

## Forecasting Scientific and Technological Development of the Russian Federation

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### Abstract

Currently, ensuring scientific and technological development is a factor in the success and prosperity of the economy. Scientific and technological progress increases the efficiency of the functioning of socio-economic systems and allows subjects of economic relations to successfully promote the results of their activities in domestic and world markets.

In such a situation, the leaderships of the countries are interested in creating conditions for intensive scientific and technological development of the economy. Forecasts are the information base for determining possible directions and rates of development of science and technology in their relationship with economic development and making high-quality management decisions in this area.

In this regard, the study is devoted to the study of trends in the scientific and technological development of the Russian Federation based on medium-term forecasting. The article presents the results of a retrospective analysis of the effectiveness of the scientific and technological development of Russia; the models used for making forecasts are characterized; the tendencies of changes in indicators characterizing the development of science and technology in Russia have been substantiated; the author's forecasts were compared with the forecasts presented in the Strategy of the Socio-Economic Development of the Russian Federation and the reasons for their partial non-coincidence were described.

The study was carried out using forecasting methods based on the moving average method; the method of least squares and factor analysis.

**Keywords:** forecasting, scientific and technical development, modeling, statistical indicators and factors.

**JEL Classification Codes:** E7.

## Introduction

The formation of the scientific and technical process is taking place under the influence of global interrelated trends and challenges, the most important of which is the change in the natural environment. A reduction in natural resource reserves while maintaining a high demand for hydrocarbon feedstock leads to intensification of competition for resources, the introduction of stricter environmental standards, and also stimulates states to switch to a resource / energy efficient Circular Economy<sup>1</sup>. Changes in the natural environment are also characterized by climate change combined with an increasing anthropogenic load, which leads to problems in the development of agriculture and, as a consequence, a threat to food supply. In addition, the deepening of the processes of mass consumption leads to environmental pollution, which also worsens the health of the population. Russia is also subject to this global trend. Its economy is based on the extensive exploitation of raw materials, the country is exhausting the possibilities of extensive growth, since the depletion of natural resources, in particular, oil, is taking place, and the conditions for its production are becoming more complicated. In addition, there is a deterioration in the environmental situation and a drop in agricultural yields, which leads to a threat to the country's food security. The population of Russia is subject to aging and the emergence of new diseases.

Another equally important global trend that has emerged as a result of scientific and technological progress is demographic and social transformations. This trend is understood as: an increase in the life expectancy of a person, a change in his lifestyle, a transformation of the education system, an increase in international migration, an increase in urbanization processes - the creation of "smart cities" with a developed high-tech and comfortable infrastructure.

Scientific and technological development has influenced not only man and nature, but also the economy. Today, the world is undergoing a transition to a new innovative model of economic growth. The new model is based not on an increase in the cost of material resources, but on the contribution to knowledge capital, the high return on which can be traced in all sectors of the economy and affects the displacement of intermediaries in the production chain and reduction of ineffective business costs.

This system became possible due to the creation of massive network interaction using various electronic platforms (Basok B.M., Rozhanskaya A.N., Frenkel S.L., 2019). The new business model of the economy also affects the change in the structure of the labor market: robotization of manual processes, replacement of routine processes, dynamic updating of computer skills requirements, growth of remote employment and labor mobility.

Scientific and technological development also contributed to the transformation of the geopolitical situation (Lobanovsky Yu.I., 2019). The promotion of new strong players who have succeeded in the innovative field to the pedestal causes aggravation of competition, instability, and security problems. Russia, as an important subject of world processes, is also aware of its susceptibility to threats to national security. In this regard, our country allocates the following priority of scientific and technological revolution: "counteraction to man-made, biogenic, socio-cultural threats, terrorism and ideological extremism, and also cyber threats and other sources of danger to society, the economy and the state" (Indicators of scientific and technological development, 2021).

Under the influence of scientific and technological revolution, not only the world is changing, but also the very paradigm of scientific and technological development. The new industrial revolution is characterized by the creation, merger and penetration of information technologies into all spheres of human life, new scientific industries appear - artificial intelligence, robotics, nano / biotechnology, new sources of renewable energy. The creation of a large number of scientific directions forced the countries to apply a new model of support for scientific and technological revolution - a selective strategy, which implies the harmonization of institutions, the effective adaptation of the best international practices to national conditions. The use of a selective strategy of scientific and technological revolution allows to restrain the dispersal of resources and achieve the greatest results in selected areas (Zuev A.S., Zueva A.N., Leonov D.A., 2020). However, it should be noted that such a strategy will be really effective for the scientific and technological development of the country only in conjunction with international cooperation, in order to compensate for the "one-sided" development of science.

Thus, despite investments in Russian science from the state and business, this area remains insufficiently productive. Institutional, regulatory and infrastructural systems are underdeveloped. Its own scientific and technological basis for the creation and implementation of priorities is not being formed. Responding to the "big challenges" facing society and the state does not act as a driver for socio-economic development.

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<sup>1</sup> Circular Economy - Resource-Based Economy

## Materials and methods (materials for usage, description of the subject area, methods and techniques of research).

In the Russian Federation, the forecast of scientific and technological development is included in the state scientific and technological strategy (Decree of the President of the Russian Federation No. 642, 2021). In addition, within the framework of scientific and technological development in the Russian Federation, the following program documents are being implemented: Science and Universities "(former National Projects" Science "and" Education ") ; National Project" Digital Economy "; State Program" Scientific and Technological Development ".

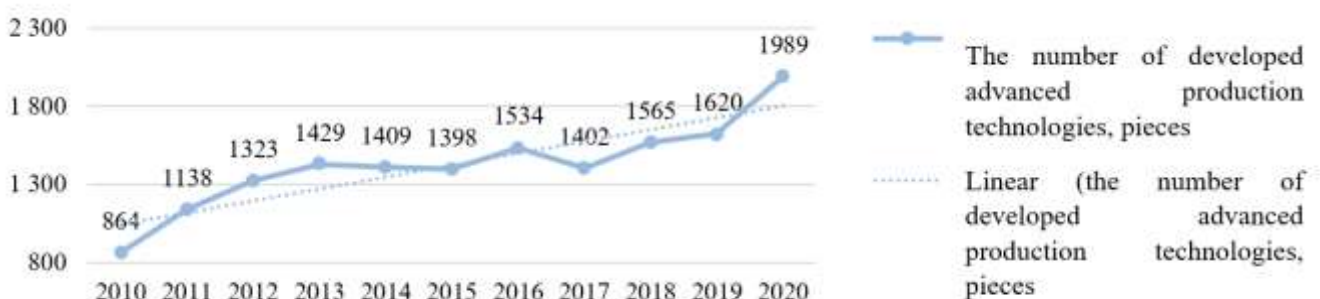
The main task of forecasting scientific and technological development is to determine the possible directions and rates of development of science and technology in their relationship with economic development. At the same time, forecasting of scientific and technological development should be carried out taking into account social and environmental consequences, human resources, as well as maintaining the international authority of national science.

Since the study includes the development of a medium-term forecast for 3 years, taking into account the characteristics of the process under study and the available tools and skills, the following forecasting methods were chosen: the moving average method; least square method; factor analysis.

## The Results

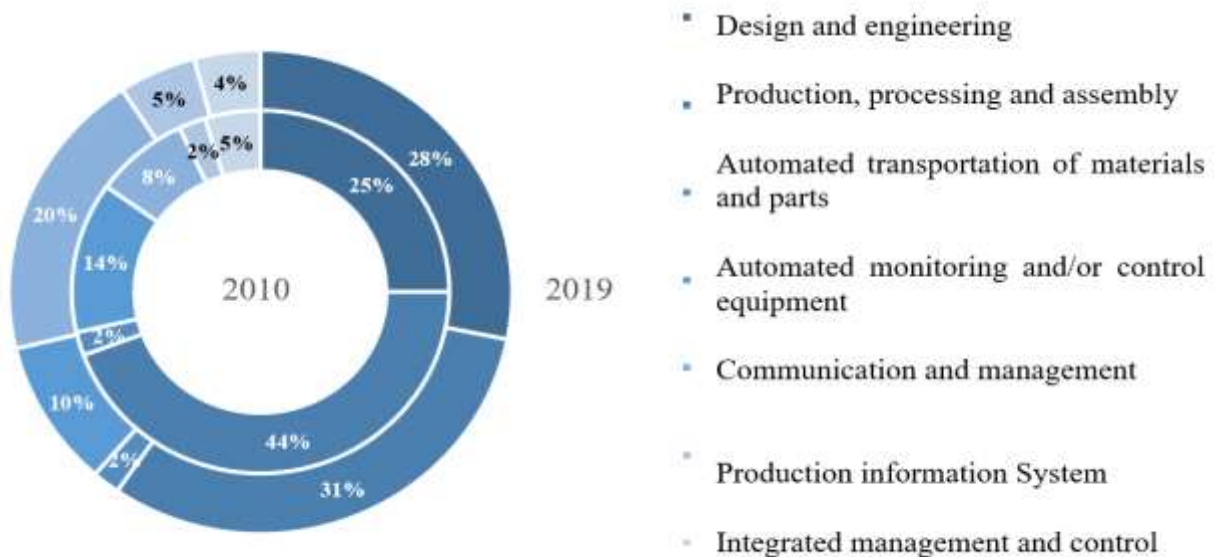
The selected system of indicators needs statistical analysis in order to determine the interdependence of factors, to reveal the patterns of development of the phenomena under study, to indicate the current state of scientific and technological development of the Russian Federation over the past 10 years, which will allow us to talk about the future state of the ongoing process.

The main result of scientific and technological development is the creation of innovative end products and services. So, according to the indicator "The number of developed advanced production technologies", we can conclude about the intensity of the ongoing process. Analysis of the dynamics of this indicator (Fig. 1) shows us that the trend develops evenly over the selected time interval. In 2010-2013, an almost twofold growth (1.7 times) can be traced, which corresponds to the period of economic recovery in the country, in 2014 a turning point occurs due to the influence of the economic crisis. After 2017, the number of developed production technologies is growing steadily and in 2020 it reaches 2.3 times more than in 2010. It should be noted, however, that the average annual growth rate of the share of innovative products is 2%.



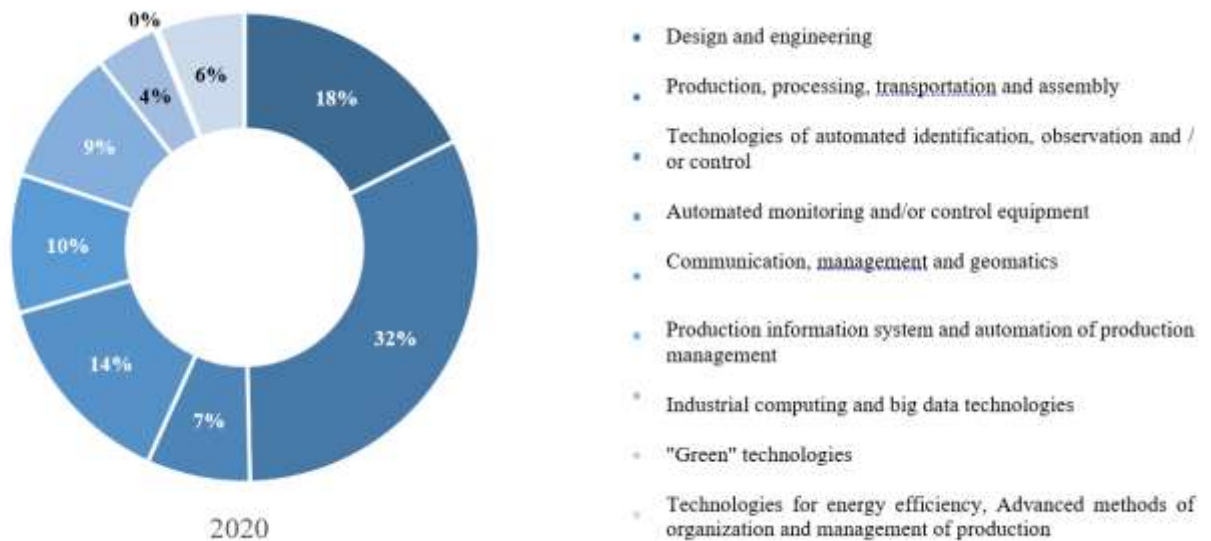
**Figure 1. Dynamics of the number of developed advanced production technologies in 2010-2020, pcs.**  
(Compiled by the authors)

Analysis of the structure of developed advanced production technologies in 2010 and 2019. (Fig. 2) shows that the main directions are production, processing, assembly and design and engineering (together they occupy a share - this is a fact that remains unchanged, but the structure changes significantly. The direction "production, processing, assembly" decreases its share within 10 years by 13%, giving way to the direction of "communications and management" (+ 12%), the expansion of the direction of "design and engineering" (+ 3%).



**Figure 2. Structural comparison of developed advanced manufacturing technologies in 2010 and 2019, %**  
(compiled by the authors)

This comparison is given for 2019 versus 2010, since in 2020 the directions of technology development changed (Fig. 3) and comparison became impossible. Analysis of the structure of the indicator for 2020 demonstrates: the merger of some areas and the formation of generalized new ones from them, as well as the emergence of new areas of technology development: "green technologies", "technologies for industrial computing big data", "technologies for ensuring energy efficiency", which corresponds to global trends technology development. As before, a large share in the structure belongs to the production direction (32%), which indicates the country's raw materials orientation. However, the emergence of modern trends contributes to the scientific and technological development of the country.

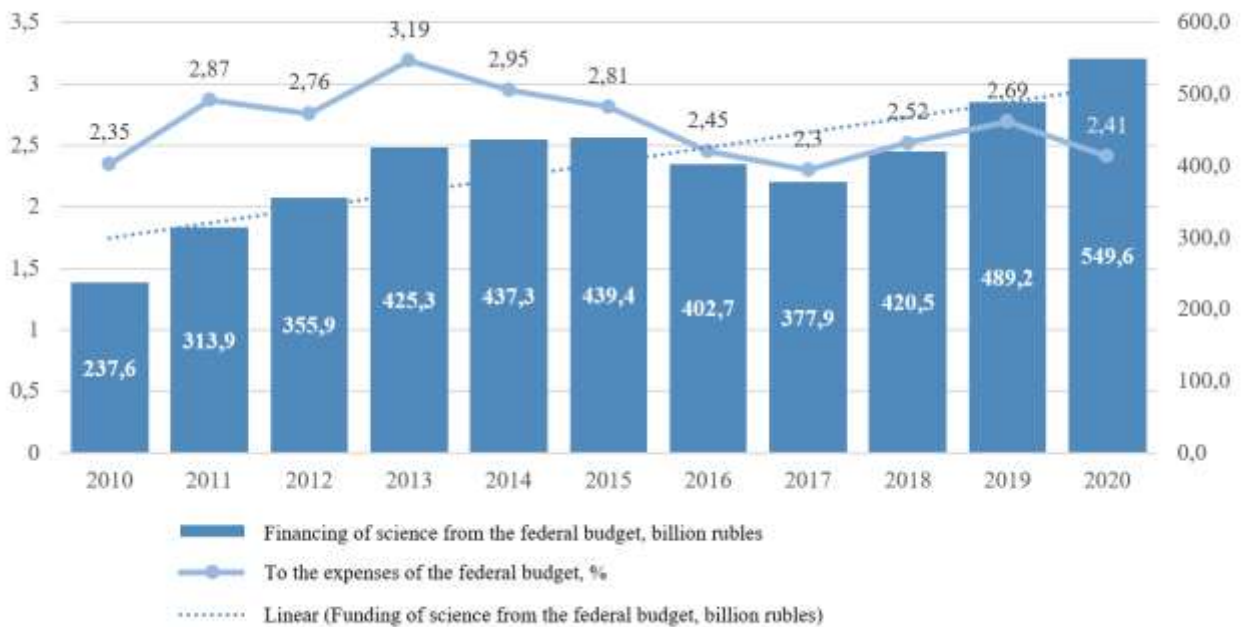


**Figure 3. The structure of the development of advanced production technologies in 2020, %**  
(compiled by the authors)

Scientific and technological development requires a large amount of financial support. Unfortunately, due to the complexity, long-term nature of the innovation process, associated with great uncertainty and risks, and the lack of sufficient free funds, economic actors consider it inexpedient and impossible to carry out scientific and technological development in the context of crises in the country. That is why the main role in financing scientific and technological development in Russia falls on the state (on average, 68% of domestic R&D expenditures). However, even the state is forced to reduce spending on science in times of crisis. Thus, funding for science from the federal budget <sup>2</sup> (Fig. 4) generally has a positive trend (allocated funds

<sup>2</sup> The data on the expenditures of the state budget for civil science are presented (excluding the financing of applied research and development for military and defense needs)

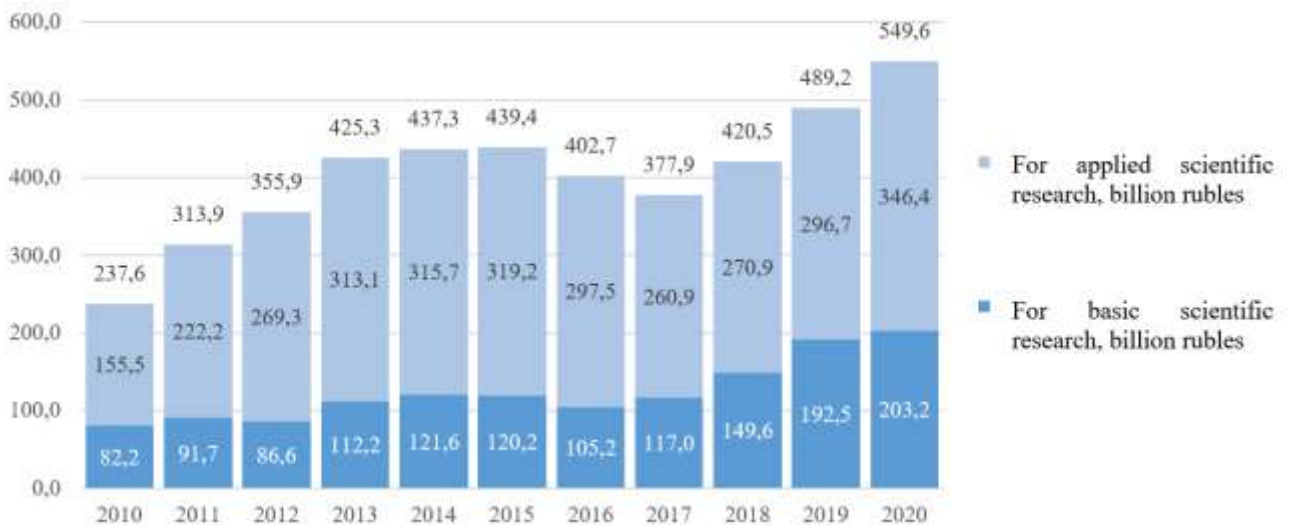
in 2020 increased by 2.3 times compared to 2010), however, after the anti-Russian sanctions due to the annexation of Crimea in 2014, the economy was shaken, which affected the funding of science. To date, the share of funds allocated for civil science in federal budget expenditures is only 2-3%. With such indicators, the implementation of the outlined plans in the field of scientific and technological development is questioned. According to the report of the Accounts Chamber (Report on the results of the expert-analytical event, 2021), Russia in terms of the share of spending on science (from all sources of funding) of GDP = 1.03% is in 34th place in 2019, significantly inferior to many developed countries. At the same time, in China, these costs amount to 2.1% of GDP, in the United States - 2.7% of GDP, in Germany - 2.9% of GDP, and in the leading countries (Israel, Republic of Korea) they exceed 4% of GDP, the auditors noted.



**Figure 4. Dynamics of funding of science from the federal budget for 2010 - 2020, billion rubles, the share of this indicator in federal budget expenditures, %**

*(compiled by the authors)*

The federal budget remains the main source of funding for science in Russia; moreover, business loses interest in investing in science every year. More than half of the budgetary allocations for science over the entire study period (on average 69%) are spent on financing applied research, the rest - on fundamental science. Exploring the structure of applied research (Fig. 5), there is a noticeable excess of spending on research in the field of national economics over all other areas of applied research.



**Figure 5. Structure of federal budget expenditures for financing science, billion rubles.**

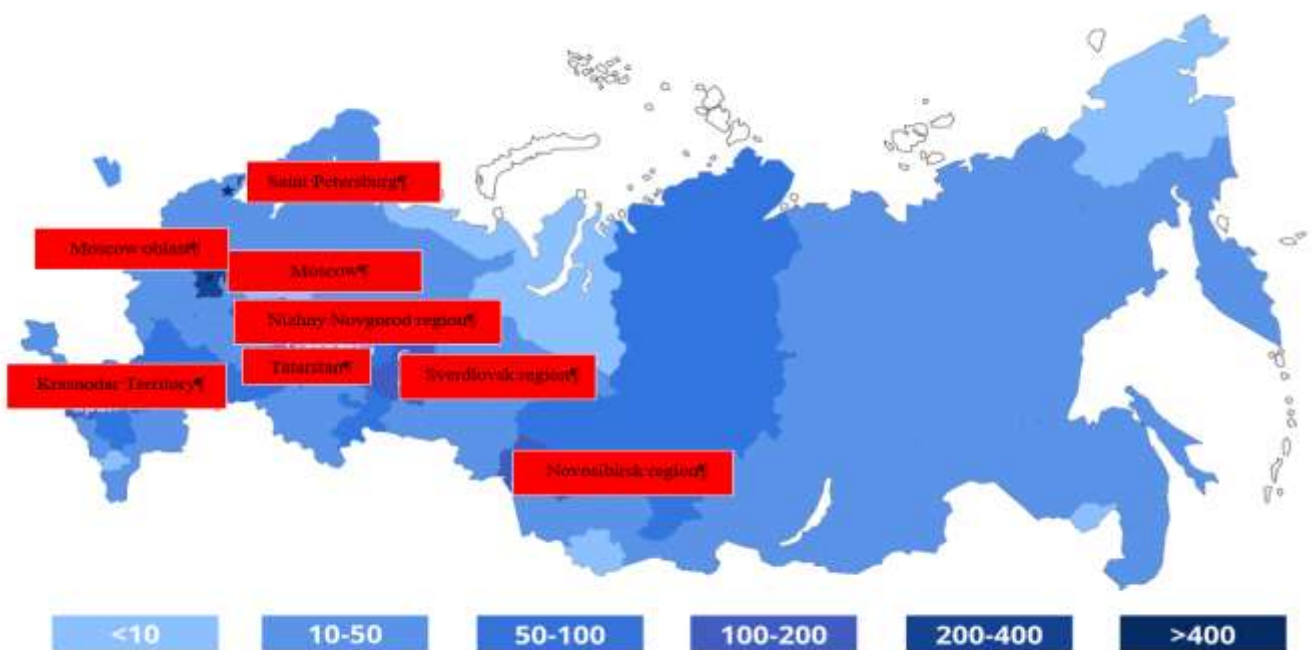
*(compiled by the authors)*

Another indicator characterizing scientific and technological development is "the number of organizations that carried out research and development." This indicator directly affects the number of innovative goods, works, and services produced. For the company, innovative activity contributes to the formation of the organization's competitive advantages, its sustainable development, including in the development and implementation of the innovative development strategy. In turn, the state provides the level of scientific and technological development, sustainable development of the country's economy. However, in the Russian Federation, the dynamics of this indicator (Fig. 6) has a positive trend. During the study period, the number of organizations that performed research and development increased by almost 20% (+623 organizations). The average annual growth rate is 2%. A sharp jump (by 16%) in 2015 is associated with the annexation of the Crimean peninsula and the beginning of the import substitution policy. Most of the organizations in 2020 (98%, 4105 units) are Russian property, the rest of the organizations are on the account of foreign (52 units) and mixed (50 units) ownership.



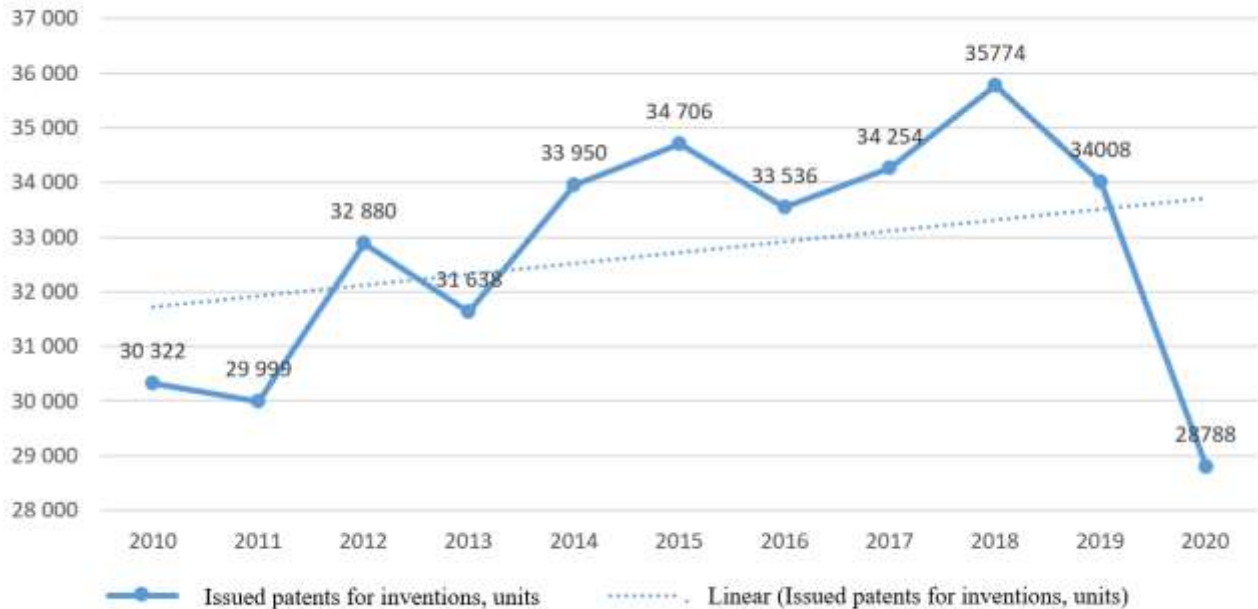
**Figure 6. Dynamics of the number of organizations that carried out research and development in 2010 - 2020, units.** (compiled by the authors)

Basically, organizations are concentrated in cities of federal significance (Fig. 7) - Moscow and St. Petersburg and in the Moscow region - in total, they account for 34% (1434 units) of all organizations that performed research and development in 2020. Also, the regions that concentrated scientific organizations on their territory are: the Republic of Tatarstan (128), Novosibirsk (117), Sverdlovsk (116), Nizhny Novgorod (100) regions and Krasnodar Territory (108). It should be noted that there is a correlation between the number of organizations performing research and the level of economic development in the regions. So, the lagging regions in terms of the indicator under consideration are: Jewish Autonomous District (2), Nenets Autonomous District (3) and the Republic of Ingushetia (5).



**Figure 7. The number of organizations that carried out research and development in the regions of Russia, units (compiled by the authors)**

Before the result of scientific research turns into a finished product, it goes through several stages at which scientific knowledge is tested for the possibility of using it in real production. One of them is patenting. That is, it can be argued that the number of issued patents for inventions reflects the effectiveness of the research and development carried out. The average annual growth rate of issued patents for inventions (Fig. 8) is 99%. After the fall in the value of the indicator in 2019, Russia did not manage to return to the baseline by 2020, which was influenced, among other things, by the epidemiological situation.



**Figure 8. Dynamics of the issuance of patents for inventions in 2010-2019, units (compiled by the authors)**

The analyzed indicators for the dynamics of their development, the presence of emissions and their interrelationships helped the overall picture and determine how scientific and technological development took place in the country over the past 10 years.

To build a forecast of scientific and technological development, a system of indicators has been compiled and analyzed, which, in the opinion of the authors, includes factors that can explain the trend in the development of scientific and technological development. Among the selected indicators there are 2 factors that are the result of scientific and technological revolution, that is, reflecting its state at a certain point in time, as well as 3 factors that are its condition, that is, describing its preconditions for the development of the phenomenon in the future (Table 1).

**Table 1. Types of factors of scientific and technological development**

Type of factor	Index
The result of scientific and technological development	1. The number of advanced manufacturing technologies developed; 2. Number of issued patents for inventions
Condition of scientific and technological development	1. Financing of science from the federal budget 2. Graduation from graduate school and doctoral studies (with the defense of the thesis) 3. The number of organizations that carried out research and development

Since the authors are faced with the task of predicting scientific and technical development at a certain point in time (3 years ahead), it is necessary to take one of the resulting indicators for scientific and technological progress. In the process of determining the theoretical essence of scientific and technological development, as well as analyzing its indicators, it became obvious how scientific and technological revolution is a complex process, which is influenced by many factors and dependencies between them. That is why, in order to predict (for 2021–2023) scientific and technological development in this study, the method of factor analysis was chosen, which makes it possible to assess the correlation dependences between indicators, as well as to identify their influence on the process under study.

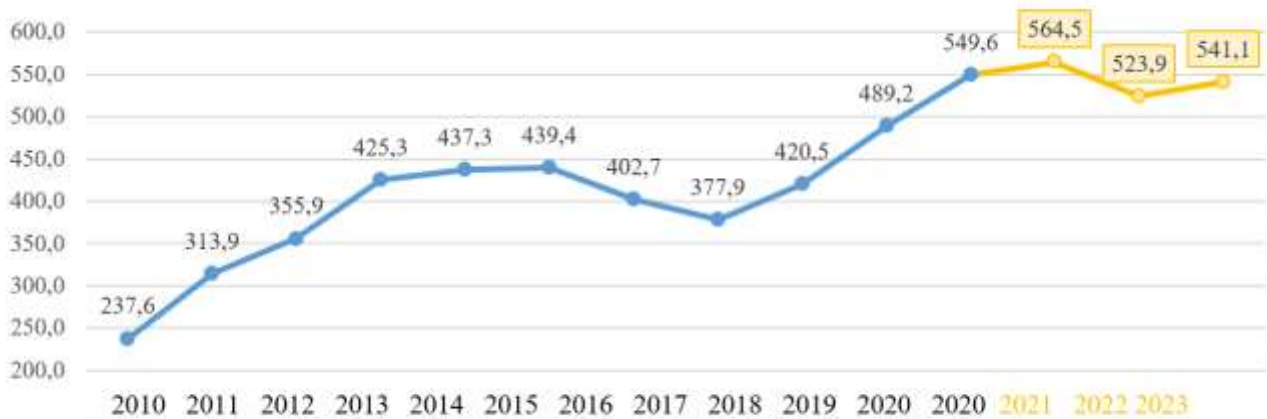
As already determined, the resulting indicator - Y in the factor model will be taken as "the number of developed advanced production technologies". Then, for the indicators that are the conditions and affect Y, the following will be taken: X1 -

Funding of science from the federal budget, billion rubles; X2 - Graduation from postgraduate and doctoral studies (with the defense of a thesis), people; X3 - Number of organizations carrying out research and development, units; X4 - Number of issued patents for inventions, units.

Based on the data, a correlation analysis was carried out, as a result of which multicollinearity between the selected indicators was not revealed, therefore, this system of indicators can be investigated using regression analysis. The coefficient of linear determination (R-square) in regression analysis showed a value of = 0.93. This means that 93% of changes in the predicted indicator are explained by the selected factors and indicates that the constructed model is of high quality.

The coefficients obtained for all X have economic meaning. The indicator that most of all affects the change in Y is the funding of science from the federal budget, which is logical from the economic point of view, since financial resources are an important instrument for achieving goals in a market economy. The most insignificant factor is the number of organizations that carried out research institutes, since fundamental and applied research is a process that does not always give a result visible on the visible horizon, moreover, not all organizations that have carried out research institutes get a result, sometimes the invested efforts are not justified, but this the indicator is important as it reflects the scientific infrastructure. The coefficient at X1 has positive values, which indicates a direct relationship with Y. The coefficients at X2,3,4 have negative values, but they can be explained by a time lag: issued patents for inventions may be monetized after several years or not be implemented into the final product at all, which also applies to the number of graduate students and doctors who defended their dissertations - the fruits of their activities can be seen in the first year, or only after many years - there is a creative component of the process and the influence of the human factor. Therefore, based on the results obtained, this model can be used to predict Y.

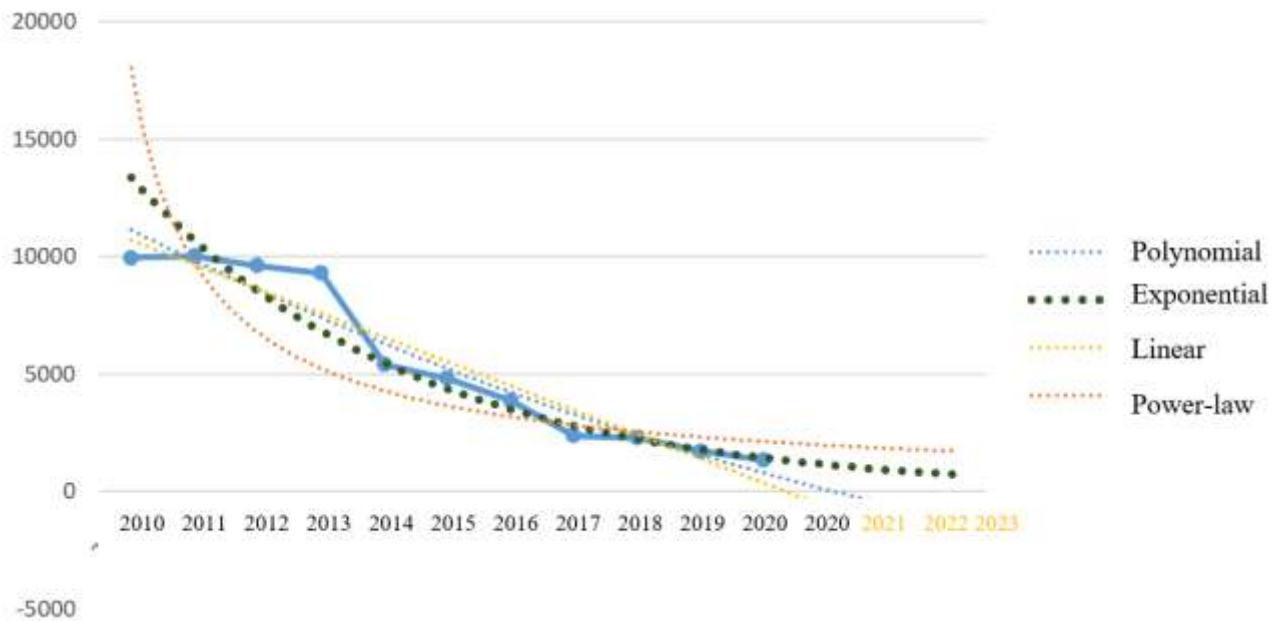
The forecast of the amount of funding for science from the federal budget (Fig. 9) in this work is based on the Federal Law on the federal budget for 2021–2023. (Federal Law No. 385-FZ, 2021). The federal budget for this period was approved at the end of 2020, therefore, the forecast values are presented taking into account the impact on the country's economy of the pandemic. Even despite a significant decline in economic activity and slowdown in GDP growth, financing civil science in 2021 is predicted only to increase, however, in 2022-2023, smaller amounts of the federal budget are laid down.



**Figure 9. Forecast of the volume of funding for science from the federal budget on the basis of N 385-FZ, billion rubles**

*(compiled by the authors)*

Since the number of graduate students and graduates-doctors with a thesis defense has a certain pattern in development over time, the least squares method was chosen to predict this indicator. The selection of the type of function that describes the trend was made empirically by constructing a number of functions (Fig. 11) and comparing them with each other in terms of the approximation reliability (Table 2).



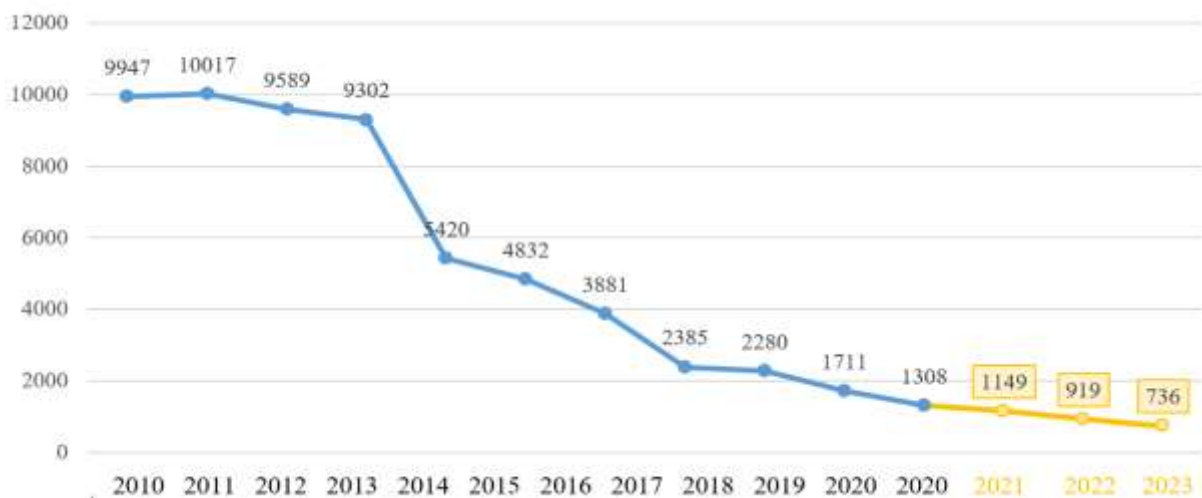
**Figure 11. Selection of the type of function that describes the development trend over time of the indicator "graduation from graduate school and doctoral studies (with the defense of the thesis)"**

*(compiled by the authors)*

**Table 2 - Comparison of functions describing the series, according to the value of the approximation reliability**

Fitting (smoothed) curve	The equation	The value of the accuracy of the approximation
Linear	$y = -1033,8x + 11718$	$R^2 = 0,9299$
Exponential	$y = 16685e^{-0,223x}$	$R^2 = 0,9554$
Degree	$y = 18006x^{-0,89}$	$R^2 = 0,7659$
Polynomial (2nd degree)	$y = 29,339x^2 - 1385,9x + 12481$	$R^2 = 0,9357$

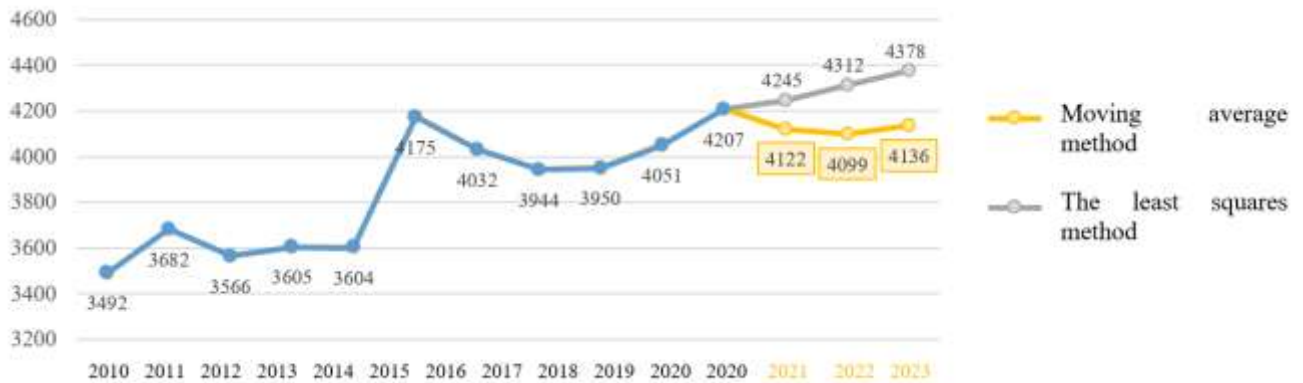
The comparison showed that the exponential curve has the most reliable approximation value ( $R^2 = 0.9554$ ). Based on this analysis, the following forecast was built (Fig. 12). The average percentage error indicates that the forecast model, on average, gives slightly underestimated results ( $MPE = 1.45\%$ ), but this value does not exceed the 5% standard, therefore, the forecast is not biased. The accuracy of the forecast (Fig. 3.3) is 88%, which indicates its quality. The obtained forecast values for 3 years in advance continue the time trend of the studied phenomenon. If the state does not take action to increase interest in science among young people, the release of graduate students and doctoral candidates will continue to decline.



**Figure 12. Forecast of the volume of graduate and doctoral studies (with the defense of the thesis) by the least squares method, people.**

*(compiled by the authors)*

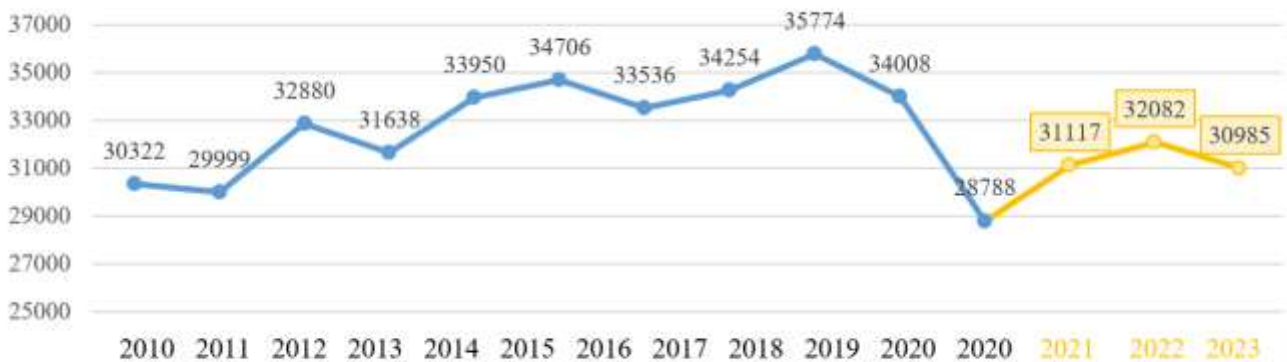
Two methods were used to predict the number of research and development organizations: the moving average method and the least squares method. Since the moving average method showed great accuracy (98% versus 97%), in further work the authors will rely on this model. The forecast (Fig. 13) is unbiased (MPE = 0.14%). According to the forecast, in 2021-2022 there will be a decrease in the number of organizations performing research and development, which can be explained by the impact of the pandemic on the country's economy. Small growth is expected in 2023.



**Figure 13. Forecast of the number of organizations that carried out research and development by the moving average method, units.**

*(compiled by the authors)*

Forecasting 4 factors influencing Y, the number of issued patents for inventions, was performed using the moving average method, since the indicator does not have a pronounced trend, the series had to be smoothed. The resulting forecast (Fig. 14) has an accuracy of 97%. MPE is within the acceptable norm (0.41% < 5%), therefore, the forecast is unbiased and qualitative. Despite the decline in the indicator in 2020, an increase in the number of issued patents for inventions is laid for the forecast period 2021-2022.



**Figure 14. Forecast of the number of issued patents for inventions using the moving average method, units**

*(compiled by the authors)*

Based on the obtained forecast values of all X, as well as on the basis of the obtained factor model, the authors obtained the following forecast Y - the number of developed advanced production technologies. The average absolute error of the forecast presented by the authors is 4.5%, which gives 95.5% forecast accuracy. MPE = -0.41, therefore, the forecast is qualitative, unbiased.

It makes sense to correlate this forecast with the scenarios of the mid-term forecast of socio-economic development, carried out by the Ministry of Economic Development of the Russian Federation. For this, among the main predicted indicators of socio-economic development, factors were selected and another factor model was compiled, where:

Y - The number of developed advanced production technologies, units. - resultant show.

X1 - Investment in fixed assets, RUB bln. This indicator was chosen as a factor due to the fact that investments are an important source of funding for research and development, in addition, this indicator reflects the degree of interest and readiness of investors to invest money with their implementation in the long term.

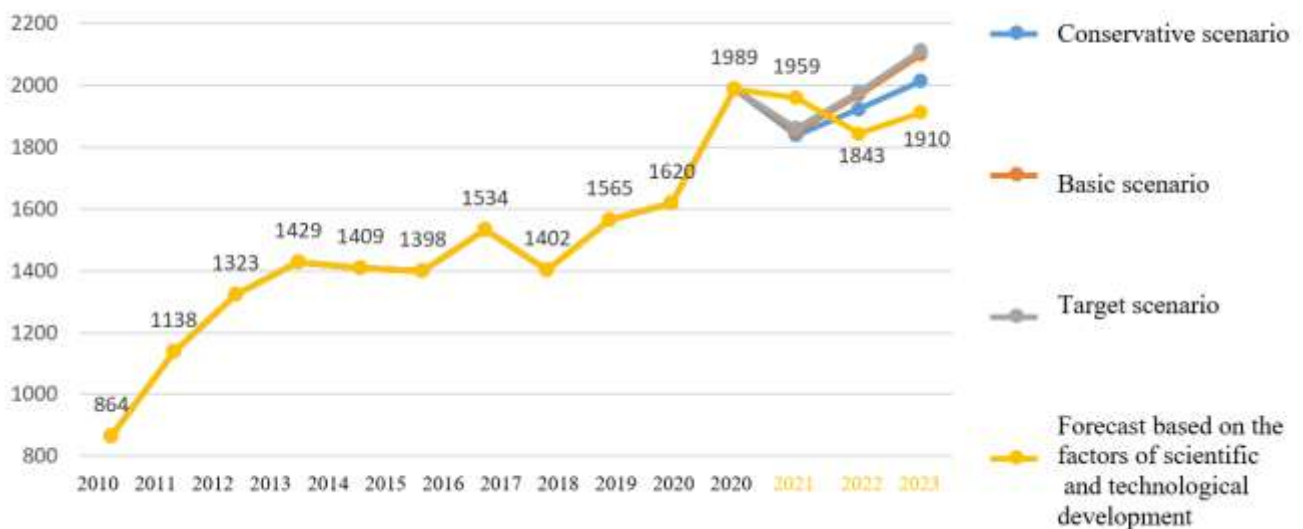
X2 - Real wages of employees of organizations, in% of the previous year. This indicator can be considered an influencing factor, since it reflects the level of well-being of the population.

X3 - Industry index, in% to the previous year. This indicator was chosen as a factor due to the fact that the influence of scientific and technological development and its main trends are most noticeable in the industrial sector of world production, which has been and remains the locomotive of the economy.

X4 - Import of goods, billion rubles. This factor also affects scientific and technological development, as it reflects the competitiveness of domestic goods. Foreign goods, due to the use of the achievements of science and technology, can be produced at lower costs, using more technological and "smart" equipment, therefore, they are more competitive in comparison with domestic goods.

Retrospective data (2010-2020) on the factors were collected at Rosstat, the forecast values were taken from the Forecast of the Ministry of Economic Development of the Russian Federation. Based on the data obtained, a correlation analysis was carried out, as a result of which multicollinearity between the selected indicators was not revealed, therefore, this system of indicators can be investigated using regression analysis.

The coefficient of linear determination (R-square) in regression analysis showed a value of = 0.97. This means that 97% of changes in the predicted indicator are explained by the selected factors and indicates that the constructed model can be used. The result of the analysis was the following graph (Fig. 15), which shows that the author's analysis and forecast values obtained in accordance with the mid-term forecast of the Ministry of Economic Development of the Russian Federation have multidirectional dynamics. In 2021, in accordance with the selected factors of scientific and technological development, there will be a less severe decline than in accordance with the main socio-economic indicators laid down in the mid-term forecast of the Ministry of Economics. However, in accordance with the scenarios, the trend will become positive already in 2022 and will continue to grow rapidly in 2023, while the author's forecast assumes that growth will resume only in 2023 and will be less sharp. In general, we can talk about the coincidence of the trend of the forecasts considered.



**Figure 15. Forecast of the number of developed advanced production technologies in accordance with the Strategy of socio-economic development of the Russian Federation, units.**

*(compiled by the authors)*

Thus, the correlated projections indicate that the state needs to take a number of measures in relation to scientific and technical activities in order to give impetus to its rise, after the recession caused by the COVID-19 pandemic.

Today, in order to become the leading economy in the world, which Russia is striving for, it is necessary to create, master and disseminate technologies of the fifth technological order, as well as create a reserve with the help of fundamental, exploratory and applied research for the transition to the sixth technological order, the core of which is technologies such as: nanotechnology, biotechnology, artificial intelligence systems, global information networks, integrated high-speed transport systems (Glazyev S.Yu., 2010).

Thus, the link between scientific and technological development and economic growth and development today cannot be refuted. Therefore, it can be argued that the gross domestic product depends on the factors of scientific and technological

development. On this basis, we will construct a forecast using factor analysis of GDP volumes (in current prices) depending on the identified and analyzed indicators of scientific and technological development.

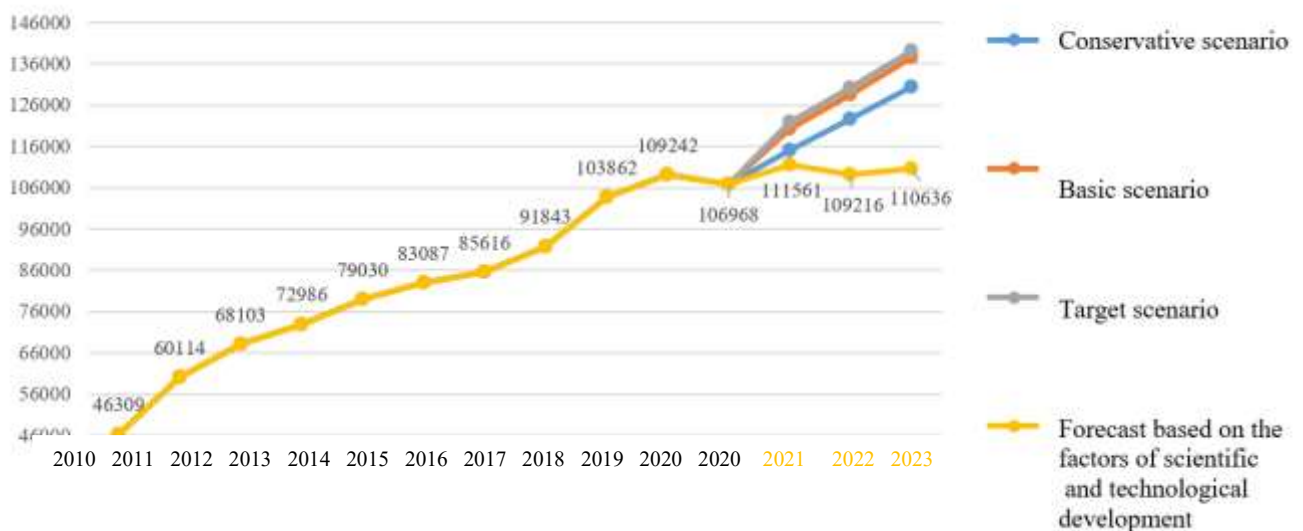
The parameters of the factorial model will be:

- Y - Gross domestic product (in current prices), billion rubles;
- X1 - Financing of science from the federal budget, billion rubles;
- X2 - Graduation from postgraduate and doctoral studies (with the defense of the thesis), people;
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The coefficient of linear determination (R-square) in regression analysis showed a value of  $R^2 = 0.94$ . This means that 94% of changes in the predicted indicator are explained by the selected factors and indicates that the constructed model can be used. The forecast accuracy is 95%. The MPE is within the acceptable standard ( $-0.29\% < 5\%$ ), therefore, it is unbiased. The forecast can be considered qualitative.

The result of the comparative analysis with the predicted scenario values of GDP (in current prices) is the following graph (Fig. 16).



**Figure 16. Forecast of GDP (in current prices) in accordance with the Strategy of socio-economic development of the Russian Federation, billion rubles.**

*(compiled by the authors)*

The graph shows that the forecast values obtained in accordance with the mid-term forecast of the Ministry of Economic Development of the Russian Federation have more positive dynamics than the author's forecast.

## The conclusion

In the modern world, there is an understanding that the rates and directions of scientific and technological development are the most important means of fighting for social and economic prosperity, achieving competitive advantages in national and international markets, and ensuring national security. The essence of scientific and technological development is to create an institutional and infrastructural system that allows science, technology and technology to develop in a single chain, as well as the state, organizations carrying out research and development, as well as the private sector to jointly contribute to the scientific and technological development of the country. Such a system will contribute to the development of domestic research and development, innovations that will be embodied in new products and technologies for the benefit of humanity. In addition to creating our own innovations, the scientific and technical process should be associated with foreign trade in

developed technologies and services of a technological nature, as well as international cooperation to replenish lost knowledge.

This process and its formation in a particular country depends on many factors, both external and internal, but it is necessary to clearly understand what these processes depend on in order to effectively manage them. The basis for tracking how the process is proceeding is a system of certain indicators and indicators, based on the analysis of which the state makes decisions. State decisions on scientific and technological development are made within the framework of the regulatory framework, which includes Federal laws, Presidential Decree, as well as Government Decisions, analytical reports of federal executive authorities and other regulatory documents regulating scientific and technical activities. These strategic documents contribute to the creation of a base necessary for scientific and technical development, but at the moment there are shortcomings in it that do not contribute, but rather interfere with the course of the scientific and technical process.

On the basis of regulatory documents, the authors compiled and analyzed a system of indicators that reflects the scientific and technological development in Russia. The analysis revealed the following problems typical for our country: insufficient funding for research and development, dependence on technology imports, a decline in human resources, low innovation activity of enterprises. In addition to the problems identified during the analysis, it is also worth mentioning that at the moment in the Russian Federation the external state audit notes some shortcomings in the regulatory and legal framework of scientific and technological development, the lack of incentives to engage in science, the lack of demand for research and development from the business side, underdeveloped scientific infrastructure.

In order to anticipate the development of the process under study and respond to potential problems, the authors made a forecast. He showed that, provided that the trends in the main indicators of scientific and technological revolution continue, scientific and technological development will decline in 2022 (under the influence of the pandemic and the related decline in economic activity as a result of quarantine measures). This forecast has been drawn up in accordance with the Strategy of Social and Economic Development of the Russian Federation until 2024. The forecast obtained by the authors is less optimistic than the Ministry of Economic Development of the Russian Federation suggests, but the values fluctuate within a narrow range, which indicates that the forecasts are consistent. Taking into account the recession predicted by the Ministry of Economic Development of the Russian Federation in 2021 and the recession predicted by the authors in 2022, the state needs to pay attention to the identified problems and take measures to stimulate scientific and technological development.

Scientific and technological development directly affects the economic growth, as well as the economic development of the country, which has been proven by foreign and domestic scientists. Therefore, the authors also considered a forecast version, in which the resulting indicator was the volume of GDP (in current prices), and the system of indicators of scientific and technological development proposed by the authors was taken as factors. It is worth noting that, as in the previous forecast, the values turned out to be less optimistic than the Ministry of Economic Development of the Russian Federation represents in its medium-term forecast, but the trend is co-directional, which proves the statistically and mathematically the influence of scientific and technological development on the country's economic development.

Today, the state has tools that enable it to move from planning and forecasting scientific and technological development to its implementation. One of these tools is the Science and Universities National Project (formerly the Science National Project and the Education National Project). The implementation of the National Project "Science" has already borne fruit, however, merging with another national project will help preserve the link between science and education.

Thus, scientific and technological development is indeed today a key element in the development of all spheres of human activity, and makes us draw attention to itself. However, this phenomenon is complex, multifactorial, which makes its study and management difficult. But this must be done in order to ensure the transition to a new technological order, and a step into a new, more environmentally friendly and high-tech world.

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