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## **Analysis of Socio-Economic Conditions for the Formation of the Innovative Potential of the Region (Kaluga Region)**

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### *Abstract*

The study focuses on the current state of the region's economy, determining the role of its innovative potential in ensuring a high level of sustainability and competitiveness. The article provides a systematic analysis of the main factors shaping the innovation potential of the Kaluga region, justifies limiting trends, including: uncertainty in the economic situation, investment risks, a high percentage of commercial credit and a lack of own financial resources. This paper evaluates the system-forming sectors and industries, the level of investment activity and substantiates their impact on increasing the innovation potential of the Kaluga region. The study reveals the mechanism of providing resources for innovation activities based on the program-targeted approach of the implemented state programs “Innovative development and modernization of the economy”, “Development of entrepreneurship and innovation in the Kaluga region”, contributing to the output, increasing attractiveness for investors, allowing to ensure high values of socio-economic development in the ranking among the regions of the Russian Federation. Based on the component approach, a rating assessment was carried out that characterizes the effectiveness of the implementation of the innovative potential of the Kaluga region. The rating is based on a system of indicators of socio-economic conditions of innovation activity, scientific and technical potential, the level of innovation and export activity, the quality of regional innovation policy.

### *Keywords*

innovation potential, region, analysis, development conditions, development conditions, formation factors, investments, budget, component approach, rating assessment, program-target approach

### *For citation*

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## **Анализ социально-экономических условий для формирования инновационного потенциала региона (на примере Калужской области)**

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### *Аннотация*

Исследование фокусируется на текущем состоянии экономики региона, определяя роль его инновационного потенциала в обеспечении высокого уровня устойчивости и конкурентоспособности. В статье проводится системный анализ основных факторов, формирующих инновационный потенциал Калужской области, обосновываются ограничивающие тенденции, среди которых: неопределенность в экономической ситуации, инвестиционные риски, высокий процент коммерческого кредита и недостаток собственных финансовых средств. В данной работе проводится оценка системообразующих секторов и отраслей, уровень инвестиционной активности и обосновывается их влияние на повышение инновационного потенциала Калужской области. В исследовании раскрыт механизм обеспечения ресурсами инновационной деятельности на основе программно-целевого подхода реализуемых государственных программ «Инновационное развитие и модернизация экономики», «Развитие предпринимательства и инноваций в Калужской области», способствующие на выходе, повышению привлекательности для инвесторов, позволяющие обеспечить высокие значения социально-экономического развития в рейтинге среди регионов Российской Федерации. На основе компонентного подхода проведена рейтинговая оценка, характеризующая эффективность реализации инновационного потенциала Калужской области. В основе рейтинга лежит система показателей социально-экономических условий инновационной деятельности, научно-технического потенциала, уровня инновационной и экспортной активности, качества региональной инновационной политики.

### *Ключевые слова*

инновационный потенциал, регион, анализ, условия развития, факторы формирования, инвестиции, бюджет, компонентный подход, рейтинговая оценка, программно-целевой подход

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## **Introduction**

The national economy of the Russian Federation is differentiated by the level of socio-economic development of the regions. This feature is due to the heterogeneity of social, demographic, economic, educational and innovation structures. Here the importance of the formation and implementation of regional socio-economic policy is revealed. Each region of the Russian Federation has its own specific features that allow it to develop in specific areas using a set of opportunities.

The basis of the innovative potential of the region is the availability of various resources, the rational use of which can ensure the transition of the economy to an innovative path. To study the innovation potential of the Kaluga region, it is necessary to consider the main components of the innovation potential, that is, the factors that form it.

As of the beginning of 2022, the population of the Kaluga region amounted to 1,012 thousand people. Despite the natural decline of the population, which in 2021 amounted to 10,788 people, the population of the Kaluga region increased by 11,864 peo-

ple. This was due to a significant migration increase, which amounted to 22,652 people. It should be noted that the main share of the migration population growth is made up of migrants from Ukraine, Tajikistan, Uzbekistan, Armenia and the Republic of Moldova. In the Kaluga Region, there is a tendency for the retirement of the population from 25 to 45 years old, who decide to relocate to other regions<sup>1</sup>. According to the survey, the main reasons for moving are improving financial well-being, changing climatic conditions, improving access to work choices and healthcare.

One of the advantages of the Kaluga Region is its proximity to the Moscow agglomeration, which includes some of the largest sales markets in Europe. However, this leads to the relocation of highly qualified population to the Moscow region, which provides a higher standard of living.

### System-Forming Factors That Ensure the Innovative Potential of the Region

The industrial sector provides about 40 % of the added value of the gross regional product of the Kaluga region. In the absence of its own raw material base, mechanical engineering and metalworking have received significant development in the region. The enterprises of the machine-building complex form the basis of the industrial potential of the region<sup>2</sup>.

The index of industrial production in 2021 by 2020 amounted to 106.3 % (9th place in the Central Federal District), but by 2022 it decreased to 94.8 % (Fig. 1). The volume of supplied goods of own production, works and services performed by own forces for industrial activities in 2021 reached the value of 1,114.2 billion rubles, then fell to 487.7 %. The share of large and medium-sized enterprises in the volume of industrial production of the Kaluga region amounted to 93.6 %.

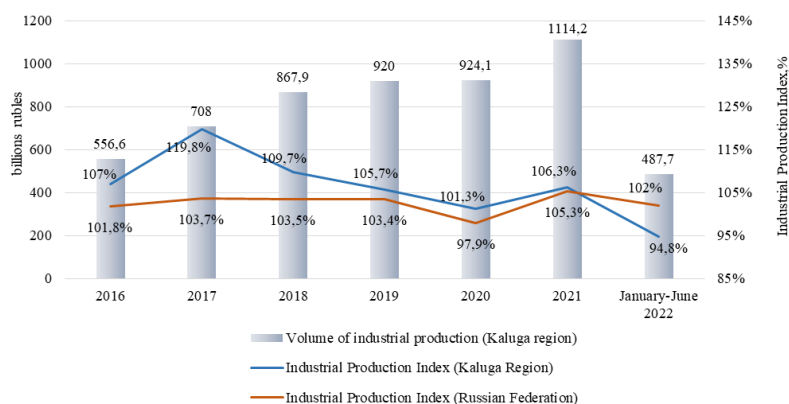


Fig. 1. Dynamics of industrial production in the region<sup>3</sup>

Рис. 1. Динамика промышленного производства в Калужской области

<sup>1</sup> Official website of the Ministry of Economic Development and Industry of the Kaluga Region [Online]. URL: <https://minek.admoblkaluga.ru> (accessed on 01.12.2022).

<sup>2</sup> The official website of the Kaluga Region authorities [Online]. URL: [https://pre.admoblkaluga.ru/sub/econom/strategy/Strateg\\_KO\\_red\\_26-11-2020\\_.pdf](https://pre.admoblkaluga.ru/sub/econom/strategy/Strateg_KO_red_26-11-2020_.pdf) (accessed on 01.12.2022).

<sup>3</sup> The official website of the Kaluga Region authorities [Online]. URL: [https://pre.admoblkaluga.ru/sub/econom/strategy/Strateg\\_KO\\_red\\_26-11-2020\\_.pdf](https://pre.admoblkaluga.ru/sub/econom/strategy/Strateg_KO_red_26-11-2020_.pdf) (accessed on 01.12.2022).

The development of existing and the creation of new enterprises has allowed the Kaluga Region over the past five years to increase the volume of industrial production per capita from 698.7 thousand rubles in 2017 to 1,113.1 thousand rubles in 2021, which corresponds to the 1st place among the regions of the Central Federal District of the Russian Federation and the 10th place among the regions of the Russian Federation. In 2021, the manufacturing industry occupies 96 % of the industrial sector of the Kaluga region. The largest share is occupied by the production of motor vehicles, trailers and semi-trailers (31.06 %), food production (16.52 %) and the production of computers, electronic and optical products (8.88 %).

Investments in fixed assets play an important role in spreading innovation. The main objective of investment policy—both regional and corporate—is to give investment an innovative character. This is the only way to provide a financial base for the innovative development of the region, increasing the competitiveness of goods and services in the region [3]. One of the most important components of the transition to an innovative economy is the constant process of modernization and updating of the material and technical base (Fig. 2).

In 2019, the degree of depreciation of fixed assets decreased to 33 %, from 44 % a year earlier. These changes were accompanied by an increase in the residual value of fixed assets from 618 billion 63 million rubles in 2018 to 1 trillion 519 billion rubles in 2019. However, the main reason for the improvement of the two indicators was the increase in the residual value of fixed assets for real estate transactions. In 2019, their value increased by 876 billion 617 million rubles, and the depreciation coefficient decreased by 4.7 %. There is an improvement in the material and technical base in the field of education, for example, the depreciation coefficient has reached 42.6 %, but still a high indicator for such an important field of activity.

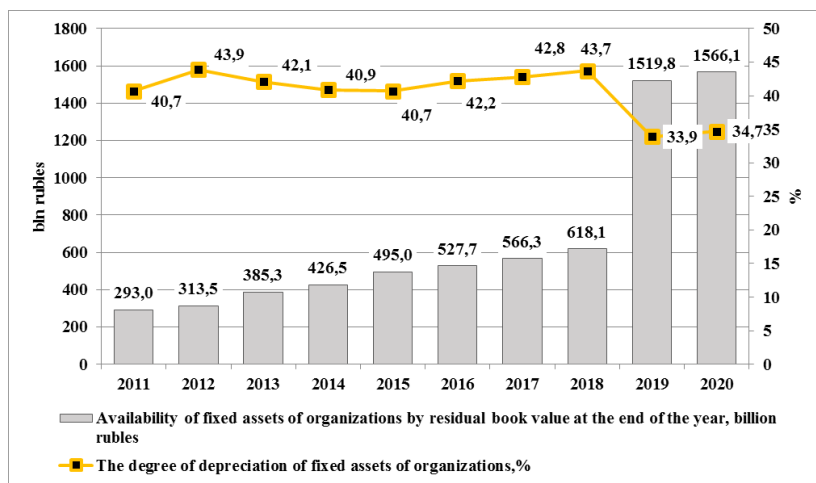


Fig. 2. Dynamics of indicators of the material and technical base of organizations in the region<sup>4</sup>

Рис. 2. Динамика показателей материально-технической базы организаций региона

<sup>4</sup> Official website of the Federal State Statistics Service [Online]. URL: <https://rosstat.gov.ru/compendium> (accessed on 01.12.2022).

It should be noted that the value of fixed assets of the manufacturing industry, which is the basis of the industrial sector of the Kaluga region, increased by 4.29 %, and the degree of depreciation increased by 8.5 %, reaching a value of 50 % in 2020. Various types of professional, scientific and technical economic activities, health and social services are experiencing similar problems with the deterioration of the material and technical base.

The improvement of the situation of the material and technical base can be triggered by an increase in investments in fixed assets (Fig. 3).

Thus, in 2021, the volume of investments in fixed assets increased to 128,508 million rubles, which amounted to 114.7 % by 2020 and 116.66 % by 2019. The main contribution to this was made by investments in machinery and equipment, vehicles, including household inventory and other objects. The volume of investments in this area in 2021 reached 60,450 million rubles, which is 36.16 % higher than in 2019. In addition, it is worth noting the rapid growth of investments in intellectual property, as this is one of the components of the innovative development of organizations. The volume of investments in this area in 2021 amounted to 3,365 million rubles, which is 187.62 % and 47.11 % higher than the values of 2019 and 2020 respectively. Investments in buildings and structures decreased to 10,407 million rubles, which amounted to 93.17 % by 2019, this was due to a strong reduction in 2020, as the increase for 2021 was 3.28 %. This component of investment plays an important role in improving the material and technical base of any organization; therefore, its reduction negatively affects the innovation potential.

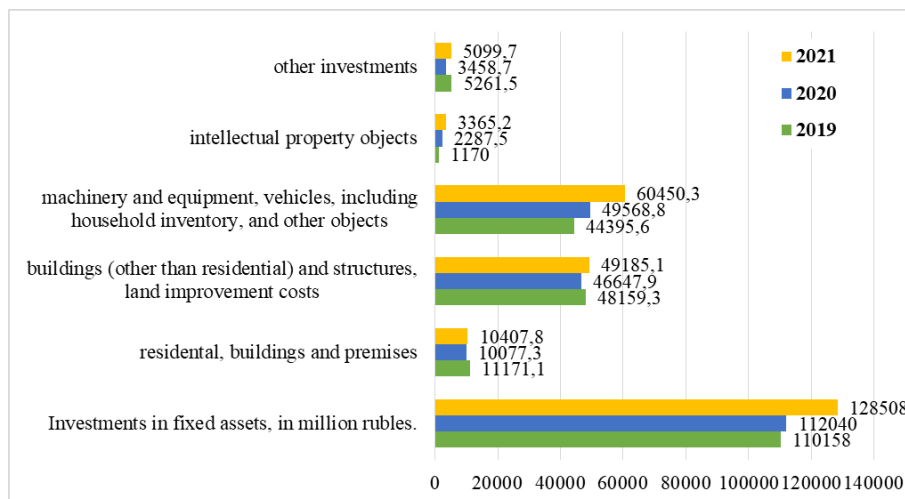


Fig. 3. Dynamics of investments in fixed assets of organizations in the region [9], million rubles

Рис. 3. Динамика инвестиций в основной капитал организаций региона [9], млн руб.

It is necessary to consider the dynamics and structure of investments in fixed assets by sources of financing in order to consider in more detail the investment potential of the region.

Based on the data published in the Federal State Statistics Service, it can be argued about an increase in the volume of investments in fixed assets by large and medium-sized organizations throughout the analyzed period. The volume of financing from own sources in 2021 increased to 66 billion 36 million rubles, which amounted to 127.13 % by 2019. Large and medium-sized organizations of the Kaluga Region are sending more and more of their own funds to invest in fixed assets, and the share of this source in 2021 reached 61.15 %. It can be noted that in 2020 there was a reduction in the volume of own funds, which was caused by the coronavirus crisis, but the total volume of investments did not decrease, since state support was provided. The volume of budget funds invested in fixed assets amounted to 20 billion 550 million rubles in 2020, which is 84.26 % higher than the value of 2019. Thus, it was possible to maintain the trend towards increasing investments in fixed assets.

According to the data of Kalugastat, there are a number of factors that limit the investment activity of organizations in the region (Fig. 4).

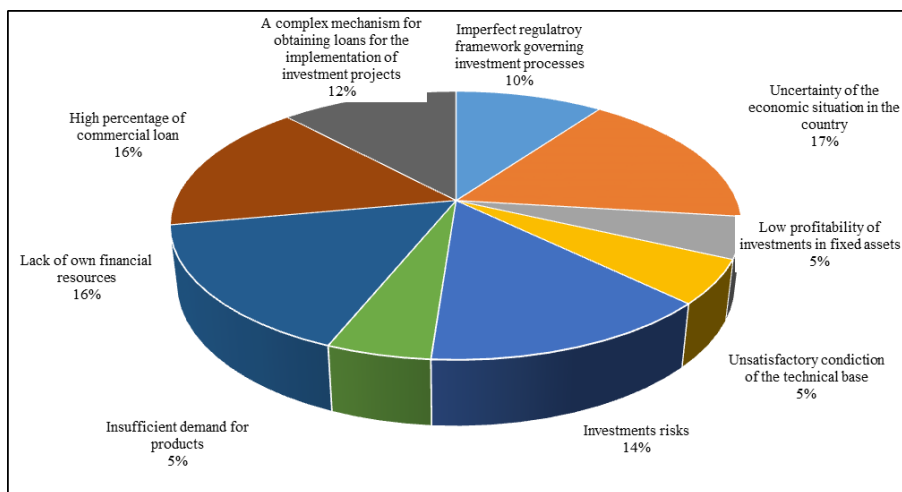


Fig. 4. Factors limiting the investment activity of organizations in the region<sup>5</sup>

Рис. 4. Факторы, ограничивающие инвестиционную активность организаций в регионе

The most significant factor influencing the reduction of investment activity among organizations of the Kaluga region is the uncertainty in the economic situation, investment risks, a high percentage of commercial credit and a lack of own financial resources. In addition, there is dissatisfaction with the state of the technical base, which does not allow the effective use of available funds and raises concerns among organizations about the profitability of investments. The solution of these problems will contribute to stimulating investment activity in the region.

In accordance with Resolution No. 631 of September 22, 2021 "On the forecast of socio-economic development of the Kaluga Region for 2022 and for the planning period of 2023 and 2024", an increase in investments in fixed assets is projected in the upcom-

<sup>5</sup> Official website of the Ministry of Economic Development and Industry of the Kaluga Region [Electronic resource] // Access mode: <https://minek.admoblkaluga.ru>

ing medium-term period of 2022–2024. This is due to the improvement of the overall investment climate, an increase in the volume of investments of enterprises engaged in modernization and expansion of production, as well as investments of new investors<sup>6</sup>.

Kaluga Region holds high positions in terms of investment activity. The region managed to build and maintain a sufficiently high level of investment attractiveness. It is necessary to note the continued dominance of investments in the manufacturing sector of the economy, but the share of investments in culture, education, healthcare and agriculture is steadily growing<sup>7</sup>.

One of the advantages of the Kaluga Region is the network of investment sites that has been built over the past decade: the Special Economic Zone «Kaluga»; company towns; 12 industrial parks; 8 innovation clusters; Obninsk Technopark; Industrial sites - Greenfields (more than 200), Brownfields (more than 150).

Thus, the investment part of the innovation potential of the Kaluga region is at a high level, which contributes to the scientific and technical development of the region.

No less important factor in the formation of innovative potential is research activity, without which it is impossible to create new knowledge that can be introduced into various production processes. In 2021, the number of organizations performing research and development in the Kaluga Region reached 46 units, having increased by 9 units since 2010. At the same time, since 2014 there has been a tendency to reduce the number of employees who are directly involved in research activities. This may be due to the migration problems that were discussed above. Despite the reduction in personnel, the Kaluga Region still shows decent results in scientific and technological activities. The Federal Institute of Industrial Property conducts a study of activity in the field of intellectual property every year. Kaluga Region is in the top 10 in Russia. In addition, our region ranks fourth in the Central Federal District and eighth throughout Russia in the ranking by the coefficient of inventive activity. It should be noted that over the past five years, applicants from our region have received 758 patents for inventions. In the top five NMRC of radiology, NPP “Technology” named after Romashin, the company “Craftway”, PEI named after Leipunsky, KRITD. Rospatent selects the 100 best and most promising inventions in Russia. The latest rating includes two developments of NPP “Typhoon”.

According to the data of the “Official Portal of the Kaluga Region authorities”, the number of personnel engaged in research and development in 2021 amounted to more than 11,000 people, including 233 Doctors of Sciences and 1,048 candidates of sciences. Kaluga Region is among the top 5 leaders in this indicator. The share of young scientists under the age of 40 engaged in research and development in the Kaluga Region is 38.3 % of the total number of scientists working in the region. Of these, the number of employees under the age of 35 engaged in research and development is 2,545 people, which is 23 % of the total number of scientists working in the Kaluga Region, including two Doctors of Sciences and 81 Candidates of Sciences. This indicates a good level of scientific potential of the Kaluga region.

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<sup>6</sup> Resolution of the Government of the Kaluga Region dated November 21, 2007 No. 302 «On the Concept of Innovative Development of the Kaluga Region» (as amended on August 1, 2011).

<sup>7</sup> The official website of the Kaluga Region authorities [Electronic resource] // Access mode: [https://pre.admoblkaluga.ru/sub/econom/strategy/Strateg\\_KO\\_red\\_26-11-2020\\_.pdf](https://pre.admoblkaluga.ru/sub/econom/strategy/Strateg_KO_red_26-11-2020_.pdf).



### **Analysis of the directions of support for the socio-economic development of the region based on a program-targeted approach**

In the Kaluga Region, the mechanism for providing resources for innovation activities is actively implemented through the implementation of a number of state programs, which are represented by the direction “Innovative development and modernization of the economy”. This section contains 10 state programs aimed at accelerating the economic growth of the Kaluga region<sup>8</sup>. A special place in the list of state programs of the Kaluga region is occupied by the program “Development of entrepreneurship and innovation in the Kaluga region”. The Ministry of Economic Development of the Kaluga Region has been appointed as the responsible executor of the state program. The main goal of this program is to create favorable conditions for the development of small and medium-sized businesses and increase the innovative activity of regional business. The program consists of two subprograms that define its main objectives: the development of small and medium-sized businesses in the region; the development of an innovative structure, high-tech industrial and innovation clusters in the region; the effectiveness of the implementation of the state program is carried out annually on the basis of a number of accepted indicators. At the moment, the program has passed half the way of its implementation, since its implementation was planned in one stage—2019–2024, so it is already possible to summarize interim results that will characterize the effectiveness of these programs<sup>9</sup>.

### **Rating Assessment of the Innovative Development Potential of the Kaluga Region (Component Approach)**

There are many ratings characterizing the effectiveness of the implementation of the innovative potential of the subjects of the Russian Federation, they will demonstrate the position of the Kaluga Region in this direction. The Institute of Statistical Research and Knowledge Economics of the National Research University Higher School of Economics, within the framework of the activities of the Russian Cluster Observatory, forms an annual rating of innovative development of the subjects of the Russian Federation. The rating is based on a system of indicators characterizing the socio-economic conditions of innovation activity, scientific and technical potential, the level of innovation and export activity, and the quality of regional innovation policy. In 2021, the Kaluga Region was able to improve its position in the rating of innovative development of the subjects of the Russian Federation by several components of the composite index at once (Fig. 5).

The socio-economic conditions of innovation activity have significantly improved, reaching a value of 0.431 in 2021, as well as export activity, increasing the value to 0.472. There was an increase in scientific and technical potential to the level of 0.386 and a slight increase in innovation activity, the index of which in 2020 was 0.355. However, there was a deterioration in the quality of innovation policy and in 2021 the Kaluga

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<sup>8</sup> The official website of JSC “Agency for Innovative Development – Center for Cluster Development of Kaluga region [Online]. URL: <https://airko.org/> (accessed on 01.12.2022).

<sup>9</sup> Official website of the Ministry of Economic Development and Industry of the Kaluga Region [Online]. URL: <https://minek.admoblkaluga.ru> (accessed on 01.12.2022).



Region took 13th place in the Russian Federation. All this made it possible to improve the position of the Kaluga Region in the overall rating of innovative development of the subjects of the Russian Federation.

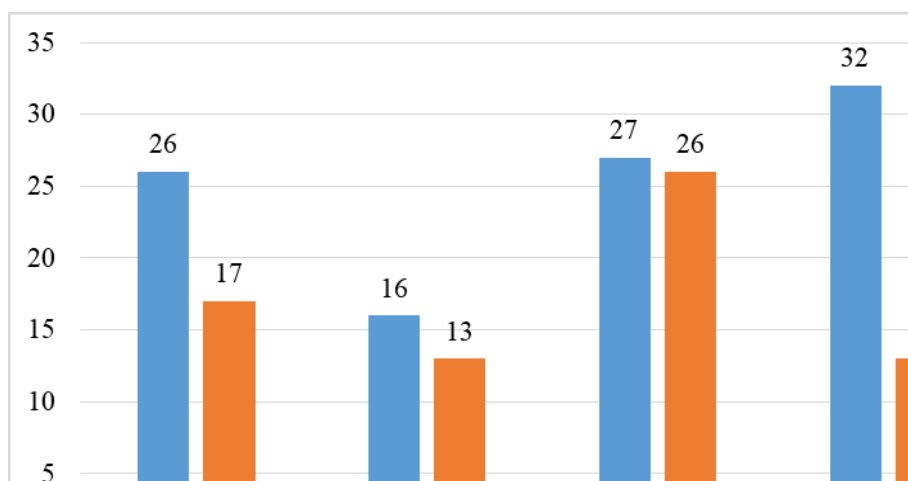


Fig. 5. Structure of the consolidated innovation index of the Kaluga Region in 2021<sup>10</sup>  
Рис. 5. Структура сводного инновационного индекса Калужской области в 2021 г.

In 2021, the rating agency RIA Rating provided its rating characterizing the scientific and technological development of the regions, in which the Kaluga Region took 15<sup>th</sup> place among all subjects of the Russian Federation, gaining 50.13 rating points. In 2019, our region took the 19<sup>th</sup> place. The improvement of the position in this rating indicates the emerging trend towards the growth of scientific and technological development in the Kaluga region, which will contribute to strengthening the innovative potential.

### Conclusion

Thus, it can be concluded that favorable socio-economic conditions have been created on the territory of the region, forming the innovative potential of the region. In order to switch to the innovative path of development, it is necessary to create a system of institutions and organizations that will be able to effectively use the available resources to stimulate innovation. One of the ways to implement the innovative transformation of the economy is the use of the cluster approach.

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