks or role models. Material attributes encompass support centres, infrastructure, public policy, universities, etc. An ecosystem's attributes are created and reproduced through their relationships with other attributes. This approach is presented in Figure 3.



**Figure 3:** Relational approach to the entrepreneurial ecosystem model (Source: Spigel, 2015)

There are different theoretical and practical disadvantages of the innovation and entrepreneurship ecosystem concept. The ecosystems are defined in very different ways, on different levels and with different research methodology and data. The discussion regarding the entrepreneurial ecosystems is mainly focused on its elements, while ignoring the processes of their combination and sustainability (Malecki, 2018). Previous investigations are also missing case studies showing the evolution of concrete entrepreneurship ecosystems. This is a huge challenge since it requires tracing history of certain area backward for a few decades (Motoyama & Watkins, 2014). Important shortcoming of the existing IEE studies is the fact that they are often focused on the entrepreneurship ecosystem in single regions or clusters, but lack a comparative and multi-scalar perspective (Alvedalen & Boschma, 2017). There are also approaches which highlight the necessity to make difference between quality and quantity in the entrepreneurship activity while assessing the IEE outcomes (Szerb, Lafuente, Horváth & Páger, 2019).

### 3. PERFORMANCE OF SERBIAN IEE

There are different indicators, methodologies and standards for measuring performance of innovation and entrepreneurship system. They can be classified into three broad categories: innovation and entrepreneurship surveys; individual indicators and composite indicators. It is very difficult to focus on only one indicator when assessing the results in certain field especially having in mind the fact that majority of indicators represent indirect measure of innovation or entrepreneurship performance.

Individual indicators of scientific or economic development are used to create composite indices which enable comprehensive consideration of the national position. There are different international initiatives for developing aggregate indices. Some of them are: European Innovation Scoreboard, Knowledge Assessment Methodology, Global Innovation Index, Global Competitiveness Index, Competitive Industrial Performance Index. For the purpose of this research, the evaluation of Serbian innovation and entrepreneurship ecosystem will be based on the Global Competitiveness Index and its components.

The Global Competitiveness Index (GCI) is developed by the World Economic Forum (WEF) and it is published every year in the Global Competitiveness Report. It is one of the broadest and most popular indicators for measuring overall performance of the economy. The World Economic Forum defines competitiveness as a set of institutions, policies and factors which determine the productivity level of the economy, which in turn determines the level of prosperity (World Economic Forum, 2016). The WEF methodology is being improved almost every year and in 2018 the Global Competitiveness Index 4.0 was developed. The GCI 4.0 is calculated on the basis of 103 individual indicators (combination of data from international organizations) and results of the World Economic Forum's Executive Opinion Survey (World Economic Forum, 2019). WEF Executive Opinion Survey is distributed to the business leaders around the globe and serves for getting answers in areas lacking official statistics or in cases when official statistics does not offer comparability between different countries. In the current WEF report, indicators are organized into twelve pillars: Institutions; Infrastructure; ICT adoption; Macroeconomic stability; Health; Skills; Product market; Labour market; Financial system; Market size; Business dynamism and Innovation capability.

The Table 1 summarizes components of the Global Competitiveness Index for the Republic of Serbia sorted by the different domains of the innovation and entrepreneurship ecosystem. Each component is described by its value, score and rank among 141 countries. Scores are indicated on a scale from 0 to 100, where 100 represents the optimal solution or "frontier". Each score is followed by the arrow indicating the direction of change in comparison with the previous period.

According to the Global Competitive Index for 2019, Serbia is the 72th most competitive nation in the world among 141 countries covered in the research (World Economic Forum, 2019). This is a fall from 65th position it held in 2018.

In the area of human capital Serbia has the worst position in the extent of staff training, while finding skilled employees has the most favourable rank. GCI components related to the market competition and dominance have the most unfavourable ranks in comparison with other IEE domains. Extent of market dominance is ranked 110th, competition in services 85th and distortive effect of taxes and subsidies on competition is 81st. These data undoubtedly reveal the fields for improvement. Financial system indicators show improvement related to financing of SMEs and venture capital availability. Domestic credit to private sector is ranked 81st and considered as less favourable than in the previous period.

Indicators of business dynamic explain the administrative, cultural and innovative environment. The business registration procedure in Serbia lasts 5 days and Serbia is ranked 27th in this field. Costs of starting a business are also low in comparison with other world economies. On the other hand, Serbia has very unfavourable rank when it comes to attitudes towards entrepreneurial risk (107th), willingness to delegate authority (82th), growth of innovative companies (83rd), companies embracing disruptive ideas (80th). These indicators show low level of innovative and entrepreneurial culture in the country.

Innovation capabilities domain of the IEE includes different indicators affecting various elements of the innovation process. Serbia has the worst results in the area of cluster development and multi-stakeholder collaboration. It is interesting to notice that although R&D expenditure in Serbia is only 0.9% of GDP, it is ranked 38th. Numbers of scientific publications, international co-inventions and patent applications take above average position among observed countries. For example, there are 1.08 international co-inventions per million population in Serbia which ranks it 43rd among 141 countries.

**Table 1:** Global Competitiveness Index components (Republic of Serbia, 2019).

| IEE domain              |  | GCI Component  | Value | Score  | Rank/141 |
|-------------------------|--|--|-------|--------|----------|
| Human capital           |  | Extent of staff training 1-7 (best)                                | 3.6   | 43.6↓  | 104      |
|                         |  | Skillsset of graduates 1-7 (best)                                  | 4.1   | 51.9↓  | 65       |
|                         |  | Digital skills among active population 1-7 (best)                  | 4.1   | 51.5↓  | 77       |
|                         |  | Ease of finding skilled employees 1-7 (best)                       | 4.4   | 57.3↑  | 51       |
| Markets                 |  | Distortive effect of taxes and subsidies on competition 1-7 (best) | 3.6   | 43.3↑  | 81       |
|                         |  | Extent of market dominance 1-7 (best)                              | 3.2   | 37.4↓  | 110      |
|                         |  | Competition in services 1-7 (best)                                 | 4.7   | 62.3↓  | 85       |
| Financial system        |  | Domestic credit to private sector (% GDP)                          | 43.3  | 45.5↓  | 81       |
|                         |  | Financing of SMEs 1-7 (best)                                       | 3.9   | 49.1↑  | 65       |
|                         |  | Venture capital availability 1-7 (best)                            | 3.2   | 35.9↑  | 69       |
| Business dynamic        |  | Cost of starting a business (% of GNI per capita)                  | 2.2   | 98.9↑  | 45       |
|                         |  | Time to start a business (days)                                    | 5.5   | 95.0 = | 27       |
|                         |  | Attitudes towards entrepreneurial risk 1-7 (best)                  | 3.7   | 44.9↑  | 107      |
|                         |  | Willingness to delegate authority 1-7 (best)                       | 4.2   | 53.1↑  | 82       |
|                         |  | Growth of innovative companies 1-7 (best)                          | 4.0   | 49.2↑  | 83       |
|                         |  | Companies embracing disruptive ideas 1-7 (best)                    | 3.5   | 42.3↑  | 80       |
| Innovation capabilities |  | Diversity of workforce 1-7 (best)                                  | 4.7   | 62.0↑  | 48       |
|                         |  | State of cluster development 1-7 (best)                            | 3.4   | 40.0↓  | 104      |
|                         |  | International co-inventions (per mil. pop.)                        | 1.08  | 22.4↓  | 43       |
|                         |  | Multi-stakeholder collaboration 1-7 (best)                         | 3.6   | 42.9↑  | 87       |
|                         |  | Scientific publications (score)                                    | 180.3 | 77.0↑  | 61       |
|                         |  | Patent applications (per mil. pop.)                                | 2.49  | 22.9↓  | 54       |
|                         |  | R&D expenditures (% of GDP)  | 0.9   | 31.0↑  | 38       |
|                         |  | Research institutions prominence 0-100 (best)                      | 0.02  | 4.2↑   | 60       |

**Source:** World Economic Forum, 2019.

#### 4. ACTORS IN SERBIAN IEE FROM THE PERSPECTIVE OF INNOVATIVE COMPANIES

Serbian innovation and entrepreneurship ecosystem includes actors from different sectors: academic, governmental and private. In this research, for each phase in establishing innovative company are presented IEE actors including their activities, type and concrete example. Of course, the phases in establishing innovative company are introduced with the assumption that innovation are based on R&D and technology transfer. In real conditions, there are non-technological innovations and those developed without research efforts. For example, innovation may happen as a result of individual intellectual work.

As illustrated in Table 2, the first phase in establishing innovative company includes research and development. This embraces generating ideas, conducting concrete R&D types and financing these activities. Actors involved in this phase are universities, research institutes, innovation centres, ministries and R&D funding agencies. R&D performers are universities and R&D institutes. They are funded by the Ministry of the Education, Science and Technological Development, Science Fund and different international programs, projects and organisations.

Conveying results of scientific research into market or wider community requires help of technology transfer and intellectual property rights (IPR) professionals. There are technology transfer offices established at the public universities in Belgrade, Novi Sad, Kragujevac and Niš. Intellectual Property Office offers consulting related to the IPR. Researchers and SMEs can also get preliminary IPR consulting and technology transfer help from the Enterprise Europe Network Advisers.

In the phase of establishing innovative company, IEE actors offer different services: creating business models; renting office space; business, legal and marketing consulting; staff training; networking and mentoring. There are many support organisations offering these services – Science & Technology parks, business incubators, clusters, associations, chambers of commerce, development agencies, etc. Serbia has four S&T parks, several business incubators, and many clusters and specialised organisation supporting innovative start-up companies. Chamber of commerce and Development Agency also have different programmes for supporting entrepreneurs and innovators. A recent study exploring facilities providing business development services in Serbia highlighted the importance of improving and standardizing their offer in order to move from co-working and property-based services to high-value services. Smart

specialization strategy is identified as a tool for transforming business incubators into network hubs and areas of innovation (EUBID project, 2019).

**Table 2:** IEE actors per phases in establishing innovative company

| Phase in establishing innovative company | Activities  | Type of IEE actor  | Example   |
|--|---|--|---|
| Research & Development                   | <ul style="list-style-type: none"> <li>- Generating ideas</li> <li>- Basic research</li> <li>- Applied research</li> <li>- Experimental development</li> <li>- Financing R&amp;D</li> </ul>   | <ul style="list-style-type: none"> <li>- Universities, research institutes and innovation centres</li> <li>- Ministries</li> <li>- Agencies for funding R&amp;D</li> <li>- International programmes and organisations</li> </ul> | <ul style="list-style-type: none"> <li>- Accredited universities: University of Belgrade, University of Novi Sad, University of Kragujevac, University of Niš, etc.</li> <li>- R&amp;D institutes: Institute "Mihajlo Pupin", Institute of physics, Vinča Institute of Nuclear Sciences, etc.</li> <li>- Ministry of education, science and technological development</li> <li>- Science Fund</li> <li>- Innovation Fund</li> </ul>   |
| Technology transfer and IP protection    | <ul style="list-style-type: none"> <li>- Advising in the area of technology transfer and IPR</li> </ul>   | <ul style="list-style-type: none"> <li>- TT offices</li> <li>- IP offices</li> <li>- Professionals, specialized projects</li> </ul>  | <ul style="list-style-type: none"> <li>- Center for technology transfer, University of Belgrade</li> <li>- Danube Center for Technology Transfer, University of Novi Sad</li> <li>- Knowledge Transfer Center, University of Kragujevac</li> <li>- Center for technology transfer, University of Niš</li> <li>- Intellectual Property Office of the Republic of Serbia</li> <li>- Enterprise Europe Network Advisers</li> </ul>   |
| Establishing a company                   | <ul style="list-style-type: none"> <li>- Creating business models</li> <li>- Office space</li> <li>- Business and legal consulting</li> <li>- Networking, mentoring, marketing and promotion</li> <li>- Professional trainings</li> </ul> | <ul style="list-style-type: none"> <li>- S&amp;T parks</li> <li>- Business incubators</li> <li>- Chambers of commerce</li> <li>- Development agencies</li> <li>- Clusters and associations</li> </ul>                            | <ul style="list-style-type: none"> <li>- Science and Technology Parks: Belgrade, Novi Sad, Niš and Čačak</li> <li>- Business &amp; Technology Incubator of technical faculties Belgrade</li> <li>- Business incubators in Novi Sad, Subotica, Kragujevac, Kruševac, Pirot, etc.</li> <li>- StartIT, ICT Hub, Impact Hub, Nova iskra</li> <li>- Chamber of Commerce and Industry of Serbia</li> <li>- Development Agency of Serbia</li> <li>- Clusters: Vojvodina ICT cluster, Fashion apparel cluster Serbia, Agro Cluster of Serbia, etc.</li> </ul> |
| Seed financing                           | <ul style="list-style-type: none"> <li>- Seed money grants</li> <li>- Crowdfunding initiatives</li> </ul>   | <ul style="list-style-type: none"> <li>- Ministries and funding agencies</li> <li>- Individual investors</li> <li>- Angel investors</li> <li>- Venture capital funds</li> <li>- Crowdfunding platforms</li> </ul>                | <ul style="list-style-type: none"> <li>- Innovation Fund</li> <li>- Ministry of education, science and technological development</li> <li>- Crowdfunding platforms: kickstarter.com, indiegogo.com, etc.</li> </ul>   |
| Financing in the phase of maturity       | <ul style="list-style-type: none"> <li>- Initial public offering</li> <li>- Loans</li> <li>- Government programmes for fostering entrepreneurship</li> </ul>  | <ul style="list-style-type: none"> <li>- Individual investors</li> <li>- Companies</li> <li>- Financial institutions</li> <li>- State institutions</li> </ul>  | <ul style="list-style-type: none"> <li>- Commercial banks</li> <li>- Ministry of economy</li> <li>- Development Fund of the Republic of Serbia</li> </ul>   |

Source: Prepared by the authors.

Acquisition of the seed financing for new business ideas is usually the most difficult phase which requires tremendous networking and effort. Actors in this phase include relevant ministries, funding agencies, individual and angel investors, venture capital funds and crowdfunding platforms. Seed money for starting innovative business in Serbia is provided by the Ministry of Education, Science and Technological Development and Innovation Fund. Also, there are different networks of investors and crowdfunding campaigns available.

In the phase of maturity, innovative companies can obtain funds through initial public offerings, loans or government programmes for supporting entrepreneurship. This includes engaging individual investors,

financial and state institutions. In Serbia, there are frequently opened public calls for fostering entrepreneurship published by the Ministry of economy and the Development fund.

## 5. CONCLUSION

The innovation and entrepreneurship ecosystem concept represents a very useful framework for assessing the external environment determining micro and macro aspects of national competitiveness. Analysis of different actors, domains, networks and relationships in the IEE enables identifying bottlenecks and areas for improvement.

According to the components of the Global Competitiveness Index grouped per IEE domains, Serbian IEE has potential for improving in all selected areas: human capital, markets, financial system, business dynamic and innovation capabilities. Ranks and scores of the GCI suggest that the most disadvantaged position of the innovation and entrepreneurship ecosystem in Serbia are related to the market dominance, attitudes towards entrepreneurial risk, cluster development, staff training and multi-stakeholder collaboration.

Analysis of the actors in Serbian IEE indicates that there are diverse organisations and institutions performing relevant activities in each phase of establishing an innovative company. It is especially developed a network of supporting organisations offering services of business and legal consulting, creating business models, networking, mentoring and professional trainings. This analysis should be considered as a preliminary mapping of these organisations. In order to understand their activities and impact, a more detailed assessment is required.

The research presented in this paper offers insights of Serbian IEE relevant for policy makers, entrepreneurs and researchers. Policy makers could find relevant information and methodology necessary for knowledge-based decision making in the area of scientific and technological development. Innovators and entrepreneurs are offered a range of stakeholders in the IEE which could help them in implementing their business ideas. The paper is also valuable for researchers since it offers a solid base for future investigation in this area.

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