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Innovative “Triple Helix” Projection: Favorable Environment For Digital Medicine For Making Medical Decisions

Krutikov Valery Konstantinovich[1] , Kosogorova Lyudmila Alekseevna[2] , Yakunina Maria Valerievna[3] , Sharov Sergey Vladimirovich[4]

[1]Doctor of Economics, Professor, Professor of the Kaluga State University named after K.E. Tsiolkovsky, vice-rector for scientific and methodological work of the private educational institution of higher professional education "Institute of Management, Business and Technologies", Kaluga; vkkrutikov@mail.ru.

[2]Candidate of Pedagogical Sciences, Associate Professor, Rector of the private educational institution of higher professional education "Institute of Management, Business and Technologies"; office@universitys.ru.

[3]Candidate of Economic Sciences, Associate Professor, Head of the Department of Economics, Kaluga State University. K.E. Tsiolkovsky; kaf08@tksu.ru.

[4]student, Kaluga State University K.E. Tsiolkovsky; sharov.sergey.vladimirovich@yandex.ru. 248030, Russia, Kaluga region, Kaluga, Plekhanovast., 2, building 1, apt.608. +79295031181

Abstract. The article examines the global trends in the innovative development of medicine, the technological basis of which is nuclear medicine and pharmaceuticals, diagnostic and therapeutic systems, digital technologies used to solve the problems of the medical sphere and the nuclear industry.Areas are considered related to the development and production of new materials, in particular radio pharmaceuticals for medical purposes according to the GMP standard, modification of materials, ionizing processing of agricultural and food products.

A perspective projection of the development of the "triple helix" system is presented, which is implemented through the creation in the city of Obninsk of the Kaluga region of the Innovative Scientific and Technological Center (INTC) "Park of Atomic and Medical Technologies", which acts as a logical continuation of the process to improve the activities of the existing cluster of pharmaceuticals, biomedicine and biotechnologies.Thanks to the comprehensive support of the state, a promising environment for innovative development is being formed, providing unlimited opportunities for conducting research work, implementing international cooperation, and training highly qualified personnel.Opportunities for constructive cooperation between business associations and scientific communities have been maximally expanded, providing, on the one hand, the creation of a reliable financial and material and technical base of science, on the other, increasing productivity, efficiency, competitiveness, and other business indicators.In the end, the main task is being solved - improving the quality of life and preserving human health and life itself.

The authors, as in previously published articles [1, 2], but at a higher quality level achieved thanks to new scientific results, consistently defend the position of the need to improve the “triple helix” system.On the example of the development of a specific project - the "Park of Atomic and Medical Technologies" and the cluster of pharmaceuticals, biomedicine and biotechnologies in Obninsk, the researchers demonstrate that constructive, mutually beneficial cooperation between the state, business organizations, scientific and educational communities and societies ensures the building of a new innovative

projection of civilizational development.

Keywords:"triple helix" system, innovation park, biology and pharmaceutical cluster, city of science Obninsk, training of highly qualified personnel; human health.

Introduction

In modern Russian reality, there are deep demographic failures, which can only be overcome by a radical change in approaches to health care problems, in particular, fertility, life expectancy and maintaining the economic activity of the population.

It is required to provide comfortable living conditions, a high level and quality of life of citizens, to strengthen the economic foundations of life, ensuring the availability of modern medical services.

At one time, the Soviet Union had a population of 280 million people, in modern Russia the population is two times less.Over the past twenty years, there has been a downward trend in the population, and according to forecasts, in ten years it may decline to 120 million people.Unfortunately, in recent years, the process of leaving the population has been increasing. Over the past year (2020), the mortality rate in Russia reached its maximum value in the last ten years.

Of course, the pandemic contributed to this tragic process, but objectively assessing the situation, it should be admitted that during the implementation of the Priority National Project "Health", serious mistakes were made due to the lack of a harmonious approach to solving the accumulated problems of domestic health care.Priorities were given to financing high-tech medical care to the detriment of maintaining the proper level of the primary health care system, which prevents the development of up to 60% of diseases.

Disharmony has led to an unacceptable level of deterioration of the fixed assets of health care institutions, a massive outflow of doctors and medical personnel from the sphere.So the Kaluga region experienced (in 2013) the need for 970 doctors and 1420 nurses, and the staffing of the polyclinics with the necessary staff was 77% [3-5].

Only modernization, aimed at a comprehensive solution to the problems of the majority of the population of Russia, can radically change the current situation.

It is required to clearly define the list of current problems and formulate an innovative projection of areas that can provide accelerated delivery of effective results.

As the global and domestic positive experience demonstrates, the solution of problems is in the plane of clustering of economic activities related to pharmaceuticals, biomedicine and biotechnology.Cluster development, subject to a harmonious, highly professional state policy to stimulate innovative development, is able to successfully integrate government, business, science, education and society.

Experimental Methods

The theoretical basis of the study was the regulatory legal documents of the Russian Federation; federal and regional programs, projects of the State Corporation "Rosatom".

In the course of the study, modern methods of qualitative analysis were applied, using information and communication technologies.Including, the method of systemic, comparative analysis of statistical, monographic and textual material, including content analysis of publications in the media and works of domestic and foreign scientists dedicated to the experience of effective management of the development of pharmaceuticals, biomedicine and biotechnology using clustering, digital medicine, medical decision making using digitalization technologies.

The authors came to the conclusion that due to the implementation of the project - "Park of Atomic and Medical Technologies", a significant contribution will be made to the activities to successfully overcome the crisis in the national health care.It is planned to create, at a new qualitative level, a unified healthcare system, which will provide, through the active introduction of innovations, access to modern medical services for every citizen of the country.The foundation and guarantor of the successful implementation of the project is the innovative projection of the “triple helix” model.

Results

The processes observed in the socio-economic life of the country, and in particular in such a public sector as health care, designed to protect the health of the population, indicate the need for large-scale transformations of the entire system of society.

The study of positive experience demonstrates that the creation of a fundamentally new structure, characterized by the ordering of elements and connections, as well as stability over time, should be based on innovative approaches when using technological, financial, production and human resources.

Charting a promising course for the country's civilizational development, it is necessary to take into account both the national interests and peculiarities of the mentality, and the attractiveness of the implemented policy for the world community.

The main tendencies of change (trends) are inextricably linked with the introduction of digital information tools and the use of artificial intelligence capabilities.

At the same time, in the internal environment, transformations cannot neglect the foundations of human existence and worsen the socio-economic state of a person, they are aimed at providing a positive trajectory for personal improvement [6].

In turn, in the external environment, transformations should not turn the country into a “besieged fortress”, [8] for which it is advisable to turn to the concept of convergence, which strongly recommends concentrating and using all that is reasonable accumulated in various systems [7].

By 2013, the Russian Federation found itself in a situation where the share of domestic drugs in

the country's medical market was represented by 30%, and the overwhelming majority of drugs were supplied from abroad.

The innovative development of Russian pharmaceuticals, biomedicine and biotechnology was hampered by the absence or high degree of wear and tear of equipment necessary for the production of drugs, aging and long-term use of technologies, an unsatisfactory level of training of personnel with the necessary level of modern competencies and skills.

Government authorities, together with the scientific community, objectively assessing the situation, have developed a policy designed to provide the population with essential, vital medicines.

The measures developed for the revival of the technological sphere for the period up to 2025 were focused on the achievements of science, technical and technological innovation, and the training of highly qualified personnel.

The peculiarities of the structural restructuring of the country's economy consist in transferring the solution of issues directly to the regions where the cluster model of accelerated obtaining of positive results is used.Federal structures, continuously monitoring, identify and support the most promising clusters, contributing to the development of universities and research centers, and provide preferential incentives for business communities.Thus, the cluster model makes it possible to integrate the potentials of power, business, and science on its platform.

The Kaluga cluster of modern innovative pharmaceuticals, biomedicine and biotechnology was formed in 2013 on the foundation of the country's first city of science, Obninsk, originally created as a center for nuclear and radiation technologies.The high concentration of creative scientific personnel ensured an active research activity not only in nuclear physics, but also in medicine, biology, pharmaceuticals and other fields.

The creative component of scientists manifested itself not only in scientific research, but also in the practical implementation of the new knowledge gained.The commercialization of scientific results, united by the term "life science", required the formation of industrial parks.

The largest transnational companies, leaders in the production of medicines, appreciated the powerful potential of Obninsk scientists, the constructive position of the authorities, and determined the long-term prospects for the cluster development of the territory where the development and production of innovative pharmaceutical substances is carried out.

The cluster members interact within the framework of the “Kaluga Pharmaceutical Cluster” Non-Commercial Partnership model, in which dozens of organizations are members.

As an example, the Faculty of Fundamental Medicine of the Lomonosov Moscow State University and the Biotechnological Business Incubator of the Lomonosov Moscow State University, the Pushchino Scientific Center, the Medical Radiological Scientific Center of the Academy of Medical Sciences and others should be mentioned.

The non-profit partnership includes large international pharmaceutical companies that produce highly effective original medicines worth hundreds of billions of rubles.By 2020 alone, the volume of products produced in the cluster will increase 30 times.

The Kaluga pharmaceutical cluster is a member of the Union of Pharmaceutical and Biomedical Clusters of Russia, is a full member of the European Platform for Cluster Cooperation, which unites up to two thousand clusters from fifty countries of the world.

It is natural to make a decision in 2020 to use a network of unique research centers and their production facilities located in Obninsk to form the Innovative Scientific and Technological Center (INTC) "Park of Atomic and Medical Technologies", under the auspices of a global technology company - State Corporation Rosatom".

Let us recall that at present the network unites thePhysics and Power Engineering Institute named after A.I. Leipunsky, MRRC named after A.F. Tsyba - branch of the Federal State Budgetary Institution "National Medical Research Center of Radiology" of the Ministry of Health of Russia, State Scientific Center of the Russian FederationResearch Institute of Physics and Chemistry named after L.Ya. Karpova, National Research Nuclear University "MEPI" (NRNU MEPI).

On the territory of the Kaluga Region, the first Russian project is to be implemented aimed at solving global technological problems in digital medicine, including nuclear medicine, and creating new non-energy technologies with the localization of research centers.

It is planned to ensure effective management of the INTC facilities, business processes and access to export markets through the use of modern digital technologies. An algorithm for making decisions within the “smart territory” will be developed and tested.

The territory will also act as a testing ground for testing digital economy solutions. To conduct medical research in this area, it is planned to build a scientific and clinical center, which will carry out activities to digitize the accumulated database of case histories and images.

The creation and use of an information base is a strategic priority of the national project "Health care", and serves as the basis for an analytical system for making medical decisions.Today, research is being carried out to determine the framework of the future infrastructure of the INTC, which will include the technopark of the city of Obninsk.

On the site being formed, a promising algorithm for the development of the educational ecosystem of Obninsk - "INTC-University-City", which will be used in the areas of international cooperation, training and advanced training of personnel for the industries covered by the project, is to be developed.

The infrastructure of the Center will include not only laboratories and educational buildings, but also a sports and recreation complex, a university clinic, a cultural and entertainment center, a helipad, a school for creatively gifted children, the State Archives of the Russian Federation, and a residential

neighborhood.

36 companies have already acted as potential residents of INTC, the management company (MC) is entrusted to regulate the work of which.A 49% share of MC is transferred to the structures of the government of the Kaluga region, and a plot of land with an area of 8.2 hectares in the city of Obninsk is transferred to the INTC fund, whose head is appointed by the Government of Russia.

All types of medical activities on the territory of INTC, carried out by business entities that are not part of the state health care system, are implemented without obtaining licenses for the relevant activities, but with the permission of the MC, which is given the right to develop regulations, rules for medical activities in the center [9-16].

It is required to assess the risks and opportunities facing the emerging infrastructure system of innovations in medicine:

- The main factor in the success of the digital transformation of medicine is the construction of a consolidated information system.
- The problem of digital medicine on a national scale is the lack of general requirements for regional medical information systems, which creates difficulties for their connection to a single system.
- Only a unified automated system can generate complete and objective information about the patient that the doctor needs to make a decision.
- The implementation of digital health requires the centralization of all data in digital format and the active use of the potential of artificial intelligence to process information.
- All participants in the process must be provided with a reliable basis for working in a single information and communication system.
- Every effort should be made to create a positive image of the modern health care system, excluding archaic, inert approaches.
- The wary attitude towards new approaches is understandable and logical, especially when it comes to human health and life, so it is necessary to explain the benefits and instill confidence in e-health.
- The worldview paradigm of the modern medical education system needs to be rethought, and in the future it should be built on the realization of the immutable truth that digitalization and globalization are the basic provisions of the future health care system.
- The digitization of the current system should be carried out in parallel with training in the competencies and skills of making medical decisions based on the available medical data and the capabilities provided by artificial intelligence.
- The structuring of medical data is a problem, since the lack of uniform standards in the fields of medicine makes it difficult to exchange data between different programs.
- Telemedicine allows patients, in their daily practice, to be in regular contact with medical

personnel, which is important for people living in remote areas or with limited mobility.

- Connecting private medical organizations to a single system will ensure the consolidation of all data on human health.
- Generalization of the experience of building international standards will allow avoiding mistakes and anticipating the needs of the system being formed.

Discussion

Head of the state corporation "Rosatom" Likhachev A.E. substantiated the necessity and prospects for the implementation of the project of the INTC "Park of Atomic and Medical Technologies" in the city of Obninsk, Kaluga Region.The project is intended to ensure the intensification of research and development in the following areas: nuclear medicine and pharmaceuticals, information and communication technologies in medicine.In addition, it is planned to build an enterprise for the production of radio pharmaceuticals for medical purposes.For these purposes, the corporation will ensure the direction of investment resources in the amount of 18 billion rubles.

It should be emphasized that the project harmoniously combines the commercial principle and the opportunity to implement innovative scientific developments [10-12].

The Deputy Minister of Finance of the Russian Federation, Kotyukov M.M., specified that the project for the creation of the INTC acts as one of the components of a single national action plan, ensuring the restoration of employment and incomes of the population, economic growth and long-term structural changes.

Thus, the implementation of the provisions of the unified plan is designed to ensure the level of income of the population of the country, which guarantees the material availability of all types of modern medical services [13].

Deputy Minister of Health Pugachev P.S., formulated the following digital health contours: registers for major diseases, for preferential drug provision and medical workers employed in medical institutions.Further, systems for collecting and processing information, as well as registers of reference information and electronic medical documents.The system being built is designed to ensure interaction between medical institutions and form a single data array.

It is advisable to pay attention to the fact that the creation of vertically integrated medical information systems (VIMIS), which accumulate the necessary, detailed information on groups of diseases, provides unified approaches to the provision of quality medical care [14].

I.T. Akhmetzyanov, a member of the Federation Council of the Russian Federation, noted that at present Russia has the intellectual potential that ensures the transition to digital medicine, it is required to make a transition from the accumulation of theoretical knowledge to its implementation in medical practice.

Currently, the task is to realize the potential accumulated by medical science and education by introducing modern innovative technologies that provide online opportunities in everyday healthcare practice [15].

G.S. Klimenko, Co-Chairman of the Council of the Chamber of Commerce and Industry of the Russian Federation for the Development of Information Technologies and Digital Economy, drew attention to the fact that there is medical inequality in the country.In his opinion, the following indicative data is that more than 150 thousand settlements are served by less than 7 thousand medical workers.Therefore, the great importance of digital technologies lies in the coverage and quality of diagnostics carried out among the population.

It can be added that the active promotion of digital medicine, its scaling, largely depends on the level of development of the modern domestic regulatory framework [15].

G.S. Lebedev, Director of the Institute of Digital Medicine of the Federal Autonomous Educational Institution of Higher EducationFirst Moscow State Medical University named after I.M.Sechenov of the Ministry of Health of Russia, highly appreciates the prospects for the development of the Unified State Information System in the field of health care (USIHC).According to the researcher, the system guarantees the patient complete protection from incorrect treatment. Medical workers, thanks to a complete information base, provide high-quality medical care in the shortest possible time.

In practice, there is a need to accelerate the process of creating a digital platform for remote monitoring of patients' health, which is associated with the vast Russian territories and the large number of remote settlements [15].

A.A. Starchenko, President of the National Agency for Patient Safety and Independent Medical Expertise, develops the ideas formulated by G.S. Lebedev, insisting on the acceleration of activities to create an information system for monitoring pregnancy in remote areas, as well as the use of automatic programs for monitoring the elderly.

It is required to intensify the joint work of the expert community and government agencies to promote telemedicine surveillance systems, which should be enshrined at the legislative level as an inalienable right of the patient [15].

The head of the Department of Medical and Biological Cybernetics of the Siberian State Medical University, Brazovsky K.S., fully supports the results of the research carried out by Starchenko and Lebedev, arguing that integration into a single digital circuit requires the development and adoption of a unified standard of information storage formats, as well as regulations exchange within information systems.

Unfortunately, today there is a problem of structuring medical data. There are no uniform standards in the fields of medicine, which prevents the connection of digital medical devices to information systems, and reduces the possibility of data exchange between different programs [15].

Conclusions

The current stage of effectively realizing the potential of the digital economy and the "triple helix" model in the healthcare industry, forms the external and internal environment of a new civilizational level, for real activities to create a unified, comprehensive, high-quality system of medical services.

The ongoing transformations are radically changing the global, federal and regional market space, the thinking and behavior of government officials, the scientific and medical community, business associations, societies and specific citizens, users of medical services.

The complexity of the activities carried out requires the process to be provided with scientific and practical justification and support for each stage of the economic policy and management decision-making.

Any managerial decision on each individual issue, taking into account the significance of its consequences for a person, is made within the framework of a long-term perspective adopted by the society, agreed upon with the participants in the process.

It is unacceptable to make secret, formal decisions that can lead to discrediting the idea of introducing digital medicine as the medicine of the future, solving a complex of socio-economic issues of society.

Each stage of the implementation of promising directions for the formation of a new system of medical services should be accompanied by positive achievements, which are necessarily brought to the attention of the public and the professional community.

It is necessary to overcome the complexes of the "psychology of a besieged fortress", since the transformations taking place in the domestic health sector, in terms of basic provisions, do not differ from the reforms carried out in other countries of the world.

The joint implementation of a single standardization for all required systems: information, analytical, intelligent, telemedicine and robotic and others, harmonizes the global healthcare industry, which, of course, will work for the benefit of every person on the planet who will be able to use all digital medical services.

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