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AND PRIVATIZATION
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Medicine of the Republic of Belarus

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1. The current state of the industry

Belarus is among the world leaders in terms of health and medicine development. Every citizen, regardless of income, has the opportunity to receive any type of medical care for free, including the most high-tech.

The country has introduced 6 social standards in healthcare – this is the standard of budgetary provision of healthcare costs per inhabitant and the standards of providing with primary care doctors, beds, pharmacies, emergency brigades and vehicles. Based on the standard of budgetary provision per inhabitant, the population is provided with all types of medical care – primary, specialized, high-tech, palliative and medicosocial.

Medical care is provided in equal amounts to urban and rural populations. The introduction of a mechanism for financing healthcare per inhabitant makes it possible for a patient to receive medical care in full, regardless of their place of residence.

Thanks to the close attention and support of the President and the government, the country's healthcare is provided with sustainable funding at the level of 4.5% of GDP, which is slightly higher than the threshold value of the social security indicator of the republic recommended by WHO (4%), and is provided for by the National Security Concept of the Republic of Belarus.

Over the past 10 years, the main principles of the Belarusian healthcare system have been the priority of preventive measures based on the formation of a healthy lifestyle; the quality and availability of medical care, including drug provision; the sanitary and epidemiological well-being of the population and its future generations.



1.1. Key industry indicators

Medicine as an industry is characterized by the following main indicators.

Key indicators of the medical industry

Name of the indicator	2019	2020	2021	2022	2023
Number of hospital organizations, units	609.0	600.0	593.0	585.0	569.0
Number of outpatient clinics, units	2,288.0	2,353.0	2,378.0	2,660.0	2,707.0
Number of practicing doctors, people	48,290.0	48,527.0	48,134.0	47,999.0	48,713.0
The number of practicing doctors per 10,000 population, people	47.4	48.4	49.2	50.6	52.0
The number of mid-level medical workers, people	126,424.0	125,398.0	124,137.0	124,613.0	125,004.0
The number of mid-level medical workers per 10,000 population, people	134.3	134.1	134.1	135.4	136.5
Number of short-stay beds, units	79,222.0	80,782.0	79,152.0	77,073.0	74,993.0
The number of short-stay beds per 10,000 population, units	84.2	86.4	85.5	83.8	81.9
The number of persons under medical supervision, people	5,313,590.0	5,406,493.0	5,488,762.0	5,324,701.0	5,435,369.0
The number of persons under medical supervision per 100,000 population, people	56,465.9	57,825.7	59,302.6	57,873.3	59,364.2
The number of pediatricians with higher education in the healthcare and (or) medical qualifications, people	4,293.0	4,256.0	4,879.0	4,766.0	4,703.0
Provision of pediatricians with higher education in the healthcare and (or) medical qualifications per 10,000 children	23.0	22.9	26.4	26.1	26.1

It can be noted that the number of hospital organizations is decreasing, but the number of outpatient clinics is increasing. At the same time, the number of practicing doctors is also growing (52.0) per 10,000 people of the population.

For comparison, in Spain there are 44.9 practitioners per 10,000 people of the population,

in Lithuania – 44.7, in Italy – 42.5.

The number of mid-level medical workers (136.5) per 10,000 people is also growing.

For comparison, in the Netherlands, the number of mid-level medical workers per 10,000 people is 113.3, in Austria – 107.6, in the Czech Republic – 90.6.

This made it possible to achieve the following indicators – 108.4 million visits by outpatient and home doctors (per resident – 11.8 visits per year), more than 2.6 million visits by emergency brigades, more than 2.5 million treated patients. In 2023, the average monthly salary of employees in healthcare organizations was USD 537.7, including in doctors – USD 944.1, mid-level medical workers – USD 523.7.

By the end of 2023, medical services exported to 140 countries, in monetary terms – more than USD 40 million.

1.2. Legal environment

The directions of the industry's development are laid down in the state program «People's Health and Demographic Security» for 2021-2025. The priority areas are:

- developing measures to enhance reproductive health, forming a culture of healthy lifestyle and health saving;
- improving the system of support for families with children, improving their living conditions, strengthening the institution of the family;
- development of outpatient services;
- transition from article-by-article financing of healthcare organizations to a system of financing based on results achieved;
- implementation of the national system of medical accreditation of healthcare organizations;
- developing regional healthcare, including interregional and interdistrict centers.

Also, the industry development is defined by the Strategy of Scientific, Technical and Innovative Development of Healthcare in the Republic of Belarus for 2021-2025 and for the period up to 2040. The goal of the Strategy is to expedite the innovative development of the healthcare industry to improve medical care to the population based on the achievements of medical science, the crea-

tion and introduction of new effective therapeutic and diagnostic technologies and medicines into medical practice.

Tasks:

- identification of breakthrough areas and possible growth points of the healthcare system;
- creating an innovative model of medical science;
- development and improvement of the efficiency of research, scientific and technical activities, formation of the market of scientific and technical products and medical technologies;
- development of a methodology for building e-health;
- ensuring the preferential development of the latest technological structures, the widespread introduction of nano- and biotechnologies, high-performance composite materials;
- increasing the innovative activity of the industry and the development of science-intensive and high-tech export-oriented technologies;
- concentration of financial resources on innovative research and development in the field of medicine and healthcare;
- improving the competitiveness of the national healthcare system, its integration into the global innovation space.

In 2023, the key moment was the introduction of amendments to the Law «On Healthcare» and the Law «On State Minimum Social Standards» on the regulatory settlement of a number of issues. The main task for 2024 is to prepare a Health Code.

The legal framework of the industry is supervised by the Ministry of Health of the Republic of Belarus and is characterized by a large number of industry regulations and procedures, as the field is focused on human treatment.

1.3. Research base

Biological, medical, pharmaceutical and chemical technologies and production are priority areas of scientific research for 2021-2025 (Decree of the President of the Republic of Belarus No. 156 of May 7, 2020).

Today, a network of state medical and pharmaceutical scientific organizations of the Ministry of Health has been formed. It includes 25 organizations. These are 5 universities (Belarusian State Medical University, Vitebsk State Order of Peoples' Friendship Medical University, Gomel State Medical University, Grodno State Medical University, Belarusian Medical Academy of Postgraduate Education), 15 republican research centers, 3 research centers (Research Center of Hygiene, Minsk Research Center of Surgery, Transplantation and Hematology, National Anti-Doping Laboratory) and 2 pharmaceutical industry enterprises (Belmedpreparations and LOTIOS Research Center).

The largest scientific organizations engaged in medical research are:

- 1) the Research Institute of Hygiene, Toxicology, Epidemiology, Virology and Microbiology of the State Institution «Republican Center for Hygiene, Epidemiology and Public Health» (Minsk).
- 2) Republican Research Center «Cardiology» (Minsk).
- 3) Republican Research Center «Mother and Child» (Minsk).
- 4) Republican Research Center of Pediatric Oncology, Hematology and Immunology (Lesnoy).
- 5) Republican Research Center of Pediatric Surgery (Minsk).
- 6) Republican Research Center for Medical Technologies, Informatization, Management and Economics of Healthcare (Minsk).
- 7) Republican Research Center for Medical Expertise and Rehabilitation (Minsk).



8) Republican Research Center of Neurology and Neurosurgery (Minsk).

9) N. N. Alexandrov Republican Research Center of Oncology and Medical Radiology (Lesnoy).

10) Republican ENT Research Center (Minsk).

Such institutions also include biomedical research institutes of the National Academy of Sciences of Belarus:

1) Institute of Biochemistry of Biologically Active Compounds of the National Academy of Sciences of Belarus (Grodno).

2) Institute of Radiobiology of the National Academy of Sciences of Belarus (Gomel).

3) Institute of Physiology of the National Academy of Sciences of Belarus (Minsk)

In general, there are 129 scientific schools in the Ministry of Health system, 81 of them operate at universities. 2.5 thousand medical workers received scientific qualifications.

In 2023, scientific research and development in healthcare continued as part of the State Programs «Science intensive technical equipment and technology», «Public health and demographic security» for 2021-2025; the State Program to overcome the consequences of the Chernobyl disaster for 2021-2025; State Research Programs «Translational Medicine», 2021-2025; «Biotechnology-2», 2021-2025.

The «State Program of socio-economic development of the Republic of Belarus for 2021-2025» indicates the need to develop a domestic vaccine against COVID-19 and organize its production. The current five-year period plans to increase the volume of production of domestic medicines and expand their range, ensuring in 2025 the production in the country of up to 70% of international non-proprietary names of medicines included in the Republican Formulary of Medicines, and to increase by 2 times the export of pharmaceutical products.

1.4. Staffing

There are 4 medical schools and 17 colleges in Belarus.

The country's leading university is the Belarusian State Medical University (BSMU). The educational process is organized at 7 faculties and at 3 institutes – the military medical, advanced training and retraining of healthcare personnel, the Research Institute of Experimental and Clinical Medicine.

The teaching staff includes 1,585 people, more than 59% have academic degrees. The number of students is 7,395, where more than 25% are foreign citizens from 60 countries, of which 65% receive education in English. About 1,000 clinical residents are trained annually, more than 20 thousand undergo advanced training and retraining.

The educational process is carried out at 124 clinical bases. Innovative platforms for developing practical skills are simulation centers: the new Republican Center for Professional Certification and Simulation Training was visited by about 8,500 people in 3 months, more than 30 thousand visits were recorded in the Higher Education Simulation Center in 1 year.

In 2024, the admission plan has been increased to 1,125 people, of which 675 are under targeted contracts. Starting from the first year, students undergo practical training. In 2023, 680 state-funded graduates (100%) were sent to internship and their first job. There are 52 scientific and pedagogical schools at the university, 132 R&D projects are implemented.

More than 300 new methods of medical care and 196 clinical protocols have been developed and approved. More than 80% of the university's students are engaged in scientific research in all departments.

375 people are enrolled in postgraduate and doctoral studies. Last year alone, the university staff defended 11 doctoral and 18 PhD theses, which is about 10% of all theses in 2023 in Belarus. And according to the results of the competitive selection among scientific organizations, BSMU entered on the Republican Board of Honor. The plan for the export of educational services has been fulfilled by 107%; among all universities in the country, BSMU accounts for 17% of exports, among medical universities – 43%.

Specialists from clinical departments supervise 8 republican centers, are heads of 19 medical associations and societies, and provide consultations to more than 150 healthcare institutions in Minsk and the Minsk region. This year alone, 88 visits were implemented, more than 700 patients were consulted, 46 surgeries, 63 consultations, 152 master classes were held.



The Ministry of Health has revised the recruitment procedure for medical universities, over the past 5 years the budget recruitment figures have been increased by 715 people, in 2024 – by another 210, in addition, the target recruitment will be increased to 70%, and in the specialties «Pediatrics», «Dentistry» and «Medical Diagnostics» - up to 80. Recruitment is projected to meet the need by 2030, when the graduation rate will be 3,070 people, of whom 1,703 will be on target training conditions. Work will continue aimed at attracting people of retirement age to healthcare organizations. Their experience should be used to develop mentoring. Following the results of the conducted sociological research, the vast majority of specialists (about 80%) do not plan to change their place of work. The most important

priorities for health workers are the recognition of the professional community, the possibility of professional development and the microclimate in the team

In general, 4.3 thousand specialists with secondary education in the field of “Healthcare” and 3.1 thousand specialists with higher education graduated in 2023. The retention of young medical specialists in the workplace was 75.2%, with secondary medical education – 73.1%. The retention rate of young medical specialists after two years of training is 75.2%.

1.5. Technologies

Science in Belarusian medicine is primarily of an applied nature, where the main emphasis is on practice. Currently, more than 350 scientific projects are implemented in the healthcare system, with new methods for diagnosing and treating diseases being developed inside these projects. In 2023 alone, 128 were developed. The most important are:

- 1) new methods of preventing bronchopulmonary dysplasia in premature infants based on the use of stem cells from umbilical cord blood; tested at the Republican Research Center «Mother and Child»;
- 2) new technological processes of high-precision protein synthesis; in particular, experimental samples of gene therapeutics for the treatment of lower limb ischemia based on DNA plasmids have been obtained and introduced into practice;
- 3) designs of chimeric antigenic receptors of RNA molecules have been created that teach the

patient's immune cells to fight cancer tumors; the developments have been introduced and used in CAR-T-cell therapy of leukemia at the N. N. Alexandrov Research Center of Oncology and Medical Radiology;

- 4) for the first time, prototypes of two domestic influenza vaccines have been created; one of them is inactivated cultural, the second is recombinant with virus antigens from plants;

- 5) new medicines and medical devices have been created. A total of 46 names of medicines have been registered (one third is Belarusian development) and 417 medical products (1/5 is also Belarusian development).

Also, new unique technologies and high-tech interventions are being introduced into medical practice: cardiac surgery on the heart and large vessels; hip replacement; knee replacement; high-tech neurosurgical interventions; high-

tech interventions for oncological diseases; high-tech interventions on the organs of vision; heart transplantation; renal transplantation; liver transplantation; lung transplantation; multivisceral transplantation (kidney-pancreas).

In terms of the number of organ transplants per 1 million people, Belarus is a leader not only in the post-Soviet space, but also ahead of many European countries. There are 50 transplants per 1 million population in the country (the average in Europe is 55.9, in Russia – 10.1, in Ukraine – 3.2). Liver and heart transplantation surgeries have become a common practice.

A unique technique for growing an artificial trachea has been created and three successful transplants have been performed to cancer patients.

In 2018, the first heart retransplantation was performed in a patient with graft vasculopathy, and in 2019, a 3D-modeled myoseptectomy technique was introduced in patients with hypertrophic cardiomyopathy.

In August 2024, resection of the aortic arch and pulmonary trunk at thymus cancer was performed. This type of surgery is extremely rare in world practice and is performed only in a number of clinics (Spain, Germany, USA). For the Republic of Belarus, this is the first successful experience of radical surgical treatment of this pathology.

Also, for the first time in 2024, an endoscopic operation «Oral endoscopic myotomy in a patient with type 2 esophageal achalasia» (according to the Chicago classification) was performed in Belarus.

On the basis of the Medicine and Pharmaceuticals cluster, cellular and molecular genetic technologies, small chemical synthesis technologies, and cancer treatment technologies are being developed (IHC test system for detecting HER-2, PCR test system for detecting mutations in the EGFR gene, NGS panel for detecting mutations, deletions, and translocations). The first domestic analogues for oncological diseases treatment, produced according to the full technological cycle, have been mastered: Temozolomide, Anastrozole, Vinorelbin, Erestinib (the first targeted drug for the treatment of lung cancer of domestic production).



Technologies for the production of the following drugs have also been mastered: antianemic agent «Epocim» or «Erythropoietin» (biosimilar of the original drug «Eprex»); antitumor and immunomodulatory drug «Leukocym» or «Filgrastim» (biosimilar of the original drug «Neupogen»); a means for the complex therapy of diabetic foot syndrome «Eberprot»; a drug for thrombolytic therapy of infarction myocardial Tenecteplase (biosimilar «Metallize»); the drug «Glargine» is a long-acting analog of human insulin used for insulin replacement therapy in diabetes mellitus, a biosimilar of the original drug «Lantu»; the drug of low molecular weight heparin – «Enoxaparin-Belmed»; the immunosuppressant Mycophenolate mofetil in tablet form, which is used in transplantology for prevention acute rejection of the graft.

Technologies for dry granulation and production of multilayer tablets (anticoagulants, antiretroviral drugs and drugs for the treatment of the nervous system and musculoskeletal diseases) have also been mastered inside the Biotechnology for Pharmaceuticals project (on behalf of the Council of Ministers). The project implementation will make a significant contribution to the

innovative development of the pharmaceutical industry in Belarus, will make the treatment of diseases such as HIV, Alzheimer's disease, gout, epilepsy, rheumatoid arthritis, thromboembolism and others more accessible to citizens of the country, and will also help reduce mortality in the population as a whole.

Also, test systems have been developed to detect the RNA of the SARS-CoV-2 coronavirus strain; technology for the production of the drug immunoglobulin against the SARS-CoV-2 virus from the plasma of the immune anti-COVID-19; methods for obtaining a purified and inactivated drug of the SARS-CoV-2 virus as a candidate for creating a vaccine. The production of the drug Gam-COVID-Vac, a combined vector vaccine for the prevention of coronavirus infection caused by the SARS-CoV-2 virus, has been organized.

In total, about 9 thousand new methods of treatment and diagnosis have been developed in Belarus over the years of independence.

1.6. Industrial and territorial clusters

There is one active cluster in the medical industry in Belarus. This is a medical and pharmaceutical cluster in Vitebsk – the Union of Legal Entities «Medicine and Pharmacy – Innovative Projects». It consists of Vitebsk State Medical University, Nativita LLC, BelVitunipharm OJSC, VitVar LLC, Akonit-Pharma LLC, Medelkombel LLC, Pharmarketing Group LLC, Vitebsk Regional

Marketing Center, Non-commercial Partnership «Union of Pharmaceutical and Biomedical Clusters» (Russia), Republican Production Unitary Enterprise «Academpharm», Sivital LLC, P. Masherov Vitebsk State University. The research core of the cluster is the Center for the Medical and Pharmaceutical Technologies Transfer, which was established on the basis of the Vitebsk State



Medical University. Currently, the Technology Transfer Center covers most of the stages of drug development: conducting preclinical, bioequivalent and clinical trials. The main goal is a full cycle of developing innovative medicines and pharmaceutical substances synthesis.

At the moment, the Union unites about 15% of Belarusian pharmaceutical enterprises. And despite the fact that clusters, as a rule, are territorial in nature, Non-commercial Partnership «Union

of Pharmaceutical and Biomedical Clusters» is part of the first Medical and Pharmaceutical Union in Belarus.

It was also planned to create a high-tech cluster in the field of complex medical equipment / instrumentation. The base organization is LINEV-ADANI CJSC. The cluster is oriented more towards instrumentation in medicine.

2. Resource and raw material base

For the Republic of Belarus, which does not have a sufficient raw material base, increasing the efficiency of its industries can be achieved solely through the active use of innovations in the development of scientific and technical potential and innovative development of science.

Innovations in healthcare are implemented in the form of creating new technologies (including bio-technologies), medical devices, medicines, organizational processes aimed at improving the efficiency of resource use and the quality of medical care, as well as the greatest satisfaction of the population's need for health services.

Innovation requires products from other industries, such as the petrochemical industry, electronics, instrumentation, biotechnology, pharmaceuticals, and the furniture industry. Medicine generates demand for the final products of these industries and acts as a consumer.

The industries closest to healthcare are biotechnology and pharmaceuticals.



BIOTECHNOLOGY INDUSTRY

A significant problem for the Belarusian biotechnology industry is the high degree of dependence on imports of equipment, reagents and materials. There is practically no production of pharmaceutical substances in the republic (only 100 pharmaceutical substances are produced and 1,395 are imported, resulting in 93.31% of imported pharmaceutical substances) and other necessary components for bioproducts production with high export potential. For this reason, modern biotechnologies are poorly implemented in the healthcare sector.

Such dynamically growing segments of biomedicine as cellular and genomic technologies, biocompatible materials and technologies of molecular genetic diagnostics are noticeably lagging behind global trends. The production of chemicals from renewable sources of raw materials has not been established, technologies for producing environmentally friendly biopolymers have not been mastered in mass production.

The need for imports also constrains the possibility of increasing the volume of certain types of livestock products. In fact Belarusian manufacturers import vitamins and micro elements necessary for the premixes production. The task of organizing large-scale production of vitamins and antibiotics of a wide range remains critical.

The republic has not developed its own industrial base for enzymes production. The main volume of industrial output falls on enzyme preparations for the alcohol industry, the production of which

is mainly made from imported substances or is established in alcohol industries using enzymes for own needs.

PHARMACEUTICAL INDUSTRY

The basis for the medicines production is pharmaceutical substances – active chemicals, associated with the medicinal properties of the drug. About 40% of the medicines used are of plant origin, the rest are created by chemical synthesis.

The main supplier of substances to Belarus is China (more than 70% of names), the second one is India. Salines, cotton wool, bandages and other dressing materials are produced by Belarusian enterprises.

For this reason, the search for new types of medicinal plant raw materials, the study of the resource potential and conditions for cultivating specific plant species in certain climatic conditions, and the study of the component composition of medicinal plant raw materials are relevant. Growing medicinal plants is also relevant due to their safe action, a small number of side effects, and the possibility of rationally combining medicinal plants with each other and synthetic drugs.

Besides, growing medicinal plants on plantations allows to preserve territories that are the habitat of some valuable representatives of medicinal raw materials. In Belarus, the Bolshoe Mozheikovo farm in the Shchuchin district specializes in growing medicinal herbs (chamomile, marigold and valerian). Belaseptika JSC in the Myadel district – 25 types of herbs useful for health (echinacea, po-tentilla alba, sage, vanilla grass, noble yarrow, mint, hyssop, motherwort, valerian, etc.) Kalina LLC in the Orsha district is engaged in the cultivation, collection, procurement of medicinal plant raw materials (48 names), its



processing and production of ready-made herbal medicines, herbal mixtures, as well as crop production. Currently, more than 35 names of medicinal monoherbs and mixtures are registered and produced.

The second direction of the medicines production is the production of tinctures. Tinctures production is based on the use of percolation technology, which allows to obtain the maximum active ingredients from herbal medicinal raw materials. A total of 7 herbal tinctures are currently registered and produced.

A project is also being implemented (BelAseptika CJSC) for the pharmaceutical substances production from domestic endocrine-enzyme and special raw materials of animal origin obtained during the cattle and swine slaughter. For example, dried bile from cattle is used in the production of finished medicines: allochol (53.3%), cholenzyme (33.3%), medical bile preserved (100%), festal

(9.36%), enzystal (9.36%). Pancreatin is produced from the pancreas and is used in the production of finished medicines: cholenzyme (33.3%), festal (35%), mezym (38%), creon (48%), wobenzyme (42%), pancreatin (39%). Dry plant extracts: garlic, Hypericum. Pepsin is produced from the pancreas of swine and is used as a pharmaceutical substance and as an enzyme for cheese production. Organization of enzyme preparations production from animal raw materials will allow the production of: from the pancreas – deoxyribonuclease, ribonuclease, trypsin, chymotrypsin; from lungs – aprotinin, heparin; from testes – ronidase, lidase; from the brain – cerebrolysin; from blood – hematogen, fibrin, solcoseryl; from thyroid gland – calcitonin, thyroïdin.

3. Production infrastructure

The healthcare system of the Republic of Belarus is represented by two sectors – public and private. Based on the policy of transforming the economy towards a socially oriented state, the public sector is the basis for implementing the main strategy of the Republic's healthcare system. Meanwhile, the private sector is also expanding on the basis of public medical institutions, and the volume of paid medical services is increasing. The private healthcare system is represented by healthcare

organizations, medical educational institutions and research organizations created by individuals and non-governmental legal entities.

There are 5,407 medical facilities in our country, of which 3,450 are state-owned and 1,957 are privately owned.

MATERIAL AND TECHNICAL BASE

In 2023, almost twice as many funds were allocated for the development of the material and technical base as in 2022. 26 healthcare facilities were commissioned (29 facilities in 2022).

Last year, for the first time, the Ministry of Health implemented a centralized purchase of special vehicles for the needs of the regions using funds from the republican budget: 279 ambulances and 6 mobile pramedical units.

24 mobile paramedical units and 26 ambulances were purchased at the expenses of local budgets and own funds of healthcare institutions. The stated demand for 2024 is 17 mobile paramedical units and 262 ambulances.

In 2023, expenses for purchase of medical equipment increased by 30%. 13 CTs, 4 MRI scanners, 2 angiographs, and 5 linear accelerators were put into operation. At present, the high-tech equipment park consists of 294 units.

To optimize the work of healthcare organizations and the rational use of expensive equipment, to increase the availability and proximity of specialized medical care to the population of rural areas, interdistrict centers for providing high-tech and specialized medical care have been created and are operating on the basis of healthcare organizations. Interdistrict interventional centers of cardiology, neurology and neurosurgery, traumatology and orthopedics, surgery are successfully operating. To increase the availability of primary medical care, work continued on introducing GP institute in outpatient health organizations in the regions. In rural areas, 100% of primary medical care is provided by general practitioners. The work of mobile medical complexes has been organized. Routes have been developed given the location of populated areas and the frequency of their routes departures has been determined based on the number of people living in each village.



3.1. Availability of industrial sites, buildings, structures and offices

In order to expedite the innovative development of industry organizations and improve the investment climate, free economic zones, industrial sites and technoparks have been created on the territory of Minsk and the regions. Currently, 6 FEZ are operating:

- FEZ Brest
- FEZ Minsk
- FEZ Gomel-Raton
- FEZ Vitebsk
- FEZ Mogilev
- FEZ Grodnoinvest.

One of the most promising sites for the implementation of pharmaceutical industries is the Great Stone China-Belarus Industrial Park. One of the main activities of the park is the development of industries in the field of pharmaceuticals, biopharmaceuticals and medical devices. At the moment, 7 residents engaged in medicine and biotechnology are registered in the park:

- VEISMED LLC (production of medical devices for surgical operating units);
- SMARTBIOTECH LLC (production of reagents for research by polymerase chain reaction);
- BAIMEN BIOTECHNOLOGIES LLC (production of components for pharmaceutical products, R&D in the field of biotechnology);
- INPITECK GS LLC (organization of a biotechnological enterprise for the production of feed additives based on humic substances and probiotics of own production, bioactive organic and organomineral fertilizers);
- ARTBIOTECH LLC (the first Belarusian commercial company creating innovative products in the field of molecular biology, producing test systems for PCR, reagents for isolation, storage and purification of DNA/RNA, oligonucleotides, raw materials for PCR);
- Hongjiubel Research Institute of Life Sciences LLC (Peptide Research and Development Project);

- AMGene Bel LLC develops and manufactures laboratory reagents and consumables for molecular biology and genetics.

Belarus is also implementing a project to create a network of industrial parks. The network will cover 11 cities in all regions of the republic. At the moment, new industrial parks are being created in the cities of Baranovichi and Pinsk. They will be ready to accept the first residents in early 2025. The area of the industrial park starting zone in Baranovichi is 13 hectares with the possibility to expand to 83 hectares. The area of the industrial park starting zone in Pinsk is 12 hectares with the possibility to expand to 50 hectares. The selected sites are included or are planned to become part of the Brest Free Economic Zone, which guarantees developers and residents a number of special tax preferences.

The industrial park in Baranovichi is generally aimed at developing chemical industries, in Pinsk – at batteries, polymer and nonwovens production. Also, there is a cluster development center – Polesie Technopark and Polesky State University in Pinsk

The production of pharmaceutical products and medical devices is also implemented within the framework of scientific and technological parks. The Polytechnic Scientific and Technological Park of Belarusian National Technical University (BNTU) has established the production and sale of more than 12 types of medical devices for cardiology, oncology, and dentistry (for example, an intraoral dental device designed to prevent snoring and sleep apnea (respiratory retention); a stent graft for the thoracic aorta, designed to treat aneurysms and delaminating aneurysms of the descending part aorta, etc.).

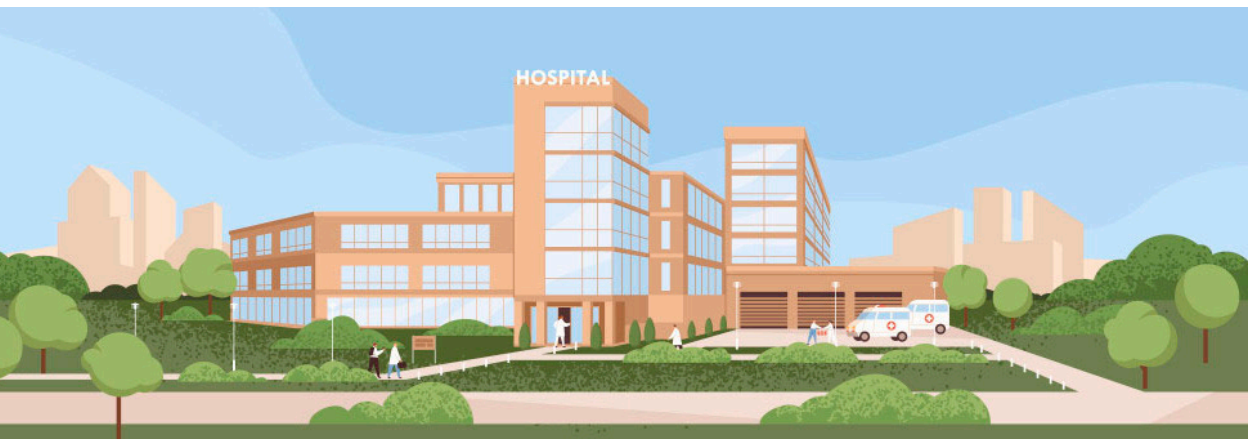
The Unitechprom BSU Scientific and Technological Park produces importsubstituting medicines for the treating oncological diseases of the head, neck, and abdominal cavity (for example, pharmaceutical substances temozolomide, cisplatin, and prospidium chloride). In 2020, the first full-cycle series of the original Temodex drug for local chemotherapy of malignant brain tumors was produced. Patents of the USA, India, and the European Union have been obtained for this drug.

There are 16 technoparks operating on the territory of the republic with a total area of over 145 thousand square meters. The number of technopark residents is over 250. The total number of employees of technopark residents in 2023 increased by 448 people, or more than 9% from the level of 2022, and made 5,323 people. The output volume in 2022 made USD 190 million. The output volume in 2023 increased almost 1.5 times and made USD 275.83 million. Residents of tech-noparks shipped products (goods and services) worth over USD 116 million for export, which is 42% of the total volume of goods produced; compared with 2022, this figure has increased by more than 2 times.

Technoparks have been established in all regional centers, as well as in Novopolotsk, Pinsk, Gorki, Bobruisk and Molodechno. It is also worth noting the important role of technoparks in developing innovative entrepreneurship in the regions of the Republic of Belarus. Technoparks organize and host startup events on an ongoing basis, including forums, investment weekends, workshops, seminars, etc. Technoparks are actively involved in the development of local startup schools.

In general, there are currently 24 subjects of innovation infrastructure operating in the Republic of Belarus, which include:

- 16 science and technology parks (technoparks);
- 6 technology transfer centers;
- Belarusian Innovation Fund;
- National Center for Intellectual Property.



IMMOVABLE PROPERTY

The market of industrial and logistics immovable property in the Minsk region (city of Minsk + 25 km from the Minsk Ring Road) accounts for more than 80% of the total market of industrial and logistics immovable property in Belarus and since 2023 retains the stock at the level of 1,612 thousand square meters. In the total stock, more than 35% of the area fall on built-to-suit projects (customized building construction, when after the completion of construction the customer and developer become the tenant and landlord).

The 2024 plans to introduce about 225 thousand square meters of space (of which 125 thousand square meters of space in the LC Wildberries in the Great Stone Industrial Park).

Over the past 2023, two new large modern warehouse facilities with a total area of 36.5 thousand square meters were commissioned in Minsk and the suburbs (151.5 thousand square meters of warehouses were commissioned in 2022). The implementation of the G13 warehouse complex project with a total area of about 20 thousand square meters has started in the

Sukharevo Business Center. Two new warehouses are under construction in the Prilesye Shopping and Logistic Center.

A feature of the market development in 2024 is the increase in demand for class C and D warehouses. Given the low vacancy rate and the lack of a wide supply of space in the Minsk region, there is an increase in rental rates and an even greater decrease in vacancy rates up to the level of 1%.

The largest increase in rental rates is observed at the lower boundary of class B (+25%), and the smallest is at the upper boundary of the same class (+3%). The highest rates are recorded on an area of 3.5 thousand square meters, while the maximum value of the requested rates during the period reached 10 euros per square meter/month.

Key factors driving demand for large warehouse spaces were the active development of e-commerce companies, the growth of traditional retail companies, and changes in the logistics routes and conditions for goods.

3.2. logistics capabilities

In 2022, 69 logistics centers operated in Belarus. In 2023, there were 67 of them. 18 logistics centers have a state form of ownership or a share of more than 50% of the state's shares. The rest of the centers are private.

For example, 51 logistics centers were established with the participation of national (Eurotorg, A-100, Tabak-invest, Belinterproduct, Darida, ALIDI-West, Alitrade-ALMI, Vitalur, ELECTROSILA, MILLENNIUM GROUP, BelVillesden, Romax,

Astomstroy, Libretic, M&M) and foreign investors (Azerbaijan, Belgium, Germany, Iran, China, Lithuania, Poland, Russia, Ukraine, Serbia, Turkey and the Czech Republic).

Such logistics centers as Brest-Beltamozhservice, Kolyadichi, Transit, Bremino-Orsha, Ozerco-Logistik, Borisovintertrans, Dominik, Belsotra, Great Stone have temporary storage warehouses, customs warehouses and free warehouses. According to experts, logistics centers belonging

to Beltamozhservice, Brestvneshtans, Transit and Dominik joint ventures are the leaders in terms of the number of services provided.

18 logistics centers are multimodal: Brest-Beltamozhservice, Brest-Beltamozhservice-2, Beltamozhservice (Minsk), Beltamozhservice-2, Beltamozhservice-Mogilev, Beltamozhservice-Gomel, Beltamozhservice-Bobruisk, Kolyadichi TLC, Khatezhino Refrigerating plant, Ozerco-Logistik, Great Stone, Bremino-Orsha, Bremino-Berestovitsa, Mikhanovichi Logistics Center, Eurosklad, Eurasia, Dobrada, Minsk National Airport. Business entities also have 13 container terminals for handling various types of containers. A number of logistics centers in Belarus either lease warehouse space (in whole or in part – without determining the «anchor» tenant) to third parties without providing them with any services, or have organized economic activities of a production or service nature on these areas. With reference to services:

- about 20 specialize in providing transport and logistics services;
- about 20 offer distribution and allocation functions;
- the rest work in the niche of warehousing and goods processing services for own needs or rent out space for production.

In 2021, 14 logistics providers were operating (TUT and TAM Logistics (T&T), Pradius nova, Vladprodimport (AgroStalStroy), Beltamozhservice, 24 Modern Logistic Center, Alfa Logistics, Dobrada, Capital Logistics, Vitrum Logistics, Ypl, Bug-Market, ALIDI-West, Caravan-logistic, VIT-LOGISTIC.

In 2023, there were 9 operating companies (-35%): TUT and TAM Logistics (T&T), ALIDI-West, Pradius nova, Vladprodimport (AgroStalStroy), Beltamozhservice, Bug-Market, Caravan-logistic, VIT-LOGISTIC, New Logistic.

At the same time, among 9 companies, only 6 provide logistics services with delivery in Belarus today.

It should also be noted that Belarus ranked 79th in the 2023 Logistics Performance Index. Kazakhstan, Georgia and Ukraine also took 79th place. China is 19th, Poland is 26th, Latvia is 34th, Lithuania and Turkey are 38th, Russia and Uzbekistan are 88th. Compared to the last year of the index publication (2018), the country improved the index by 24 positions. Belarus ranks highest in terms of infrastructure development related to logistics and transport, efficiency of customs border crossing procedures and compliance with delivery deadlines.



4. Market overview

4.1. The main trends

MGLOBAL TRENDS

Artificial Intelligence in medicine transforms the technologies of diagnosis, treatment and patient follow-up. It helps to effectively and accurately analyze the results of diagnostic studies, process X-rays, tomography and ultrasound results. It finds application in personalized medicine (elaborating individual treatment plans), in predicting the diseases development, risk assessment, and developing preventive measures.

1. Medical robotics. The use of robots in areas such as surgery (allowing surgeons to perform complex types of operations through small incisions with improved accuracy and less risk to the patient), rehabilitation and patient care (robotic exoskeletons help patients recover from severe injuries and strokes, providing movement support and stimulating muscle activity).

2. Wearable devices for health monitoring. They help to monitor heart rate, blood oxygen levels, sleep quality and physical activity, blood glucose levels and other indicators.

3. Genome editing. It helps to detect and modify certain DNA sections in the genome of living organisms, eliminate genetic defects, and add new genes.

4. Virtual and augmented reality technologies in medicine. They are actively used to train surgeons and improve surgical imaging by reproducing complex surgical procedures. They are also used in therapy to treat post-traumatic stress disorder (PTSD) and in rehabilitation to restore motor skills and coordination of movements.

5. Implantable devices and prostheses. The prostheses are equipped with sensors and micro-processors, allowing to simulate natural

movements. Implantable devices such as pacemakers, neuroimplants and deep brain stimulation devices are customized for patients' personal needs, significantly improving the control of chronic conditions. The prospects in this direction are the creation of bionic organs that will be able to simulate the functions of real organs.

6. Drug transport systems. The use of nanotechnology in drugs transporting directly to the affected tissues or cells. This allows to reduce the side effects of drug therapy. In the future, – the creation of smart implants capable of releasing and dosing drugs at the request of the body or the doctor in real time.

7. Bioprinting and 3D printing of organs. They are used in transplantology to create living tissues and organs for a specific patient. The technology is developing in the direction of printing complex structures such as hearts, kidneys and livers, which in the future may solve the problem of shortage of donor organs. At present, clinical trials of simple tissues such as skin and cartilage are actively underway.

8. Creation of new vaccines. The creation of new vaccines, not only for viral and bacterial diseases, but also for cancer. In addition, vaccines for viral diseases based on mRNA platforms are being developed, which have shown their effectiveness and flexibility during the COVID-19 pandemic.

9. Telemedicine and digital technologies. It allows to provide a remote high-quality care, usually using online consultation platforms, mobile applications for health monitoring and chronic disease management systems. Patient surveys allow to collect feedback and improve the quality of care, making treatment more personalized.



TRENDS IN BELARUS

Belarus is following the current global trends. Belarusian scientists have created a software product capable of diagnosing a pulmonological patient with almost 100% accuracy (note: with lung and respiratory tract diseases) based on artificial neural networks. Currently, Belarus has a screening program in effect for the early detection of cancer among smokers, which allows to accumulate a common database of digital X-ray images and computed tomography diagrams. A neural network is constantly being trained on this base.

Since 2015, the Interdepartmental Research Center for Artificial Intelligence has been operating on the basis of the United Institute of Informatics Problems of the National Academy of Sciences of Belarus and the Institute of Physiology of the National Academy of Sciences of Belarus. It brought together the top specialists in the field of medical, biological, information, technical and physical and mathematical sciences to create frontier artificial intelligence technologies.

In the last 5 years, the AI-based medical images recognition and diagnosis technologies (developed by the team of Vasily Kovalev) is surely in the world's TOP-10.

AI systems are used today to design medicines, speech recognition and synthesis, and identify certain molecular compounds to create various materials.

Medical robotics is also developing. The Republican Center for Robotic and Endoscopic Surgery has been operating on the basis of the Republican Clinical Medical Center of the Presidential Administration for 5 years. The Center has created a robotic operating room, where the first new generation robotic complex in the CIS is installed and used, allowing to increase the level and quality of high-tech surgeries.

The first robotic surgery in Belarus took place on February 2, 2018 on the basis of the same center using the Italian robotic complex Senhance Surgery of TransEnterix company.

In 2023, the first Belarusian robotic pharmacy of Belpharmacia Republican Unitary Enterprise was opened. It has a pharmacy robot in the form of an automated medicine rack. The robot is equipped with a special mobile manipulator, with which medicines are collected and delivered directly to the pharmacy's cash register.

There is a Republican Center for Professional Certification and Simulation Training in Belarus. The center houses more than 180 units of sophisticated computer equipment, robot simulators, virtual simulators, and has unique equipment - a cardiac surgery operating room, a hybrid surgical operating room. 90% of the simulators are of domestic production.

The development of genomic research is implemented at the Institute of Genetics and Cytology of the National Academy of Sciences. The gene editing technology is the same for plants, animals and humans. Almost half of the research of Belarusian geneticists is devoted to the human genome study. From preventing socially significant diseases to detecting dangerous

mutations. In general, scientists conduct about 30 genome-wide sequencing per year. Research is expensive and time-consuming. Subsequently, the result is also subjected to bioinformatic research. Belarus has already elaborated methods to combat cancer using its own edited cells. CAR-T therapy is applied in the N.N. Alexandrov Russian National Research Center for Oncology and Medical Radiology. Methods for detecting pathogenic mutations have also been developed. For reference. In addition to humans, scientists have mastered gene editing in animals, in particular, the technology of full-genome sequencing (decoding and writing down the sequence of nitrogenous bases of DNA) has been mastered in cattle, and methods for screening various hereditary diseases have also been developed.

As part of the union program "DNA Identification", scientists were able to work on the ethnogenomic portrait of a Belarusian. The final software and information complex, created on the basis of materials from Belarusian and Russian researchers, is already being used by investigators in criminal cases. Today, the complex accommodates more than 150 ethnic groups.





Large-scale research on nutrigenomics is underway, where the relationship between the genome and nutrition is studied. This is how, for example, a study of athletes in cyclic sports was implemented on the subject of caffeine metabolism (an approved doping substance) and the absorption of water-soluble vitamins by athletes during exercise. Research is also being implemented on the personalization of medical products in relation to the effectiveness of medical preparations for different people: a method has been developed for identifying the resistance of people with osteoporosis to treatment with bisphosphonates.

Belarusian scientists are actively moving towards the production of artificial organs. 3D-printed models of the heart and joints have already been showcased. The production of joint patches seems to be very promising. The operation to replace it with an artificial one is quite difficult.

Our own school for vaccine creation is developing. This was facilitated by the COVID-19 pandemic due to the spread of the SARS-CoV-2 coronavirus. In 2023, clinical trials of a domestic vaccine for COVID-19 were completed in Belarus. As a result, Belarus has its own inactivated whole-virion drug for the coronavirus prevention.

A vaccine against dental caries is currently being developed that would prevent the proliferation of *Streptococcus mutans*. An interesting test system for diagnosing periodontal diseases has been developed and has already been implemented in Minsk city clinics and regional polyclinics. The project on the use of cellular technologies in the treatment of patients with pulp and periodontal diseases continues.

The Belarusian inactivated influenza vaccine is currently being developed. It is quadrivalent and will contain two strains of influenza A and two strains of influenza B. Unlike most drugs that are currently being used, the virus will not be grown on chicken embryos, but on cell cultures. This will remove one of the main contraindications for vaccination – allergy to egg albumin protein. Scientists are also developing anti-flu drugs that block the process of the virus entering the cell.

Also, the Institute of Biophysics and Cellular Engineering of the National Academy of Sciences is creating a universal platform for the development of a wide variety of adenovirus-based vaccines. In addition, the institute plans to obtain virus antigens in plant systems.

The development of telemedicine in Belarus has already been enshrined in law. On July 23, 2021, the Resolution of the Ministry of Health of the Republic of Belarus No. 65 of May 28, 2021 came into force, which defines how medical care is provided in Belarus using telemedicine technologies. When providing medical care using telemedicine technologies, the physician may correct previously prescribed treatment, provided that a diagnosis was made and treatment was prescribed during in-person appointment

(examination, consultation). Also:

- an appropriate record is made of the correction (prolongation) of previously prescribed treatment in the patient's medical documentation;
- an electronic doctor's prescription is being generated;
- the necessary additional examinations are prescribed;
- a medical certificate of health status, an extract from medical documents, and an additional medical report are issued, including in the form of an electronic document.

4.2. Production and consumption

THE MEDICAL SERVICES MARKET

The revenue of medical institutions in the republic for 2023 made USD 652.8 million. About 58% of this amount falls on the capital, city of Minsk – USD 378.6 million (it has grown 2.5 times over the past 6 years). The reason is that Minsk has a high concentration of clinics and medical centers (both public and private) that provide paid services.

In total, more than 200 public and private organizations (including affiliates) in Minsk and the Minsk region provide various medical services, from dentistry and ophthalmology to surgical intervention. In addition, 15 of the 16 Republican Research Centers are located in Minsk and widely provide paid services to the population

and foreign citizens. The most popular areas of medical services are ophthalmology, plastic surgery, diagnostics, laboratory diagnostics, gynecology, dermatology, urology.

Private institutions where you can get paid medical services prevail: there are more than 140 of them. And this is without taking into account dental and ophthalmological clinics, laboratories, etc.

As a rule, the dominant position was occupied by the public sector (up to 88.5% of the total number of admissions). However, over the past 5 years, the volume of paid services in public institutions has decreased from USD 117.1 million in 2018 to



USD 101.5 million in 2023. During the same time, the revenue of private medical centers increased more than 2 times – from 210.6 million to 436.3 million dollars.

The share of state institutions in the paid medicine market has decreased from 33% to 19% in five years. Accordingly, the share of private medical centers has increased to 81%. On average, their revenue increased by 20% annually due to market growth and a decrease in the share of public clinics.

Another factor in the success of private medical centers has been the development of the insurance medicine, when the service is provided with a medical insurance policy. In 2022, the volume of paid medical services in the country made 58.3 dollars per person per year.

The flow of funds in the commercial medical market is formed by three channels: cash payments (about 85-87% of the total market volume), voluntary insurance (12-14%) and compulsory medical insurance of foreign citizens (1-2%).

The main players in the paid private medicine market are both multidisciplinary and specialized centers: Lode, Ecomedservice, Kravira, Nordin, Novamed, Mercy Clinic, IdealMed, Seventh Heaven, Terra Medica, New Vision, Alfamed, Optimed, Embryo, Avicenna, A Clinic, Euromedica, Cardian, Amadeus Clinic, SynLab (the largest German holding Synlab Group), Synevo (Swedish holding Medicover), Invitro (Cyprus holding Invitro Holding Limited), Evaclinic, Good Hearing Center and others.

PRODUCTION OF MEDICINES

Industrial production of medicines is currently implemented by about 40 organizations.

In total, 5,6 thousand names of medicines and pharmaceutical substances have been registered in the republic, of which 1,686 are of domestic

production: 1,578 items are generic, 86 – original, and 22 – innovative. The member organizations of the Belpharmprom holding have registered 745 medicinal products: 692 generics, 45 originals, 6 innovatives, and 2 bioanalogues. They belong to various pharmacotherapeutic groups: antitumor drugs, for the treatment of cardiovascular diseases, antifungal, antiviral and antibacterial, as well as for the treatment of diseases of the musculo-skeletal system, digestive tract and metabolism.

In the total volume of production of medicines, the share of organizations participating in the Belpharmprom holding is about 60%.

In 2023, the holding's organizations produced pharmaceutical products worth USD 300.5 million.

Following the 2023 results, the share of organizations participating in the Belpharmprom holding accounts for more than 49% of all export deliveries of domestic medicines.

Pharmaceutical products of the holding's member organizations are exported to 22 countries. The export structure is dominated by the Russian Federation, Kazakhstan, Azerbaijan, Uzbekistan and Kyrgyzstan.

Drug provision remains strategic for the system. Enterprises of the Pharmacy system purchased medicines worth more than USD 664.7 million, of which the share of domestic products was 47%. Top 10 most demanded drugs by consumers produced by companies in the industry:

1. Analgesics;
2. Anti-inflammatory and antirheumatic drugs;

3. Drugs for the treatment of anemia;
4. Plasma replacement and perfusion solutions;
5. Psycholeptics;
6. Antimicrobial drugs for systemic use;
7. Psychostimulants;
8. Antiseptics and disinfectants;
9. Other drugs for for treating nervous diseases;
10. Antidiarrheal drugs, intestinal anti-inflammatory and antimicrobial drugs.

In the structure of drug consumption in Belarus, as in world practice, cardiovascular drugs, antibiotics, chemotherapeutic drugs and a number of others are leading. The consumption of medicines in Belarus per capita is the highest in comparison with the CIS countries and is second only to Russia.

BIOTECHNOLOGY AND BIOMEDICINE

In the field of biopharmaceuticals and biomedicine, the republic has witnessed the dynamic development of the production of blood plasma preparations, biene, acid derivatives and peptide synthesis products, creatine phosphate-based drugs for the treatment of cardiovascular diseases, antitumor pharmaceutical substances, enzyme immunoassay kits, kits and reagents for molecular diagnostics, multifunctional EPR spectrometers, DNA primers, and cellular products for the treatment of human diseases. The number and cost of medical services provided with the use of bio-technologies (bone marrow transplants, genetic analyses, etc.) has almost doubled.



4.3. Key players

PHARMACEUTICALS AND MEDICINES

Belmedpreparaty Republican Unitary Enterprise is the largest pharmaceutical company in the country. Belmedpreparaty Republican Unitary Enterprise has a number of unique production facilities and is the only manufacturer in Belarus of insulin, enzyme and biogenic preparations, drugs for treating cancer and tuberculosis, narcotic and psychotropic drugs. In general, the company is a multistage production based on high-tech technologies, producing over 350 names of medicines.

OJSC Borisov Plant of Medical Preparations produces more than 250 names of medicines of 12 pharmacotherapeutic groups. The annual

production volume is over 5 billion tablets, more than 200 million capsules, more than 15 million packages of ointments, more than 15 million bottles of tinctures and solutions, 300 million ampoules with injection solutions, 50.0 million bottles of antibiotics. Every year, more than 50% of the products are exported.

Minskintercaps Unitary Enterprise is the leader of the domestic pharmaceutical industry in the production of medicines in hard and soft gelatin capsules. The company's product range is annually replenished with new drugs, about 95% of which are produced under the import substitution program and are generics of original brands.





The Lekpharm Belarusian-Bulgarian Joint-Stock Company is a modern enterprise in the field of development, production and sale of medicines. The main area of development and production are drugs for the cardiovascular system. The company has 150 domestic registration certificates. Given all available dosages, the company produces 197 names of medicines.

The Pharmland Belarusian-Dutch Joint-Stock Company. The company's activities are focused on the production of drugs for the treatment of cardiac, neurological, and infectious diseases; it also implements research in therapy of oncological, immunocompetent and other socially significant diseases. The company has 130 national registration certificates and 20 foreign registration certificates.

JSC Nesvizh Plant of Medical Preparations is the largest manufacturer of infusion medicines in Belarus. The plant is the main supplier of infusion and injection drugs.

Exon Republican Unitary Enterprise is engaged in the production of medicines in tablets, powders, granules, capsules, in the form of syrups, as well as hematogen. The plant is active in packaging products of foreign manufacturers for the Belarusian market.

NatiVita LLC. The NatiVita pharmaceutical company is working on the creation of innovative medicines for the treatment of cancer and other serious diseases. Currently, NatiVita is one of the TOP-3 companies in the hospital market of the

Republic of Belarus and is the No. 1 company in the oncology segment. The company's portfolio includes more than 20 registered medicines for the treatment of oncological, autoimmune and other diseases. NatiVita initiated the creation of the first pharmaceutical cluster in the Republic of Belarus: the Union «Medicine and Pharmacy — innovative projects».

Rubikon LLC is a dynamically developing pharmaceutical company that began production activities in 2010. The priority direction for the development of soft dosage forms production is the development and production of suppositories. There are more than 20 names of generic and original medicines in development. Currently, more than 80 different names and forms of medicines and medical devices are produced.

NPK Biotest LLC. The main activity of the company is the production of medicines and biologically active supplements. The range of manufactured products includes over 65 medicines, 24 types of biologically active supplements and 30 types of tea drinks.

RPUP AKADEMPHARM is a dynamically developing high-tech state pharmaceutical enterprise. The nomenclature of the company's mastered medicines consists of over 40 names of drugs of various pharmacotherapeutic groups.

Ferane JSC. The main activity is the development, production and sale of medicines, medical devices and dietary supplements using natural plant and animal raw materials, as well as raw materials

ФЕРЕЙН  FERANE

 PHARMA
TECH

FREBOR 

 АКАДЕМ
ФАРМ



 ФАРМ
ЕХНОЛОГИЯ

of microbiological and chemical synthesis. The company produces about 50 types of medicines and dietary supplements.

FreBor Unitary Enterprise. The company's product range consists of consumables for hemodialysis therapy and general medical consumables for providing the necessary assistance in intensive care units, anesthesiology, urology, obstetrics and blood service institutions.

Pharmtechnology LLC is the largest domestic non-state pharmaceutical enterprise with a full production cycle. The range of manufactured products includes more than 150 types of medicines from various pharmacotherapeutic groups. The annual increase in production is about 20%. The production range increases annually by 5-10 items due to the development and production of new medicines.

PHARMATECH CJSC is a modern pharmaceutical enterprise, the main direction of which is the production of medicines, dietary supplements, specialized products, and the provision of contract manufacturing services. In 2013, the company was the first in the Republic of Belarus to start the production of antiretroviral drugs for HIV therapy.

Belalek LLC is a resident of the Great Stone Industrial Park. The company offers a wide range of dosage forms: tablets, capsules, powders and suspensions for internal use, sprays and aerosols. Med-interplast foreign unitary enterprise It develops medicines on the basis of its own research laboratory, introduces medicines into

production, actively participates in the program of replacing imported drugs with more affordable analogues and creates innovative products. To date, about 30 drugs have been developed, registered and produced.

Reb-Pharma Foreign Production and Trade Unitary Enterprise. The assortment list of the company consists of 67 drugs that have been registered, including drugs that have no analogues in Belarus.

TriplePharm JLLC. It is one of the top five foreign and domestic manufacturers of products for the hospital segment of the pharmaceutical market of the Republic of Belarus. The company manufactures medicines using a full technological cycle and specializes in the production of latest generation antibiotic powders for parenteral use.

Nika-Pharmaceutica LLC - the main activities of the enterprise are the development, production and sale of medicines, biologically active supplements, as well as medical devices.

BelVitunipharm JSC

BelVitunipharm JSC is a leading manufacturer of vaccines, serums and veterinary pharmacological preparations in the Republic of Belarus and the CIS countries. It produces about 150 names of veterinary drugs, more than 100 of which are import-substituting on the territory of the EAEU.

Algimed Techno LLC

Algimed Techno LLC was founded in 2019 in Minsk. The company's product portfolio includes: PCR kits, ELISA kits and antibody-

based technologies, mass spectrometry solutions, kits for working with micro-RNA, products for lysis, isolation and purification of nucleic acids, proteins, competent cells, for sample preparation and research in PCR laboratories of various types, products for the detection of endotoxins and

pyrogens (LAL, MAT), enzymes, NOVAPREP solutions for screen-ing and diagnostics of cervical cancer.



MEDICAL DEVICES AND EQUIPMENT

The list of Belarusian companies and holdings engaged in the production of medical products and equipment includes several dozen industrial enterprises. The largest of them are registered in the cities of Minsk, Grodno, Vitebsk, Smorgon, Brest, etc.

LINEV-ADANI CJSC – one of the leaders in the production of medical diagnostic equipment with the use of X-rays. The company also performs R&D activities on the platform of the Research and Innovation Center LINEVA CJSC.

Respect-Plus Production and Commercial LLC is one of the leaders in the CIS countries in the production and development of devices for anesthesia and artificial ventilation of the lungs, which are an integral part of the equipment of operating rooms and intensive care units.

Medtechnocenter Republican Unitary Enterprise is one of the largest manufacturers of medical devices and equipment.

Raton-MedTech is one of the leading Belarusian manufacturing associations engaged in the de-

sign, manufacture and sale of medical equipment and medical products.

Belmedmaterialy JSC is one of the leading manufacturers of medical devices in the Republic of Belarus. The scope of manufactured products includes more than 150 types of medical furniture and medical products made of metal with the use of high-quality polymer coating, resistant to treatment with disinfectants, temperature and physical impact, as well as products made of stainless steel.

STRUM CJSC is one of the leading enterprises in the country for the medical equipment production.

Olsa OJSC is an enterprise specializing in the production of medical furniture on a metal frame (intensive care beds, functional, hospital beds, wheelchairs, couches).

5. Investment potential and development prospects of the industry

5.1. Investments and investment attractiveness of the industry

Biotechnology and biomedicine are the core of complex projects of the future, which will become points of economic growth, since they provide for the organization in Minsk and the regions of the country of unique production facilities with high economic potential, the creation and development of new scientific and engineering schools in the field of high technologies.

Currently, six comprehensive projects of the future are being implemented, two of which directly affect the healthcare sector:

- innovative healthcare, which includes the creation of a hybrid cardiac surgery center, a bone marrow and stem cell transplant unit, biopharmaceutical production of medicines based on recombinant technologies and blood plasma fractionation, as well as the introduction of modern electronic healthcare technologies into medical institutions;
- biotechnologies for pharmaceuticals. This project provides the establishment at the National Academy of Sciences of Belarus of production of medicines for treating viral diseases, cardiovascular and other diseases, antitumor drugs based on monoclonal antibodies, as well as probiotics and bioregulators for the control of pathogenic

microorganisms (including disinfection) and the restoration of microbiocenoses.

Comprehensive projects of the future will give a powerful impetus to the further development of biotechnology and biomedicine in Belarus, which will greatly increase the investment attractiveness of the industry.

The development of biotechnologies in Belarus demonstrates breakthrough discoveries in the field of healthcare. Examples include the following:

- creation of transgenic goats with a human gene embedded in their DNA. This allows to extract a valuable product from their milk – the recombinant protein lactoferrin, which has antiviral, antimicrobial, antibacterial, anticarcinogenic, antiinflammatory, antioxidant, regenerative and immune-stimulating properties;
- developing cellular immunotherapy methods for a wide range of oncological diseases, which can significantly increase patient survival and prevent the development of disease recurrence;





- creating cellular technologies for the treatment of immunological, allergic and functional pathologies (rhinitis, type 1 diabetes, systemic sclerosis, urogenital tumors, etc.), as well as new methods of DNA diagnostics of human and animal diseases.

Biotechnologies are also in demand in pharmaceuticals. The Academy of Sciences has established the production of domestic medicines based on own technologies for the enzyme synthesis of compounds with antitumor and immunostimulating activity. The National Academy of Sciences of Belarus has organized the production of a wide range of innovative biological products: to increase crop yields, forage harvesting, prevention and treatment of animals, wastewater treatment, etc. According to their characteristics, domestic biological products are not inferior to the best foreign analogues and are in high demand in Belarus and abroad.

A plant for the production of blood plasma drugs is being built in the Brest region. The commissioning is planned for the end of 2024. This will be the first enterprise of its kind in the CIS. Belarus already has enterprises that produce medicines from blood plasma. In 2023, about 110 tons of

this component were prepared, half of which was used to make drugs. But it is not enough for all patients. Such medications are needed in case of immune system disorders, liver failure, and for blood replacement. For example, one of the plasma-based drugs is immunoglobulin. The state purchases it for about USD 14 million a year.

Also noteworthy is Decree No. 327. As per Decree, pharmaceutical organizations may be provided with subsidies for:

- reimbursement in 2022-2030 of part of the interest for the use of loans received under guarantees from the Government of the Republic of Belarus for the implementation of investment projects for the creation, technical reequipment and reconstruction of production facilities aimed at creating new production facilities and (or) expanding the range of medicines;
- compensation in 2022-2025 for part of the costs associated with:

- preclinical (non-clinical) research and clinical studies (tests), as well as with the implementation of work on examination and registration (confirmation of registration) of medicines, bringing registration dossiers in line



with the EAEU requirements;

- obtaining certificates of compliance with the requirements of the Rules of Good Manufacturing Practice of the EAEU;

- with the inspection and certification of the production of medicines for compliance with international GMP requirements.

The procedure and conditions for granting these subsidies are determined by the Council of Ministers.

In addition, the Decree provides for exemption of pharmaceutical manufacturers from VAT and customs duties with reference to technological equipment, components and spare parts for it, raw materials and materials imported into the territory of Belarus for exclusive use in the country in order to implement certain investment projects.

The following investment projects received subsidies under Decree No. 327:

- creation of modern automated production of antitumor drugs in the form of lyophilized

powders, concentrates and solutions for injections;

- facility construction warehouses and production of non-sterile medicinal products at a production site in the city of Lida;

- creation of medicinal products production in the form of eye drops using BFS technology;

- creation of pilot industrial production of solid dosage forms using innovative technologies.

In general, the country faces the task of creating new pharmaceutical production facilities and increasing the volume of medicines production and their exports. More than 20 investment projects are planned to be implemented at pharmaceutical enterprises by 2030, about 300 names of medicines will be developed.

There are also discussions about the creation of production and clinical trials in nuclear medicine, including the production of radiopharmaceuticals and proton therapy.



LONG-TERM PROJECTS

The «Healthy Cities and Towns» preventive project

The republic is implementing the state preventive project «Healthy Cities and Towns» which involves all administrative territories of the republic and represents 202 settlements. For the purpose of indicating and identifying biological agents, reference centers operate in individual areas and infections, within the framework of which cooperation is implemented between scientific and practical institutions of the Republic of Belarus and other states in the Commonwealth of Independent States, the Eurasian Economic Union, and the Union State.

The goal of the Healthy Cities and Towns project is to create a city (town) that lives according to the healthy lifestyle principles, where the population is responsible for their own health and the health of others, and where conditions are available for health maintenance and improvement. The project implementation is caused by the need to create such conditions that physical education, proper nutrition and mental health become the norm of every person since childhood. The Healthy Cities and Towns Initiative should develop into a large-scale government project. All settlements of the country claiming to be a healthy city or village should receive a full-fledged health-saving environment. Without smoking and alcohol, with sports grounds, safe living conditions, clean water and air.

The rapid advancement of information and communication technologies in all spheres of the economy and the formation of an information environment required a digital transformation of the healthcare system. A project is being implemented in the country to create an e-health system. Its implementation will allow patients to use electronic prescriptions and documents, create convenience when making an appointment with a doctor, and provide the opportunity to have a personal account with the necessary volume of

research and recommendations. The introduction of informatization makes it possible to solve the problem of queues – over 900 thousand admission tickets are ordered online every month.

The creation of e-Health will bring the medical care to a qualitatively new level, increase the efficiency of decision-making on diagnostics and treatment of patients, as well as the efficiency of the healthcare system as a whole.

DIGITALIZATION OF THE HEALTHCARE SYSTEM

A draft Concept for the digital development of healthcare in the Republic of Belarus is being developed, which involves the introduction of information and other advanced technologies into management and business processes for the purpose of their qualitative transformation in the field of healthcare. The strategic goal of developing the healthcare system will be to ensure a high healthy life expectancy of the population through maximum accessibility of high-quality medical care for each person, creation of institutions for a healthy lifestyle and active longevity, and the development of digital platforms for medical services.

In a relatively short period of time, we have managed to create modern communication systems, introduce advanced information technologies into healthcare, and make the

Internet and mobile communications widely available. The industry operates national-level information systems, the main ones being the Belarusian Cancer Registry; the Diabetes Mellitus; Tuberculosis; HIV-infected patients; Human Resources, and other registries.

Priority areas for developing digital healthcare:

- 1) Connection of medical organizations via secure data transmission channels:
 - seamless integration of medical information systems;
 - cloud technologies and data storage;
 - electronic medical documentation.
- 2) The development of telemedicine technologies.
- 3) Providing doctors with an electronic signature.
- 4) Developing medical information systems.
- 5) Biometric identification of patients.
- 6) Big data and indepth analytics (including the introduction of AI technology).





«Caring Polyclinic» Pilot Project

Work continued on the implementation of the Caring Polyclinic project, aimed at creating a comfortable environment for both patients and medical workers. The project is based on the Lean Manufacturing principles. The project implementation tools are 5S technology (sorting, maintaining order, keeping clean, standardization, improvement) to organize workplace and standardize management and organizational processes in the polyclinic.

The result of implementing the pilot project «Caring Polyclinic» will be an increase in the time the doctor spends with the patient, a reduction in the waiting time for receiving a medical service, a reduction in queues, and creation of a comfortable and accessible environment for patients. One of directions will be the formation of a new corporate culture, as well as the competencies of medical workers to quickly identify problems and eliminate them.

Introduction of the Electronic Admission system has created a comfortable environment for patients in clinics. National standards are being implemented on the basis of interdistrict centers.

At the moment, the automated information system (AIS) «Electronic Prescription» has been implemented. The purpose of the AIS «Electronic Prescription» is to create a single database of electronic prescriptions and provide access to information on prescribed and dispensed medications in real time. In the future, it is planned to expand the use of the project to implement new electronic services for the population.

5.2. Development prospects and export potential of the industry

The priority direction of the industry development, which has a strong export potential, is the production of new medical materials based on nanotechnology. In Belarus, research in the field of nanotechnology is implemented as part of sectoral scientific and technical programs, fundamental research programs of the National Academy of Sciences of Belarus and grants from the Belarusian Republican Foundation for Fundamental Research. The implementation of the comprehensive program of applied scientific research «Nanomaterials and Nanotechnology» (since 2006) has significantly advanced research in this direction.

In particular, investment projects are being implemented to organize mass production of pharmaceutical substances and finished dosage forms (synthetic drugs, nanostructured forms of drugs, fundamentally new forms based on cellular biotechnology), modern molecular biological means of medical diagnostics, medical equipment and medical products; production of means for the treatment of cardiovascular diseases, diseases of the nervous system, infectious diseases, a new generation of antitumor drugs, biopreparations from blood plasma, diagnostic means for hereditary and multifactorial diseases. New technologies are being developed for interventional and surgical methods of treating diseases, organ transplantation, and the use of stem cells in the treatment of diseases of various etiologies.

It is planned that by 2030 nanomaterials will be created for the targeted delivery of medicines, «smart» implants (artificial vessels, artificial skin, etc.) and artificial organs, for the interface of electronic devices implanted in human organs, and the organs themselves to support human life.

Medical genomics is also a promising area. The focus of research in this area is aimed at identifying gene variants that determine

predisposition to common diseases. The Institute of Genetics and Cytology of the National Academy of Sciences of Belarus (together with Republican Research Center «Mother and Child», Republican Research Center «Cardiology», Research Center of Hygiene, Belarusian Medical Academy of Post-graduate Education, Belarusian State Medical University) has developed methods of DNA diagnostics of genetic predisposition to cardiovascular diseases (thrombophilia, coronary heart disease, myocardial infarction, etc.); venous thrombosis; respiratory diseases (bronchial asthma, allergies); endocrine diseases (type 2 diabetes mellitus, obesity); diseases of bone metabolism (osteoporosis, rheumatoid arthritis); violation of the normal physiological course of pregnancy (miscarriage, gestosis, rhesus conflict). Based on the Institute's developments, DNA diagnostics of hereditary hearing loss, mitochondrial pathologies, and hemochromatosis have been deployed. This is especially relevant in the field of medical tourism and the export of services.

Breakthrough discoveries in biotechnology should also be noted:

- creation of transgenic goats with a human gene embedded in their DNA. This allows to extract a valuable product from their milk – the recombinant protein lactoferrin, which has antiviral, antimicrobial, antibacterial, anticarcinogenic, anti-inflammatory, antioxidant, regenerative and immune-stimulating properties;
 - developing cellular immunotherapy methods for a wide range of oncological diseases, which can significantly increase patient survival and prevent the development of disease recurrence;
 - creating cellular technologies for the treatment of immunological, allergic and functional pathologies (rhinitis, type 1 diabetes, systemic sclerosis, urogenital tumors, etc.), as well as new methods of DNA diagnostics of human and animal diseases.
- The Academy of Sciences has established the production of domestic medicines



based on own technologies for the enzyme synthesis of compounds with antitumor and immunostimulating activity.

Active work is underway to establish the production of medical devices, high-tech reagents, supplements and special-purpose materials.

In order to increase production volumes, work is underway to create and develop new drugs in demand. Issues of technology transfer for their production are being worked out with 13 global pharmaceutical manufacturers from 5 countries: BioImmunity LLC, Geropharm LLC (Russia), BioCubaFarma Group of companies (Republic of Cuba), Sinopharm Corporation (China), companies from Iran.

The increase in volumes will be facilitated by the implementation of investment projects for the modernization and reconstruction of existing

production facilities, as well as the creation of new ones. At least 12 such projects must be implemented, 8 of which are aimed at creating new productions of demanded medicines. The development of cooperation between Belarus and China deserves special mention: a roadmap for the development of a traditional Chinese medicine center in Minsk was signed. A roadmap for cooperation in the field of healthcare between Belarus and the Kingdom of Eswatini has also been signed. Further plans include the supply of medicines, the organization of a joint venture, the organization of a clinic in the kingdom.

In order to increase the volume of export deliveries, work has been intensified to reorient the export of Belarusian medicinal products to the markets of the CIS countries and far abroad.

6. Investment climate

6.1. Macro indicators by country

GDP for 2023 at current prices amounted to 71.82 billion US dollars, a decrease of 1.36% compared to 2022. The decrease in industrial output in 2023 compared to 2022 amounted to 3.53%, the decrease in agricultural output - 9.00%. In 2023, there was an increase in wages (1.91%) and a decrease in pensions (4.09%).

Exports of goods in 2023 compared to 2022 decreased by 6.62%, imports increased by 1.35%. The foreign trade balance decreased by 83.40% and amounted to 0.73 billion US dollars.

Key socio-economic indicators

Indicator	2020	2021	2022	2023*	2023/2022
Gross domestic product, USD billion USA	61,38	69,69	72,80	71,82	-1,36%
Population (at the end of the year), thousand people	9,68	10,28	12,10	11,01	-9,00%
The average annual number of people employed in economy, thousand people	48,54	61,42	64,51	62,23	-3,53%
Nominal accrued average monthly salary, USD	12,14	12,21	10,57	11,88	12,30%
The average amount of assigned pensions (at the end of the year), USD	123,20	118,80	88,60	72,92	-17,70%
Industrial products, USD billion	18,50	20,90	21,60	23,11	6,99%
Agricultural output in farms of all categories, USD billion	21,94	23,68	25,68	25,38	-1,17%
Retail turnover, USD billion	5,13	6,03	6,50	6,71	3,10%
Paid services to the population, USD billion	72,40	94,90	89,20	86,67	-2,83%
Investments in fixed assets, USD billion	37,20	49,40	46,80	43,70	-6,62%
Volume of foreign trade in goods and services, USD billion	35,20	45,50	42,40	42,97	1,35%
export	2,00	3,90	4,40	0,73	-83,40%
import	9349,60	9255,50	9200,60	9155,98	-0,48%
balance	4319,60	4284,50	4215,90	4152,20	-1,51%
Nominal accrued average monthly wage, USD	514,39	568,67	620,35	632,18	1,91%
Average amount of assigned pensions (at the end of the year), US dollars	197,87	202,65	239,94	230,14	-4,09%

Note: * - data from the National Statistical Committee of the Republic of Belarus are preliminary and may be revised

6.2. Investor Roadmap



Investment projects and PPP
>1000

Investment ideas
>700

Concessions
9

**Manufacturing sites
and real estate**
>900

Land plots
>1000



map.investinbelarus.by

More investment projects and ideas, as well as land plots and real estate objects for the implementation of investment projects can be found on the interactive portal «Investor's Roadmap»

6.3. Preferential regimes

General guarantees

Belarusian legislation provides the following basic guarantees to investors:

- the right of private property and its protection without discrimination
- protection against illegal actions of state bodies, which violate rights of investors and/or cause losses
- equality of rights for national and foreign investors
- free repatriation of profits
- protection of investments against nationalization and requisitioning

By law, nationalization can only be carried out on the basis of public necessity and subject to appropriate compensation. Compensation for nationalized property must be paid in a timely manner and include the value of the nationalized property and other losses caused by nationalization. The legislation also establishes a number of circumstances under which requisitioning is possible. These are mainly emergencies such as natural disasters, accidents, epidemics and epizootics, as well as when the public interest requires these measures.

Investment agreement

- VAT deduction in full amount
- exemption from import duties and taxes on import of technological equipment, raw materials and materials into the territory of the Republic of Belarus
- exemption from reimbursement of losses in forestry and agricultural production

Small and medium-size cities, rural territories

- exemption from income tax for 7 years
- exemption from real estate tax for 7 years
- exemption from import customs duties on imported (imported) goods contributed to the statutory fund, from the date of manufacture of which not more than 5 years have passed for some commodity items
- exemption from profit tax in the part of profit received from sale of goods of own production; exemption from income tax for 7 years

Bremino-Orsha

- 0% VAT and duty on customs
- 0% corporate tax for 9 years
- 0% property tax for 20 years
- 0% VAT for 15 years at realization, rent (leasing) to residents of real estate objects till 1 January 2033
- 0% income tax, tax on dividends and similar income for 5 years from the announcement of profits (for the founders of resident companies and joint ventures)
- 0% tax on dividends and similar income from the date of declaration of profits up to 1 January 2033 (for joint ventures if accrued from a management company)
- 5% on royalties until January 1, 2028

Free economic zones (FEZ)

- exemption from profit tax when selling products for export and to other FEZ residents
- exemption from real estate tax on properties in FEZ within three years of registration
- exemption from land tax and land lease for the period of design and construction, but for no longer than 5 years from the date of registration. Exemption irrespective of the direction of their use (if sold for export or to other FEZ residents)
- exemption from payment for the right to conclude a land plot lease agreement

Industrial park «Great Stone»

- exemption from income tax on revenue from the sale of goods (works, services) of own production within ten years from the date of registration as residents
- exemption from property tax on properties
- exemption from tax on land plots
- until 1 January 2027, the income tax rate is 9%
- full deduction of VAT amounts charged for imported goods (works, services) as well as property rights used in designing, construction and equipping of buildings and structures in the Industrial Park
- exemption from customs duties and VAT on goods (production equipment, components and spare parts, materials and raw materials) imported to Belarus for the implementation of investment projects

The choice of preferential treatment will depend on a number of factors and components of the investment project, such as the need to create infrastructure facilities, export orientation of the project, implementation of innovative technologies and many others.

More detailed information about the business environment, investment opportunities in the Republic of Belarus can be found on the website of the National Agency of Investment and Privatization of the Republic of Belarus at www.investinbelarus.by/en/business-environment, as well as to get necessary advice and assistance in implementation of the investment project in Belarus by contacting representatives of the Agency at the contacts specified on the website www.investinbelarus.by/en/contacts.

National Agency of Investment and Privatization


The Agency is a state institution that provides assistance at no cost or foreign investors interested in launching a business in Belarus:

- provision of information about investment opportunities, preferential regimes and benefits granted, economic sectors and legislation
- providing a platform for negotiations and support during negotiations
- provision of up-to-date information about investment projects
- organization of visits to the Republic of Belarus (schedule development, visa support)
- assistance in selection of sites and premises
- representation of investor's interests during negotiations with governmental representatives concerning implementation of investment projects, as well as improvement of investment climate in the Republic of Belarus
- search for prospective partners for investment projects, arranging meetings and negotiations for establishing cooperation
- aftercare

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