# THE IMPACT OF INNOVATION ON THE EFFICIENCY OF HEALTH EXPENDITURES IN HUNGARY

Ilona Gál[1], László Pataki[1]

[1]John von Neumann University, Doctoral School of Management and Business Administration, Infopark sétány 1., 1117 Budapest, Hungary

**Keywords:** health innovation, R&D strategy, PAM50
JEL Classification: I11, I15, O31

## 1 INTRODUCTION

The goal of Hungary's Research, Development and Innovation Strategy (2021–2030) is to reach 3% of GDP by 2030 of the R&D expenditures and to be among the top 25 countries in the world by 2030 according to the Global Innovation Index (GII). Through the Neumann János Programme [1], the main objective of the Health priority is to stimulate the diffusion of innovative diagnostic technologies, therapeutic procedures and medical devices. The corresponding 2025 tenders should also consider Hungarian specificities to be effective.

## 2 MATERIAL AND METHODS

The authors have analysed the Hungarian innovation strategy, with a particular focus on innovations in the health sector. According to NRDI Agency, in 2025, the Life Sciences Catalyst programme will focus on health innovation, with a budget of €25 million (HUF 10 billion) to support preclinical development. The incubation of innovative hospital and clinical business ideas will be supported with a separate scheme for €5 million (HUF 2 billion) in 2025.

Health innovation is defined in the OECD edition of the Oslo Manual 2018 [2]: "An innovation is a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)". According to this new approach, the new or improved good or process is available to third parties on the market or already implemented by the developer. It does not automatically follow from this revised definition that there is a direct link between the number of licenses acquired by firms and product innovation, while the relationship between R&D investment and innovation at SMEs is strong [3].

The authors have analyzed the database of National Intellectual Property Office for patents from the last 20 years searching for nine keywords focusing on cancer (Hungarian and English), medical (Hungarian two synonyms and English), patient care, oncology (Hungarian and English), healthcare. Authors selected patents of the type „European patent in force", which are typically filed by large companies operating in the European market. The applicants of domestic (inventors in their home country) protected patents are typically medical universities and large Hungarian registered companies (Richter Gedeon Nyrt., Egis Gyógyszergyár Zrt.). However, using the keyword "health", authors found 500 patents, of which 201 are European patents in force, with the remaining 299 patents being filed by individuals in 164 cases, followed by SMEs and universities and large companies. The relationship between SMEs and innovation and the impact on their activities is largerly debated and researched [4], but the specific presence of health innovation in the SME sector in the V4 countries has not been

**https://doi.org/10.11118/978-80-7701-073-3-0023**

studied in detail. According to a study related to SMEs life expectancy in health sector in V4 countries [5], this category of companies is standing on a stable footing, which is relevant from their capacity point of view of beeing actively involved in development of health innovations.

In Hungary, the number of new cases of malignant breast cancer in women is steadily increasing. While the number of new breast cancer cases per 100,000 inhabitants was 128.1 in 2007, preliminary data suggest that the number had risen to 168.7 in 2023 (National Cancer Registry). Early detection and treatment of breast cancer is a major burden for society, but the tools are already available on the market to help diagnosis and allow for more targeted and effective treatment. As a pilot project [6] authors have selected the Microarray 50 (PAM50) gene expression classifier utilized in breast cancer diagnosis. This is available on the Hungarian market, is strictly privately financed, and is not supported by the National Insurance House. A retrospective analysis of 36 patients was performed to see if the prognosis was different based on PAM50 and conventional immunohistochemistry (IHC).

## 3 RESULTS

PAM 50 and IHC subtype in 22 cases mathched, in 7 cases PAM indicated a better prognosis, in 7 cases PAM50 indicated a worse prognosis. Based on the results of this genetic test the clinician can avoid the over- or under-treatment of the patient with chemotherapy. The 20% discrepancy registered by authors on this small sample is significant especially if one considers the side effects with its costs of the overtreatment of the patients and also the life expectancy of the patients in case of undertreatment.

The health sector is a strategic area for innovation for a sustainable future. Based on the data received, a more targeted design of the call for proposals is necessary to achieve the innovation strategy and increase the number of health innovations. The potential applicants should be extended to the SME sector, the targeted eligible developments are too limited from health innovation point of view, they should be modified to achieve the objectives, and the limit should not be set at supporting proof of concept results, but should be extended to the studies in the pre-clinical and clinical phase. These modifications can bring on one hand a positive cost/effect in shorter time, and on ther other hand they can improve the value of the overall survival (OS) and the progression-free survival (PFS) indicators.

## 4 CONCLUSIONS

Overall, the research can contribute to the decision process of the decision makers to help them decide where and how much resources to allocate, to establish the most efficient use of the funds, the range of applicants and the activities eligible for funding. Especially in Hungary, the much-targeted health innovation is supported by the central budget, private sources are not prevalent.

## REFERENCES

[1] KULTURÁLIS ÉS INNOVÁCIÓS MINISZTÉRIUM. 2023. *Neumann János Programm. Budapest: Kulturális és Innovációs Minisztérium*. https://cdn.kormany.hu/uploads/document/9/9c/9c4/9c456efcdb6b945893a284dcc8ba2e455f7188a1.pdf

[2] OECD/EUROSTAT. 2018. *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation*. 4th Edition. The Measurement of Scientific, Technological and Innovation Activities, Paris/Eurostat, Luxembourg: OECD Publishing. https://doi.org/10.1787/9789264304604-en

[3] AL-HANAKTA, R., ILLÉS, B.CS., DUNAY, A., ABDISSA, G.S., ABDI, K. M. 2021. The Effect of Innovation on Small and Medium Enterprises: A Bibliometric Analysis. *Visegrad Journal on Bioeconomy and Sustainable Development*. 10(1), 35–50. https://doi.org/10.2478/vjbsd-2021-0008

[4] ABDURAZZAKOV, O., ILLÉS, B.CS., JAFAROV, N., ALIYEV, K. 2020. The Impact of Technology Transfer on Innovation. *Polish Journal of Management Studies*. 21(2), 9–23. https://doi.org/10.17512/pjms.2020.21.2.01

[5] VITÉZ-DURGULA, J., DUNAY, A., THALMEINER, G., VAJAI, B., PATAKI, L. 2023. Financial Analysis and Survival Research of the Visegrad Countries' Health Industries. *Sustainability*. 15(16), 12360. https://doi.org/10.3390/su151612360

[6] DANK, M., MÜHL, D., PÖLHÖS, A., CSANDA, R., HEROLD, M., KOVACS, A.K., MADARAS, L., KULKA, J., PALHAZY, T., TOKES, A.-M., TOTH,M., UJHELYI, M., SZASZ, A. M., HEROLD, Z. 2023. The Prediction Analysis of Microarray 50 (PAM50) Gene Expression Classifier Utilized in Indeterminate-Risk Breast Cancer Patients in Hungary: A Consecutive 5-Year Experience. *Genes*. 14(9), 1708. https://doi.org/10.3390/genes14091708

**Contact information**
Corresponding author's e-mail: ilona.gal@kronet.hu