

EMERGING TRENDS IN THE DEVELOPMENT OF THE SERBIAN STARTUP INNOVATION ECOSYSTEM

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ABSTRACT:

The Serbian startup innovation ecosystem is experiencing a period of dynamic growth and evolution, marked by emerging trends that are reshaping the landscape of entrepreneurship and innovation in the region. Recent research indicates that the ecosystem has continued to grow at nearly 30% annually, despite increasingly challenging global and local circumstances, which is reflected in the increase in the number of startups in the idea phase and pre-seed phase. Through a comprehensive review of recent literature and industry reports, this paper examines the latest developments and emerging trends shaping the development of the Serbian startup innovation ecosystem aiming to contribute to a deeper understanding of the dynamics and opportunities within the region's entrepreneurial landscape. It also provides valuable implications for understanding of the factors driving entrepreneurial activity and innovation in the region. These include the growing prominence of deep tech startups leveraging advanced technologies such as artificial intelligence, blockchain, and biotech, and the expanding role of ecosystem startup support organization such as science and technology parks, accelerators, regional innovation startup centers and academic innovation incubators in supporting startup growth and success.

Keywords: *Serbian startup ecosystem, innovation, emerging trends, startup entrepreneurship*

1. INTRODUCTION

Strengthening the competitiveness of the national economy, with particular emphasis on innovation and startup entrepreneurship is consider as one of Serbia's greatest priorities. Innovations drive progress by challenging traditional industries and introducing new products and services, often leading to the emergence of new technologies, industries, and markets which often highlights the significance of innovative entrepreneurship in advancing economic activities. The growth and development of startups not only contribute to economic development and reducing unemployment, but through new ideas, products, and services, innovations, knowledge, and the creativity of their

members, initiate technological and economic changes within the national economy of Serbia [1].

Startups play a pivotal role in driving the economic advancement of a country. They play a vital role in regional development through innovation, driving institutional changes, enhancing productivity, and introducing fresh products and services to the market. In light of the recent economic crisis, the promotion and support of startup entrepreneurship have become increasingly critical [2].

While considerable advancements have been achieved, the Serbian startup ecosystem encounters hurdles hindering its further expansion. These obstacles encompass talent acquisition, market expansion, regulatory intricacies, and societal perceptions towards entrepreneurship. Overcoming these impediments demands sustained cooperation and alignment among diverse stakeholders, governmental agencies, industry stakeholders, academic institutions, and the startup community. In light of these opportunities and challenges, this paper seeks to examine the emerging trends shaping the development of the Serbian innovation startup ecosystem, providing insights into its evolution, current state, and future trajectory. By understanding the dynamics of the ecosystem and identifying key drivers of success, stakeholders can better navigate the landscape and capitalize on the opportunities presented by Serbia's vibrant startup ecosystem.

2. STARTUP INNOVATION ECOSYSTEM IN SERBIA

The **national innovative ecosystem** can be defined as *the system of interacting private and public firms (either large or small), universities and government agencies, aiming at the production of science and technology within national borders. Interaction among those units may be technical, commercial, legal, social and financial, in as much as the goal of the interaction is the development, protection, financing or regulation of new science and technology* [3].

The startup ecosystem is an environment where startups develop. It comprises individuals, teams, startups at different stages of development, and various types of organizations and institutions. Together, these elements function as a system to create and accelerate the development of new startups. This ecosystem concerns all stakeholders, such as businesses, governmental bodies, academic institutions, investors, freelancers, and support entities. Their collective involvement is indispensable for the sustainability of startup ventures, as without their collaboration, the survival of a startups is nearly unattainable [4].

Republic of Serbia, with its strategic location in Southeast Europe, rich talent pool, and growing reputation as a growing regional technology hub, has emerged as a more attractive destination for startup investment and entrepreneurship. Over the past decade, the country has made significant strides in fostering a conducive environment for startup innovation, characterized by a supportive regulatory framework, access to funding, and a vibrant entrepreneurial community. Although the Serbian startup innovation ecosystem is gaining more and more importance, it must be noted that it is still a startup ecosystem that is in the development phase, so it has not been the subject of major research globally

but there are more and more initiatives in that direction. In light of this, continued efforts towards strengthening the Serbian startup ecosystem are paramount to unlocking its full potential and positioning it as a prominent player on the regional and global startup stage.

By definition, the Serbian startup innovation ecosystem involves Serbian startups, academic institutions, science and research organizations, institutes, governmental agencies, innovators, researchers, domestic and international investors, venture capital funds and public and private entities dedicated to fostering entrepreneurship and startup ventures. Collaboratively, they establish a network of startup enterprises to enhance the business landscape, define regulatory frameworks, exchange knowledge, bridge academia-industry gaps, and promote initiatives for regional economic development.

The Serbian innovative ecosystem includes startups as well as startup teams, where there are significant differences and similarities. Republic of Serbia defined **startup** as a newly established business entity or entrepreneur that develops an innovative product or service with the potential for rapid and substantial growth [5], where **startup team** is a group of individuals who develop an innovative product that demonstrates the potential for large and rapid business growth on the global market - the startup team is not registered as a business entity in the appropriate register. Startup teams that register as business entities become startups in the full sense of that term [4]. A **spinoff startup** represents a startup established by an existing legal entity with the aim of developing and commercializing innovations, while a **spinoff startup from a scientific research organization** represents a startup established with the aim of developing and commercializing innovations stemming from scientific research [5].

According to StartupBlink, Serbian startup ecosystem that include Belgrade, Novi Sad and Niš, has several interesting trends to show [6]:

- Serbia maintained its positive momentum and increased 1 spot in 2023, ranking 51st globally;
- On a regional level, the country remains the 14th startup ecosystem in Eastern Europe and 6th in the Balkans;
- Last year was very good year for Serbia, with 3 ranked cities showing positive momentum;
- The capital and highest ranked city in Serbia, Belgrade, showed an increase of 35 spots to rank 165th;
- Among cities in the Balkans, Belgrade is now ranked 4th, a 2-spot increase from 2022;
- Belgrade outperforms in the Marketing & Sales industry, where it ranks among the top 100 cities globally;
- Novi Sad entered the global top 400 cities with an increase of 59 spots;
- After returning to the Index last year, this year Niš jumped another 145 spots to join the global top 700.

The Global Startup Ecosystem Report 2023, shown that from July 1, 2020 until December 31, 2022, Belgrade and Novi Sad created an ecosystem value of USD 1.1 bn which is a growth of 75.41% compared to the previous period. The value of the

ecosystem is expressed through economic influence, calculated as exit value and startup valuation. The startup ecosystems of Belgrade and Novi Sad are recognized among the best 20 European ecosystems by available talent – in the category which measures the ability to employ tech talents [7].

According to Startup Scanner 2024, characteristics of the Serbian startup ecosystem are embodied in several trends [8]:

- According to the Startup Genome methodology, the startup ecosystem is in the first phase of ecosystem development - the activation phase, characterized by intensive growth. This is reflected in the increasing number of startups in the ideation and pre-seed stages;
- Just over half of the startups (56.7%) have non-technical founders in their founding team, who come from industries such as marketing, business, finance, and creative industries, while 43.3% of startups consist of teams without non-technical founders;
- Founder Profile: Founders in Serbia are predominantly male, aged between 30 and 39, with a master's degree, currently residing in Serbia, and most of whom have gained their previous experience through work in corporations;
- A significant concentration of startups is in the Belgrade region (57.9%), as the main business and technological center in Serbia. The second-largest region in terms of the number of startups is the Vojvodina region with 22.9%, while 19.2% of startups originate from the Central Serbia region;
- The main challenges facing domestic startups in Serbia are financing, sales, and hiring talent with the appropriate skills

2. EMERGING TRENDS IN SERBIAN INNOVATIVE STARTUP ECOSYSTEM

Serbian innovation startup ecosystem has been characterized by constant rapid growth, which brings with it economic development and an increase in the number of new employees. In recent years, Serbia initiated several processes that led to a more durable approach to ecosystem growth, internal alignment between different stakeholders, and increased international exposure. According to the previous discussion, there are several important trends indicating the growth and potential of the Serbian startup innovation ecosystem.

Growth in the number of startups. Last year, Serbia witnessed a remarkable surge in the number of startups compared to the previous year, reflecting the growing vibrancy of its entrepreneurial and innovative landscape. The most significant Startup Scanner 2024 research has shown that the domestic innovation ecosystem continues to experience impressive growth of 20% to 30% in new startups annually, indicating vitality and resilience even in challenging global conditions. This occurs despite well-known local challenges such as access to funding, sales and customer acquisition, as well as hiring staff with the appropriate skills. It is estimated that in 2023 the ecosystem grew by around 150 new startups, and that 1,350 new team members were employed at the ecosystem level. It's worth noting that the actual number of new jobs created in 2023 fell short of the projected 3,000, and notably, there was a decrease in hiring across the

startup ecosystem compared to 2022. Research from the previous year indicated that 1,600 new hires were recorded in 2022. While it's common for annual projections to be overly optimistic, the discrepancy between anticipated and actual results underscores the significant challenges encountered by the ecosystem throughout the year. In any case, currently, approximately 6,000 people are employed within the domestic startup ecosystem, which is 2,500 more than in 2021 [8].

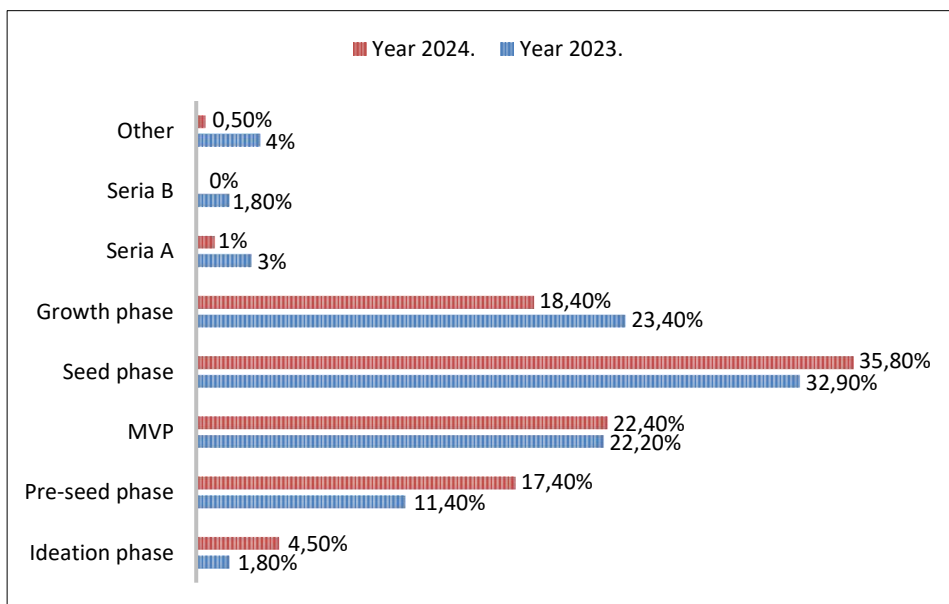


Figure 1 Percentage of startups in different stages of development in 2023/2024 [8,9]

The rise in the number of early-stage (ideation and pre-seed phase) startups suggests a growth in entrepreneurial activity within a given region or industry (Figure 1). The growth of early-stage startups is instrumental in driving economic development by creating new job opportunities, generating revenue streams, and stimulating overall economic growth. Startups inject vitality into the economy, fostering competition, and contributing to productivity gains. These stages are critical for validating startup ideas and often represent a crucial milestone towards further developing and financial support.

Growing interest in advanced technologies. The Serbian IT sector is the country's most recognizable economic engine of growth - gaming, blockchain, artificial intelligence and web3 as well as the field consisting of medtech, biotech and healthtech, are the most prominent sectors, due to the number of talents, resources, support and activities of Serbian startups. There is a growing number of highly educated and talented young people in Republic of Serbia who are interested in entrepreneurship, with many individuals that are returning from abroad and bringing new ideas and skills with them. This trend is creating a more favorable environment for startups and venture capital funds. Venture capital funds in the Republic of Serbia can play an important role in future with further development of startup innovation ecosystem, in supporting

innovative ideas and technological innovations offering financial support to startups engaged in the development of new innovative products and services.

Serbia's tech industry accounts for at least 6% of the nation's GDP and is growing rapidly. There are over 45,000 highly-skilled tech professionals in Serbia, which is known globally for its world-class engineers. Computer programming is compulsory for all students over the age of 11, who study Scratch, Python, Pygame, and Jupyter. There are 44 specialized IT courses taken by 800 pupils annually in high schools. 3,300 software engineers graduate from 26 faculties every year. Main sub-sector strengths that Serbian startup ecosystem is recognizable for gaming industry, blockchain and Life sciences [7].

According to Serbian Gaming Association, estimated number of teams and companies in gaming industry is 150 which had 175m euros in revenue during 2023, with more than 4300 professionals in industry. Comparing data from 2017 to 2023, there is seven-year overview of the growth and development of Serbian gaming ecosystem. Serbian games have been downloaded/ purchased more than 100m times during 2023, the 15 most successful Serbian gaming companies generated over 175m euros which is increase of 17% compared to previous year. Over 70% of the above-mentioned revenue is generated by companies creating and selling a product, while the remaining 30% is attributed to services in the gaming space. The majority of companies depend on a single mature product for a significant portion of their revenue. It is important to note that 25% of the product companies are subsidiaries of international companies, whose work is more similar to providing services, as their work can't be attributed to a specific product of the company. Most known gaming studios are: 3Lateral, Nordeus, Fortuna Esports, Playstudios Europe, Ubisoft Belgrade, Wargaming and others [10].

Serbia has emerged as a hotbed of innovation and entrepreneurship in the field of blockchain, cryptocurrency and web3, and to became the home for many startups related to blockchain. In 2021, Serbia's Law on Digital Assets became effective – that law legalizes cryptocurrency trading and mining, and encourages cryptocurrency service providers to obtain licenses and authorization from Serbian authorities to operate within the country. Two licenses for the provision of digital assets services have been issued to date. Tenderly, with the mission to create a better environment for all web3 developers to build in, raised a \$40 million Series B in March 2022 and Web3 venture-builder Attic42 opened in April 2023. The Serbian government is looking into implementing blockchain technology in healthcare, urban planning, and other areas of interests.

There is a growing interest among domestic startups in artificial intelligence and machine learning as significant drivers of innovation within the startup ecosystem. It's evident that the startup world is entering the era of generative artificial intelligence, with a growing focus on innovative ideas that incorporate AI in various ways. In 2019, the Serbian government adopted the National AI Strategy, which sets out a framework for developing AI in Serbia whit aim to create an environment that fosters innovation, promotes the development of AI talent, and encourages the use of AI in various sectors. During 2022 Serbia become part of the Global Partnership on Artificial Intelligence and seven new master programs in AI was established at six faculties. During 2023 Serbia

adopts ethical guidelines for Artificial Intelligence. All previous statements highlight the significance of AI for the Serbian ecosystem.

The construction of BIO4 campus – first Life Sciences campus in the region, a unique multidisciplinary project that will enable Belgrade to become one of the renowned and recognized bioeconomy centers in Europe, began in 2023. The main goal is to BIO4 become most advanced center in biotechnology and genetics, and home for Faculty of Biology, Faculty of Pharmacy, Faculty of Technology and Metallurgy, eight scientific institutes and national database of genetic resources.

It's important to be noticed The Centre for the Fourth Industrial Revolution in Serbia as platform promoting public-private partnerships in Life Sciences, which coordinates various projects in the field of biotechnology with the aim of enhancing conditions for the development, testing, and advancement of new technologies for the benefit of society. Primary focus is on data from the fields of biomedicine and genetics, infrastructure development for the storage and utilization of big data, as well as the establishment of new protocols to ensure better conditions for the advancement of the health and science sectors.

Increasing availability of venture capital and angel investment. Although that majority of Serbian startups bootstrapping their development (due to number of startups in early stages of growth), one of the key drivers of the Serbian startup ecosystem's growth can be the increasing availability of venture capital and angel investment, both from domestic sources and international investors.

Venture capital funds offer not only financial investment, but also valuable intangible assets based on their experience and networks - this aspect of investment is critical, as startups in early stages often lack both financial and intangible resources, including past experience and knowledge, which are necessary for them to develop their business. However, only a limited number of startup companies have been successful in attracting venture capital funds investment and the timing of receiving investments ranges from the initial stage to the later stage of startup growth [11].

Venture capital funds are recognized in the state legislation of the Republic of Serbia in the past few years. According to the Law on alternative investment funds Venture capital funds are alternative investments funds with a private offer whose assets, in accordance with the alternative investments fund's business rules, are mainly invested in business entities that are newly founded or are in the initial stages of business, and show potential for growth and business expansion [12]. With the right support and investment, the venture capital industry in Republic of Serbia has the potential to drive significant economic growth and job creation in the coming years. Despite the current modest size of the venture capital industry in Republic of Serbia, there have been some notable successes in recent years [13].

According to Startup scanner 2024 there is slight increase in availability of venture capital funds, 13,4% investments in Serbian startups during 2023 came from venture

capital funds which is increase comparing to 2022 when 8,4% of domestic startups financed their growth using venture capital funds. It demonstrates a notable uptrend. Comparing the percentage of investments from business angels between 2022 and 2023 (8.4% to 13.4%, respectively) demonstrates a steady trend (Figure 2). This influx of capital has provided startups with the financial resources needed to fuel their growth. Previous data, show that Serbian startup ecosystem is steadily maturing with more startups that are worth investing – venture funds usually invest in startups that are in later stage of growth.

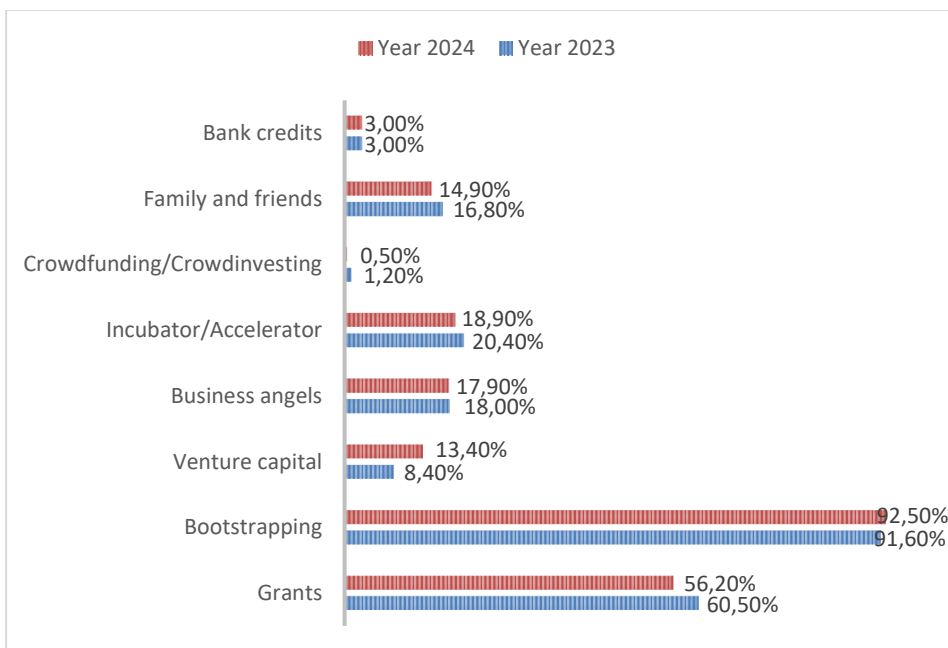


Figure 2 Finance sources of startups growth (*startups can use several different sources of financing) [8,9]

First corporate venture capital fund in this part of Europe was established in 2021 by Serbian state-owned telecommunications operator Telekom Srbija with primary goal to support and invest in technological and business solutions, which due to their innovation in the market can lead to rapid and major transformations. Newly established VC funds. Omorika Ventures and The Fifth Quarter are two new funds that started operations in 2023. In addition to TS Ventures and two new venture capital funds, there is a number of foreign and regional private venture capital funds interesting in local ecosystem, which indicate that domestic startup innovation ecosystem is becoming more attractive and that can be expected more venture funds to enter domestic startup ecosystem in future

Slight increase in academic interest in startups entrepreneurship. Although academic interest remains modest, the recent period has shown a slight but encouraging increase in interest in startup entrepreneurship and the commercialization of innovations stemming from science and research organizations. Significant stakeholders in the

startup ecosystem particularly emphasize the great potential of technology transfer from academia to industry.

Particularly noteworthy is the "Expert2Mentors" initiative conducted by the Faculty of Organizational Sciences in Belgrade as part of the Venture an Idea project supported by USAID. This initiative focuses on enhancing mentoring skills among professors and associates from research organizations to work with student startup teams in the critical initial stages of development. Over the past three years, the program has engaged over 80 professors and associates from research organizations at the University of Belgrade and the University of Kragujevac. They had the opportunity to enhance their knowledge and skills in the field of startup entrepreneurship and innovation development, as well as ways to support students in developing their innovative ideas. As a next step of the program, at the University of Belgrade, the pre-incubation program Route2Launch was implemented, through which 29 student startup teams developed their business ideas [8].

Towards the end of the preceding year, with the goal of aiding entrepreneurial teams (made by students, researchers, and/or faculty members, either individually or in a mixed composition) within scientific research organizations to develop and commercialize their innovations in the market and develop innovative ideas, 14 **innovation incubators** were established at scientific research organizations. This initiative was supported by the Ministry of Science, Technological Development, and Innovation of Republic of Serbia with aim to [14]:

- foster and support the development of entrepreneurial competencies,
- increase the number of startup teams with business ideas,
- boost the number of startups in the earliest stages of development,
- emphasize the provision of training, mentorship, and counseling,
- facilitate their growth and enable smooth entry and success in the market,
- support multidisciplinary and collaboration of scientific research organizations with one or more related scientific research organizations and/or science and technology parks.

Establishing innovation incubators is intended to ignite entrepreneurial spirit among youth and enhance the success rate in the early stage of business development. In the first quarter of the current year, 117 activities were held, including training sessions, workshops, and seminars, with the participation of over 900 students, researchers, and professors.

3. CONCLUSION

Through analysis of the current state and emerging trends, it is evident that the Serbian startup ecosystem is evolving, facing numerous challenges and opportunities. Key emerging trends in ecosystem encompass the growth of number of startups, growing interest in advanced technologies, increasing availability of venture capital and slight increase in academic interest in startups entrepreneurship. The progress of the Serbian startup ecosystem offers numerous opportunities for entrepreneurs, investors, and society as a whole. However, to sustain this positive trend and capitalize on all potential

benefits, further enhancement of government support is needed through the creation of a more favorable business environment, increased investment in technological transfer from academia, as well as the growing interest of venture funds. In addition, there are evident movements towards establishing a leadership position in the Western Balkans region, as Serbia emerges as a frontrunner in fostering a vibrant startup ecosystem characterized by innovation, tech talent, and investment.

4. LITERATURE

- [1] N. Radosavljević, C. Bešić, G. Rendulić Davidović (2022). *Karakteristike srpskog Startup inovacionog ekosistema Republike Srbije u funkciji privrednog razvoja Republike Srbije*, Međunarodna konferencija o savremenim dostignućima u nauci i tehnologiji COAST 2022, Maj 26-29. 2022, Herceg Novi, Crna Gora, str. 175.
- [2] Ziakis, C., Vlachopoulou, M, Petridis, K. (2022): *Start-Up Ecosystem (StUpEco): A Conceptual Framework and Empirical Research*, Journal of Open Innovation: Tehcnology, Market and Complexity, Volume 8, Issue 1, p. 35, doi: <https://doi.org/10.3390/joitmc8010035>
- [3] J., Niosi, P., Saviotti, B., Bellon, B. & M., Crow (1993). *National systems of innovation: In search of a workable concept*. Technology in Society, 15(2), pp. 207–227.
- [4] Official Gazette of the Republic of Serbia, *Startup ecosystem development strategy of the Republic of Serbia for the period 2021-2025*, Official Gazette of the Republic of Serbia, No. 30/18, Belgrade, Republic of Serbia
- [5] Službeni glasnik Republike Srbije, *Zakon o inovacionoj delatnosti*, Službeni glasnik Republike Srbije broj 129/2021, Beograd, Republika Srbija, 2021.
- [6] GlobalBlink: *Global Startup Ecosystem Index 2023*, (<https://lp.startupblink.com/report/#lp-pom-box-30>), accessed date 1. April 2024.)
- [7] Startup Genome: *Serbia, Belgrade and Novi Sad startup ecosystem*, (<https://startupgenome.com/ecosystems/belgrade-and-novi-sad>, accessed date 5. April 2024).
- [8] Digital Serbia Initiative (2024), *Startup scanner 2024*, Digital Serbia Initiative, Belgrade, Republic of Serbia, 2024.
- [9] Digital Serbia Initiative (2023), *Startup scanner 2023*, Digital Serbia Initiative, Belgrade, Republic of Serbia, 2023.
- [10] Serbian Gaming Association, *Serbian Gaming Industry Report for 2023*, (https://sga.rs/wp-content/uploads/Serbian-Gaming-Industry-Report-for-2023-by-SGA.pdf?utm_source=sajt&utm_medium=vest&utm_campaign=launch, accessed date 5. April 2023), 2024.
- [11] Jeong, J., Kim, J., Son, H., Dae, N. (2020): *The Role of Venture Capital Investment in Startups Sustainable Growth and Performance: Focusing on Absorptive Capacity and Venture Capitalists' Reputation*, Sustainability 2020, No. 12, 3447. <https://doi.org/10.3390/su12083447>
- [12] Official Gazette of the Republic of Serbia, *Law on Alternative Investment funds*, Official Gazette of the Republic of Serbia No. 73/2019, Belgrade, Republic of Serbia, 2019.

- [13] N. Radosavljević, C. Bešić, G. Rendulić Davidović, M. Pešić, *Venture capital funds as source of alternative financing the growth and development of startup companies in the Republic of Serbia*, II International Conference on Advances in Science and Technology, May 31 – June 03, 2023, Herceg Novi, Montenegro, p. 700.
- [14] Ministry of Science, Technological Development and Innovation, *Program for the Formation and Development of Innovation Incubators in Scientific and Research Organizations in the Republic of Serbia*, Belgrade, Republic of Serbia, 2023.

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