Formation of a New Paradigm of Scientific and Technological Development in the Era of Global Transformation

Tsutsulaeva Sapiyat[1,*] and *Isakieva* Zulay[2]

[1]Kadyrov Chechen State University, Grozny, Russia
[2]Chechen State Padagogigal University, Grozny, Russia

Abstract. The essence of the new scientific paradigm lies in the fact that it made it possible to determine the patterns of development of the global society. This was achieved primarily through the understanding that humanity in its development objectively, whether we like it or not, pursues only one ultimate goal. This is the goal of satisfying the highest need of each individual (which he is not yet fully aware of) to become perfect physically, intellectually and spiritually and to achieve a high level of consciousness. Effective collaboration and collaboration across disciplines, this journal writes, maximizes the potential benefits of interdisciplinary research and provides a foundation for future research activities.

1 Introduction

The formation of a new paradigm of scientific and technological development is due to the pronounced orientation of technological changes towards strengthening the cognitive and physical capabilities of a person, including in connection with the unfolding of a new industrial revolution (creation, convergence, penetration into all areas of ICT, artificial intelligence, robotics, biotechnology; practical the use of materials with desired properties, modern electronics, new energy sources, methods of its storage and transmission) [1]. A significant factor in the transition to a new paradigm is the digitalization of research and experiments, the development of new methods and technologies for their implementation (modeling, big data processing, robotization of experiments, network tools for analyzing and exchanging information, etc.) [2]. The interdisciplinarity of R&D is growing, and the capital intensity of the research infrastructure is growing. Scientific and technological advances increasingly affect socio-cultural, ethical and legal issues. Social orientation becomes the basis for new management approaches in the paradigm of "responsible" research and innovation. Under these conditions, many countries are actively moving to a new model of organizing and supporting science, in particular, based on the harmonization of institutions and the effective adaptation of the best international practices to national conditions [3]. The key characteristics of the model are the strengthening of the strategic orientation and attention to the global context of the policy, its focus on solving socio-

* Corresponding author: sapiyat_univ@mail.ru

economic problems, achieving specific goals and effects (productive knowledge); emphasis on increasing the requirements for the productivity of scientific activity; stimulating the transfer of knowledge and the commercialization of technologies created in scientific organizations and universities (including on a network basis, the principles of superiority and openness), the innovative activity of companies in various sectors of the economy; development of international cooperation, in particular in the implementation of megascience projects and the creation of global centers of excellence. Contacts between scientists from different countries are intensifying, which leads to an increase in academic mobility, international co-authorship and joint patenting.

2 Research Methodology

In the new scientific paradigm being developed by the author, the use of an interdisciplinary approach in conjunction with such approaches as integrity, consistency, complexity, and all together only in understanding the need to achieve an objectively set development goal gives an absolutely fantastic synergistic effect [4]. It allows you to understand that only in this way chaos, complexity and uncertainty are eliminated and the search for answers to all development problems is minimized in time and space. But today, many scientists prove that chaos, complexity, uncertainty and crises are a natural, even a necessary condition for development. In response, new branches of knowledge are justified, creating even more barriers to understanding development problems. In the new scientific paradigm, the third and fourth postulates are that everything is analyzed through a single indicator – time and through a single criterion for the effectiveness of the development of the human system - the time between the identified goal and the reality where the world is located. The shorter the time between, the closer humanity and each individual approach the realization of the goal. This gave the key to understanding the development paradigm that must inevitably replace the existing one. In other words, we have received the key to understanding the future [5]. The relevance and timeliness of solving these problems lies in the fact that they make it possible to identify and prevent the causes of crises, climate change and environmental disasters. It also makes it possible to prevent the emergence of real wars using, for example, atomic and other modern weapons or covert wars using climate, biological, information and other weapons, which sometimes affect not only individual states, but the entire global world as a whole. Today we are witnessing a form of war called the COVID-19 pandemic [6]. Thus, we see that any of the problems of the development of Russia or any country of the global society is not an economic, technical, medical or any other problem. The degree of achievement of the goals of socio-economic and scientific and technological development will depend on the implementation of the following conditions: the account of transition to its new model, strengthening of personnel potential and material and technical base; • availability of a flexible, receptive innovation ecosystem for the technological modernization of existing and development of new industries; massization of innovations in all sectors of the economy; stimulation of demand for scientific and technological achievements; • development of R&D prioritization mechanisms focused on solving the most important socio-economic and environmental problems, ensuring national security and sustainable growth; • integration of Russian science into the global scientific and technological space; • improving the quality of science, technology and innovation policy, creating a system for evaluating the effectiveness of implemented measures, ensuring their adaptability to global trends, including the effective use of alternative institutions that meet the specifics of the digital environment.

3 Results and discussions

Business investments in science will grow, which is due to an increase in the investment activity of companies due to the need to compete with foreign manufacturers mainly in the Russian market, the introduction of incentives for modernization and innovation. Provided that the geopolitical situation is softened, certain resources for the development of R&D can be obtained from foreign sources (from transnational corporations, international organizations, investment funds, etc.) [7]. A positive role should be played by incentives aimed at localizing high-tech industries and research departments of foreign companies in Russia. International cooperation will intensify, the pool of partner countries in the field of science and technology will expand. The implementation of the scenario will improve the current model of organizing and supporting domestic science. The ratio between the sources of funding for science in the forecast period will change quite significantly (the share of the business sector will increase from 28.1% in 2016 to 40% by 2030), but the role of the state will remain dominant. The difference from the countries - global technological leaders, where the main source of development of advanced science, which ensures a high level of competitiveness in international markets and sustainable economic growth rates, is a dynamic and flexible private business [8]. The scenario provides for the continuation of institutional changes in science. Their key areas are the restructuring of its public sector (assessing the performance of research teams and organizations; introducing new organizational forms; focusing on competitive targeted funding of initiatives and centers of excellence, leading organizations and teams that demonstrate high productivity and significant results in the implementation of scientific and technological priorities and full-cycle projects); active support of university science, university centers of advanced research, laboratories headed by leading Russian and foreign scientists. This will ensure an increase in the share of the university sector in the costs of science, in the total number of organizations performing R&D. The main factors influencing the development of the material and technical base of science will be the expansion of the network of centers for collective use, the strengthening of the corporate sector of science, the implementation of mega-science projects in Russia. However, due to financial constraints, this update will be slow [9]. The implementation of the scenario will allow, by the end of the forecast period, to stabilize the scale of the personnel potential of science, however, it will not be possible to achieve a sustainable increase in the number and quality of researchers. In connection with the strengthening of requirements for the efficiency and effectiveness of scientific activity, the growth of remuneration of scientists, there will be a redistribution within science (in favor of centers of excellence and corporate research centers), a slight improvement in its age structure. In order to strengthen competencies in areas traditional for Russia and develop fundamentally new proprietary technological solutions that set new international standards, platform (end-to-end) technologies (ICT, nanotechnologies and new materials, energy-saving and energy-efficient technologies, biotechnologies, artificial intelligence, robotics, space technologies, etc.) [10]. The range of introduction of new developments will expand due to the scaling of demand from the traditional and rapid development of new sectors of the economy, personalized medicine, ICT, science, education, etc. A significant share in export flows will be occupied by high-tech products, intellectual services and technologies, products of creative industries, such as provided for by the Strategy, the National Technology Initiative, the Digital Economy of the Russian Federation program [11]. It is planned to actively support the accelerated, dynamic transfer of modern competencies, the formation of bridgeheads for embedding in global chains of creating new knowledge and value, primarily in those areas where production and technological standards and regulations are just being established and Russia has a chance to use the advantage of catching up. It will be necessary to promptly adopt and implement a

number of decisions in the field of creating an environment and infrastructure for innovation activity, and accelerated integration into the global economy. Existing and new system tools for stimulating demand for innovations, regular monitoring and evaluation of their effectiveness will be actively used [17]. In addition to the course towards improving the business climate, creating conditions for long-term investments and increasing planning horizons, companies will implement measures to support fundamentally new, promising markets and business models: modernization of traditional sectors, including low-tech ones; incentives for companies that demonstrate a high level of global competitiveness. The key to achieving the goals under this scenario is the expansion of the cohort of innovative enterprises, the replication of success stories [12]. The implementation of the scenario will ensure a radical increase in the efficiency and innovative activity of traditional sectors of the economy on a new technological basis and access to emerging global markets, whose share in the structure of the world economy is growing rapidly. To do this, it is important to support the accelerated spread of the open innovation model in Russia. If successful, the share of organizations implementing technological innovations in the total number of industrial production organizations will increase to 18.4% by 2030 (in 2016 - 9.2%), the intensity of the corresponding costs - up to 3.6% (in 2016 - 1.8%) [13]. The expansion of international cooperation and the development of competencies necessary for the implementation of technological breakthroughs will make it possible to form segments of high-tech industries and the knowledge economy that are competitive at the global level. Knowledge capital and innovation will become the main sources of economic growth, which will be facilitated by the development of the institution of intellectual property and public services.

4 Conclusions

The key driver of scientific and technological development will remain the demand for new technologies on the part of basic industries, including those that form the country's export potential - the defense industry, agro-industry, transport (including shipbuilding and aircraft building) and fuel and energy complexes, heavy engineering [14]. Demand will be supported by such regulatory measures as the introduction of regulatory regimes that "squeeze out" obsolete technologies and production; development of platform (end-to-end) technologies; dissemination of best innovation management practices; support of modern forms of cooperation between scientific organizations, universities, enterprises; implementation of measures for the training and retraining of the corps of engineers, updating the training programs for engineering (certified engineers) and research personnel with the involvement of foreign specialists and successful Russian entrepreneurs. The level of innovative activity in the economy will increase somewhat, primarily due to large companies from traditional sectors [15]. The share of organizations implementing technological innovations in the total number of industrial production organizations will reach 11.5% by 2030 (in 2016 - 9.2%), which is lower than the level recorded in the leading countries (USA - 14.3% , China - 35.4%, Switzerland - 52.7%). The intensity of spending on technological innovation will increase to 2.2% (in 2016 - 1.8%), which is generally in line with the level of advanced countries (Germany - 2.9%) [16]. The low innovative activity of small and medium-sized businesses is unlikely to change. The scenario does not imply the widespread practice of open innovation in Russia, a significant reduction in regulatory and administrative barriers, including in terms of the legal registration of modern forms of cooperation and partnership, support for cross-border flows of knowledge and technologies, including special regimes for their import, access to international projects .

References

1. A. Yu. Apokin, D. R. Belousov, Scenarios for the development of the world and Russian economy as a basis for scientific and technological forecasting, **3(3)**, 12-29 (2009).
2. A. A. Chulok, Forecast of prospects for scientific and technological development of key sectors of the Russian economy: future challenges, **3(3)**, 30-36 (2009).
3. V. P. Emelyanova, G. N. Danilova, T. Kh. Kolesnikova, *Assessment of the quality of land surface waters by hydrochemical indicators*, 115 (2020).
4. A. A. Daukaev, R. Kh. Dadashev, L. S. Gatsaeva, R. A. Gakaev, IOP Conf. Series: Earth and Environmental Science, 378 (2019).
5. D. T. Dzhatdoeva, Distribution of species of medicinal plants of the flora of Karachay-Cherkessia by floristic regions and high-altitude zones, **2**, 68-78 (2012).
6. D. T. Dzhatdoeva, Geographical analysis of the flora of medicinal plants of Karachay-Cherkessia, **1**, 33-36 (2012).
7. Bio-Economy Technology Platforms. The European Bioeconomy in 2030: Delivering Sustainable Growth by addressing the Grand Societal Challenges (2021).
8. C. Cagnin, E. Amanatidou, M. Keenan, Orienting European Innovation Systems towards Grand Challenges and the Roles that FTA Can Play, **39(2)**, 140-152 (2020).
9. EU-Russia Energy Dialogue, Energy Forecasts and Scenarios 2009-2010 Research. Final Report. Moscow: Publishing House “Economica, Stroitelstvo, Transport” (2021).
10. K. Haegeman, F. Scapolo, A. Ricci, E. Marinelli, A. Sokolov, Quantitative and qualitative approaches in FTA: from combination to integration? **80**, 386-397 (2021).
11. R. Kh. Ilyasov, Spline modeling and analysis of relationships in the economy with the possible presence of regression switching points, **11(4)**, 165-175 (2018).
12. K. M.-S. Murtazova, Ecological and economic assessment of sectoral agricultural technologies, **3(15)**, 68-71 (2021).
13. R. T. T. Forman, M. Godron, *Landscape Ecology*, 620 (2010).
14. I. U. Shakhgiraev, Green structures in the concept of sustainable development of modern cities. Regional building complex: investment practice and implementation of PPP: materials of the All-Russian scientific and practical conference, 376-383 (Moscow, 2019).
15. I. U. Shakhgiraev, Management of the financial security of an enterprise, IV All-Russian Scientific and Practical Conference “The Impact of the New Geopolitical Reality on Public Administration” and development of the Russian Federation”, 236-242 (Grozny, 2021).
16. V. P. Emelyanova, G. N. Danilova, T. Kh. Kolesnikova, *Assessment of the quality of land surface waters by hydrochemical indicators*, **115** (2020).