

# Innovative factors of sustainable development

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**Abstract.** Modern economic and geopolitical realities require new approaches to ensuring sustainable development. This is certainly possible on the basis of the accumulated socio-economic potential. And it's necessary to consider the whole set of disturbances in the economy as an additional challenge, an irritant for activating existing reserves. The research hypothesis: the stability of the country's economic growth rates is ensured by the qualitative, systematic growth of the main innovative indicators of the development of territorial and sectoral economic systems. Innovations should reflect the dynamics of technical and technological solutions both in the field of production and in the field of IT technologies, in the fields directly related to the education and science. The analysis of the main groups of indicators for the development of innovative processes from January to June 2023 was carried out. The results of the study indicate that there is a significant innovative potential for sustainable development. In the course of further research, the analysis and forecast of innovative development should be carried out on the basis of the Russian and international statistics.

## 1 Introduction

In modern economic conditions sanctions pressure, the post-pandemic period, a high degree of volatility of exchange rates, oil prices, rising production costs and a lot of unaccounted and unnamed external and internal factors negatively affect the development of the economy. Exactly in these conditions it is important to rely on the factors of sustainable economic development. Their implementation will create a balanced economic system. Sustainable development implies economic growth, social development and environmental protection [1, 2]. This is certainly possible on the basis of the accumulated socio-economic potential, whereas the whole set of disturbances in the economy should be considered as an additional challenge, an irritant for activating existing reserves.

The problems of sustainable development and economic growth are actively studied by Russian and foreign economic scientists [3]. Among them are S. D. Bodrunov, R.S. Grinberg, D.E. Sorokin [4], E.G. Animitsa, Ya.P. Silin [5], V.A. Kristof, A.K. Hornidge [6], N. Ward, D. L. Brown [7]. All of them emphasize that the accumulated potential and nano-technologies provide the basis for the sustainable development of the entire economy [8].

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As a hypothesis, the authors supposed that the stability of the country's economic growth rates is ensured by the qualitative, systematic growth of the main innovative indicators for the development of territorial and sectoral economic systems.

The innovative development of the economic system is ensured not only by the development and use of new technological solutions, an increase in the number of scientific and production complexes as well as in government spending for these purposes. It is also ensured by solving a complex of issues related to the development of spatial scientific structures, growth of existing and creation of new hybrid scientific-oriented communities. Innovations should reflect the dynamics of technical and technological solutions in the field of production and information technologies, in areas directly related to education and science [9]. Innovative development should be accompanied not only by vertical integration of economic agents, but also by horizontal – cooperation of organizations.

## 2 Materials and Methods

In order to assess the level and dynamics of the development of innovative processes in the economy, it was conducted a study that covered following legal entities and their structural units: a) by type of economic activity – the All-Russian Classifier of Types of Economic Activity (OKVED) and the size of enterprises (RF Law No. 209-FZ of 07/24/2007); b) by sectors of the economy (OKVED 2); c) by organizational and legal forms (KOPF). The indicators of the structure were taken into account as target indicators. The following indicators were analyzed: the volume of innovative products and services rendered; the costs of technological innovations (by types of costs (current, capital), as well as by sources of financing); information on the use and creation of new technologies.

For an objective assessment of the level of innovative development in Russian economy, we analyzed the main groups of indicators for the development of innovative processes for January – June 2023 and obtained the following results.

The average cost of research and development per 1 organization in the Russian Federation amounted to 134,363,960 rubles, while the highest value was recorded by the Federal Service for Technical and Export Control (hereinafter FSTEC) – 1,268,946,800 rubles, also this organization accounts for the maximum value for internal costs of research and development – 1,083,016,630 rubles. The minimum value is 1,919,160 rubles – for regional and local public associations on the first point and on the second – 1,537,860 rubles, too. On average, in the Russian Federation, 1 organization accounts for 115,693,270 rubles for costs, and if you look at the grouping of organizations, the average value was 131,255,310 rubles.

Internal running costs (without depreciation) per 1 organization on average in the Russian Federation amounted to 109,756,290 rubles. The largest value belongs to FSTEC organizations – it is 1,081,395,680 rubles, and the smallest value is 1,536,150 rubles – regional and local public associations.

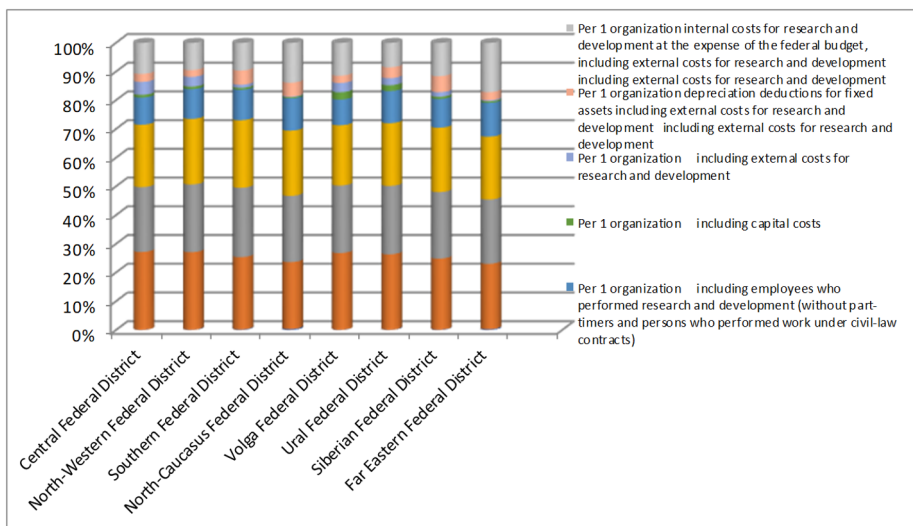
Labor costs for employees who performed research and development per 1 organization in the Russian Federation as a whole amounted to 49,001,560 rubles. The maximum value of 350,570,040 rubles is observed in the State Atomic Energy Corporation «Rosatom». The lowest value is 354,870 rubles in regional and local public associations, on average, taking into account groupings of organizations, – 51,953,280 rubles.

Capital costs per 1 organization on average in the Russian Federation as a whole amounted to 5,936,970 rubles. The maximum value is common for the State Atomic Energy Corporation «Rosatom» – it is 137,048,760 rubles per 1 organization. The minimum value of 26,190 rubles refers to the executive authorities of the regions in the Russian Federation performing functions in the field of healthcare.

External research and development costs for 1 organization in the Russian Federation as a whole amounted to 18,670,690 rubles, the maximum value of 185,930,170 rubles refers to the FSTEC, and the minimum – 32,230 rubles – to the Ministry of Culture of the Russian Federation.

Depreciation charges on fixed assets for 1 organization in the whole country amount to 15,053,670 rubles, the highest value is 106,634,120 rubles in the FSTEC, and the minimum value is 45,040 rubles for regional and local public associations.

Internal costs for research and development at the expense of the federal budget for 1 organization in the Russian Federation as a whole amounted to 54,006,290 rubles, while the maximum value in the State Atomic Energy Corporation «Rosatom» is 559,294,440 rubles, and the minimum value is 542,200 rubles for state authorities in the regions of the Russian Federation, other state bodies in the regions of the Russian Federation, executive authorities of the regions in the Russian Federation (Fig. 1):



**Fig. 1.** Key performance indicators of organizations that carried out research and development in January - June 2020, per one organization by federal districts

The analysis of the tables of the All-Russian Classifier of Administrative-territorial division objects showed that the highest labor costs for one employee are made in the Far Eastern Federal District, the lowest ones are in the North Caucasus Federal District. The maximum costs for research and development are made in the Central Federal District, the minimum ones are in the North Caucasus Federal District. The same distribution is fixed on depreciation charges for fixed assets and internal costs for research and development at the expense of the federal budget.

The analysis by regions revealed that the highest labor costs for 1 employee are in the Tyumen region, the lowest ones are in the Ryazan region. The total costs of research and development are the highest in the Nizhny Novgorod region, the lowest ones are in the Altai Republic. Depreciation charges on fixed assets are the maximum in the Tomsk region, the minimum ones are in the Altai Republic. Internal costs on research and development at the expense of the federal budget are the highest in the Nizhny Novgorod region, the lowest ones are in the Lipetsk region.

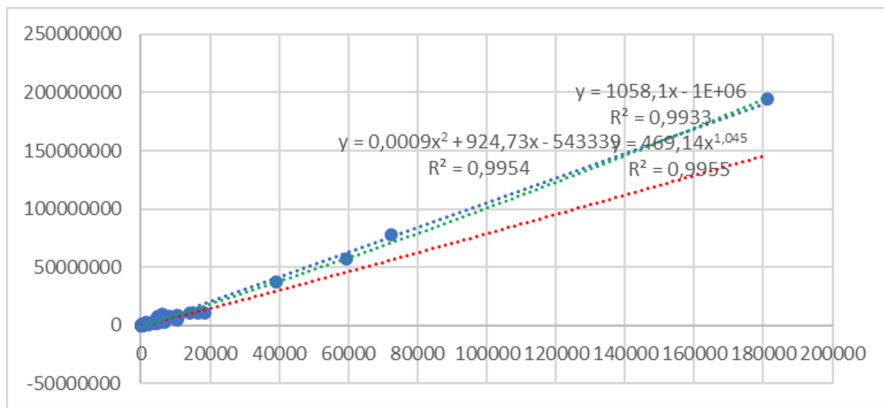
From the tables analysis of the All-Russian Classifier of Ownership Forms, it follows that the performance indicators of foreign organizations that carried out research and development (per 1 organization) are significantly higher than Russian ones. The labor costs for 1 employee are minimal in organizations owned by religious associations, they are

maximum in the municipal ownership. The costs of research and development per 1 organization are minimal in the ownership of religious associations, they are maximum in the state ownership. The internal costs of research and development at the expense of the federal budget are minimal in the ownership of trade unions, they are maximum in the state ownership.

### 3 Results and Discussion

In the course of the research, a correlation and regression analysis was carried out between the studied features, based on the hypothesis of the impact on the amount of research and development costs (rubles) –  $y$  (dependent attribute) of the average number of employees who performed research and development (people) –  $x$  – independent attribute.

On the constructed correlation field, the relationship between the studied features is noticeable (Fig. 2):



**Fig. 2.** Graph of the correlation field of the calculated regression equations

The analysis of the influence of the advanced production technologies used ( $x$ ) on the volume of innovative goods and services produced ( $y$ ) over the same period revealed a high degree of dependence between the studied features, which is confirmed by the corresponding calculated coefficients. Empirical regression coefficients:  $b = 0.1991$ ,  $a = -1.0746$ , regression equation (empirical regression equation):

$$y = e^{-1.0745525956414x} x^{0.1991} = 0.34145x^{0.1991}$$

The calculated correlation coefficients and the determination index indicate a high relationship between the elements under consideration. The empirical correlation ratio is 0.812, which indicates a high impact of factors on the final result (on the Cheddock scale).

### 4 Conclusions

The results of the study indicate that there is a significant innovative potential for Russia's sustainable development, even under the conditions of sanctions pressure and global restructuring of foreign economic relations.

At the same time, innovative development is hindered due to a number of objective and subjective reasons: structural restructuring of the economy, insufficient financing, lack of a base and qualified personnel, high volatility of investments. In the course of further research, the analysis and forecast should also be based on up-to-date statistical data not only from Russian, but also from international statistics.

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