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IMPROVING CONDITIONS FOR INNOVATION POLICY IN NORTH MACEDONIA

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ABSTRACT

The innovation ecosystem represents a complex network of institutions, companies, policies, and individuals who jointly create the conditions for the development of new technologies, entrepreneurship, and economic competitiveness. North Macedonia, as a small transitional economy, has gradually been developing its innovation potential over the past decade through the introduction of government programs for supporting start-ups, strengthening the IT industry, establishing business incubators, and stimulating research activity within academic institutions.

Despite these positive trends, the system faces significant challenges, such as limited investment in research and innovation, insufficient private capital, and the emigration of highly qualified professionals. This paper analyses the structural elements of the innovation ecosystem in North Macedonia, current achievements, and potential directions for improvement.

Key words: *innovation, ecosystem, competitiveness, Macedonia.*

INTRODUCTION

The innovation ecosystem represents a network of institutions, organizations, policies, companies, and individuals who collaborate with one another to create conditions for the development of new technologies, products, services, and businesses. In the modern economy, a well-established innovation ecosystem is one of the key drivers of sustainable economic growth, competitiveness, and societal modernization. North Macedonia, as a small developing economy, is gradually building this structure through a combination of public policies, private initiatives, and international support. According last European Innovation Scoreboard report, North Macedonia is Emerging Innovator. In today's global economy, innovation ecosystems are one of the key drivers of competitiveness, productivity, and sustainable economic growth. Given the accelerated technological transformation, digitalization, and increasing international competition, countries that succeed in building functional and dynamic innovation ecosystems achieve higher levels of development, attract investments, and enable more efficient use of national resources.

In this context, the innovation ecosystem is not understood merely as a collection of innovative companies, but as an integrated network that includes universities, research centers, the private sector, the startup community, financial institutions, incubators, government policies, and international partners. Effective coordination among these stakeholders creates the conditions for generating new technologies, fostering entrepreneurial culture, and enhancing societal capacities for the absorption of innovation.

North Macedonia, as a small and economic open country, has in the past decade actively worked on developing its own innovation ecosystem. Although the country faces structural limitations, such as limited technological infrastructure, insufficient investment in research and

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development (R&D), and weak cooperation between academia and the business sector, significant progress is nevertheless evident. Particularly important are the institutional reforms, innovation support mechanisms through the Fund for Innovation and Technology Development (FITD), the growth of the startup scene, the expanding presence of IT companies, and the emergence of new innovative clusters and competence centers.

Despite these achievements, the innovation ecosystem in Macedonia remains in a phase of consolidation. Its further advancement depends on establishing a clearer strategic vision, increasing investment in research and development, strengthening cross-sector collaboration, and improving human capital. The research presented in this paper aims to analyze the structure, capacities, challenges, and opportunities of the Macedonian innovation ecosystem in order to determine its competitiveness, its alignment with contemporary European trends, and the policies that could contribute to its further improvement.

INSTITUTIONAL SUPPORT

The Innovation policies in the Republic of North Macedonia are regulated with a set of laws tackling research, innovation and competitiveness, more specifically, the Law on Innovation Activity, the Law on Higher Education and the Law on Science and Research Activities.

In order to create a favorable climate to support competitiveness, entrepreneurship and innovation, legal and institutional changes were implemented in the ecosystem for supporting innovation and entrepreneurship. A new Law on Innovation Activity, Scientific and Technological Development and Entrepreneurship was adopted in July 2025. The adoption of this Law aims to establish an efficient and functional national innovation system that will enable continuous scientific and technological development, as well as establish an efficient and functional system for supporting entrepreneurship. The new Law repealed the Law on Innovation Activity and the Law on Establishing the Entrepreneurship Support Agency of the Republic of North Macedonia.

The institutional framework governing the above mentioned regulative and policy is rather complex and includes the Ministry of Education and Science, the Ministry of Economy, the Ministry of Digital Transformation.

The Fund for Innovation and Technology Development is established in December 2013 with following objectives: i) support for SME growth and expansion through the commercialization of innovations; ii) enhance R&D investments in research and development; and iii) transfer of new technologies. FITD provides support through direct financing of SMEs and provision of technical assistance aimed at strengthening enterprises' capacity to access finance. The Ministry of Economy, the Agency for Promotion of Entrepreneurship and the Cabinet of the Prime Minister in charge of the economic sector also provide support to enhance innovation activity in the private sector. Analysis has shown that such a complex institutional network results in fragmentation and overlaps in public measures supporting innovation in firms, hence, the future planning needs to rely on better coordination and harmonization of the support measures. During its 11 years of existence, the Fund for Innovation and Technology Development has implemented a total of 1,100 projects amounting to 138 million euros, of which 40 million euros represent co-financing from the companies.

Pursuant to the new Law, the Agency for Innovation, Scientific and Technological Development and Entrepreneurship has been established as an independent state administration

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body with the status of a legal entity. The Ministry of Education and Science is responsible for supervising the implementation of the provisions of the Law. Pursuant to the Law, the Agency for Support of Entrepreneurship of the Republic of North Macedonia continues to operate as the Agency for Innovation, Scientific and Technological Development and Entrepreneurship of the Republic of North Macedonia and assumes all rights and obligations from the Fund for Innovation and Technological Development. The new agency will transfer employees, all movable and immovable property, equipment, documentation, archives, etc. from the APPRM and FITR.

The establishment of the new institution will ensure a comprehensive approach to supporting innovation and SMEs, including the development and implementation of new instruments. The new agency will also be a very important partner in the implementation of the Smart Specialization Strategy.

SMART SPECIALIZATION STRATEGY

The Smart Specialization Strategy of North Macedonia 2024-2027 is adopted in December 2023, adopted for the first time the Smart specialization strategy 2024-2027 and its bi annual Action plan (2024-2025.)

The Ministry of Education and Science and the Ministry of Economy and Labor the are the key institutions responsible for its creation and coordination of the implementation.

The S3's objectives, outlined alongside measures from the Action Plan 2024-2025, focus on achieving scientific excellence, development of innovation ecosystem, increasing competitiveness and greening of businesses, developing human capital, driving digital transformation, and as crosscutting objective ensuring effective implementation and continuous Entrepreneurial Discovery Process (EDP) dialogue. Induced output: The reform aims to increase of number of supported innovative companies by specialized centres and stimulate participation in EIC/EIT programs.

INNOVATION INFRASTRUCTURE

According to the legal framework, the innovation structure in Macedonia consists of:

- a business–technology incubator;
- a business–technology accelerator;
- a science and technology park;
- a technology transfer center;
- a national office for technology transfer; and
- other entities providing infrastructural support.

The innovation performers which is existing in the country are: Business-technology incubators, Business-technology accelerators, Centers for Technology Transfer and Hubs. In this regard as a good example is establishing of INNOFEIT European Digital Innovation Hub at Ss. Cyril and Methodius University which is part of European network of digital hubs. It is financially supported by EU Digital by 50% and 50% by national funds. Also, un important infrastructure is Vezilka project selected in October 2025 by EuroHPC JU programme. Also, three business-technology accelerators have been established, including Business Accelerator UKIM (BAU) at Ss. Cyril and Methodius University as leading accelerator in Macedonia, supporting tech entrepreneurs, startups, and spin-offs through funding, mentorship, international market access,

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and business development. These innovation performers offer mentoring, workspace, trainings, access to investors.

Moreover, Macedonia's efforts to integrate digital research infrastructures, such as data repositories and virtual platforms, reflect best practices in promoting open access and international cooperation. These initiatives enable Macedonian scientists to participate in global research networks and contribute to solving worldwide challenges.

The innovation infrastructure in Macedonia is still developing, and universities play an important role in:

- developing ICT professionals,
- conducting basic and applied research,
- creating spin-off companies,
- cooperating with industry within EU-funded projects.

CHALLENGES IN THE DEVELOPMENT OF THE INNOVATION ECOSYSTEM

The development of an effective innovation ecosystem in North Macedonia is constrained by a range of structural, institutional, and systemic barriers that limit the country's ability to produce, absorb, and commercialize innovation. Although initiatives such as the Fund for Innovation and Technology Development (FITD) have stimulated entrepreneurial activity, the overall ecosystem remains fragmented and underdeveloped (FITD, 2023).

A major challenge is the persistently low level of R&D expenditure. North Macedonia invests significantly below the EU average, which restricts technological advancement and reduces competitiveness in high-value sectors (European Commission, 2023). Private-sector R&D remains limited due to the dominance of small enterprises with constrained financial capacity. Collaboration between universities and the private sector is essential for knowledge transfer, yet Macedonian institutions often lack incentives and mechanisms for applied research partnerships. This results in low commercialization, patenting, and innovation output (OECD, 2021). Innovation infrastructure—such as laboratories, technology parks, and incubators—remains insufficient in scope and quality. Existing structures often lack modern equipment and long-term support programs needed to scale startups (World Bank, 2022). Human capital challenges represent one of the most serious constraints. Skilled professionals frequently migrate to EU countries in search of better opportunities, contributing to a persistent talent gap (World Bank, 2023). The mismatch between education programs and labor market needs further limits the innovation potential of domestic firms (ETF, 2022). Access to venture capital, angel investment, and other risk finance instruments remains extremely limited. Banks generally maintain a conservative lending approach, restricting credit availability for high-risk innovative ventures (OECD, 2021). Regulatory complexity, slow digitalization of public services, and low institutional efficiency create obstacles for firms attempting to innovate or scale operations. Intellectual property protection, while improving, still requires stronger enforcement (European Commission, 2023). Policy fragmentation and overlapping institutional responsibilities weaken the coherence of the national innovation agenda. Alignment with EU frameworks such as Horizon Europe and Smart Specialisation remains partial and inconsistent (European Commission, 2023). A risk-averse business environment and limited societal awareness reduce support for innovation investments. Many companies prioritize short-term survival rather than long-term technological development (OECD, 2021).

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So, despite the progress, Macedonia faces several structural challenges:

- insufficient investment in scientific research,
- brain drain of young and highly qualified professionals,
- limited access to private investments and venture capital,
- underdeveloped cooperation between universities and industry,
- administrative barriers and slow procedures.

RECOMMENDATIONS FOR IMPROVEMENT

Strengthening the innovation ecosystem in North Macedonia requires a coordinated, long-term, and evidence-based policy approach. Based on the key challenges identified in the analysis, some recommendations are proposed. To reach European innovation standards, North Macedonia must gradually increase public and private R&D expenditures. This can be achieved by introducing tax incentives for companies that invest in R&D, expanding competitive funding programs for applied and industrial research, encouraging co-financing schemes between government, industry, and academia.

A structured framework for knowledge transfer is essential. So, policies should focus on establishing Technology Transfer Offices (TTOs) at universities, funding joint research projects between universities and companies, encouraging academic researchers to commercialize their innovations through spin-off companies. To support entrepreneurship and technology development, the country should invest in modern laboratories, testing facilities, and digital infrastructure, strengthen existing incubators and accelerators with long-term support programs, develop regional innovation hubs and specialized competence centers. Addressing brain drain and skill shortages requires structural interventions like Revising curricula to reflect market needs, especially in ICT, engineering, and STEM, supporting lifelong learning programs and upskilling initiatives, providing incentives for high-skilled workers to remain in, or return to, the country. A stronger financial ecosystem is critical for scaling innovative startups. This can include creating public-private venture capital funds, expanding the availability of early-stage grants and seed funding, establishing credit guarantee schemes to reduce bank lending risks. A unified innovation strategy is necessary for long-term progress. Recommended actions include establishing a national body responsible for coordinating innovation policies, aligning national strategies with EU frameworks such as Horizon Europe and Smart Specialisation, improving monitoring and evaluation systems for innovation programs. To strengthen societal support for innovation is necesarry to promote innovation awareness campaigns, competitions, and public events, encourage experimentation, risk-taking, and problem-solving in education, support school and university programs focused on innovation, STEM, and entrepreneurship.

So, the recommendations are focused on:

- Strengthening inter-institutional coordination;
- Increasing investments in innovation – With a higher share of GDP allocated to innovation, the country can build a more competitive and knowledge-based economy;
- Support for young researchers and entrepreneurs: Grants, scholarships, mentoring programs, incubators, and accelerators;
- Improving international cooperation-increasing participation in Horizon Europe, EIT, EIC

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- Building technological infrastructure: Rapid implementation of the science and technology park, laboratories, and digital innovation centers;
- Encouraging PPPs (public–private partnerships), venture capital, and stronger focus on the commercialization of research;
- Monitoring and evaluation: Development of success indicators (R&D growth, commercialization, patents, startup growth) and mechanisms for regular monitoring of the S3 strategy.

CONCLUSION

The development of the innovation ecosystem in North Macedonia represents both a strategic opportunity and an ongoing challenge for the country's long-term socioeconomic progress. The analysis demonstrates that, although several important steps have been taken such as the establishment of targeted funding mechanisms, the rise of the startup community, and gradual alignment with European innovation policies, the ecosystem remains in a formative stage. Structural weaknesses, including low investment in research and development, insufficient collaboration between academia and industry, limited access to finance, and continued brain drain, continue to constrain the country's capacity to generate and commercialize innovation.

At the same time, the research highlights that North Macedonia possesses significant untapped potential. The growing ICT sector, the increasing engagement of young entrepreneurs, and the presence of international programs create favorable conditions for moving toward a more dynamic innovation-driven economy. To leverage these opportunities, the country must strengthen institutional coordination, improve innovation infrastructure, and cultivate a culture that supports experimentation, knowledge transfer, and technological advancement.

In conclusion, the innovation ecosystem in North Macedonia is at a critical turning point: the foundations have been established, but substantial efforts are required to achieve full functionality and competitiveness. With sustained political commitment, strategic investments, and effective cross-sector cooperation, North Macedonia can accelerate its transition toward a resilient, knowledge-based economy and strengthen its integration into the European and global innovation landscape.

The innovation ecosystem in Macedonia is undergoing steady development and transformation. Support from the state, an active private sector, a growing start-up community, and international programmes is creating a solid foundation for further progress. By overcoming structural challenges and increasing investments in knowledge, technology, and young talent, Macedonia can build a competitive, dynamic, and modern innovation-driven economy.

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