Integrating the Goals of Innovative and Sustainable Development in Science and Technology in Russia

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Abstract. The long-term competitiveness of national economies directly depends on their innovativeness. The paper analyzes a set of indicators measuring the impact of science and technology on national competitiveness. Among the indicators analyzed are the number and type of enterprises engaged in R&D, the volume of budget funding of science, and the number of developed and used advanced production technologies. Emphasizing the differences between the sustainable state and sustainable development, the authors discuss the need and practicality of supporting innovations to ensure the sustainable development of the Russian economy and the integration of goals of innovation and sustainable development. The reasoning of conclusions and proposals is based on official statistics and understanding of most critical aspects in scientific and technological development.

Keywords: Innovative development ∙ Applied researches ∙ Fundamental science ∙ Technologies ∙ Economic development

1. Introduction
The research’s relevance is accepted by authoritative international organizations that have been addressing it for a long time. The new sustainable development goals were formulated at the 70th session of the United Nations (UN) General Assembly. Every five years, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) prepares reports reflecting the state and long-term trends in science, technology, and innovation in the modern world. In 2015, a science report “Towards 2030” [9] was published. Being involved in international cooperation, Russia is interested in integrating the processes of innovation and sustainable development.

2. Materials and Methods
The research’s methodological basis is domestic and foreign works in science, technology, innovation, and sustainable development. The authors used economic and statistical analysis to identify trends in Russia’s development of science and technology. The initial information for the analysis was provided by official statistics [2]. The authors analyzed the structure and dynamics of the researched indicators for 2010–2018. To identify trends in the development of science and technology, the authors selected features reflecting the potential and effectiveness of scientific activities. The authors believe that the analysis of the selected elements will justify possible approaches to assessing the impact of science and technology on integrating innovative and sustainable development of the Russian economy.
3. Results

Given the differences between sustainable state (as the features of the system’s ability to keep the necessary settings and properties under the influence of the external environment) and sustainable development (features of motion), the authors believe that sustainable development is consistently high or increasing rates of economic growth in the short and long term. Moreover, in a short time, changes can be achieved under various scenarios, including inertia. Nevertheless, the economic system, in our opinion, cannot maintain stable high growth rates for a long time without focusing on the goals of innovative development that ensure the system’s competitiveness.

The modern system of official statistics contains a complete list of indicators that characterize the high potential and small efficiency and effectiveness of science and technology development. The limited scope of this paper allows us to reflect only some of them. We carried out a structural and dynamic analysis of Russian organizations performing R&D (Table 1).

| Types of organizations                  | The number of organizations, units | Share of organizations % | Growth rates in 2018 to 2010, % |
|----------------------------------------|------------------------------------|--------------------------|---------------------------------|
| Total                                  | 3,492 3,950                       | 100 100                  | 113.12                          |
| Research organizations                 | 1,840 1,574                       | 52.69 39.85              | 85.54                           |
| Design organizations                   | 362 254                           | 10.37 6.43               | 70.17                           |
| Design and survey organizations        | 36 20                              | 1.03 0.51                | 55.56                           |
| Experimental factories                 | 47 49                              | 1.35 1.24                | 104.26                          |
| Educational organizations of higher education | 517 917                      | 14.81 23.22             | 177.37                          |
| Industrial organizations that had research, design, and engineering departments | 238 419                           | 6.82 10.61              | 176.05                          |

Source: [2].

Table 1 shows an increase in the number of organizations that performed research and development in 2018 compared to 2010 by 13.12%. Simultaneously, organizations of one type show significant growth (educational organizations of higher education and industrial organizations that have R&D divisions), while organizations of the other kind show an equally substantial reduction (research, design, design, and survey enterprises). It should be noted that the structural changes indicate the strengthening of integration processes in the fields of science, education, and business, the effectiveness of which is assessed not by quantitative indicators of the number of participants, but by the synergetic effect of their interaction.

The development of fundamental and applied research and development is directly dependent on the size and sources of funding. In the analyzed period, the domestic R&D expenditure structure was dominated by the state (65%–70%) and the business sector (25%–30%). A much smaller share was provided by foreign sources (2.5%–4.5%), higher education institutions (0.5%–1.2%), and private non-profit organizations (0.1%–0.2%) [4]. State funds for research and development include budget funds, budget allocations for the maintenance of higher education institutions, and public sector organizations (including their own). Figure 1 presents the structural and dynamic analysis of science funding from the Federal budget. Funds cannot compensate for the low share of necessary science funding from the federal budget from other sources since basic research, high-cost, and high-risk does not attract investors focused on a guaranteed quick result.
Figure 1. Structural and dynamic analysis of science funding from the Federal budget, million rubles. 
Source: [2].

One of the features of innovation results is the dynamics of the number of developed and used advanced production technologies (table 2).

| Advanced manufacturing technology | The number of advanced production technologies, units | Growth rates in 2018 to 2010, % |
|----------------------------------|---------------------------------|-----------------------------|
| Developed advanced production technologies | 864 | 1,565 | 181.13 |
| Used advanced production technologies | 203,330 | 254,927 | 125.38 |

Source: [2].

In the analyzed period (2010–2018), the number of used advanced production technologies was higher than the number of developed ones. In 2010, there were 235 used for one technology, whereas, in 2018, this figure dropped to 163. This gap primarily reflects the dependence of indigenous production on imported production technologies. The growth rate of developed advanced production technologies (181.13%) exceeds the growth rate of used technologies (125.38%), which is a positive trend in developing applied research and development. This trend was formed under the influence of structural deformations of science, R&D, and external threats caused by import substitution.

The analysis allows us to make the following conclusions:

- The change in the structure of enterprises performing R&D reflects the greater involvement of higher education organizations in this process, with a decrease in the number and share of research and development enterprises;
- Maintaining a low share of basic research in science funding from the Federal budget is a threat to the technological lag of the Russian economy in the long term;
- The excess of the number of advanced production technologies used over the developed ones shows the dependence of the economy on the import of production technologies and insufficient effectiveness of the commercialization processes of indigenous developments;
- The above confirms the need to strengthen the innovation component’s role in the sustainable development of the Russian economy.
4. Discussion

In the contemporary scientific literature, serious attention is paid to the development of science and technology, leading to innovative changes as the main economic growth drivers. A. A. Gudkova and T. I. Turko drew attention to the general trends and features of the development of science, technology, and innovation in different countries, which should be considered when forming a national science, technology, and innovation policy [3]. Theoretical and methodological approaches to assessing the readiness to the national technological initiative are reflected in the works of N. A. Sadovnikova and E. V. Sibirskaya [7]. Various aspects of state support for innovative organizations are considered by M. M. Butakov, O. N. Sokolova, N. A. Zaitseva, A. A. Larionova, L. A. Kozlovskikh, and I. P. Palastina [1].

Many authors touch upon the problems of financing basic and applied research. Yu. R. Ichkitidze, and S. Yu. Rumyantseva [5] studied the trends in innovative development, and the global experience of state support for new industries are studied. N. I. Ivanova indicates that, in modern conditions, science is part of the research and development system. It is focused on the needs of sustainable economic development. The results of scientific activities depend, to a large extent, on financial investments not only by the state but also by business in this sphere [6]. R. Seidl da Fonseca and A. Pinheiro-Veloso, analyzing financial support tools for science, technology, and innovation, focus on cooperation and networking within the framework of public-private partnerships [8]. The scientific discussion on the problems of science and technology development allowed us to justify the author’s position on the sustainable development of the economy and the integration of innovation and sustainable development goals.

5. Conclusion

Having considered the theoretical aspects of the organization of science and technology in Russia, analyzing the level of resource potential and the effectiveness of scientific activities, the authors show the need and feasibility of integrating the goals of innovative and sustainable development to improve the efficiency of resource use and ensure the competitiveness of the national economy.

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