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## INNOVATIONS IN SCIENCE: A COMPARATIVE ANALYSIS BETWEEN LITHUANIA AND KAZAKHSTAN

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**Abstract** *This article presents a brief analysis of the current state of the scientific and technological spheres in the Republic of Kazakhstan and the Republic of Lithuania. Based on the analysis of the conceptual apparatus and the study of scientific literature, approaches to the analysis of the scientific and technological spheres are presented. The article considers and analyzes the size of intramural R&D expenditures in Kazakhstan and Lithuania in 2016–2020, as well as their relation to gross domestic product. It is noted that the accounting of intramural R&D expenditures in Kazakhstan and Lithuania is carried out in full compliance with internationally recognized OECD standards – first of all, following the FRASCATI Manual, the main provisions of which are reflected in the legislation of the OECD countries regulating the implementation and development of scientific and technological policy. Information is provided on indirect tax incentives used in practice in Kazakhstan and Lithuania, the purpose of which is to increase the motivation of the business environment to implement and carry out R&D projects. The calculation of the growth of the level of intramural R&D expenditure in relation to GDP is carried out in this paper. Its performance will ensure the size of the indicator under consideration at the strategic levels in Kazakhstan and Lithuania. The authors' proposals, the implementation of which will ensure the effective development of scientific and technological policy in Kazakhstan and Lithuania, are also formulated and supplemented.*

**Keywords:** *intramural R&D expenditures, FRASCATI Manual, innovations in science, technology transfer stimulation.*

**Reikšminiai žodžiai:** *mokslinių tyrimų ir plėtros išlaidos, FRASCATI vadovas, inovacijos moksle, technologijų perdavimo skatinimas.*

## Introduction

The problems of innovation processes are partly determined by the political and economic positions of public policy makers and the ability of policy power centers to ensure continuity in the strategic directions of innovation processes. When structuring the decomposition of innovative changes in the activities of public administration, it can be seen that the problems of innovation implementation are determined by: the qualitative characteristics of the parameters of the internal and external environment of public institutions related to organizational skills of strategic management; the quality of changes and the efficiency of the management, economic, financial, and social factors; and staff shortages (including managers and a bureaucratic approach to procedural aspects of the development and implementation of innovative projects) (Bučinskas 2012, 11).

Successful growth, industrial renewal, and technological innovation require access to new scientific and applied research and technological developments due to the growing importance of scientific knowledge and technology for economic development. Researchers working in the field of technology and research management recognize that government policies and programs can influence the formation of a technological innovation environment in a country (Kiškienė 2009, 258).

The rapid advancement of all societies depends on scientific and technological development and advancement of the quality of life of their people (Morris and Miller 1999, 334).

According to Pisano (2012, 8–9), such investments may involve the application of already established technologies (secondary R&D) or the creation of entirely new technologies and areas of scientific inquiry (primary R&D). Although these innovations primarily involve “hard” or physical science (Anderson 2000, 54), they may also involve the social sector, such as new types of political, economic, or familial systems (Sherwin 2016).

Most societies invest in both types of innovations, especially societies that are undergoing dramatic restructuring. Such investments are especially essential to the independent countries whose economies have shifted from being centrally planned to become more open and globally focused market systems (Investopedia 2016).

Increasingly, Kazakhstan is expected to shift from its historic role as an adopter of technological innovations developed by others to a nation that is providing leadership in the creation of innovations that work to its own benefit and that of other nations in Central Asia (Graham and Werman 2017; Hiro 2009, 30–31; Lipovsky 2016, 305–307). Given the development priorities identified by the country’s national leadership, every reason exists to believe that this level of technological leadership will continue to prevail in Kazakhstan (World Bank 2016).

In this case, the *aim of the research* is the development of innovation matters aimed at the provision of permanent growth in the level of intramural R&D expenditures to GDP in Lithuania and Kazakhstan.

To achieve this goal, the following tasks are addressed in this article based on the comparative analysis of R&D ecosystems in Kazakhstan and Lithuania:

– *The development of the key managerial use imperatives of the FRASCATI Manual by the main economic sectors (government, business enterprise, high education, and non-profit) in Lithuania and Kazakhstan.*

– *The current development of innovations in science in Lithuania and Kazakhstan.*

– *The importance of analysis of intramural R&D expenditures to GDP for both Lithuania and Kazakhstan.*

The authors put forward two *main hypotheses* that would lead to the achievement of this goal:

*H1.* Development and further improvement of the system of tax incentives aimed at ensuring a competitive business environment and the maximum involvement of business in the field of R&D.

*H2.* Technology transfer stimulation, which will allow the creation and implementation of world-class R&D projects in accordance with European Standards. This will also ensure the growth of innovation activity and the index of economic complexity, as well as contributing to the increase of intramural R&D expenditures to GDP.

The *methods* used in this article are: analysis of scientific sources and documents, exploratory research and observation, and comparative analysis. The use of the latter method requires more detailed presentation, as this method is used when comparing objects that are similar in anticipation of scientifically valid results.

In terms of appearance, the countries of Lithuania and Kazakhstan are very different because of their geographical location, culture, historical development, economic resources, and other features.

Still, comparison is possible according to the problem we have chosen because:

1. When we talk about a state that bases its policy on knowledge and new technologies in today's virtual world, the size or potential in this country do not matter.

2. In both countries, demographic changes (migration), reduced labor supply, and, as a result, high wage growth are forcing companies to invest in technologies that increase productivity.

3. Both countries aim to increase productivity growth and narrow the gap between the EU and other leading countries through technological development.

The key objective of scientific and technological policy implemented in any country is the desire to achieve global leadership in the field of innovation. This is reflected in entry into the list of the top 30 countries that are world leaders in the field of innovation.

### **The development of the key managerial use imperatives of the FRASCATI Manual by the main economic sectors (government, business enterprise, high education, and non-profit) in Lithuania and Kazakhstan.**

The basic document defining conceptual and methodological approaches to the definition, evaluation, and measurement of R&D is the FRASCATI Manual (OECD). It presents a terminological, conceptual apparatus that reveals the main definitions used in the scientific, technological, and innovative sphere. Among them are R&D, intramural and extramural R&D expenditures, and institutional sectors that carry out R&D expenditures and form sources of R&D financing (higher education, business enterprise sector, non-profit sector, foreign sources of financing, etc.).

As noted on the OECD website, the FRASCATI Manual is an internationally recognized

methodology for the collection and use of R&D statistics. It is a special tool for statisticians and those involved in the implementation of scientific, technological, and innovation policy in the country. The FRASCATI Manual contains definitions of basic concepts, guidelines for data collection, and classifications for compiling information related to R&D.

As a country of the European Union, the Republic of Lithuania has been a member of the OECD since 2004 and, accordingly, participates in all initiatives of this authoritative organization, including the development and implementation of standards and regulations under the development of scientific and technological policy. In turn, the Republic of Kazakhstan is trying to establish a dialogue with the aim of developing cooperation with the OECD, aimed at implementing the best international practices and standards of this organization.

For more than fifty years, the FRASCATI Manual has been an international standard for the formation and use of R&D statistics. For example, in the Republic of Lithuania, selective exploratory research was conducted among employees in the field of R&D for knowledge of the main provisions of the FRASCATI Manual. The research focus group included scientists from such fields as law, economics, and management, as well as their social partners – that is, businesspeople, government officials, and representatives of non-governmental organizations.

In particular, the following questions were asked during the survey (Nefas 2021):

Have you heard about the FRASCATI Manual? What do you know about the practical application of the FRASCATI Manual in Lithuania? What do you know about the policy of scientific innovation in Lithuania? Do you know about the relationship between the FRASCATI Manual and the policy in the field of scientific technology?

The following answers were received to these questions (percentage of the total number of respondents in the corresponding category of employees): 38% of scientists, 20% of economists, 10% of managers, 8% of lawyers, and 32% of social partners had heard about the FRASCATI Manual; 20% of scientists, 15% of economists, 3% of managers, 2% of lawyers, and 12% of social partners knew about the practical application of the FRASCATI Manual in Lithuania; 78% of scientists, 45% of economists, 20% of managers, 13% of lawyers, and 62% of social partners knew about the policy of scientific innovation in Lithuania; 10% of scientists, 7% of economists, 2% of managers, 1% of lawyers, and 8% of social partners know about the connection between the FRASCATI Manual and policy in the field of scientific technologies.

Today, one of the most important components of the socio-economic development of any state is an increase in the level of scientific and technical activity aimed at creating and promoting R&D products in the market. This process takes place in a highly competitive environment. Therefore, the joint activities of scientists and businesspeople engaged in promoting R&D products to the market should be aimed not only at creating new goods and services but also at improving their properties and characteristics qualitatively. That is, the results of R&D should find their consumers (clients) in the market.

In general, the attribution of the results of any scientific activity to R&D carried out by businesses, universities, research institutes, non-profit sector enterprises, etc., is carried out and checked for global novelty by expert scientists who provide their services to the relevant authorized state bodies (state scientific foundation, association, etc.). They are usually part of the structure of the Ministry of Education and Science of the country. Scientific experts summarize global experience in the field of science and innovation, studying advanced achievements from monographs and articles in industry scientific journals published by such large and world-famous publishing

houses as Wiley-Blackwell, Taylor and Francis, Springer, etc.

Furthermore, the authorized state body gives an expert opinion on the results of scientific activity carried out in accordance with OECD standards. If the results obtained correspond to the results of R&D, then in this case the subject of economic activity submits to the state statistical bodies information about the expenses incurred, which are then attributed to intramural R&D expenditures and, thus, increase the level of scientific and innovative development of the state, contributing to the achievement of global innovation leadership.

Particular importance in the second chapter of the FRASCATI Manual is given to three types of research (fundamental, applied, and experimental) by which it is customary to divide R&D projects carried out by universities, businesses, and the non-profit sector. As a result, statistical agencies generate macroeconomic data, which are usually allocated in accordance with the requirements of statistical accounting. On the one hand, these are the spheres (sectors) of the implementation of intramural R&D expenditures, and, on the other, they are the sources of financing intramural R&D expenditures.

The availability of these data makes it possible for public administration bodies to effectively manage the flow of funds necessary for the implementation of scientific, technological, and innovation policy. One of the distinctive features of the current edition of the FRASCATI Manual is the addition of information on measures of indirect state tax support in the implementation of R&D projects.

In particular, it notes that the governments of some countries provide tax support for R&D in order to stimulate investment in R&D in the economy by providing a preferential tax regime and acceptable intramural R&D expenditures, especially for commercial enterprises. The main types of tax benefits include tax credits and concessions (intramural research and development tax credits and tax allowances), which are applied in some OECD countries.

Confirming Hypothesis 1, the authors note that in Kazakhstan and Lithuania such initiatives and incentives have been developed and formalized at the legislative level. For example, in Kazakhstan, they are prescribed in the Code of the Republic of Kazakhstan On Taxes and other mandatory payments to the budget of 2019.

In accordance with this Legislative Act, a taxpayer has the right to reduce taxable income in the amount of 50 percent of the amount of deducted expenses for research, scientific, and technical work in connection with the creation of an object of industrial property for which there is a security document issued, as well as for the acquisition of exclusive rights to intellectual property from higher educational institutions, scientific organizations, and startup companies under a license agreement or an assignment agreement of exclusive rights for the purpose of commercialization of the results of scientific and (or) technical activities.

At the same time, in accordance with the Law on Corporate Income Tax in the Republic of Lithuania, when calculating corporate income tax, expenses incurred on R&D are deducted from income three times in the tax period in which they were incurred. When calculating taxable profit, the procedure for recognizing the expenditures of R&D work is established by the Decree of the Government of the Republic of Lithuania On Approval of the Description of the Procedure for Attributing Costs to Research and Development Work.

Summarizing the theoretical part of the article, the authors note that in various countries (especially those in the OECD) which are world leaders in the field of innovation, management, and analysis of scientific and technical activities (Ministry of Education and Science, scientific foundations and associations, and state statistics bodies), methodological explanations and recom-

recommendations for economic entities engaged in R&D are being developed and constantly improved. These explanations and recommendations fully comply with the OECD standards – that is, the FRASCATI Manual. In a number of countries (Austria, Germany, Israel, South Korea, etc.), they are also reflected in National legislation.

The authors summarize that in almost all OECD countries, there are practical recommendations for economic entities (higher education, businesses/the business environment, and the non-profit sector) to keep records of intramural R&D expenditures. These clarifications have been developed in accordance with the National laws of these countries, which, as a rule, are based on the principles and standards prescribed in the FRASCATI Manual.

### **The current development of innovations in science in Lithuania and Kazakhstan.**

The Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan takes into account intramural R&D expenditures in full compliance with the FRASCATI Manual, reviewing and publishing relevant statistical data reflecting the development of the scientific and technological sphere in our country.

The fundamental principle of accounting for intramural R&D expenditures, which is adhered to by the state statistical bodies of all OECD countries, is the allocation of sources of R&D financing and R&D sectors. The sources of funding and R&D sectors are clearly defined in the FRASCATI Manual (OECD). When conducting statistical accounting, as a rule, the following main sectors of R&D formation and financing are provided by business enterprises: higher education; the government sector; the non-profit sector; and foreign grants.

As can be seen from Table 1, in 2020 the largest values of intramural R&D expenditures in their formation and implementation were occupied by the public sector – the republic budget (94.483 million euros, or 51.95% of the total volume of sources of funds, and 89.154 million euros, or 49.02% of the total volume of sectors of performance).

**Table 1. Volumes and shares of R&D sources of funds and performance in Kazakhstan in 2020**

| Sources of funds |        | Sector                             | Sectors of performance |        |
|------------------|--------|------------------------------------|------------------------|--------|
| Million euros    | %      |                                    | Million euros          | %      |
| 181.869          | 100.00 | Intramural R&D expenditures, total | 181.869                | 100.00 |
| 72.603           | 39.92  | Business enterprise funds          | 75.243                 | 41.37  |
| 93.298           | 51.30  | Republic budget                    | 89.154                 | 49.02  |
| 1.185            | 0.65   | Local budget                       |                        |        |
| 4.517            | 2.48   | Foreign investments                |                        |        |
| 10.266           | 5.65   | Other sources/non-profit funds     | 17.472                 | 9.61   |

Note: the amount of intramural R&D expenditures was converted from tenge (national currency of Kazakhstan) to euros due to the ratio of tenge:euro established by the National Bank of the Republic of Kazakhstan on the November 30, 2021. That is: 489.52 tenge per 1 euro.

<https://www.nationalbank.kz/en/exchangerates/ezhednevnye-oficialnye-rynochnye-kursy-valyut>

The second place in this indicator was occupied by business enterprise funds, where funding achieved was 72.603 million euros (or 39.92%) and performance was at 75.243 million euros (or 41.37% of the total volume of sectors of performance).

The total accumulation in the sectors of foreign investments and other sources/non-profit

funds amounted to 14.783 million euros (or 8.13%), while the implementation of R&D by these sectors amounted to 17.472 million euros (or 9.61%).

Similar trends can be traced in Lithuania (see Table 2), where the largest values of intramural R&D formation expenditures were occupied by the public sector – 305.939 million euros, or 53.49% of the total volume of sources of funds in 2020. In turn, the business sector had the highest value of intramural R&D expenditures. In 2020 this indicator amounted to 218.393 million euros, or 38.28% of the total volume of sectors for R&D performance.

**Table 2. Volumes and shares of R&D sources of funds and performance in Lithuania in 2020**

| Sources of funds |             | Sector  | Sectors of performance |             |
|------------------|-------------|---|------------------------|-------------|
| Million euros    | %           |   | Million euros          | %           |
| 571.948          | 100.00      | Intramural R&D expenditures, total  | 571.948                | 100.0       |
| 27.705           | 4.84        | Business enterprise funds   | 218.965                | 38.28       |
| 305.939          | 53.49       | Government funds  | 164.393                | 28.74       |
| 13.773           | 2.41        | Higher education institutions funds   | 13.773                 | <b>2.41</b> |
| <b>1.015</b>     | <b>0.18</b> | Private   | 1.015                  | 0.18        |
| 10.952           | 1.91        | Foreign funds   | 173.802                | 30.39       |
| 191.260          | 33.44       | Own funds (funds from economic and commercial activities)                                 | -                      | -           |
| 17.622           | 3.08        | European Union funds (excluding funds provided under State budget).                       | -                      | -           |
| 2.972            | 0.52        | International organizations funds (excluding funds provided under State budget).          | -                      | -           |
| 0.710            | 0.12        | Other sources (other countries' budgets, higher education, non-profit institutions, etc.) | -                      | -           |

**Sources:** <https://www.stat.gov.lt/home> – official website of the Lithuanian Department of Statistics.

The second position in the sources of funds section is occupied by own funds (funds from economic and commercial activities), where funding is 191.260 million euros (or 33.44%), whilst in sectors of performance the second position belongs to foreign funds, with 173.802 million euros (or 30.39% of the total volume of sectors of performance).

The total number of organizations that carried out R&D in 2020 was 396 in Kazakhstan and 1,118 in Lithuania (see table 3).

**Table 3. Number of organizations that carried out R&D in Kazakhstan and Lithuania in 2018–2020 by sector**

| Sector                    | 2018       |           | 2019       |           | 2020       |           |
|---------------------------|------------|-----------|------------|-----------|------------|-----------|
|                           | Kazakhstan | Lithuania | Kazakhstan | Lithuania | Kazakhstan | Lithuania |
| Total                     | 384        | 1 074     | 386        | 1 079     | 396        | 1 118     |
| General government sector | 103        | 31        | 100        | 31        | 93         | 30        |

|                            |     |       |     |       |     |       |
|----------------------------|-----|-------|-----|-------|-----|-------|
| Higher education sector    | 95  | 41    | 92  | 38    | 99  | 37    |
| Business enterprise sector | 149 | 1 002 | 158 | 1 010 | 167 | 1 051 |
| Private non-profit sector  | 37  | ...   | 36  | ...   | 37  | ...   |

**Sources:** [www.stat.gov.kz](http://www.stat.gov.kz) – official website of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan Bureau of National Statistics.

<https://www.stat.gov.lt/home> – official website of the Lithuanian Department of Statistics.

In the higher education sector in Kazakhstan, the number of enterprises performing R&D amounted to 99, which is 6 more than in the general government sector and 62 more than in the non-profit sector. Meanwhile, the total number of R&D enterprises in Lithuania in the general government sector and in the higher education sector amounted to 67, which is 6% of the total number of enterprises engaged in R&D activities.

Thus, differences in the general government and higher education sectors in both countries are insubstantial, whereas the number of organizations in the business enterprise sector that carried out R&D in Lithuania in 2020 was 1,051, which was 6.3 times more than in Kazakhstan.

The importance of analysis of intramural R&D expenditures to GDP for both Lithuania and Kazakhstan.

The ratio of intramural R&D expenditures to GDP is the main indicator in the research sphere that reflects the level of scientific-technological development in any country in the world. For example, one the main goals of the European Program Horizon 2020 was the achievement of an agreement that this value should be no less than 3%.

The authors note that the statistical authorities of the Republic of Kazakhstan carry out the accounting of intramural R&D expenditures in full compliance with the FRASCATI Manual. Table 4 and Figures 1 and 2 show the main indicators characterizing the state and development of the scientific sphere in the Republic of Kazakhstan and the Republic of Lithuania in 2016–2020.

**Table 4. The main indicators of the state and development of the scientific sphere in the Republic of Kazakhstan and the Republic of Lithuania in 2016–2020**

| Value                                      | 2016       |           | 2017       |           | 2018       |           | 2019       |           | 2020       |           |
|--|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|
|  | Kazakhstan | Lithuania |
| Intramural R&D expenditures, million euros | 136.052    | 327.612   | 140.718    | 378.906   | 147.541    | 426.306   | 168.191    | 485.998   | 181.869    | 571.948   |
| % to GDP                                   | 0.14       | 0.84      | 0.13       | 0.90      | 0.12       | 0.94      | 0.12       | 1.00      | 0.13       | 1.17      |

Note: the amount of intramural R&D expenditures was converted from tenge to euro due to the ratio of tenge:euro established by the National Bank of the Republic of Kazakhstan on November 30, 2021. That is: 489.52 tenge per 1 euro.

<https://www.nationalbank.kz/en/exchangerates/ezhednevnye-oficialnye-rynoch->

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As can be seen, the value of intramural R&D expenditures in the Republic of Kazakhstan in 2020 amounted to 181.869 million euros, which was 13.678 million euros (or 8.13%) more than in 2019 and 34.328 million euros (or 23.27%) more than in 2018. According to the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, the level of intramural R&D expenditures in 2020 amounted to 0.13%, which was 0.01% more than in 2019 and 2018.

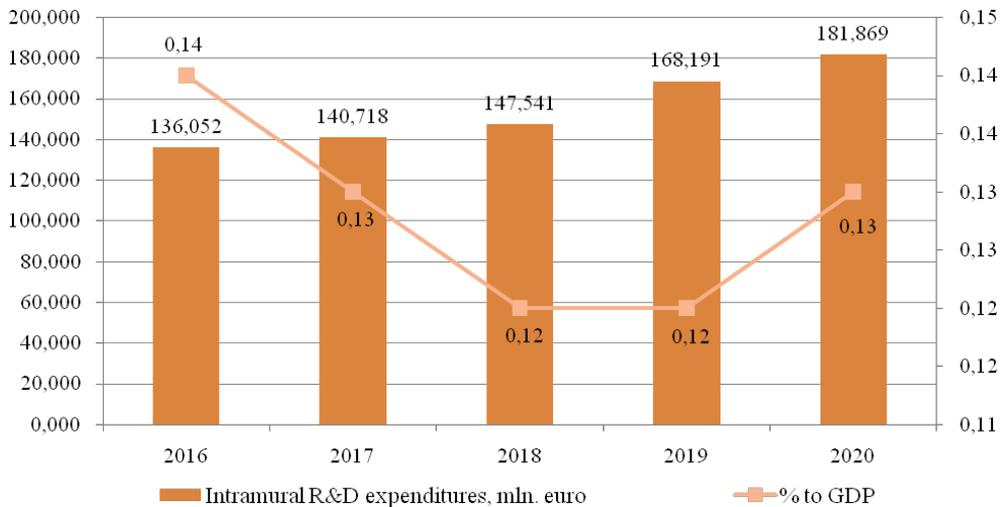
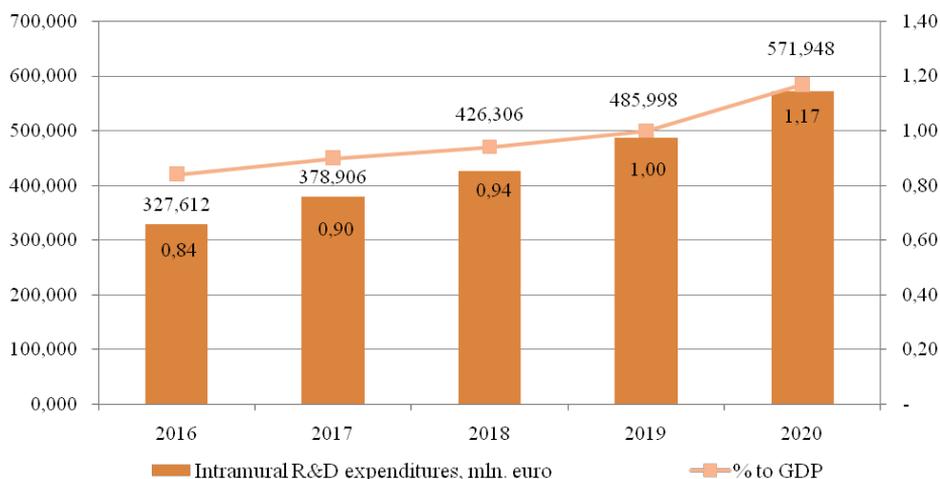


Figure 1. The dynamics of intramural R&D expenditures to GDP in Kazakhstan in 2016–2020

The value of intramural R&D expenditures in Lithuania in 2020 amounted to 571.948 million euros, which is 85.95.6 million euros (or 17.69%) more than in 2019 and 145.642 million euros (or 34.16%) more than in 2018. According to the Official Statistics Portal, the level of intramural R&D expenditures in 2020 amounted to 1.17%, which is 0.17% more than in 2019 and 0.23 more than in 2018 (see Figure 2).



**Figure 2. The dynamics of intramural R&D expenditures to GDP in Lithuania in 2016–2020**

According to the Strategic Development Plan of the Republic of Kazakhstan until 2025, the ratio of intramural R&D expenditures to GDP in 2021 should be 0.5%, in 2025 1.0%, and in 2050 3.0% (see Table 5).

**Table 5. Forecasted values of intramural R&D expenditures to GDP until 2050 in Kazakhstan**

| Technologies and innovations | Value  | Relation  | 2016 | 2021 | 2025 | 2050 |
|------------------------------|--|---|------|------|------|------|
|                              | Intramural R&D expenditures  | To GDP  | 0.14 | 0.5  | 1.0  | 3.0  |
|                              | The volume of private co-financing of projects for the commercialization of the results of scientific and/ or technical activities | % of the total amount of funding for applied research | 7    | 20   | 50   | ≥50  |

**Source:** Strategic Development Plan of the Republic of Kazakhstan until 2025

Thus, if planning of this indicator is carried out on the basis of a linear dependence with an increasing total, urgent measures at the state level are needed in the Republic of Kazakhstan, which would allow for an annual increase in the level of intramural R&D expenditures by an amount calculated as follows:

$$(1.0\% - 0.13\%) / 5 = 0.174\%,$$

where 1.0% is the planned value of the level of intramural R&D expenditures in 2025; 0.13% is the value of the level of intramural R&D expenditures in 2020;

and 5 is the number of years (that is, a five-year period – 2021–2025).

Thus, in order to achieve the planned level of intramural R&D expenditures by 2025 in the amount of 1.0%, it is necessary to ensure its growth by an average of 0.174%.

According to the Lithuania 2030 Strategy, in 2030 the Republic of Lithuania should take 10th place among the countries of the European Union in terms of the level of intramural R&D expenditures to GDP. According to OECD data, in 2019 this position was occupied by the Netherlands, where the value of this indicator was 2.18%.

Thus, if planning for this indicator is carried out, in the Republic of Lithuania the annual increase in the level of intramural R&D expenditures should be provided by the amount calculated as follows:

$$(2.18\% - 1.17\%) / 9 = 0.112\%,$$

where 2.18% is the planned value of the level of intramural R&D expenditures in 2030;

1.17% is the value of the level of intramural R&D expenditures in 2020;

and 9 is the number of years (that is, the nine-year period is 2022–2030).

Thus, in order to achieve the planned level of intramural R&D expenditures by 2030 in the amount of 2.18%, it is necessary to ensure its growth by an average of 0.112%.

The implementation of the Strategic Development Plan of the Republic of Kazakhstan until 2025 and the Lithuania 2030 Strategy primarily depends on stimulating the transfer of new technologies to these countries, which will ensure a permanent increase in the level of intramural R&D expenditures to GDP and will contribute to achieving innovative leadership in the modern world in accordance with European standards.

The authors are confident that under these growth rates of R&D spending in both countries and the existent trends of socio-economic development it is quite possible to achieve the goals mentioned in the Lithuania 2030 Strategy and the Strategic Development Plan of the Republic of Kazakhstan until 2025. In essence, this growth is to be provided based on permanent dialog between businesses and state authorities focused on discussion on the improvements of the R&D environment and the development and implementation of legislative measures aimed at the attraction and extension of business initiatives in R&D.

## Conclusion

Summarizing the above, we believe that in the Republic of Kazakhstan and the Republic of Lithuania it is necessary to:

1. Diversify the system of direct and indirect incentives that would interest businesses in investing in R&D projects. However, a dialogue between businesses and the state should be established, the result of which should be the alignment of conditions for indirect incentives (tax credits, tax allowances, etc.) aimed at the further competitive development of the innovation ecosystem of the Republic of Kazakhstan and the Republic of Lithuania. Effective regulation of these relations between the state and businesses based on the principles and laws of the market economy confirms hypothesis 1.

2. Develop state programs for increasing the level of intramural R&D expenditures to GDP, based on an action plan for stimulating technological transfer, the implementation of which would allow a level of 1.0% to be reached by 2025 in the Republic of Kazakhstan and ensure 10th place in this indicator in the Republic of Lithuania among the countries of the European Union. Stimulating the transfer of new technologies both to Kazakhstan and Lithuania should provide inno-

ational growth expressed in increasing the percentage of intramural R&D expenditures to GDP. This would certainly provide a leading position for Kazakhstan in R&D in Central Asia, and for Lithuania amongst the EU countries. Thus, hypothesis 2 is confirmed, where the authors actualize the issue of stimulating technological transfer at the present stage of scientific and technological development in Kazakhstan and Lithuania.

3. Develop and implement domestic methodological recommendations for businesses on the implementation of intramural R&D expenditures in accordance with OECD standards.

4. Study international R&D legislation and develop and improve proposals, the implementation of which would increase the level of intramural R&D expenditures in relation to GDP.

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## Inovacijos moksle Lietuvoje ir Kazachstane: lyginamoji analizė

Anotacija

*Straipsnyje pateikiama trumpa situacijos analizė, atspindinti dabartinę mokslo ir technologijų sferos būklę Kazachstano Respublikoje ir Lietuvos Respublikoje. Remiantis analize ir mokslinės literatūros studijomis, pateikiami mokslo ir technologijų sferos analizės požūriai. Straipsnyje nagrinėjamas ir analizuojamas vidinių išlaidų MTEP dydis Kazachstano Respublikoje ir Lietuvos Respublikoje 2016–2020 m., jų santykis su bendruoju vidaus produktu. Akcentuojama, kad vidinių MTEP išlaidų apskaita Kazachstano Respublikoje ir Lietuvos Respublikoje vykdoma laikantis tarptautiniu mastu pripažintų EBPO standartų, visų pirma, vadovaujantis „FRASCATI“ vadovu. Šio vadovo pagrindinės nuostatos atspindi EBPO šalių teisės aktuose, reglamentuojančiuose mokslo ir technologijų politikos įgyvendinimą ir plėtrą. Pateikiama informacija apie Kazachstano ir Lietuvos praktikoje taikomas netiesiogines mokesčių lengvatas, kurių tikslas – didinti verslo aplinkos motyvaciją įgyvendinti ir vykdyti MTEP projektus. Šiame darbe atliktas vidinių MTEP išlaidų augimo BVP atžvilgiu skaičiavimas. Jo veikimas užtikrins nagrinėjamo rodiklio dydį strategiiniuose Kazachstano ir Lietuvos lygiuose. Suformuluotų autorių pasiūlymų įgyvendinimas prisidės prie efektyvios mokslo ir technologijų politikos plėtros Kazachstane ir Lietuvoje.*

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