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INSTITUTIONAL ASPECTS OF ACTIVATION OF IMPORT SUBSTITUTION PROCESSES AND MAXIMIZATION OF IMPORT DEPENDENCE OF THE ECONOMY OF THE RUSSIAN FEDERATION

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Abstract. *The article presents the author's clarified definition of the economic concept of "import independence". According to the proposed approach, import independence is a stage in the development of production and economic systems at various levels (state, region, cluster, municipality), in which there is a set of objective conditions for the creation and subsequent effective marketing of goods, works, services that both replace imported analogues and surpass them in terms of competitiveness, as well as the production and sale of goods that have no foreign functional analogues. The main areas of influence on ensuring a high level of import independence of the economy of the Russian Federation of basic socio-economic institutions, such as the institutions of ownership, corporate governance, arbitration and arbitration courts, trade unions, and innovative infrastructure are highlighted. The presence of a close influence of investments in the development of the innovative infrastructure of the Russian Federation in 2015 - 2023 on the activation of processes to ensure import independence is proven. Recommendations for the development, approval and implementation of a comprehensive program to maximize the import independence of the domestic economy are formed. Keywords: import substitution, import independence, innovation, innovation infrastructure, institutions, imported analogues, state economic policy.*

Introduction. Progressive transformation of the domestic economy, ensuring sustainable growth of its competitiveness directly depend on the activation of import substitution processes and ensuring a high level of import independence of production of goods, works, services by companies of various types of economic activity.

The purpose of the work is to systematize the institutional aspects of ensuring import substitution processes and maximizing import independence of the economic system of the Russian Federation. The main objectives of the work are:

- clarifying the content of import independence as an economic concept;
- identifying the main directions of influence of basic socio-economic institutions on ensuring import substitution processes and increasing import independence of the modern economy of the Russian Federation;
- economic and statistical assessment of the intensity of development of such a fundamentally important institution from the point of view of implementing the import substitution strategy as the institution of national innovation infrastructure, on the activation of processes of ensuring import independence of the economy of the Russian Federation.

Materials and methods. The article is based on official statistics demonstrating trends in the development of import substitution processes, ensuring import independence, as well as innovative activity in the economy of the Russian Federation in 2015-2023, articles and monographs on the problem under study, and the norms of such a key legal act on the problem under study as the Concept of Technological Development of the Russian Federation until 2030.

In the process of preparing and writing the article, the following main methods were used: critical analysis of specialized literature on import substitution and ensuring import independence in the national economy of Russia, synthesis of various approaches to the problem under study, deduction, induction, analysis of norms and institutions, study of a trend demonstrating the activity of the import substitution process, one-factor correlation and regression analysis.

Research results and their discussion. The problem of activating import substitution processes in the Russian economy in late 2010 - early 2020. has been repeatedly updated at the federal level of state management of financial and economic processes, for example, within the framework of the Concept of Technological Development of the Russian Federation until 2030 [1]. Many publications are devoted to issues of import substitution; in most of them, these processes are understood as the simple displacement of imported goods or services from domestic industry markets by relatively competitive analogues of domestic production [2, p. 18], [4, p. 126].

At the same time, since 2022, the Government of the Russian Federation and other government agencies have been raising the issue of not so much activating

import substitution processes in the Russian economy as ensuring comprehensive import independence of economic development. At the same time, the concept of "import independence" is also presented in a number of scientific publications, in particular, in the studies of E.N. Dolgov [5, p. 50], K.S. Fioktistov [7, p. 53], but they do not provide a clear definition of this definition. In our opinion, import independence is a stage of development of production and economic systems at various levels (state, region, cluster, municipality), in which there is a set of objective conditions for the creation and subsequent effective marketing of goods, works, services, both replacing imported analogues and surpassing them in terms of competitiveness criteria, as well as the production and sale of goods that have no foreign functional analogues. Quantitatively, the level of import independence of the Russian economy can be assessed by various indicators. One of the most general criteria of this kind is the share of domestically produced goods, works or services in the final consumer goods market: in general, for 2015-2023 this indicator increased from 56.4% to 78.1%; while, in particular, in the food market by the beginning of 2024 it exceeded 90.0% [8, p.219]. Another significant indicator characterizing the intensity of the development of import independence processes in the Russian economy is the average share of imported components in the cost structure of domestic organizations. As shown in Figure 1, in 2015-2023 this indicator decreased by 2.19 times, which indicates a fairly intensive development of import substitution processes and ensuring import independence.

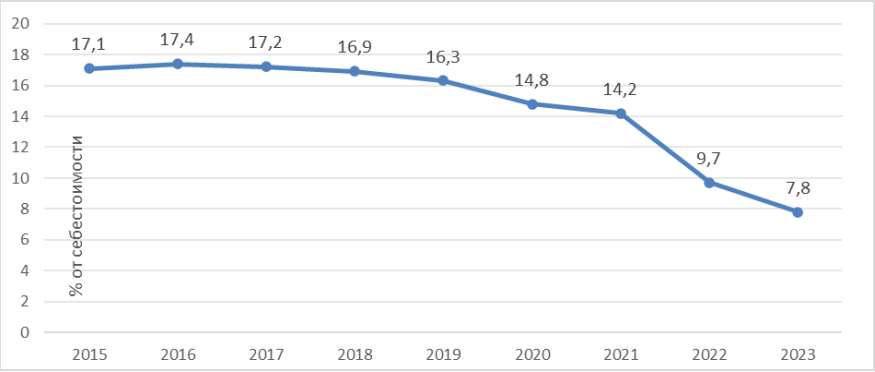

Figure 1. *The share of imported components in the cost structure of goods, works, services of the economic system of the Russian Federation, % [6, p.186]*

In general, the development of modern socio-economic systems, including ensuring a high level of their import independence, is directly influenced by institutional factors.

In this case, in modern economic science, an institution is usually understood as a set of interconnected, interdependent, to a certain extent reinforcing the influence of each other, standards, rules, norms of economic behavior, as well as legal, ethical and other mechanisms for coercion to their effective implementation (R. Coase, D. North, 1960). The entire diversity of institutions can be differentiated into formal and informal; the former are complexes of norms and standards of general economic, social or industry legislation, which are, of course, mandatory for execution for the entire circle of persons whose economic behavior is regulated by such norms, the latter include traditions, customs of business turnover, norms formed by SROs (self-regulatory organizations) of business community entities - they are, strictly speaking, not mandatory for execution; however, their observance usually leads to an increase in the level of reputational capital of the relevant economic entities. The following main general institutions have a direct impact on the efficiency of functioning and development of modern economic systems, ensuring the activation of import substitution and maximizing import independence: 1. The institution of ownership of the results and means of operating activities. The following main areas of ensuring the efficiency of the activities of organizations of the Russian economy, in particular, depend on the stability, efficiency and transparency of the development of this institution, including intensity of participation of the latter in import-substituting projects and programs to ensure a high level of import independence:

- the possibility of substantiating, approving and subsequently effectively implementing the strategy of socio-economic, sectoral and financial development of the organization - in conditions of instability or insufficient transparency of the institution of ownership, objective incentives for the development and implementation of such a strategy are reduced; even if its provisions are developed qualitatively, they largely lose their meaning;

- the opportunities for attracting co-investors, both private and public (based on the principles of, for example, public-private partnership (PPP) for co-financing investment projects or programs of the organization, including those that ensure an increase in the level of import independence of the national economy as a whole) increase;

- the likelihood of obtaining bank loans, including long-term loans, on terms favorable to the borrowing organization increases.

2. The institution of corporate governance, which includes a set of rules regulating the processes of protecting the legitimate interests of various groups of shareholders or other groups of owners of property and income of the company, primarily minority owners, as well as the possibilities of the latter's effective participation in co-management of the company's development. The main areas of influence of the norms of this institution on the efficiency of the functioning of organizations are:

- clear identification of the rights and legitimate interests of various groups of shareholders or other owners of enterprises, as well as representatives of the managerial corps;

- regulation of shareholder participation in the management of the organization's business complex, incl. in the distribution of the received net profit, in particular for the purposes of co-financing the development and improvement of import-substituting projects and programs;

- mechanisms for protecting the company from possible hostile takeovers developed by external economic entities, usually large players in the corporate market, often using administrative or criminal resources;

- norms and rules that minimize the negative impact of possible greenmail (corporate blackmail) on the company's development;

- standards for the company's entry into the IPO procedure with corporate shares or bonds on the stock market.

3. General institute of state regulation and programming of financial and economic processes. The main areas of influence of the specified institute on development of economic systems are:

- determination of rules of business turnover, organization and implementation of economic relations;

- formation, development and improvement of the regulatory framework for functioning of more private institutes influencing various aspects of ensuring efficiency of macro-, meso- and microeconomic systems (institution of law enforcement system, institute of insurance, institute of credit organizations, etc.);

- creation and development of rules regulating the nature of taxation of economic entities, including possible tax preferences for organizations implementing import-substituting production projects;

- formation of market, including road, transport, logistics, innovation and other types of infrastructure of the economic system;

- substantiation and improvement of tools of public-private partnership (PPP), aimed at ensuring growth of financial, economic and social efficiency of activities of private companies and initiators of investment projects due to synergy of public and non-governmental financial and organizational resources.

4. The institutions of the arbitration court and the court of general jurisdiction are ideally aimed at ensuring objective and prompt resolution of economic disputes between various groups of economic entities, at minimizing transaction and other costs associated with such proceedings [3, p. 71].

5. The institution of the arbitration (magistrate) court is aimed at facilitating the processes of concluding pre-trial, settlement agreements between participants in economic turnover and ensuring, on this basis, the growth of the financial and economic activities of the latter due to the absence of reasons to appeal to the po-

tential of the official institutions of the state judicial system, which in most cases is associated with significantly higher costs of both time and financial resources of participants in economic disputes.

6. The institution of trade unions of employees of organizations, the main areas of influence of which on the development of the latter are:

- the formation of a system of norms and organizational and economic mechanisms aimed at ensuring effective protection of the rights and legitimate interests of employees of organizations of various profiles from possible arbitrariness on the part of employers;
- additional control over compliance with the norms and rules of labor safety;
- representing the interests of employees whose legal rights have been violated in courts of various instances against employers;
- encouraging employers to form and develop effective personnel management systems, to strictly comply with the provisions of employment contracts, etc.

The incentives for increasing labor productivity of employees of Russian enterprises, including those producing and selling import-substituting goods, works or services on the relevant industry markets, largely depend on the quality of the functioning of the institution of trade unions.

7. The Institute of Innovative Infrastructure of the Economy, the quality of whose functioning directly affects both the intensity and effectiveness of scientific, technical and, in general, innovative processes, and, ultimately, the effectiveness of the structural modernization of the economic system in the direction of ensuring a high level of its systemic import independence.

The innovative infrastructure, in this case, includes the following main elements: business incubators; technology parks; technopolises; small innovative enterprises that are subsidiaries of institutions of higher or secondary specialized education; digital platforms aimed at ensuring the activation of interaction between various subjects of the innovation process; special economic zones (SEZ) with an innovative profile; crypto asset exchanges specializing, through ICO and other mechanisms, in promoting innovative digital startups.

Overall, for 2015-2023, total investments from all sources for the formation and development of the innovative infrastructure of the Russian Federation increased by 2.15 times annually [6, p.179]. To assess the impact of investments for such purposes on the activation of processes to ensure import independence in the domestic economy (based on the criterion of the average share of imported components in the cost of Russian organizations), the correlation and regression analysis tools were used (Fig. 2).

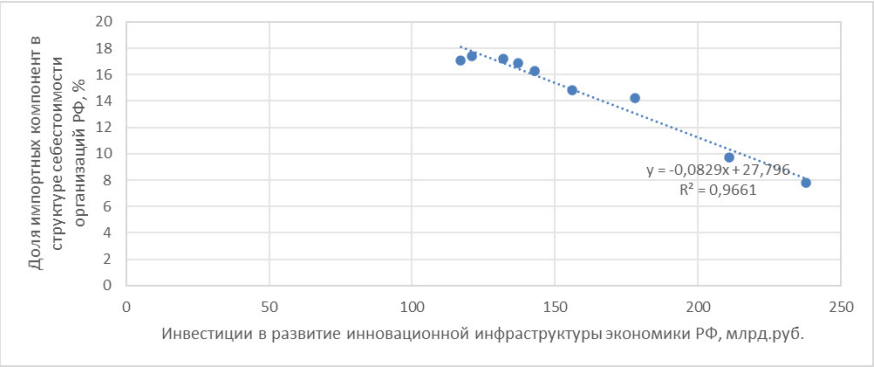

Figure 2. *Economic and statistical function of the impact of investments in the development of innovative infrastructure of the Russian economy on the activity of ensuring import independence, 2015 - 2023 (based on the author's research)*

As shown in Figure 2, the economic system of the Russian Federation in 2015 - 2023 was characterized by a statistically stable relationship between the intensification of investments in the development of innovative infrastructure and the dynamics of the processes of ensuring import independence. Accordingly, it is advisable, even in the context of a relatively difficult budget situation, to consistently increase the volume of budget financing for federal and regional innovative infrastructure facilities - one of the objective foundations for ensuring the maximization of import independence of the Russian economy.

Conclusion. As shown in the work, the activity of ensuring import independence of the economic system of the Russian Federation largely depends on the quality of functioning in the domestic legal space of both general institutions and, first of all, special institutions regulating the processes of developing innovative infrastructure.

To improve the process under consideration, it is advisable to adopt a comprehensive state program for maximizing the import independence of the Russian economy. Such a program should include a clear list of industry priorities aimed at the fullest possible implementation of the import independence policy in the domestic economy. Regional programs to promote import substitution and import independence should be included in such a comprehensive program as subprograms, which will increase the synergy effect in terms of state support for import-substituting industries and projects. The key focus of the program proposed for development and adoption should be the improvement of the institutions of the innovation infrastructure of the Russian Federation, primarily in the direction of increasing the transparency of financing and management of the latter's facilities, ensuring

the fullest possible accessibility of the potential of the innovation infrastructure for Russian business entities of any scale of operations and industry affiliation.

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MUTUALLY BENEFICIAL COOPERATION BETWEEN LARGE AGRICULTURAL HOLDINGS AND FARMS AS A MODERN TREND IN THE DEVELOPMENT OF THE RUSSIAN AGRO-INDUSTRIAL COMPLEX

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Abstract. *The article establishes that sanctions against the Russian economy have predetermined the need to ensure defense and food security of our country. This indicates the relevance of the topic of this article. It was revealed that further development of agricultural production is hampered by structural disproportion, when in the country more than half of these products are produced by an insignificant part of large producers. This situation significantly increases the risks of ensuring food security of our country. It is proposed to reorient the economic policy of the development of the Russian agro-industrial complex to the organization of mutually beneficial cooperation between agricultural holdings and farms. Such an approach will ensure the actual development of farms and their transformation into a key sector of the Russian agro-industrial complex. As the main result of the study, a number of undeniable advantages of organizing mutually beneficial cooperation between large agricultural holdings and farms are substantiated.*

Keywords: *Russian agro-industrial complex, development, structural disproportion, agricultural holdings, farms, cooperation.*

Introduction

Increased attention to the development of the Russian agro-industrial complex (AIC) is explained not only by its growth in the last 10-15 years, but also by the increase in its rate in a difficult situation associated with the introduction of sanctions. At first, in 2015-2016, the growth rate of Russia's GDP was declining. Then came the adaptation period (2017-2019), and subsequently (2020-2023) this

indicator has a positive trend. This was largely facilitated by the agrarian reform carried out at the beginning of the 21st century (the adoption of the National Project "Development of the AIC" for 2006-2007 and the Doctrine of Food Security of the Russian Federation in 2010 [1, 2]), and then the adoption of the Federal Scientific and Technical Program for the Development of Agriculture for 2017-2030 and the State Program for the Development of Agriculture and Regulation of Agricultural Markets of Agricultural Products, Raw Materials and Food [3, 4]. These documents defined the forms and mechanisms of state support for the industry. In addition, the Russian Government introduced retaliatory restrictions on food imports from countries that initiated sanctions against the Russian economy. This resulted in an increase in the industry's share in the country's GDP, Russia's unexpected entry into world markets as a major food exporter, a reduction in the gap between imports and exports of agricultural products, and a decrease in the share of purchases of foreign food products.

In terms of the volume of foreign exchange earnings from agricultural exports to budgets at all levels, the industry confidently ranks third, behind the oil and gas sector of the economy and exceeding revenues from the sale of arms and other key industries. If these trends continue, the agricultural sector has shown a positive balance of exports and imports of manufactured products in the last 3-4 years. According to the decree of the President of Russia, the Russian AIC has been set an ambitious task: to increase agricultural exports by 1.5 times by 2030 compared to 2021. This means that by 2030, exports should reach $ 55 billion. In 2023, agricultural exports amounted to $ 43.5 billion, which already shows growth compared to $ 41.3 billion in 2022 [5]. However, to achieve these goals, it is necessary to take into account current trends and challenges.

At the same time, the structure of the Russian AIC differs significantly from world practice. In most countries of the world today, farms predominate, producing the bulk of agricultural products. In Russia, the development of peasant farms (PF) is slow, since even before the reforms, the structure of the agro-industrial complex was oriented toward large agricultural organizations (LAO) in the form of agroholdings. As a result, an abnormal situation has arisen, when the production of the main volumes of agricultural products is concentrated in groups of farms that are opposite in size. Thus, a fairly significant share of production (about 25-30%) is provided by small private subsidiary farms (PSF) of the population. The share of production of large agroholdings exceeds 58-63%. There is a large gap between these groups of farms, which is filled by the production of agricultural products in PF (9-15%). In the very near future, it is necessary to change the existing imbalances. Large-scale agricultural production also exists in the USA, but the volumes of production are distributed almost evenly among farms of different sizes. At the same time, the largest farms account for up to 28% of the produced goods [6].

Purpose of the study

The main objective of this study is to substantiate the possibilities of interaction between agroholdings and peasant farms while maintaining modern trends in the development of the Russian agro-industrial complex.

Materials and methods

The importance of the Russian AIC in the country's economy has been and remains very important, since it provides employment for about 6.5% of the population, and its share in GDP is confidently maintained even under the unfavorable impact of sanctions [6]. This circumstance indicates the high stability of the Russian AIC in unfavorable conditions for the development of the Russian economy.

In recent decades, many countries around the world have been characterized by a decrease in the share of agriculture in the structure of GDP. In Russia, in the period from 2020 to 2023, the dynamics of this share did not change significantly and was at the level of 3.8÷4.0% [6]. Despite this, the agricultural sector today is the pillar that supports the development of the country's economy in unfavorable periods. Thus, under the conditions of sanctions, the Russian economy experienced periods of first a decline and then growth in GDP. At the same time, the share of the Russian agro-industrial complex in GDP remains relatively constant, since its development does not slow down as significantly as the development of the economy as a whole.

The main indicators characterizing the state of the Russian AIC are given in Table 1 [6, 7].

Table 1

The place of the Russian AIC in the country's economy, 2020-2023

Indicators	2020	2021	2022	2023
GDP, billion rubles	107658	135773	155188	172148
GDP growth (in constant prices), in % to the previous year	–2,7	5,9	–1,2	3,6
GDP per capita, RUB (at current market prices)	728860	922264	1057767	1176687
Population size, million people	147,7	147,2	146,7	146,3
Rural population share of total population, %	25,3	25,0	24,9	24,7
Share of agriculture, hunting and forestry (%)	4,0	3,9	3,8	3,9

At the same time, disproportions in the structure of agricultural enterprises can become a serious threat to maintaining modern positive trends in its development. Currently, there are three types of farms in agriculture: agricultural organizations (ACO), which are part of large agroholdings; peasant farms, including individual entrepreneurs (IEP); small personal subsidiary farms (PSF) of the population. Although AHO are usually classified as large farms, the majority of them (84.2%)

are representatives of small businesses, while representatives of large businesses account for only 4.7% [6].

During the reform period, the importance of these types of farms underwent dramatic changes. The share of gross output of ACO in the period 2015-2022 tended to increase from 54 to 60%. On the contrary, changes in the share of PSF of the population had the opposite direction from 35 to 24%. The share of gross output of PSF in this period slowly increased from 11 to 16%. (see table 2 [6]).

Meanwhile, maintaining a focus on a small number of large agricultural enterprises significantly increases the risks of ensuring the supply of food to the country's population, its quality and the required production volumes. In reality, food supply is dependent on the production activities of agricultural holdings. To prevent disruptions in food supplies, they need to create favorable conditions through the use of various forms of state support.

Table 2

Share of manufactured products by type of farm, billion rub. (%)

Types of farms	Years					
	2015	**2018**	**2019**	**2020**	**2021**	**2022**
ACO	2588,6 54%	3022,1 56%	3348,4 58%	3787,0 59%	4566,8 60%	5149,4 60%
IEP	1654,9 35%	1656,7 31%	1659,7 27%	1717,6 27%	1922,0 25%	2063,7 24%
PSF	551,1 11%	670,0 13%	793,3 15%	964,2 14%	1184,1 15%	1350,4 16%

However, as businesses in the Russian agro-industrial complex grow larger, the efficiency of agricultural production decreases for a number of reasons. Among the most important of them, we highlight the following:

- an increase in the number of subsidiaries and branches with an increase in the number of hired managers, whose goals do not always coincide with the goals of business owners, which necessitates increased control, and therefore, the involvement of new employees not directly involved in production;
- in the territories where agricultural holdings and their branches are located, the development of small businesses is significantly limited;
- large agricultural holdings and their branches significantly increase the burden on the ecology of the territories where they are located;
- large agricultural holdings and their branches are characterized by a high concentration of production only in certain settlements, which worsens the conditions for the development of agricultural production in other settlements and leads to their degradation.

There are quite a lot of problems with the production of agricultural products in private household plots of the population. Farms of this type, as a rule, use outdated technologies and means of production, there are significant difficulties with the supply of products to vertical food chains, which are mainly owned by large businesses. According to the indices of agricultural production, private household plots of the population in 2022 (98.6%) were significantly inferior to similar indicators for agricultural organizations and peasant farms (114.0% and 121.4%, respectively) [6].

Agricultural production areas such as grain and oil crops, sugar beet, pig farming, poultry farming and others are mainly carried out by agricultural enterprises and peasant farms. Since these types of farms have modern machinery and equipment, use the most productive plant varieties and animal breeds, the productivity and quality of their products are not inferior to foreign competitors both in the domestic and foreign markets.

The situation is completely different in those areas of agricultural production in which private household plots of the population specialize. This is the production of potatoes, vegetables and fruits, livestock farming and others. Since private household plots of the population use outdated technologies, machinery and equipment, labor productivity in them is extremely low. As a result, they cannot compete with large producers and are forced to maintain extensive production due to a large number of farms of this type. In the areas of agricultural production in which private household plots of the population specialize, the problems of meeting the needs for production volumes, import substitution and entering world markets have not yet been fully resolved. Moreover, if current trends in agricultural development continue, the share of household plots in production will continue to decline.

The decisive role in the growth of agricultural production rates was played by its support at the state level. It ensured the attraction of investment resources necessary for the modernization of the industry. The positive dynamics of the growth of the Russian AIC was ensured by the allocation of subsidies for obtaining investment loans, leasing schemes for the purchase of new machinery and equipment, compensation of expenses for the purchase of elite seeds and livestock. However, these advantages were provided to a small number of large agricultural holdings, while the majority of small and medium-sized farms did not receive such support. The implementation of such a policy is aimed at ousting a significant number of agricultural producers from the market. Its consequence may be the development of agriculture in limited territories, the loss of part of agricultural land, and a reduction in labor resources. Meanwhile, the basis of the strategy for the development of the Russian AIC should be the creation of conditions for a more complete use of the potential of all types of farms producing agricultural products.

Results and discussion

In Russia, agricultural holdings and agrofirms are united into agricultural enterprises of different sizes and their branches. Sometimes, one agricultural enterprise with branches is formed. Of interest are data on the number of employees and the size of land per agricultural enterprise, on average, as well as on the size of revenue (see Table 3 [8, 9]). The table shows that the main share of agricultural enterprises - 56% - have revenue from 3 to 10 billion rubles per year. On the contrary, large agricultural holdings, whose share is about 20%, produce the maximum volume of agricultural products by revenue of 23.8%.

Large agricultural holdings own hundreds of thousands of hectares of land and employ more than 20,000 workers. In 13 agricultural holdings that own more than 300 thousand hectares of agricultural land (about 3%), 4% of workers employed in agriculture work, producing more than 8% of all products. The obvious discrepancy between the area, number of workers and revenue is determined by the presence of agricultural enterprises with intensive production in the largest agricultural holdings that do not require large areas (poultry farms and pig farms).

Table 3

Grouping of large agricultural holdings by key indicators, 2021

Revenue, billion rubles	Number of agricultural holdings	Number ACO	Distribution, %			
			Share	Profit	Busy people	Subsidies
To 3	23	118	0,6	2,2	2,0	2,9
3÷4	19	84	0,4	2,5	1,6	1,9
4÷5	17	89	0,5	2,9	1,8	2,2
5÷10	19	104	0,6	5,5	3,2	4,3
Over 10	22	183	0,9	23,8	13,1	17,7
Of these, over 100	1	21	0,1	4,7	1,4	6,9
Total for agroholdings	100	578	3,0	36,9	21,7	28,9
Other ACO		17040	87,0	52,5	66,3	58,7
Total for all ACO		19592	100	100	100	100

However, the scale of production increases the efficiency of business only to a certain limit: at the moment, in agriculture, profitability indicators increase as the area of agricultural land increases to 7-10 thousand hectares, and with further growth of the area of land, they decrease (see Table 4 [6]). Taking into account the increasing threats to the stable provision of food to the country's population in the context of a high concentration of agricultural production in several large agricultural holdings and the negative impact of sanctions restrictions has revealed the need to revise existing approaches to state support for agricultural organizations and the principles of its formation.

Table 4

Economies of scale in activities ACO

Land area, ha	% from the total number ACO	On 1 ACO		% subsidies on 1 ACO	Profitability, %	EBITDA
		person	ha			
Without lands	12	78	0	21	7	4,83
До 1 000	27	17	443	7	3	4,96
1000–3000	26	34	1874	12	10	3,44
3000–5000	12	58	3922	10	14	2,48
5000–7000	7	82	5913	7	17	2,54
7000–10 000	5	112	8331	7	21	2,34
10 000–20 000	6	159	13 859	14	18	2,46
20 000–50 000	3	244	28 685	12	19	3,00
More 50 000	0	1074	107 103	11	11	4,27
Total	100	64	4 136	100	12	3,44

In modern conditions, state support for ACOs should not stimulate further expansion of large agroholdings, but should be reoriented towards creating equal conditions for hundreds of thousands of smaller farms-producers, mainly for PSF. There is a fairly simple explanation for this, since the transition to the market in almost all post-socialist countries has led to a significant reduction in the IEP of the population and the rapid development of PSF. If the current trend continues in Russia, the share of products produced in the IEP of the population will decrease to 20% by 2024, and to 15% by 2035.

The reduction in production in the IEP of the population must be taken into account when developing a strategy for the development of the Russian agro-industrial complex. In other words, it must be compensated by an increase in the production of agricultural products in the ACO and PSF. Only if this condition is met will the country not lose a significant part of agricultural production. At the same time, the issue of stimulating the production of agricultural products in the PSF is of particular relevance. Large agroholdings should take part in solving this issue, first of all. They will have to create conditions for the products in the PSF to be produced using modern technologies that allow the formation of standard batches of high-quality food and their integration into food chains. The dispersed land, labor and other resources of the IEP of the population can be used with maximum efficiency in the PSF, which has been increasingly developing in our country in recent years.

PSF in modern Russia actually began to revive in the 80-90s of the last century. Most farmers began to establish their farms from scratch. The development of this process is still very slow. And this happens despite the fact that the indis-

putable competitive advantage of PSF is maximum motivation for work, since the farmer is simultaneously the owner, the master, and the main worker. The basis of PSF activities is life on one's own land, the use of one's own equipment in work, work for the benefit of one's family.

Today, PSFs are the most dynamically developing structural formation in Russian AIC. The development of PSFs is becoming of paramount importance, firstly, due to the negative impact of sanctions restrictions, which no one is going to cancel, and secondly, due to the introduction of countermeasures by our country and, above all, a food embargo on the supply of imported food and agricultural products. The consequence of this was the need for a complete revision of the agricultural development policy, stimulation of targeted state support for its key sectors, reorientation of the activities of economic entities to new forms and models, including in terms of PSF development.

The uniqueness and novelty of the situation developing in the Russian AIC suggest the possibility of transforming the negative impact of sanctions restrictions into positive trends in the development of the industry. They are manifested in the implementation of mutually beneficial cooperation between agroholdings and PSFs while increasing the degree of their participation in providing large food producers with high-quality raw materials and in solving the problem of ensuring food security both at the regional level and throughout the country as a whole [10]. At the same time, the most intensively developing PSFs are those that have managed to successfully enter agricultural clusters and organize successful cooperation with the agroholdings leading them. The presence of a stable market for the sale of manufactured products allows agroholdings to make targeted investments aimed at supporting small producers represented by PSFs. Thus, all participants benefit from the organization of mutual cooperation, namely: agroholdings become guaranteed consumers of products and raw materials manufactured by PSFs, and for each new job in an agroholding, there are 6 to 8 jobs in PSFs included in agro-industrial clusters; PSF, in cooperation with agricultural holdings, receives investment and technical support through the provision of interest-free loans, prepayments and other financial resources, as well as the purchase of machinery and equipment.

With a well-founded and correctly implemented economic policy for the development of the Russian AIC, the organization of cooperation between agroholdings and PSF will ensure further strengthening of their financial stability, saturation of regional markets with high-quality food products of domestic production, development of environmentally friendly production of agricultural products and the industry as a whole. The recent history of the development of PSF in Russia shows that in order to ensure complete food security for the country and its regions, economic policy in the Russian AIC should be reoriented towards the

organization of mutually beneficial cooperation between large agroholdings and PSF within the framework of specialized agro-industrial clusters.

Conclusion

Based on the results obtained during the study, the following conclusions can be formulated.

1. Despite the unfavorable impact of sanctions, the Russian AIC in recent years has been characterized by stable trends in production growth in most areas, which contributes to the successful implementation of the strategy of import substitution of foreign-made food supplies.

2. The introduction of a food embargo and the implementation of targeted government support measures, primarily for large agricultural producers, allowed the Russian AIC to virtually completely eliminate the need to purchase foreign food, and in a number of areas to become one of the leaders in its export.

3. At the same time, there is an obvious disproportion in the organizational structure of the Russian AIC, when most of the products are produced by a limited number of large producers - agricultural holdings, which significantly increases the risks of fully ensuring food security for individual regions and the country as a whole.

4. The consequence of this situation was the need for a complete revision of the development policy of the Russian AIC, stimulation of targeted government support for its key sectors, reorientation of the activities of economic entities to new forms and models, including in terms of the development of PSF.

5. The benefits and advantages of organizing cooperation between large agroholdings and smaller PSFs have been identified, which should form the basis for the formation of economic policy for the development of the Russian AIC in the near future.

6. To date, the potential of PSFs has not been fully realized. The development of PSFs is slow. The attitude towards PSFs as a sector that determines the future intensification of the development of the Russian AIC based on the introduction of innovative management and production technologies is not supported at the level of state economic policy provisions. The volumes of financial support allocated to PSFs by the state are clearly insufficient.

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SELECTION OF EFFECTIVE DEVELOPMENT STRATEGIES FOR SUBJECTS OF THE RUSSIAN AGRO-INDUSTRIAL COMPLEX BASED ON FORECASTING TOOLS

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Abstract. *In modern conditions, the justified application of forecasting tools for the formation of effective innovative strategies for their development is of primary importance for the subjects of the Russian agro-industrial complex. This circumstance predetermines the high relevance of the topic of this work. Since the process of forming innovative development strategies and making investment decisions is associated with many alternative options and risk, there is a need to improve the methodology of portfolio investment and assess the investment qualities of the entire arsenal of investment portfolio strategies in order to justify the choice of the most optimal one. This article reveals the issues of forming effective innovative strategies for the development of subjects of the Russian agro-industrial complex based on forecasting the dynamics of crop yields using a system of hybrid models.*

Keywords: *profitability, risk, portfolio theory, investment tool, forecasting system of models.*

Introduction

Modern research in the field of mathematical support for financial management includes the development of innovative development strategies and tools to improve the efficiency of decision-making when managing investments in individual stock assets. This area includes methods of technical analysis (C. Lebeau, D.V. Lucas, A. Elder, etc.), applied regression analysis and time series analysis (N. Draper, G. Smith, J. Seber, J. Box, G. Jenkins, I. Fisher, etc.). Another area relates to the theory of portfolio investments (works by G. Markowitz [1], W. Sharpe [2], J. Tobin, R. Merton, R. Roll, etc.). These studies are based on the analysis

of the combined effect of investments in various investment instruments, taking into account their mutual influence. Despite the variety of works on improving investment mechanisms in financial markets, the problem of coordinating various approaches and creating a comprehensive investment system has not received due development.

In addition, the process of forming innovative development strategies and making investment decisions is associated with many alternative options and risks. Investors willing to invest money face the problem of adequate and objective risk assessment and investment prospects. The above circumstances have predetermined the need to improve the methodology of portfolio investment and assessment of the investment qualities of the entire arsenal of investment portfolio strategies in order to reasonably select the most optimal one in relation to the activities of business entities in the agro-industrial complex.

This article is devoted to the issues of forming effective innovative development strategies for business entities in the agro-industrial complex based on forecasting the dynamics of crop yields using a system of hybrid models.

Purpose of the study

The purpose of the study is to develop effective innovative strategies for the development of business entities in the agro-industrial complex and improve methods for forecasting crop yields. This goal determined the need to solve the following problems:

- to propose the most preferable mechanism for constructing a forecast of crop yields;

- to conduct a comparative testing of the proposed mechanisms for forecasting crop yields.

Materials and methods

Achieving the set goal required:

a) assessing the forecasting capabilities of empirical models using information on exchange rate dynamics in stock markets;

b) formulating the methodological foundations of multi-factor portfolio modeling;

c) developing and verifying an arsenal of investment portfolio strategies synthesized on the basis of a hybrid system of models.

At the initial stage, a hybrid forecasting system is built based on the available historical data. Building a system of models is a two-stage procedure:

1) to assess the relationships between the investment instruments under study, a correlation analysis is carried out, and simultaneous regression equations are built:

$$y_i(k) = a_0 + \sum_{j=1}^{m} a_j y_j(k), j \neq i. \quad (1),$$

where y_i – investment instruments;

m – number of investment instruments used;

k – number of the year in which the research is conducted.

2) for each investment instrument, predictive models are synthesized, the initial form of which can be represented as follows:

$$y_i = a_0 + \sum_{j=1}^{m}\sum_{t=1}^{p} a_{jt} y_j (k-t). \quad (2).$$

After completing the stage of constructing forecast models and checking their suitability (on q_2), the following options are possible:

1. There is not a single model in the system that is suitable for generating forecasts.

In this case, the current time interval (bar) is skipped, i.e. the investment portfolio is not formed in this time interval.

2. The synthesized system of empirical models according to the selected quality criteria is suitable in full.

In this case, the investment portfolio is built for the studied set of investment instruments.

3. Verification of the models showed that not all models are suitable for practical application.

In this case, unreliable prognostic models are replaced by corresponding simultaneous models. The system of models obtained in this way will be called hybrid, since it includes models of different structures (simultaneous and prognostic).

If several suitable empirical models are obtained for some investment instrument (instruments), then in this case the resulting profitability forecast is formed by combining the forecasts [3].

Next we move on to forming an investment portfolio (unique for each moment in time) *k* from q_3). Into the portfolio at each step of the rolling verification from the initial number *m* investment instruments, only those for which positive yield values were obtained according to the prognostic models are included in the consideration [4]. For the convenience of further presentation, the adjusted number of investment instruments will again be designated – *m*. Let's write down the generally accepted restrictions: $(w_i \geq 0, i = 1,2,...,m,)$, where w_i – weight i-го investment instrument.

$$\sum_{i=1}^{m} w_i = 1. \quad (3).$$

We will determine the weights of investment instruments proportionally to the predicted value of profitability obtained using predictive models. For this purpose, we find the sum of the profitability forecasts:

$$S = \sum_{i=1}^{m} D(x)_i . \quad (4).$$

Then the weights of investment instruments can be determined from the expression:

$$w_i = \frac{D(x)_i}{S}. \quad (5).$$

Thus, we obtain the optimal investment portfolio for the current moment in time – for the *k-th* year. Having processed all time intervals from q_3, we obtain a series of points (D(x), Rs), where Rs is the risk level, according to which we construct the "Risk-Profit" model. [4].

The proposed approach was tested for the formation of investment strategies in global stock markets [5]. Based on data on the yield of treasury bills, common stocks, long-term government and corporate bonds and on changes in the consumer price index for 1986÷2013, simultaneous and predictive models were built. Data for 2014÷2023 were reserved for the final testing of the approach.

1. Correlation analysis showed that the yield on government and corporate bonds correlates very closely with each other.

2. Models were obtained for forecasting:

a) yield on treasury bills. Forecast lead time is one year;

b) changes in the consumer price index, which reflects the inflation rate in the USA.

3. In accordance with the portfolio theory, a scatter diagram was constructed based on the calculated estimates of expected yield and risk level (for 2013 (see Fig)).

The results obtained are fully consistent with generally accepted concepts: the minimum value for expected yield and risk over the above time interval was shown by treasury bills, and the maximum by ordinary shares, with bonds of both types occupying an intermediate value.

The "Risk-Yield" model has the following form:

$Dx = 0{,}64Rs; R^2 = 0{,}93.$ (6),

where Dx – profit, Rs – risk.

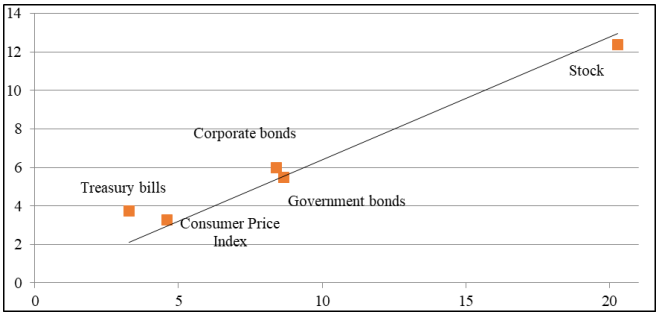

Figure. *Scatterplot for 2013.*

The synthesized model of profitability forecast was tested on data for 2014÷2023.

The forecast values of yield on treasury bills in the period under consideration are positive and correlate with historical data at a satisfactory level. $r = 0{,}67$. Here r is the correlation coefficient.

Thus, both studied approaches based on portfolio analysis and based on a hybrid system of models consistently recommend purchasing treasury bills.

Results and discussion

Based on the methods and materials described above, methodological recommendations for forecasting crop yields were developed. Their direct implementation in the practical activities of business entities in the agro-industrial complex will contribute to the formation of effective innovative strategies for their development.

The models presented below were built on statistical data on the dynamics of crop yields for a number of agricultural crops for the period from 2014 to 2023 with a time interval of one year [4].

The original sample of statistical data is divided chronologically into two non-overlapping subsamples: educational – q_1 and verification – q_2. The input variables used are the prices of the crops under study: grains and legumes (Y), sugar beets (S), sunflower (P), potatoes (Kr) and vegetables (O).

The training subsample is used to synthesize predictive models of optimal complexity. Namely, on q_1 unknown coefficients of candidate models are found, then the constructed models are verified for the quality of the forecast q_2.

Initially, to assess the relationship between the above-mentioned agricultural crops, a correlation analysis was conducted, from which it follows that the dynamics of the yield of all the studied crops closely correlate with each other, with the exception of the yield of potatoes.

The formation of a hybrid system of prognostic models is carried out in two stages.

At the first stage, forecasting models were developed.

Following E. Harvey [7] and K. Dougherty [3], a system of simultaneous forecasting models was built for the studied crops. Thus, for forecasting the yield of grain and legumes, a simultaneous model in general can be represented as follows:

$$Y(k) = a(0) + a(1)\times S(k) + a(2)\times P(k) + a(3)\times Kr(k) + a(4)\times O(k) \quad (7),$$

where k – time period number.

This formulation of the forecasting problem, in the opinion of the authors, seems quite reasonable, since the studied agricultural crops (in the general sense) function “in the same” environment and, therefore, can demonstrate stable statistical relationships. The presence of such relationships, in turn, allows us to synthesize models suitable for forecasting.

For each agricultural crop, models of the type presented above were constructed. For this, it was necessary to identify unknown coefficients and exclude from consideration those terms from the original structure for which the errors of the coefficients calculated with a confidence level of 95% turned out to be greater than the moduli of the coefficients themselves.

Then, having a certain set of price values for sugar beet, sunflower, potato and vegetables that do not belong to the training sample q1, not only was the suitability of the model tested, but also the predicted values of the yield of grain and leguminous crops were calculated.

Thus, models of this type (7) allow:

1) to quantitatively assess the interdependencies between the dynamics of the yield of the agricultural crops under consideration;

2) get an answer to the "what-if" question, i.e. calculate some scenarios for further developments.

The obtained models, based on the known values of the right-hand sides, allow us to calculate the corresponding values of grains and legumes, sugar beets, sunflowers and vegetables. An exception is the model for predicting potato yields, since its quality criterion does not meet the necessary requirements (R2 = 0.50). In this regard, we will call the resulting system a weakly coupled system of simultaneous equations.

At the second stage, prognostic models of optimal complexity were developed.

For a more complete picture of the dynamics of crop yield, auto- and cross-correlation analysis was carried out for all studied agricultural crops with lags of 1, 2, 3, 4 and 5. The conducted correlation analysis showed that the order of the autoregressive equation is $p < 4$.

In general, models were constructed with lags of 1-3 years for the input variables Y(k), S(k), P(k), Kr(k), O(k), starting with the equation:

$$Y(k) = a(0) + a(1)\times Y(k-1) + a(2)\times Y(k-2) + a(3)\times Y(k-3) + a(4)\times S(k-1) + a(5)\times S(k-2) + a(6)\times S(k-3) + a(7)\times P(k-1) + a(8)\times P(k-2) + a(9)\times P(k-3) + a(10)\times Kr(k-1) + a(11)\times Kr(k-2) + a(12)\times Kr(k-3) + a(13)\times O(k-1) + a(14)\times O(k-2) + a(15)\times O(k-3) \quad (8).$$

Not all presented models are suitable for direct application in practice. The following forecast models meet the requirements of practice: yield of grain and leguminous crops, sunflower and vegetables. The model for forecasting the yield of sugar beet cannot be used directly, since the quality criterion of this model is $R^2 = 0.64$.

To improve the efficiency of investment decisions, we will replace the forecast equation with the previously obtained simultaneous equation, which has a significantly higher value of the determination coefficient. Thus, it is finally recommended to use a hybrid system of models containing both simultaneous models

and forecast models for the practical development of innovative strategies for the development of business entities in the agro-industrial complex. In general, the structure of such an equation (for forecasting the yield of grain and leguminous crops) can be presented in the following form:

$$Y(k) = a(0) + a(1)\times Y(k-1) + a(2)\times Y(k-2) + a(3)\times Y(k-3) + a(4)\times S(k-1) + a(5)\times S(k-2) + a(6)\times S(k-3) + a(7)\times P(k-1) + a(8)\times P(k-2) + a(9)\times P(k-3) + a(10)\times Kr(k-1) + a(11)\times Kr(k-2) + a(12)\times Kr(k-3) + a(13)\times O(k-1) + a(14)\times O(k-2) + a(15)\times O(k-3) + a(16)\times S(k) + a(17)\times P(k) + a(18)\times Kr(k) + a(19)\times O(k) \quad (9).$$

In the problem under consideration, it was not possible to synthesize a model for forecasting the dynamics of potato yield. Consequently, further investment analysis in the time interval under consideration will be carried out on a truncated list of crops: grain and legumes, sunflower, sugar beet and vegetables. If several suitable models are obtained for a certain crop, then in this case the resulting yield forecast is formed by combining the forecasts.

Conclusion

Based on the results obtained in the course of the conducted research, the following conclusions can be formulated:

1. In the process of forming innovative development strategies and making investment decisions, there is a need to choose the most optimal option from a variety of alternatives. This, in turn, implies further improvement of the methodology of portfolio investment and assessment of the quality of options for innovative development strategies based on specialized tools for forecasting the dynamics of agricultural crop yields.

2. As such a tool, a hybrid forecasting system is proposed, which has its own algorithm for constructing using statistical data for certain time periods.

3. The introduction of hybrid systems of production management models obtained in the course of the conducted research into the practical activities of economic entities of the agro-industrial complex can be used to improve the development of innovative strategies for their development.

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CURRENT ISSUES OF DEVELOPMENT OF THE INVESTMENT MARKET OF THE REPUBLIC OF ARMENIA

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Annotation. *In the conditions of a modern market economy, the development of the economy and society largely depends on the possibilities of attracting private investment. In any country, the level of investment has a significant impact on socio-economic processes and is manifested by a corresponding change in the main macroeconomic indicators. At the macro level, investments ensure the competitiveness of the country, sustainable economic growth and an increase in the standard of living of the country's population, as well as the sustainable development of individual industries and sectors of the economy due to the constant modernization of production and the introduction of new technologies. An important condition for attracting investment is the presence of a developed investment market, the creation of a favorable investment environment and ensuring an adequate level of investor protection, which helps to increase the attractiveness of the economy from the point of view of foreign and local investors.*

Keywords: *Investments, investment policy, macroeconomics, microeconomics, national income, gross domestic product.*

Analysis of the dynamics of investment flows in the RA shows that over the past decade they have demonstrated a downward trend, which is due to the insufficient development of the investment market in our country, the low attractiveness of the investment environment and the insufficient efficiency of investment activities. state investment policy.

In order to clarify the development paths of the investment market, it is of primary importance to identify and analyze the main obstacles to the development of the industry and their characteristics, as well as to develop a state investment policy aimed at improving the investment market with clearly defined priorities.

At the same time, especially in the RA with a transition economy, the development of an effective investment policy and its consistent application, taking into

account the imperative of producing material goods that meet the modern needs of the world economy, cannot be implemented in isolation from the current global political and economic processes. In the modern era, no country in the world can survive in isolation, and regardless of the reality of what level of economic development the country has, what resources it has, how integrated it is into the world economic system, the solution to any problem of domestic economic development is considered in the logic of global processes. Therefore, the adaptation of investment policy to the constantly changing requirements of the world market is beyond doubt.

The issues of promoting investments in the domestic market of the Republic of Armenia, increasing their efficiency, encouraging investment initiatives do not lose their relevance, and in the current situation, when our country is faced with a security problem, the activation of investment activities is becoming an issue on the agenda.

The development of the economy and society, both from the point of view of general and individual business entities, largely depends on the possibilities of attracting investment. It is indisputable that the level of investment attractiveness in any country has a significant impact on the socio-economic situation, including such key macroeconomic indicators as economic growth, national income and employment level.

From the point of view of conceptual understanding of investments, the famous American researcher, Nobel laureate V. Sharpe's definition. According to Sharpe, an investment is considered to be "the giving up of a certain value at the present time with the aim of getting rid of this value in the (possibly indefinite) future" [1].

Based on this interpretation of investments, two key aspects of the properties characteristic of investments can be identified. Firstly, this process is usually associated with certain risks, and secondly, it is somewhat extended in time.

One of the important features of investments is the ability to consider them at both the micro and macro levels. At the micro level, investments imply any investment of funds in economic activity with the aim of making a profit in the future. The latter are associated with the implementation of structural, organizational, managerial and other functions of enterprises and are determined by the market situation. Investments at the micro level are necessary for the purposes of expanding and developing production, major repairs, replenishment and modernization of fixed assets, increasing the competitiveness of products, implementing resource-saving and environmental measures, etc. Investments at the macro level ensure the competitiveness of the country, sustainable economic growth and, on its basis, an increase in the standard of living of the country's population.

The investment process is closely linked to the country's economic system, and this connection is of a very mutual nature. Activation of investment activity

is important from the point of view of ensuring the normal flow of economic relations, as well as sustainable economic growth, and at the same time, a normal investment process is impossible without economic, social and legal support from the state. state.

The trends recorded in the global economy over the past 20 years indicate that attracting foreign direct investment continues to be an important political goal for many countries around the world, and the movement of global investment flows, in addition to geopolitical and raw material factors, is most influenced by government regulation of investment activities. In total, in 2020, 152 investment regulation measures were adopted in 67 countries around the world, which in one way or another affected foreign investment. This number of measures exceeds last year's figure by approximately 42%. At the same time, the share of restrictive measures has increased. The latter accounted for 41% of the total number of events [2].

A study of investment incentive and restrictive measures trends in different countries of the world, 2008-2020 period shows that the number of incentive measures in 2008-2010 as part of the policy aimed at overcoming the global financial and economic crisis, after an upward trend, they generally had a downward trend until 2015, despite a slight increase in 2012.[3]

Many countries have simplified investment-related administrative procedures, and some have expanded existing investment promotion regimes to attract more foreign investment. Liberalization measures have mainly affected agriculture, mining, defense, financial services, transportation, pharmaceuticals, and digital technologies.

The Republic of Armenia has been a member of the Eurasian Economic Union (EAEU) since 2015. The Union also actively discusses investment opportunities of the Eurasian Economic Union countries, the creation of a favorable business environment and prospects for investment cooperation, and has developed proposals for the development of cooperation. EAEU states in this area, overcoming the negative consequences of crises and deepening integration cooperation within this structure. The Union member countries have committed not to worsen the conditions for doing business and to provide additional guarantees for investment. Another important advantage of the Union is the application of the national regime or the most favorable conditions for investors from the EAEU countries, as well as the elimination of quantitative and other restrictions on investment. Moreover, the functioning of the single market for EAEU services is also a stimulating factor for activating investment flows into the economies of the EAEU member countries.

A study of the structure of the RA capital market shows that in 2020, as of January 31, the main part of the market was occupied by government bonds, accounting for 11% of GDP, while the volume of corporate bonds in circulation and the capitalization of equity securities amounted to 3.4% and 2.3% of GDP, respectively [4].

2019 During this period, the volume of trading operations with corporate securities and government bonds of the Republic of Armenia on the Stock Exchange (ASE) amounted to 100 billion drams, and outside the exchange - about 900 billion drams. The majority of secondary circulation was accounted for by trading in government securities of the Republic of Armenia. The corporate bond market remains quite small, despite the favorable regulatory environment and a number of reforms implemented in this sector. 2020 As of January 31, there were 19 issuers, including 11 commercial banks, 4 credit institutions, 3 real sector companies and 1 international organization. The total volume of corporate bonds in circulation amounted to about 220 billion drams, of which about 78% were denominated in foreign currency (171 billion drams), 22% - in drams (49 billion drams) [5].

There are practically no issues of equity securities in the RA. In 2019, only one issue was made in the amount of 320,320,000 drams, and in 2018 - 2 issues of preferred shares with a nominal value of 6,369,000,000 drams [6]. In September 2019, the 3rd issue of Eurobonds was made in the total amount of 500 million US dollars, with a maturity of 10 years and a coupon income of 3.95%, and in 2021 - the 4th issue in the amount of 750 million US dollars, with a maturity of 10 years and a coupon income of 3.6%. Obviously, the issue of sovereign Eurobonds was an important step for the state to present Armenia in a positive light in the international financial market and increase the demand of foreign investors for other local financial instruments.

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However, despite this large investment potential, the small volume of high-quality capital market instruments means that pension funds are cautious about funding the private sector.

The study of the structure of investors in debt securities shows that the number of investors who are really active in this market is higher. 2020 As of January 31, the number of investors in corporate bonds was 2705, while in government bonds and Eurobonds - 739 and 21, respectively. 2020 At first, there were only 2 state investment funds and 23 non-state funds operating in the RA. At the same time, the size of the assets of all funds was only 23.3 billion drams, more than 60% of which

were invested in RA government securities. It is obvious that the investment fund industry in our country is in its infancy and does not yet have much significance as an investor in the capital market.

Investment companies occupy a small part of the market (0.9%) and do not have a significant impact on the formation of investment demand in the capital market. There are 12 investment companies operating in the RA securities market, with total assets amounting to 63 billion drams. Investments in equity securities in the sector are insignificant, and investments in debt instruments account for 12% of assets, of which 7% are investments in government securities.

Credit institutions are the second largest in terms of assets, managing about 10% of the financial system's assets[8].

The involvement of active foreign investors in the Armenian investment market is very low. 31.01.2020 Currently, there are about 1,418 foreign investor accounts in the custodial system, but at least 30% of them have a zero balance. 90% of foreign investors' investments were made in equity securities[9]. Such a high level of investment in equity securities is due to the fact that the shareholders of a number of large companies are foreign individuals, and it should be taken into account that these individuals operated in the non-public capital market and did not have a major impact on public market demand.

The indicators selected for analysis are gross domestic investment (GDI), gross domestic product (GDP), foreign direct investment (FDI), trade turnover and exports (turnover). Consider the following interdependencies:

- GDP – VVI,
- GDP-FDI,
- Trade turnover – VVI,
- Trade turnover-FDI,
- Export – VVI,
- Export-FDI.

In order to have a stationary series, a transition was made to a logarithmic series. First, the correlation matrix between the selected indicators was calculated (Table 1).

From the cross-correlation matrix it is evident that only the export-FDI relationship is weak and moderate, the GDP-FDI relationship, and the trade turnover-FDI relationship. For this reason, we limited ourselves to describing the nature and strength of the relationship. In particular, the relationship is direct, i.e., the growth of one index leads to the growth of the other index. It should also be noted that the GDP-FDI and FDI indicators showed a parallel trend in 76% of cases during the period under study.

Then, the regression models of the corresponding pairs were considered.

The following linear regression models were constructed:

$$\ln(GDP)=c1+c2 \times \ln(GDI)+\varepsilon 1$$
$$\ln(T\text{urnover})=c3+c4 \times \ln(GDI)+\varepsilon 2 \quad (1.1)$$
$$\ln(E\text{xport})=c5+c6 \times \ln(GDI)+\varepsilon 3$$

Table 1

Matrix of cross-correlation of indicators

Matrix of cross-correlation of indicators (orrel. matrices)	VVI	GDP	FDI	Trade	Export
VVI	1	0.81	0.87	0.84	0.67
GDP	0.81	1	0.51	0.98	0.96
FDI	0.87	0.51	1	0.56	0.34
Trade	0.84	0.98	0.56	1	0.94
Export	0.67	0.96	0.34	0.94	1

GDP, trade turnover and export are the explanatory variables, and the regressor is GDP. $c1,c2,c3,c4,c5,c6$ - unknown parameters of the models, and $\varepsilon 1,\varepsilon 2,\varepsilon 3$ - random variables expressing the error of the models.

The results of the assessment are as follows:

$$\ln(GDP)=6.15+0.39\times\ln(GDI)$$
$$\ln(T\text{urnover})=2.89+0.71\times\ln(GDI) \quad (1.2)$$
$$\ln(E\text{xport})=2.60+0.58\times\ln(GDI)$$

As an interpretation of the obtained results, it can be stated that the correlation coefficient is calculated above. The elasticity coefficient is 1.003, which means that a 1% increase in GDP leads to a 1.003% increase in GDP. The approximation error is 1.88%, which indicates good approximation quality. This means that the deviation between the actual and approximate values is 1.88% on average. The determination coefficient is 0.66, which means that 66% of the variation in GDP is explained by GDP. The model regressor is significant according to the Student's criterion, the t-statistic is 6.08, and the corresponding table value is 2.43, the observed value is greater than the table value, so it is significant, and the significance level, P-value is 0.000132, so we have a confidence level of 99 percent. According to the Fisher criterion, the F statistic is 37:03, and the tabular value is 4:38, the observed value is greater than the tabular value, so the model is significant. For the autocorrelation test, we will use the Durbin-Watson statistic, it is 1.65, so there is no autocorrelation. Let's check the hypothesis of heteroscedasticity using the

Spearman rank correlation coefficient. The Spearman rank correlation coefficient is 0.35, we assume the hypothesis that the coefficient is zero, while the competitor has the opposite. The critical value is 0.52, the tabular value is 2.44, the tabular value is greater than the critical one, so the coefficient is not significant, that is, the hypothesis of the absence of heteroscedasticity is accepted. The hypothesis of normal distribution of residuals was tested using the RS statistics, RS is 3:1, the interval includes the interval of acceptance of the hypothesis of normal distribution (2:7-3:7), so the residuals are distributed normally.

Thus, the GDP-GDI relationship is direct, significant, the quality of the model approximation is high, the obtained estimate - the value of the elasticity coefficient is applicable.

Urban factors have a particularly strong influence on the development of the investment market, as evidenced by the significant attention paid to them in international expert assessments. Foreign investors attach primary importance to these factors, since for the latter, the political stability of the investor country, the geopolitical position of the region, the level of interstate relations, etc. are of primary importance.

Along with the analysis of international structures' assessments regarding the attractiveness of the investment field of the Republic of Armenia, which specifically concern the assessment of political risk, an assessment of the investment environment of the Republic of Armenia based on expert surveys was also highlighted. Based on the questionnaire proposed by the author, an expert survey was conducted among 19 experts who have a clear opinion and position regarding the investment environment. Representatives of leading banks, insurance companies, leading firms in the industrial sector, as well as experienced academic scientists were involved in the survey as experts.

Undoubtedly, stable investment processes in any country depend on the introduction of the latest scientific and technological achievements into production and, consequently, on high rates of scientific and technological progress, increased labor productivity, both at the level of the entire economy and at the level of individuals, sectors, industries and organizations.

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ETHICAL RISKS OF PROFESSIONAL ACTIVITIES OF AN ADVOCATE AND WAYS TO MINIMIZE THEM

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Abstract. *In the article, the author examines the ethical issues of the relationship between a lawyer and a client. The author draws attention to cases of non-compliance with ethical standards by both novice lawyers and lawyers with extensive professional experience. Having identified a number of reasons for the unethical behavior of an advocates, the author points out the negative consequences of such behavior and the risks to which both an advocates who violate ethical standards and their clients are exposed. In conclusion, the author formulates a number of measures aimed at minimizing the ethical risks of the professional activity of an advocate.*

Keywords: *advocate, ethics, ethical standards, ethical risks of the professional activity of an advocate, risk minimization.*

Moral issues in relationships between an advocate and a client have always been of significant importance, which is reflected in both international and internal acts of the advocate community of the Russian Federation. Thus, in paragraph 1.2.1. The General Code of Conduct for Lawyers in the European Union,[1] the ethical rules are intended, through their voluntary compliance by those to whom they apply, to ensure that advocates carry out their duties in the best possible way, as is necessary for the proper functioning of any human society. The Basic Principles on the Role of Lawyers[2] also state that advocates, when assisting their clients in the administration of justice, must seek to ensure respect for human rights and fundamental freedoms recognized by national and international law, and must always

[1] Code of Conduct for Lawyers in the European Union was adopted by the Council of the Bar and the Law Society of the European Union in Strasbourg on 28 October 1988, revised in Lyon on 28 November 1998, in Dublin on 6 December 2002 and in Porto on 19 May 2006. // https://fparf.ru/documents/international-acts/general-code-of-rules-for-advocates-of-countries-of-the-european-community/

[2] Basic Principles on the Role of Lawyers were adopted by the Eighth United Nations Crime Congress in August 1990 in New York. // https://normativ.kontur.ru/document?moduleId=1&documentId=175940

act freely and persistently and in accordance with the law and recognized professional standards and ethical norms.

Clause 1 of Article 1 of the Code of Professional Ethics of Advocates (hereinafter referred to as the CPEL) establishes "rules of conduct that are mandatory for every advocate in the exercise of legal practice, based on the moral criteria and traditions of the legal profession, on international standards and rules of the legal profession…".

The norms of the Code of Professional Ethics of an Advocate require advocates to maintain the honor and dignity inherent in their profession under all circumstances (clause 1 of Article 4 of the Code of Professional Ethics of an Advocate), and in cases where issues of professional ethics of an advocate are not regulated by the legislation on advocacy and the bar or the Code of Professional Ethics of an Advocate, an advocate is obliged to observe the customs and traditions established in the bar that correspond to the principles of morality in society (clause 3 of Article 4 of the Code of Professional Ethics of an Advocate).

At the same time, ethical standards are not always observed by advocates, as evidenced by the data presented in the Report of the Council of the Russian Federal Bar Association (RFBA) the period from April 2021 to April 2023. For example, during the specified period of time, the qualification commissions of the bar chambers of the constituent entities of the Russian Federation considered 10,059 disciplinary cases, based on the results of which 6,590 conclusions (65.5%) were issued on the presence of violations of standards in the actions (inactions) of advocates[3]. At the same time, penalties in the form of reprimands and warnings were applied to 5,694 advocates (86.4%), and the status was terminated for 896 advocates (13.6%).[4]

There are different opinions in academic circles about the reasons for unethical behavior of advocates in the process of providing qualified legal assistance. One of the reasons identified by researchers is the lack of experience in the professional activities of advocates who have recently acquired the status. Lack of experience in professional activities can lead to the mistaken understanding that any potential ethical problems can be easily overcome,[5] and also lead to the mistaken identification of ethical behavior by advocates with compliance with minimum standards.

[3] The report of the Council of the Federal Chamber of Advocates of the Russian Federation for the period from April 2021 to April 2023 was approved by the XI All-Russian Congress of Advocates on April 20, 2023. P. 44. // https://fparf.ru/documents/fpa-rf/the-documents-of-the-council/otchet-soveta-federalnoy-palaty-advokatov-rf-za-period-s-aprelya-2021-g-po-aprel-2023-g/

[4] The report of the Council of the Federal Chamber of Advocates of the Russian Federation for the period from April 2021 to April 2023 was approved by the XI All-Russian Congress of Advocates on April 20, 2023. Pp. 44-46. // https://fparf.ru/upload/medialibrary/c1e/y1ape23956d6gzqpc9uo1vpous0b1m7w/Otchet-Soveta-FPA_2023.pdf

[5] Jennifer K. Robbennolt & Jean R. Sternlight, Behavioral Legal Ethics, 45 ARIZ. ST. L.J. 1007, 1116 (2013).

This approach is very narrow, reducing "ethics" to determining whether disciplinary rules apply to specific issues. When the rules do not apply to the current situation, advocates may stop thinking about the ethical consequences of their decisions.[6]

At the same time, not only novice advocates can neglect ethical standards in the process of carrying out professional activities, but also advocates with extensive experience in professional activities. One of the reasons for the unethical behavior of advocates with extensive experience in providing qualified legal assistance may be professional deformation. Thus, according to R.A. Maruste, "the moral character of a person starting to work as an advocate has already been basically formed in a previous life, and the atmosphere of advocate activity only either limits or accelerates the manifestation of deviations"[7].

Along with the reasons indicated, researchers also point to other reasons for non-compliance with the norms of professional ethics by both novice advocates and advocates with experience in professional activity. These are reasons such as the stratification hierarchy of the profession[8], macroeconomic changes in society as a whole,[9] and others.

The increase in the number of ethical risks in the activities of advocates is also facilitated by the realities of the present time. For example, advocates are exposed to risks associated with the ethical aspects of advocacy due to the widespread use of the capabilities of the information and telecommunications network "Internet". Currently, many advocates maintain websites, personal blogs and use other modern opportunities to inform potential clients about themselves. At the same time, the use of social networks in the professional activities of an advocate is associated with a number of risks[10].

At the same time, agreeing with A. Krokhmalyuk, we consider it important that "trying to fit into the media field and use it for his own purposes, an advocate must position himself as a member of a professional corporation, take into account its interests and be guided by its rules, and belonging to this corporation, in turn, should contribute to his advancement both in the media field and in the legal services market"[11].

[6] *Jennifer K. Robbennolt & Jean R. Sternlight*, Behavioral Legal Ethics, Vol. 45 Arizona State Law Journal, 2013. P. 1127

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Failure to comply with ethical standards in the process of providing qualified legal assistance leads to the emergence of risky situations for both the advocate and his clients, loss of respect for the institution of advocacy and loss of public trust. In order to prevent such outcomes, the advocacy community directs its efforts to maintaining moral principles among its members. In accordance with the requirements of the Code of Professional Ethics of an Advocate, violation by advocates of the requirements of the legislation on advocacy and the bar and the CPEL, committed intentionally or through gross negligence, entails the application of disciplinary measures (clause 1 of Article 18 of the CPEL). In addition, the Ethics and Standards Commission was created and is functioning, which is a collegial body of the Federal Chamber of Advocates of the Russian Federation, and which provides clarifications on the application of the CPEL. These clarifications are mandatory for both individual advocates and bar chambers of constituent entities of the Russian Federation (clause 1 of Article 37.1 of the Federal Law "On Advocacy and the Bar in the Russian Federation"); (clause 1, article 18.2 of the Code of Advocates' Ethics).

At the same time, such a fairly wide range of risky situations in which an advocate can make a decision ignoring ethical standards requires taking additional measures to minimize ethical risks. These can be both preventive measures, such as organizing additional training for heads of advocacy organizations in order to eliminate cases of their ignoring unethical behavior of members of advocacy organizations, and measures taken after violations have been committed. Such measures can include analyzing the most common cases of unethical behavior of advocates during classes to improve the professional level of advocates and trainee advocates.

Only strict compliance by each advocate with the requirements of the profession, respect for the honor and dignity of the individual, and self-respect will help to eliminate the ethical risks of professional activity.

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THE LEGAL NATURE OF THE TAKEOVER OF A COMPANY IN RUSSIA AND FOREIGN COUNTRIES

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Annotation. *This article is devoted to the study of the peculiarities of the acquisition of companies under Russian law through the prism of the analysis of foreign legislation regulating the acquisition of companies in the USA, Great Britain, China, Brazil and South Africa.*

Keywords: *company takeover, reorganization, deal, shares.*

The mergers and acquisitions market, also known as M&A, is an integral part of any market economy. FRANK MEDIA, citing the AK&M news agency, reported that 536 transactions worth $50.59 billion were carried out in 2023, which was the highest figure since 2019 [3]. According to BCS EXPRESS, citing the London Stock Exchange Group and the Financial Times, the volume of mergers and acquisitions (M&A) increased by 30% in the first quarter of 2024 and reached $690 billion [2]. These data indicate that the M&A market is relevant in the context of current political and economic transformations, and issues such as legal regulation of the takeover of a company in Russia are not only theoretical but also practical.

Currently, the legal nature of takeovers in Russia is uncertain. Thus, according to paragraph 5.1 of the Decree of the President of the Russian Federation "On measures to implement industrial policy in the privatization of state enterprises", takeovers are the acquisition by one company of a controlling stake in another company [4]. It can be concluded in due time that from the point of view of domestic legislation, takeovers are transactions, however, this is incorrect. As domestic and foreign practice shows, the takeover of an organization is not just the acquisition of an enterprise (Article 559 of the Civil Code of the Russian Federation) or the alienation of shares under a sale and purchase agreement (454 of the Civil Code of the Russian Federation), it is a more complex process, which

consists in a lengthy process of consolidating a controlling stake in one's hands. Also, in our opinion, it is incorrect to consider a takeover as a major transaction (Article 78 of the Federal Law "On Joint-Stock Companies"), since the defining feature of a major transaction is its price, equal to at least 25 percent of the book value of the company's assets, and since the capitalization of the acquiring organization usually exceeds the capitalization of the acquired organization several times, such transactions cannot be recognized as major. In turn, the takeover of an organization is complicated by the processes of preliminary audit of the acquired company, a non-disclosure agreement, and antitrust inspections. The takeover of a company can also occur during the buyout of accounts receivable at auction. Also, it is worth remembering about hostile takeovers. Thus, it is absolutely wrong to recognize a takeover as a transaction.

Further, it is logical to draw an analogy between acquisitions and mergers and assume that acquisition is a reorganization. However, in Article 57The Civil Code of the Russian Federation, which regulates the reorganization of a legal entity, does not contain any mention of absorption. Also, Chapter II of the Federal Law "On Joint-Stock Companies" and Chapter V of the Federal Law "On Limited Liability Companies", which regulate the reorganization of a legal entity, also do not contain any mention of takeovers. It is worth noting that on December 25, 2023, bill No. 519694-8 was introduced to the State Duma of the Russian Federation to amend the Federal Law "On Joint-Stock Companies", the Federal Law "On the Securities Market" in order to improve the legislative framework regulating relations associated with the acquisition of large blocks of shares of public joint-stock companies (takeovers) [1]. However, this bill does not provide any clarity on the status of takeovers in domestic legislation.

It can be assumed that the takeover is a reorganization. It is important to note here that there is no definition of reorganization in Russian legislation. However, domestic theorists, when defining the term "reorganization", highlight one important feature - during reorganization, a legal entity is terminated and a new one is created, which we do not observe during takeover, in connection with which we come to the opinion that takeover cannot be considered a form of reorganization.

There is also no uniform understanding of the nature of organizational takeovers in the foreign regulatory framework.

In the United States of America, the process of mergers and acquisitions is regulated by federal and state legislation. Federal legislation, such as the Securities Act of 1933, the Clayton Antitrust Act of 1914, the Securities Exchange Act of 1934, the Hart-Scott-Rodino Antitrust Improvements Act of 1976 declare general rules for securities transactions, establish antitrust restrictions and contain more declaratory rules. State legislation is more variable and its rules are definitive. The term reorganization appears in Title XI of the Bankruptcy Code and is recognized

as a form of bankruptcy. [19]. Based on the analysis of Article 14A of the North Carolina Business Corporation Act, reorganization is recognized as any significant changes in a corporation [16]. Chapter 8 of Title I of the Delaware Corporate Code distinguishes between the terms merger, consolidation and transformation. Based on the meaning of paragraphs 251, 255 and 256 of the above-mentioned acts, a merger is equated with a Russian accession, an association is equated with a merger, and a transformation is equated with a reorganization of a legal entity [13]. According to paragraph "A" of paragraph 6-501.1 of the Oklahoma Statutes of 2014, mergers are recognized as transactions [6]. Based on the meaning of paragraph 19-7-2 of the General Laws of the State of Rhode Island of 2022, acquisitions are recognized as transactions [9]. Subparagraph b of Article 7 of paragraph NRS 704.329 of the Nevada Revised Statutes of 2022 defines a merger, acquisition and change of control of an enterprise as a transaction [8]. Section 34(1) of Chapter 59A of the New Mexico Statutes of 2021 defines a takeover as an agreement, arrangement, or activity that results in the acquisition of control of another person and the acquisition of its assets [7]. Based on the above, we conclude that there is no uniform understanding of the legal nature of reorganization and takeover in US law, and the legislation is focused directly on regulating mergers and acquisitions rather than defining and disclosing the concepts.

According to established M&A practice in the USA, during an acquisition one company receives all the assets of another, these assets are subsequently integrated into existing business processes in order to strengthen its own position in the market. Examples of the most high-profile acquisitions include the acquisition of Warner-Lambert by the pharmaceutical company Pfizer, Inc. in 2000, the acquisition of Android Inc. by Google LLC in 2005, and the acquisition of Pixar Animation Studios by The Walt Disney Company in 2006. In all of the above cases, all assets are transferred from one company to another, with the subsequent strengthening of the acquiring company's position in the market without creating a new organization.

In the United Kingdom, under the Takeover Code, a takeover is a transaction aimed at acquiring more than 30% of the voting rights of a company [20].

In the People's Republic of China, according to Article 2 of the Interim Provisions on Mergers and Acquisitions of Domestic Enterprises by Foreign Investors dated 02.01.2023, mergers and acquisitions are transactions [15].

In the Federative Republic of Brazil, according to Articles 227, 228, 229 of the Corporation Law No. 6.404 of 15.12.1976, three types of reorganization of a legal entity can be distinguished: consolidation, division and merger [10]. Consolidation is an analogue of the Russian merger, consolidation is an analogue of division, but merger, based on the definition, is an operation to absorb one or more organizations, during which all rights and obligations are transferred to the acquiring organization.

In the Republic of South Africa, in accordance with Section 1 of Part A of the Companies Act of 08.04.2009, there is no definition of a takeover, there are only references to a merger, which is recognized as a transaction or series of transactions [12].

Based on the above, the following conclusions can be drawn:

Analyzing the doctrine, legislative framework and practical experience of takeovers in Russia and foreign countries, we can come to the conclusion that it is wrong to consider takeover as a form of reorganization of a legal entity or as a transaction. In our opinion, takeover is a complex set of legal and economic techniques aimed at gaining control over the acquired company, consolidating assets and further strengthening one's own position in the market. In view of this, we can make a logical conclusion that at present takeover is more of an economic term than a legal one.

At present, despite the fairly rich experience of M&A throughout the world, the question of the legal nature of the acquisition of companies still remains open, since domestic and foreign legislation does not provide a clear understanding of the nature of this phenomenon.

Thus, the legal nature of the takeover is uncertain, and it is inadmissible to consider the takeover as a reorganization of a legal entity or a transaction. The legislative framework of foreign countries is also imperfect and has a number of gaps, which is why it is not possible to borrow foreign experience.

In our opinion, the most logical approach would be to consider the acquisition as a complex set of legal and economic techniques aimed at gaining control over the organization, implementing it into one's own business processes, without creating a new legal entity.

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UNNAMED BUSINESS ASSOCIATION MODELS

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Annotation. *Modern Russian theory and law enforcement practice are quite contradictory in the issue of understanding an entrepreneurial association as a subject of civil law relations, which is due to the lack of sufficient experience in this area. The author emphasizes the need to create a holistic, scientifically grounded concept that reveals the nature and essence, methods of creation and organization of activities of entrepreneurial associations.*

Keywords: *simple partnership agreement, concern, consortium, corporation, business association.*

Rapid economic development and increasing complexity of business turnover have led to the emergence of new mechanisms of interaction between participants in civil legal relations. Today, one cannot help but notice entrepreneurial structures that are gradually being introduced into the Russian legal system. Such structures include concerns, consortiums, franchises, etc., i.e. new forms of cooperation between the industrial sector, scientific organizations, and other participants for the joint achievement of common goals.

In the domestic doctrine today very little attention is paid to external business relations; in most cases, Russian "corporatists" devote their works to problems related to internal relations, i.e., relations that develop between participants within a legal entity. However, in the legally developed countries of continental Europe, everything is somewhat different, since the emphasis of foreign authors is aimed at relations between corporations, those same external relations, the forms of their participation in each other [8, pp. 283-295]. In German and Austrian law, there is an entire sub-branch called "concern law".

Analyzing the literature devoted to entrepreneurial and corporate associations, we can identify the following types of associations that are not specifically identified by Russian legislation as entrepreneurial, but, in fact, are precisely that:

1. A concern is a rigid and centralized structure with a single management, where relationships are built on a contractual basis. A concern is generally simi-

lar to a simple partnership, but taking into account that the management belongs to the parent company. However, from the analysis of scientific works on this topic and identifying a concern with a holding, one can make an unambiguous conclusion about the possibility of forming a concern not only with the help of an agreement, but also through other instruments applicable to the formation of a holding. In addition, the integration form in the form of a concern differs from a simple partnership also in the presence of the participants of the partnership in property turnover as independent entities, while the participants of the concern act as dependent, controlled persons and conduct their business activities according to the course approved by the parent company. Concerns for Russian law are not a particularly new structure, since back in the USSR it was envisaged that enterprises could unite into concerns, and in the early 90s, concerns were not only associations, but were also endowed with the status of a legal entity. It is necessary to note the fact that concerns united entire industries, such as oil, gas, etc., however, as now in civil legislation, such an organizational and legal form was not mentioned. Today, various groups of companies should be recognized as an analogue of the Western European concern in the Russian Federation. At the same time, the term "concern" has become an integral part of the name of many legal entities, for example, JSC "Concern Pramo", JSC "Concern of Radio Engineering VEGA", etc.). Analyzing all of the above, we can state the fact that the concern mainly unites business entities on the basis of a joint activity agreement (simple partnership agreement). Moreover, many concerns are also part of an entrepreneurial association such as a holding (for example, Rossium Concern LLC is also a multi-profile investment holding[1]).

2. Consortium -a form of cooperation between the industrial sector, scientific organizations and other participants to jointly achieve common goals. For example, this is interesting All-Russian Association of Women's Public Organizations "Consortium of Women's Non-Governmental Associations"[2], which bases its activities on "the consolidation of society's efforts in implementing the principle of equal rights and opportunities for men and women in society, and enhancing the role of women's non-governmental organizations in the area of protecting women's rights."Belov A.P. notes that the consortium is a temporary association of not only legal entities, but also individuals (Russian and foreign), who have combined their capital to carry out entrepreneurial activities by constructing large facilities, producing machinery and equipment[1, p. 54]. The uniqueness of consortiums is that this association allows for the creation of innovations in production and the search for new markets. For example, one of the largest financial and invest-

[1] https://rossium.ru/?utm_source=yandex.ru&utm_medium=organic&utm_campaign=yandex.ru&utm_referrer=yandex.ru

[2] https://wcons.net/o-konsorciume/reports-and-documents/organization-documents/

ment consortiums in Russia is the Alfa Group consortium.[3]It should also be noted that Russia is not standing still, and the process of creating consortiums (one of the main tasks set in the strategy for the development of the information society) should be determined through the creation of cross-industry consortiums in the field of digital economy. based on the largest Russian Internet companies, banks, and telecom operators [9].

3. Cartel – an association of legal entities with the aim of effectively resolving issues related to the sale of products [3, p. 228]. At the same time, it should be noted that Russian legislation has a negative attitude towards this type of association, constantly fighting it. For example, in the Federal Law of the Russian Federation "On Protection of Competition" from Article 11, the legislator's ban on the creation of associations of legal entities in the form of a cartel is clearly visible. This position of the legislator is confirmed in the report of the FAS Russia, which notes that "In world practice, the creation of a cartel is one of the most dangerous types of violations in the sphere of competitive relations, since it causes enormous harm to the interests of the state in the economic sphere, and accordingly, the fight against cartels and other anti-competitive agreements is one of the most important areas of activity of the FAS Russia"[4].

4. Conglomerates are definitely similar to concerns built on a vertical type of management, since this type of association of legal entities is its subspecies. Both manufacturing enterprises and completely different structures can be combined into a conglomerate. For example, the International Financial Reporting Standard contains permission for both insurance and banking organizations to combine into a conglomerate.[6]A conglomerate, due to the broad provision of autonomy, is a more advantageous option for unification than a rigid vertical concern, but on condition that there are economically strong participants.

5. Corner is a type of corporate association, the purpose of which is the total concentration of capital in one entity with the aim of monopolizing the market for a certain type of product (products). Concentrated capital is necessary for the purchase of shares of individual joint-stock companies for their subsequent resale or for obtaining a controlling stake. Today, such business associations are practically absent in Russia and as an example we can cite the court case that was considered in Tatarstan in 2022 between Corner-Agent LLC and the Inter district Inspectorate of the Federal Tax Service [7].

6. A syndicate is an association of enterprises producing similar products. When legal entities form a syndicate, they generally retain their independence, with the exception of commercial independence, since the purpose of forming

[3] https://www.alfagroup.ru/

[4] Report on law enforcement practice, statistics of typical and mass violations of mandatory requirements with an explanation approved by the FAS Russia // The text of the document is given in accordance with the publication on the websitehttp://knd.fas.gov.ru

such a corporate association as a syndicate is to resolve sales issues. For this purpose, one, and most often a whole network of trading companies is created in its structure. However, the sale of products is not the only purpose of creating a syndicate. Thus, today in Russia, the legislator has allowed the organization of a syndicate, but only in a strictly defined area of activity and only for certain entities. As an example, we can cite the Federal Law "On Insolvency (Bankruptcy), Federal Law "On a syndicated loan (credit) and amendments to certain legislative acts of the Russian Federation" which speak of a "syndicate of creditors"[10, 11].

7. A pool is an association of organizations whose participants do not lose their legal independence, created to consolidate funds and minimize business risks in order to distribute the income received from joint activities at the end of the "pool" period. Pools have become widespread in the field of insurance, trade, exchange, patent and other services. Thus, in accordance with Article 14.1 of the Federal Law "On the Organization of Insurance Business in the Russian Federation", it is noted that insurance (reinsurance) pool - an association of insurers jointly carrying out insurance activities for individual types of insurance or insurance risks on the basis of a simple partnership agreement (joint activity agreement)[4].In this case, the concept of a pool is considered not only as an association of any entities, but also as a set of securities or other property.[12].

To sum up, it is necessary to note the following: today, in the age of "rapid" economic development, it is difficult to imagine not only large but also medium-sized businesses whose activities would be organized using only one legal entity [2, p. 5]. Today, the tendency towards the integration of legal entities into entrepreneurial associations are gaining momentum both in Russia and in foreign countries, since the current state of the market cannot be called stable, in connection with which, it is "easier for entrepreneurs to survive" as part of a group with the largest capital than to look for consumers and sales markets alone. One should agree with the opinion of Kashin N.A., that despite the absence of holdings, concerns, etc. in the Civil Code of the Russian Federation as independent organizational and legal forms, it is impossible to reject their presence and influence on the country's economy in today's realities [5, p. 3-9]. In this regard, in order to unify the legal regulation of the activities of business associations, it is necessary to amend paragraph 1 of Article 1041 of the Civil Code of the Russian Federation by adding paragraph 2 of the following content: "Associations of commercial organizations based on a simple partnership agreement (joint activity agreement) that do not have the status of a legal entity, for the purpose of carrying out their business activities, depending on the purpose of their creation, may be created in the form of a consortium, holding, syndicate, pool and other business association provided for by special legislation."

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EXPERIENCE OF THE EUROPEAN UNION AND THE COOPERATION OF INDEPENDENT STATES IN MIGRATION POLICY AND THEIR SECURITY ISSUES

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Abstract. *This article analyzes and reveals the significance of the EU migration policy experience for the CIS, the migration factor in Central Asia and its specific modern aspects, the impact of migration securitization processes on the security of Uzbekistan. In particular, when we compare the migration policy and experience of the CIS region, which is an important participant in international migration, and the European Union, it is shown that the CIS needs to carry out a lot of institutional and procedural work regarding immigration.*

Keywords: *migration, EU, CIS, securitization.*

Introduction

Migration is a social phenomenon that characterizes the state of the modern world order. Despite the fact that the desire to migrate is inherent in humans and has been observed several times over the centuries-old history of mankind, the unprecedented scale of modern migration flows is surprising. According to the International Organization for Migration, in 1970 there were about 43 million migrants, and in 1990 the number of migrants tripled to 128 million. reached 10 people, and by now (according to 2024 data) their number worldwide has exceeded 281 million and every 30th person in the world has become a migrant, which clearly shows the impact of migration processes on the system of international relations. . Indeed, we are now living in a period of mass migration. Globalization of the world economy and geopolitical instability in some regions of the world cause a large-scale increase in the impact of migration processes on society and countries. In the context of global migration, the European Union (EU) and the Commonwealth of Independent States (CIS) face many migration problems. It should be recognized that the EU has extensive experience in the field of migration, so we see that it solves migration issues more effectively than the CIS, and responsibly approaches the provision of good conditions for labor migrants and their rights. The Importance of EU Migration Policy for the CIS

The first and main reason why migration regulation within the CIS is not properly organized and does not have perfect mechanisms, as in the EU, is that the CIS does not have higher powers and authority than countries such as the EU. The CIS, created in 1991 and began its activities in 1993, is an organization for cooperation of post-Soviet countries, the participating countries cooperate in the social, legal and economic spheres, and also have agreements on a visa-free regime.

According to researchers, documents and agreements on migration issues adopted within the CIS usually remain declarative. In particular, the Eurasian Economic Union (EAEU) guaranteed the free movement of workers and equal protection of their rights as citizens of the host country in the context of migration, but state and non-governmental organizations protecting the rights of immigrants were not effectively created, and mechanisms for the protection of their rights were not developed for immigrants. Immigrants' rights are often violated because there are no mechanisms in place to enforce court decisions on migration issues, as in the European Union[1].

At the same time, from the point of view of labor relations, the difference between the EAEU and the European Union is that the labor activity of citizens of the EAEU member states in the Russian Federation is regulated by Russian labor legislation, in which case national legislation may prevail over the decisions of the EAEU. The EU requires the adaptation of national legislation to the decisions of the Council of Europe, as well as the development of clear and perfect mechanisms for the implementation of decisions and agreements adopted at the Union level. On the other hand, the mechanisms for compliance with laws and decisions and their implementation in the EAEU are weak, and the agreements and decisions of the Union are sometimes not implemented or their implementation is replaced by internal procedures. In particular, the Arbitration Court is a dispute resolution body and is authorized to interpret and clarify the laws of Arbitration. In theory, this should be a higher body, whose decisions are recognized by the EAEU member states. However, the judges of the Court of the International Court of Justice themselves, K.L. Chaika and T.N. Neshataeva acknowledges that the decisions of the International Court of Justice are not binding on member states, which in turn "leads to a lack of legal certainty and stability and affects the rights and freedoms of citizens." In addition, there are no enforcement mechanisms (sanctions, fines, etc.) in the event of non-compliance with court decisions[2].

Another important issue is the solution of immigration problems in the European Union by democratic means, protection of the rights of immigrants, not

[1] Davletgildeev Rustem Sh. International legal regulation of labor migration in the Eurasian region: an attempt to get closer to the freedom of movement of workers in the EU? Journal of Social Policy Studies. Vol. 16. No. 4. 2018. – P. 595-610. Umida Khaknazar, Ziyodullo Parpiev, EAEU: Joining cannot be postponed. January 30, 2020, https://www.gazeta.uz/ru/2020/01/30/eeu/

[2] Umida Khaknazar, Ziyodullo Parpiev, EAEU: Joining cannot be postponed. January 30, 2020, https://www.gazeta.uz/ru/2020/01/30/eeu/

only socio-economic, but also political (for example, elections and participation in elections) and cultural (for example, promotion of identity and traditions of diasporas), while support for integration into the life of the host country has begun (for example, organizing free language courses and cultural events). In the EAEU, there is almost no opinion and legislation on the political and cultural rights of immigrants. In addition, practical and legal work and instructions on democratic approaches to solving immigrant problems, a fair judicial system, participation of non-governmental organizations, legal assistance to immigrants, support for the integration of immigrants have not been established. Also, a provision prohibiting discrimination against employees of member states on the basis of their citizenship must be added to the agreement on the EAEU, and provisions on the legal regulation of labor migration of third-country nationals must be included in the agreement on the EAEU[3].

Politicization and Securitization of Immigration in the CIS

Across Europe, including Russia, there is a trend of growing migrantophobia and xenophobia, which is forcing governments to securitize migration, both justified and unjustified. Alexey Makarkin, an expert who compares the securitization of migration and anti-migration movements in Europe and Russia, explains the differences between them as follows: In Russia, the topic of migration arises in two cases, - says the political scientist. Firstly, in elections, for example, in the mayoral elections of Moscow in 2013, there was not a single pro-immigrant candidate, the expert recalls: “There are no pro-immigrant parties in Russia. When an anti-immigrant wave rises in Europe, there will always be political forces that talk about the need to integrate immigrants. A person who wants to be elected somewhere in our country will never say such things.” According to Makarkin, this is due to the conservatism of Russian society: Russian liberals are Western conservatives, and Russian conservatives are Western far-right radicals. At the same time, in Russia there is no voting for migrants, and migrants do not influence the electoral process, as, for example, in France. The second moment when this topic arises is when an immigrant commits a high-profile crime: “Experts remember cases of similar crimes committed by local residents, but they do not give in to emotions and do not think about expertise. The situation with migrants is different. The authorities either tighten migration rules, or solve a specific problem, or use their agenda in their own interests and legitimize the activities of the far right as much as possible. And all these rules are still applied[4].

The Central Asian region, as a migrant-sending country, faces serious migration problems. On the one hand, the role of labor migration in solving unemploy-

[3] Davletgildeev Rustem Sh., 2018, o‘sha manba.

[4] Elena Mukhametshina, The attitude towards migrants in Russia is worsening – “Levada Center”, April 27, 2017.

ment and other socio-economic problems for the young independent countries of this region is significantly high, on the other hand, the socio-political and cultural consequences of migration cause many problems. The results of the study show that external migration of the population from the countries of Central Asia has a significant impact on the general situation in the countries of the region and the formation of socio-demographic, economic and political trends[5]. The fact that the Russian Federation remains the main migration destination for Central Asian countries, in particular, increases the region's socio-political dependence on Russia[6]. In this regard, Tajikistan is a very dependent country on Russia. Because Tajikistan's economy largely depends on migrant remittances, which, according to the World Bank, accounted for 31% of GDP in 2020. In this indicator, Tajikistan ranks first in the world[7].

Uzbekistan ranks first in the CIS in terms of the number of labor migrants, the majority of labor migrants work in Russia. Of course, this is explained by the fact that Uzbekistan ranks second in the CIS after Russia in terms of population, but on the other hand, this is explained by the lack of sufficient jobs in the country and the fact that incomes are still lower than those of the population. in Russia and Kazakhstan. Therefore, in addition to solving the socio-economic problem facing Uzbekistan, it is important to take measures to properly regulate and improve the effectiveness of external migration and prevent it from becoming a political tool in interstate relations. Since migrantophobia and xenophobia are growing in Russia, the securitization of immigration by politicians requires close cooperation between the Central Asian countries and Russia in resolving these issues. Also, the securitization of migration for Central Asia, especially for Uzbekistan, is complicated, first of all, by the fact that labor migrants join various extremist and terrorist organizations. The large number of illegal migrants, the humiliated, degraded and difficult situation of many migrants, their personal problems and difficulties are exposed to the lies and deception of representatives of various radical and extremist groups. Low knowledge of the language and social activity of migrants, high incomes and survival positions, difficulties in relationships with family and other negative aspects develop psychological anger and hatred towards labor migrants, which creates negative consequences for the social life of both sending and receiv-

[5] Yuldasheva G.I. Problems of social inclusion in the territory of the Eurasian states: an example of Uzbek labor migration in Russia. Responsible for ed.: K. Kaiser, B. Sultanov, Almaty: IMiRS KNU, 2017. – P. 83-94. Farkhod Tolipov. On the problem and scenarios for the development of labor migration in Uzbekistan. // https://cabar.asia/ru/farhod-tolipov-o-probleme-i-stsenariyah-razvitiya-trudovoj-migratsii-v-uzbekistane?pdf=3289

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[7] Yugay Yu. V. Labor migration from Central Asian countries to Russia. Post-Soviet studies. Vol. 5. No. 2, 2022. – P. 213.

ing countries. These situations require measures to reduce migration by increasing jobs in the country, as well as implementing ways to send labor migrants to regions and countries where the rights of immigrants are well guaranteed.

Conclusion

Much of the experience of the European Union can be drawn from the CIS and the EU in order to avoid excessive securitization of migration. In particular, the development of laws and mechanisms in the fight against discrimination, improvement or approximation of laws in the field of legal regulation of labor migration taking into account the experience of the European Union, the development of the activities of state and non-state bodies. - government organizations protecting the rights of migrants, pension and social protection, the activities of diasporas and improving the political rights of immigrants are desirable.

It is necessary to improve the migration policy of the Central Asian countries, especially to take measures to avoid dependence of labor migration on one country and to diversify it. The Central Asian countries still (70-90%) depend on Russia. This makes Russia an excellent political tool. Of course, in our time of growing migrant phobia, finding other alternative host countries is not an easy task. But it is often emphasized that developed countries lack labor resources.

It is necessary to prevent the securitization of migration in the CIS. Although this is more the task of the host country, sending countries should also pay attention to this. To this end, in the case of the Central Asian countries, in dialogues and meetings with the leaders and officials of the Russian Federation, migration issues should be covered less in the media, objective information should be provided even when providing information, and various discriminatory and hateful statements should not be disseminated. information, political representatives with migrant phobia need to work on measures to reduce the volume of output and sentences of words.

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MODERNIZATION OF SCIENTIFIC ACTIVITY OF STUDENTS IN THE CONDITIONS OF THE EUROPEAN EDUCATIONAL SPACES (BEGINNING OF THE XXI CENTURY)

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Annotation. *In this article, the author examines the modernization of students' scientific activities at leading universities in the world (early 21st century). The relevance of this article is due to the use of European experience in modernizing the scientific activity of students in modern conditions of development of higher education, the priority task of which is to ensure the global competitiveness of the world's leading universities. This makes the transition to a new quality of the system of research activities of university students extremely relevant. Currently, special attention is paid to student scientific schools, the main goal of which is to attract creative, capable youth to research activities, expand and deepen students' knowledge, familiarize themselves with world achievements in science and technology, and new scientific discoveries. Students' research activities develop in the general mainstream of European civilization on the basis of common humanistic, spiritual and cultural values, having their own established traditions: fundamental scientific and applied research; well-equipped scientific laboratories; support for scientific research at the state level. It has been proven that in European universities, university scientific councils began to have greater rights, the structure of higher education became more flexible and simplified, and there was a certain convergence of the educational process with research activities.*

Keywords: *higher education; university; research activities of students; modernization; government funding; educational reforms; international activities; integration; competitiveness; research programs.*

The beginning of the 21st century is associated with the intensive development of research activities of students in the conditions of interuniversity research centers, since integration processes acted as an important resource and made it

possible to make a significant leap in the economy, having a positive impact on all European countries as a whole.

In the modern world, as economic, political, social and cultural life develops, the work of a modern researcher should be aimed at scientific research in order to improve the quality of work. The works of scientists (A.A. Gribankova, V.I. Dobrynina, O.V. Dolzhenko, O.A. Zablotskaya, E.Yu. Ignatyeva, V.A. Kapranov, O.A.) are devoted to the period of modernization of research activities of students in European countries. N. Oleynikova, A. Chickering, R. Dressel, D. Gillard, D. Goerig, M. Naish).

Currently, the development of European culture, joint actions in the field of student research, and increasing the volume of government funding for scientific research is a priority task of higher education. In this context, the main goals of students' research activities were formed: - support economic growth and improve the competitiveness of European countries by raising the standards of academic performance and research activities of students; - promote the development of an efficient and flexible labor market due to increased choice, diversity in teaching and research training; - to form a broad outlook for a person of scientific culture, attract creative students to research activities; - ensure a balance between research and teaching; - increase the number of study places at universities, be conduits of new ideas, and create a special scientific and creative atmosphere in the region. To achieve these goals, key measures were taken: expansion of the higher education sector through the creation of new scientific schools, research laboratories, centers; providing research training for future specialists [2, p. 111]. Looking at the events of the last twenty years in the European education system, one can notice a trend of major changes in order to implement new government educational reforms. The general trends of legislative reforms were as follows: the creation and strengthening of lifelong education, in which the key factor is given to the scientific work of students; diversification of higher education; ensuring the training of highly qualified specialists in the higher education system with an emphasis on scientific research; encouragement and funding of scientific research; integration of universities that form a close link with the business sector as well as industry; increasing the importance of the state in the education system; resolution of a number of issues in the field of academic and international activities of students, as well as the participation of teachers and researchers at all levels of activity. For example, the most significant universities in the UK - Oxford, Cambridge, the University of London - continue to remain the most popular, and a characteristic feature of research programs is the introduction of new combined natural science courses, as well as the teaching of integrated courses combining natural science and humanities subjects [4]. Thus, at the Faculty of Humanities of the University of Leeds, students were offered approximately 80 combinations

of subjects to study: 10 of them were courses in one subject (English, history and classics), 70 - courses in two subjects (Arabic and English , Arabic and French, Arabic language and religion, Arabic and Spanish languages), etc. At the University of Birmingham, the Faculty of Humanities offered the study of the Russian language in combination with English, French, Italian, history, geography, etc. [3; 6; 7]. According to British experts, the university should become a favorable environment for personal improvement, developing the student's research skills, without which his communication at any level in a modern "healthy" society is simply impossible. Thus, the importance of British universities as educational centers and the training of highly qualified personnel becomes obvious; their priority is the discovery of various types of high-tech technologies based on intelligence and a prosperous economy: diversification of higher education, ensuring the training of highly qualified specialists within the higher education system with an emphasis on scientific research; increasing the role of the state in managing education systems; increasing connections between universities and business and industry; expansion of international cooperation in the field of research activities at the national, regional and international levels. Consequently, at the beginning of the 21st century. in the UK there has been a popularization of student research activities as an effective career path at the university. In Germany, in accordance with the requirements of modern times, a feature of the development of student research activities has been the emergence of specialized universities on the basis of former engineering institutes and special institutes; new universities (this includes engineering, social welfare, economics, design, etc.). Looking at German state documents on issues of science and education, one can notice that big changes have been made in the field of higher education: the organizational structure and mode of operation of universities have been determined, the goals and objectives of students' research activities have been outlined, scientific and experimental laboratories have been equipped and well equipped. Thus, educational documents at different levels recommended new approaches to preparing students' research activities at German universities. The general trends of these educational documents were the following: ensuring the training of highly qualified specialists within the framework of the higher education system with an emphasis on the research activities of students with the expansion of scientific and educational programs; strengthening ties between universities and industry and business structures; stimulation and financing of scientific research. The modern higher education system in Germany includes 240 public universities, 99 private and 40 run by the church. As autonomous educational institutions, each student is given academic freedom, independence and the opportunity to study in English.

At universities in Germany, in the conditions of decentralized management of the education system in the country, each of the 16 states independently solves all

problems, including financing research activities. Thus, for the maintenance of the research activity system, government expenditures amount to approximately 9% of the total amount of necessary funds, municipal authorities allocate up to 17%, and land administrations allocate almost 74% of all funds [9]. Contrary to the modern laws of the established coordination system, Germany has achieved a fairly high level of unification of educational structures. However, having its own structure of educational institutions for training future specialists, each state carries out a traditionally differentiated approach to the professional training of scientific personnel, while taking into account the structure of higher education in the country. Since universities in Germany are not only educational institutions, but also large research centers, they conduct fundamental and applied research: about half of the students are constantly engaged in scientific research, participate in government programs, or are engaged in specific scientific and technical developments. The starting point for this concept is the spread of research culture, based on universal and fundamental education. The country occupies stable high positions in international rankings of educational institutions. Almost 50 out of 240 public German universities are included in the Top 500 best universities in the world (as of 2019, 42 out of 500). Thus, at the beginning of the 21st century, universities in Germany began to reorganize their traditional structure. New structural associations have emerged with the functions of educational and research units, mainly on the basis of previous seminars and institutes that belong to the same faculty. In such sections, the organization of research activities of future specialists is far from the same. For example, in the section "Science of Education", which unites 10 pedagogical departments at the University of Hamburg, lies the main burden of preparing students for research activities. At the University of Frankfurt am Main, future specialists are trained in 14 out of 19 sections [8]. The research activities of students develop in the general mainstream of European civilization on the basis of common humanistic, spiritual and cultural values, having their own established traditions typical only for German education: traditions: fundamental scientific and applied research; well-equipped scientific laboratories; support for scientific research at the state level; the opportunity to conduct scientific research in English. Universities have established themselves as major research centers, conducting fundamental and applied research.

In France, the beginning of the 21st century is a period of development of student research activities at the university. The chronology of reforming the research activities of French students is presented as follows: the formation of a system of continuous education, the most important links of which are higher educational institutions, training centers of large industrial firms and professional societies; creation of non-traditional higher educational institutions (open universities, radio and television colleges, universities without walls, etc.) with the

organization of training in them based on the widespread use of new information technologies (computer systems, satellite communication systems, e-mail, cable television, video and audio systems, etc.); stimulating connections between higher education institutions and industry, including legislative regulation of intellectual property issues; establishing stricter accountability of higher education institutions to government bodies, i.e. "recentralization" of management of the education system [11]. The reforms carried out in France at the beginning of the 21st century are aimed, first of all, at young specialists mastering certain scientific skills, knowledge, and skills and at preparing young people for research activities. Significant modernization of the country's higher education system was manifested in the content and forms of organization of students' research activities, and significant changes in the structure of French universities themselves. Obviously, the scientific, structural and administrative reorganization of the French higher education system implies a further increase in the autonomy of universities and their departments, the decentralization of universities, further development of students' research activities. Thus, at the beginning of the 21st century, great positive changes took place in the system of research activities of students in France, which is supported by legislative acts at the state level: university scientific councils began to have greater rights, the structure of higher education became more flexible and simplified, there was a certain convergence of the educational process with research activities.

Conclusions. Thus, the new system for training future specialists reflects the characteristic features of foreign higher education, as well as national features determined by cultural traditions, the level of economics and technology. However, modern research determines that, in contrast to the foreign experience of student research activities, which is determined by historical, economic and cultural factors and the peculiarities of the development of universities as research centers, for the domestic theory and practice of higher education, this problem is extremely relevant. The main feature of all European universities is their flexibility, accessibility to a wide range of people and the ability to quickly respond to educational changes that are taking place in European countries. In modern conditions, a student researcher has to independently plan his research activities; draw conclusions; model and forecast; make many responsible decisions; analyze the situation and find the right way out of it; compare, since global society requires a breadth of scientific and cultural horizons. A person who strives to cultivate such qualities in himself has enough potential both to determine his worthy place and for further self-development.

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PROFESSIONAL VICTIMIZATION OF PENITENTIARY SYSTEM EMPLOYEES

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Abstract. *The scientific article deals with the important problem of professional victimization of the Federal Penitentiary Service employees, which is relevant for both theoretical victimology and practical activity in this field. Taking into account the growth of criminal attacks on FSIN employees, the need to develop victimological measures becomes indisputable and requires a deeper analysis of personal, psychological and professional aspects of victimhood. The article analyzes in detail the psychological aspects of victimhood, as well as its constitutive types. Four criteria are identified, according to which it is possible to structure professional victimization of penitentiary system employees.*

Keywords: *penitentiary system, professional victimization, victimology, victim behavior, employees of the Federal Penitentiary Service, victimological safety, the psychological structure of victimization.*

Victimology in Russia has a relatively recent history. The first significant research in this field appeared in the 1960s, when Russian psychologists L.V. Frank and D.V. Rivman began to study the victim's personality and its influence on criminal behavior. It was then that the term "victim behavior" was introduced, which emerged within the framework of criminal victimology, literally meaning "the doctrine of the victim" (from Latin "viktima" - victim and Greek "logos" - doctrine). This direction allowed to focus on the role of the victim in the criminal process and not only on the figure of the offender.

In modern Russian victimology, the emphasis is not only on the study of psychological and social aspects of victim behavior, but also on the development of measures to protect the rights of victims. An important aspect is also the analysis of factors influencing the risk of becoming a victim of crime, which helps to develop effective prevention and support measures.

The date of the emergence of victimology is generally considered to be 1941, when the German criminologist Hans von Genting published an article entitled "The criminal and his victim". In his work, he analyzed criminal cases and concluded that there are three types of victims: those who succumb to, facilitate or provoke crime. These studies by Genting initiated research on victimology, which soon attracted the attention of other scholars. However, as D.V. Rivman notes, it is difficult to identify a single scientist who could be called the founder of victimology in its modern sense. Many researchers have contributed to the development of this science. However, one of the key figures is psychologist Benjamin Mendelsohn, who is often referred to as the creator of scientific victimology and the author of the term "victimology. Mendelsohn expanded the boundaries of this field by suggesting that the study should include not only victims of crime, but also victims of natural disasters, genocide, ethnic conflict, and war. Unlike Genting, who viewed victimology solely within the framework of criminology, Mendelsohn proposed that it be identified as an independent scientific discipline. This allowed victimology to cover a wider range of issues, including not only criminal aspects, but also social, psychological and humanitarian problems related to victims of various negative events and phenomena.

The concept of victimhood helps to further understand the phenomenon of the victim, considering him/her not only as a passive object of crime, but also as an individual whose behavior and characteristics may contribute to the development of a situation leading to violence or other offenses. Currently, the concept of "victimhood" is given a number of definitions. Thus, according to L.V. Frank, victimhood is a potential or actual ability of a person individually or collectively to become a victim of socially dangerous behavior. [8]. Frank distinguished the following types of victimhood:

- Personal victimization is a set of socio-psychological properties of an individual that determine his or her ability to become a victim of crime. These properties may include both personal character traits, such as gullibility or indecisiveness, and behavioral characteristics that increase the risk of victimization;
- Role or occupational victimization is an 'impersonal' characteristic caused by the performance of certain social functions by an individual. Some professions or roles in society may be associated with an increased risk of victimization. An example would be law enforcement officers, social workers or doctors who face dangerous situations in their line of work;
- Social victimization is a phenomenon related to the existence in society of crime in general, which objectively puts any person in the position of a potential victim. This implies that everyone in society can be subject to criminal victimization regardless of their personal qualities or professional responsibilities.

A.L. Repetskaya in her work considered the concept of victimhood and defines it as follows: it is a certain complex of stable typical social and psychological (less

often physiological) properties of personality, which in principle can be subjected to correction up to their complete neutralization and which cause in interaction with external circumstances an increased "ability" of a person to become a victim of crime [6].

I.G. Malkina-Pykh emphasizes on the constituent components of victimhood, considering it as a potential ability inherent in a person to become a victim of crime as a result of a certain interaction of his personal qualities with external factors on the one hand, and on the other hand - as a property conditioned by his social, psychological or biophysical qualities (or a combination of them), contributing in a certain life situation to the formation of conditions in which there is a possibility of causing harm to a person by unlawful means [3].

In our view, victimization is a set of personal and social characteristics that, when combined with external circumstances, increase the likelihood that a person will become a victim of crime. It can include both innate or acquired character traits (e.g. low self-esteem, anxiety, passivity) and social factors such as a person's status in society, profession or financial situation.

Victimization is not a static state, but a dynamic phenomenon that can change depending on circumstances and personal development. Researchers emphasize the importance of external conditions, such as the level of crime in a society, economic turmoil or adverse social conditions that increase or decrease the likelihood of victimization.

Victimization behavior can manifest itself in various forms, ranging from inconsiderate actions to conscious risk taking. There are several categories of victimization [1]:

1. Accidental. Often associated with carelessness, gullibility, inexperience. It is mostly a passive form of behavior.

2. Chronic. A person constantly finds himself in dangerous situations because of certain personality traits or social status.

3. Guilty. The person himself provokes the situation or aggressor and deliberately puts himself in dangerous conditions.

From the point of view of N.M. Iovchuk, "...victimization behavior is a psychological deviation, fixed in the habitual forms of human activity (behavior), causing a potential or real predisposition of the subject to become a victim" [2, p. 45].

According to N.B. Morozova, "...victimization behavior is defined by a set of emotional and personal characteristics that contribute to a maladaptive style of response of the subject, leading to damage to his physical or emotional-psychic health" [4, p. 25].

In the scientific literature, V.A. Tulyakov [7] identified two constitutive types of victimhood:

1. Anthropological (personal) - is an objectively existing human quality, which is expressed in the subjective ability of some individuals, due to a set of psychological properties formed in them, to become victims of a certain type of crime in conditions when there was a real and obvious for ordinary consciousness possibility to avoid it.

2. Attributive (role) - is an objectively existing characteristic of certain social roles in the given conditions of life activity, which is expressed in the danger for persons performing them to be subjected to a certain type of criminal offenses only because of the performance of such a role.

V.A. Tulyakov focuses on such a component of victimhood as deviation from the norms of safe behavior, which is realized in a set of social "behavioral deviations from the norms of individual and social security", mental "pathological victimhood, fear of crime", and moral "victimized intrapersonal conflicts" manifestations [7]. D.V. Rivman also moves in this logic, noting that victimhood cannot be zero, but this does not mean that a person is destined to become a victim with inevitability and predetermination.

P.I. Yunatskevich [10, p.44] identifies a number of grounds for classifying types of victimhood, offering a more detailed approach to its typology. From our point of view, this classification covers both behavioral and psychological aspects of victimhood:

1) By traits of behavior in different life situations. Victimization can manifest itself in different areas of life, such as:

- Criminal - related to crime;
- Political - related to political violence or repression;
- Economic - involving instances of economic fraud and fraud;
- Transportation - related to traffic accidents;
- Domestic - arising from family or household conflicts;
- Military - arising from military actions and conflicts.

2) By actual psychological mechanisms. This criterion takes into account the internal psychological factors that influence victimization:

- Motivational - conditioned by the motivation of the individual;
- Cognitive - related to cognitive processes and perception;
- Emotional-volitional - based on emotional and volitional qualities of a person;
- Mixed - a combination of several mechanisms.

3) By the number of participants. Victimization can involve not only individuals but also entire groups:

- Individual - related to an individual;
- Group - involves small groups of people who are victimized;
- Public ('mass') - covers mass phenomena, such as victims of natural disasters or riots.

4) In relation to professional security activities. This criterion distinguishes victimization depending on professional training:

- Non-professional ("general civilian") - related to victimization of ordinary citizens;
- Professional - characteristic of those whose work is associated with risk and security (FSIN officers, police, military, rescue workers).

5) By psychological level of victimization. The degree of expression of victimization characteristics may vary:

- Mildly expressed;
- Medium-expressed;
- Strongly expressed.

6) By time of onset. Victimization can be:

- Situational - occurs in certain circumstances and is temporary in nature;
- Relatively stable - long-lasting, often associated with personal characteristics.

This classification highlights the diversity of victimization and the need to consider both behavioural and psychological factors in order to better understand the predisposition to victimization in different life contexts.

The problem of professional victimization of FSIN employees has existed for not the first year and, unfortunately, does not disappear. The effectiveness and efficiency of the entire penal and correctional system directly depends on the victimological safety of employees, i.e. on the extent to which they are out of the zone of risk of becoming a victim of an offense, crime [9].

From our point of view, in relation to prison staff, victimization can be structured according to the following four criteria:

1. Professional victimization. Performance of official duties in conditions of constant interaction with inmates increases the risk of becoming a victim of aggressive behavior. Correctional officers, when faced with violent or manipulative individuals, are often targeted for criminal offenses. The peculiarities of their profession make them potential victims, as they are in high-risk situations on a daily basis.

2. Social victimization. Given the social context in which officers of the penal system operate, their position in society can lead to victimization. The low level of trust on the part of citizens in law enforcement and law enforcement agencies, the presence of stereotypes and negative expectations about the staff of such institutions can cause their victimization behavior in certain situations, when they are vulnerable to attacks or aggression from prisoners and their environment.

3. Psychological victimization. The personality traits and psychological background of an employee can play an important role in predisposing him or her to victimization. Lack of confidence, lack of stress tolerance or inability to respond appropriately to threats increases the risk of victimization. In contrast, psychologi-

cally prepared staff with self-protection and conflict management skills can reduce the likelihood of victimization.

4. Organizational victimization. Structural and organizational working conditions, such as inadequate psychological safety, outdated equipment or understaffing, can increase the risk of victimization of employees. Inadequate support from management or insufficient legal protection also play an important role in increasing vulnerability to criminal elements.

Thus, the victimization of prison officers is conditioned by both personal qualities and professional risks, social factors and organizational conditions that can either increase or decrease the likelihood of their professional victimization.

Victimization of employees of the penal enforcement system can be divided into the following categories:

1. Innocent victimhood - is related to the peculiarities of labour activity and psychophysical qualities of the employee. At the same time, his/her behaviour is generally socially approved both in normal situations and in pre-crime situations. Innocent victimhood occurs when an employee of the penitentiary system becomes a victim of crime solely because of objective factors, such as a high degree of risk in work, interaction with dangerous inmates or insufficient protection in the conditions of performing official duties.

2. Culpable victimization - is associated with inappropriate behavior of an employee, which is considered negative from the point of view of law and morality. Such behavior can become a catalyst for crime, creating conditions for aggressive actions on the part of prisoners. This may include excessive cruelty, abuse of power, unfair treatment of convicts, or disregard for safety standards. In conditions of penitentiary institutions, such behavior provokes crimes against employees, as it violates the balance between rights and responsibilities, and also contributes to tension in the system.

In penitentiary crimes, i.e. crimes committed in places of deprivation of liberty, culpable victimization can manifest itself in various institutions: correctional colonies, medical correctional institutions, settlement colonies, educational colonies, prisons and pre-trial detention centers. In these institutions, increased risks and threat factors require employees to comply with strict standards of conduct and safety rules. Improper performance of duties or deliberate violation of standards can significantly increase the likelihood of victimization.

I.A. Papkin [5, p. 55], who studied the professional victimization of employees of penal enforcement agencies, identifies the psychological structure of the personality of an employee of the Federal Penitentiary Service, consisting of three interrelated dynamic blocks:

1. Potential victimization is manifested in insufficient professional psychological training of an employee to act in extreme situations, as well as in the presence

of negative personal qualities such as aggressiveness, cruelty, increased risk appetite and insufficient communicative tolerance. These traits can create conditions for conflict and increase an employee's vulnerability to aggressive actions by prisoners.

2. Realizable or behavioral victimization is a specific action or behavior of an employee that makes him more vulnerable in the work environment. In this case, victimization is expressed in behavior that provokes convicts to aggression or illegal actions. This may be inappropriate treatment, ethical violations, or the misuse of force, which exacerbates the risk of confrontations.

3. Realized victimhood is the final state when an employee actually becomes a victim of criminal assault or aggression. This block characterizes situations in which victimization has already moved from a potential or behavioral level to real harm caused by criminal actions. Realized victimization includes specific cases of attacks, threats or other criminal acts against an employee as a result of his vulnerability or improper behavior.

Thus, the psychological structure of victimization of FSIN employees is considered as a dynamic process that begins with potential personal characteristics and can turn into real victimization through certain behavioral patterns.

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SEMANTIC MOTIVATION AND ITS TYPES

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Abstract. *The article deals with the notion of semantic motivation that is the relation between the word's form and its meaning. Various approaches towards the semantic motivation are compared. The given data uncovers to which extent the structure of a word provides for its understanding and what factors can influence the comprehension. The types of semantic motivation, namely, the phonetic, the morphological, the lexical, and the contextual motivation are defined and explained on the basis of examples. The cases of high and low semantic motivation are demonstrated and the underlying reasons are revealed.*

Keywords: *semantics, semantic motivation, lexical meaning, phonetic motivation, morphological motivation, lexical motivation, etymological motivation, contextual motivation.*

In the recently developed anthropocentric paradigm special attention is paid to the science, which deals with the understanding of meaning of lexical units both in the language system and in speech acts that is Semantics. The objective of this science is to study the laws that influence the changes and fluctuations of the word meaning. This might be reasoned by the social, contextual, pragmatic, emotional, etc. factors.

There are two terms used in Linguistics for the abovementioned science: Semasiology and Semantics. In the Russian linguistics the preference is given to the term Semasiology, as the term Semantics is at times used as a synonym of the term "meaning" itself. Still, foreign linguists prefer the term Semantics as the science, which strives to find how meaning is reflected in the language system, how interlocuters' involvement and intentions might be reflected in the lexical meaning of the word. To this extent, Semantics is close to Pragmalinguistic studies.

The main objects of semantic study are as follows: semantic development of words; its causes and classification; relevant distinctive features and types of lexical meaning; polysemy and semantic structure of words; semantic grouping and

connections in the vocabulary system, i.e. synonyms, antonyms, terminological systems, etc.

Great attention within semantic studies is paid to the notion of semantic motivation. Motivation in semantics refers to the degree, to which the meaning of a word, phrase, or linguistic sign is linked to its form, structure, or function. Jakaitienė states that motivation should be identified as the semantic-structural component of a word making it possible to understand the relation between the word's meaning and its formal composition [1, p. 26]. In simpler terms, it explores whether there is a reason or logic behind why a word means what it does, or if the relationship between the form and meaning is arbitrary. When the word is 'motivated', it is easy to perceive its meaning from its formal structure or from the connection with other words within the context or the language system. Thus, by uncovering a motivative character of a word, there is a possibility to clarify how an object or a phenomenon has got its nomination on the premise of certain properties and which factors in which way have influenced human subconsciousness in giving this or that name.

According to Lacoff, motivational information can be identified as informative categories that explain (or motivate) why it is natural for a lexical unit to mean what it means, or that explain why it is natural, or «makes sense», that a specific meaning is expressed by a certain lexical item, rather than another [2, pp. 107-109]. Lacoff pays more attention to the psychological factor lying behind the motivation that is revealing underlying reasons existing in human mind, why certain object is called like it is and why it has definite (not another one) meaning, which is closely connected with the process of categorization. He claims that for a speaker it is much easier to learn and apply an item's name in speech if s/he understands how it is motivated and can distinguish its place within the language lexicon [2, p. 438].

Ilson adheres to a similar point of view, still emphasizing that etymological information that underlies the word's meaning can result in better understanding of a notion, thus, creating a link between past and present meaning and making it easier to understand and use a word [3, pp. 77-78]. Gaivenytė also states that a motivated item is easier to memorize, as it creates associations in the brain with other items of a language. Still, it should be taken into consideration that the main links of a word within the lexical system is determined by its definition as at times associations might by random and arbitrary [4, pp. 19-25].

Regardless of the approach to motivation, the majority of linguists subdivide semantic motivation according to the levels of the language hierarchy and a word's place within the context and the language field. Accordingly, there might be distinguished phonetic, morphological, lexical, semantic, etymological, cultural, functional, contextual, cognitive, etc. motivation. Let us delve into some of the mentioned subtypes.

Phonetic motivation refers to the idea that there is a connection between the sound structure of a word and its meaning. In phonetic motivation, certain sounds or sound patterns are perceived to have a direct or symbolic relationship with the concepts they represent. One of the clearest examples of phonetic motivation is onomatopoeia. According to Merriam-Webster, onomatopoeia is "the naming of a thing or action by a vocal imitation of the sound associated with it". Thus, here the phonetic motivation is viewed through a word's formal imitation of the sound its meaning is associated with. For instance, words like 'buzz', 'meow', 'woof', 'bang', 'crack' reflect the sounds made by the objects or animals they describe.

Phonetic motivation also might be perceived through a sound symbolism, when certain sounds seem to be associated with particular qualities or ideas, even if they do not directly imitate real-world sounds. For example, words that start with /gl/ in English (e.g., glow, gleam, glimmer, glare, glisten, glitter, glacier) are often associated with luster and smoothness [5, p. 54]. The use of hard consonants like /k/ and /t/ in words such as crash, clash, or cut can evoke sharp, forceful actions, while softer sounds like /m/ or /l/ are often associated with smooth or gentle concepts. In this regard, Crystal suggests that "words with soft sounds such as 'l,' 'm,' and 'n,' and long vowels or diphthongs, reinforced by a gentle polysyllabic rhythm, are interpreted as 'nicer' than words with hard sounds such as 'g' and 'k,' short vowels and an abrupt rhythm." [6].

Thus, when a listener or a reader (pronouncing in one's mind) a word that has high phonetic motivation can easily build association connected with the meaning of a word. On the other hand, when the word is not highly motivated phonetically, it might be difficult to approach to its meaning and memorize it.

Another type of semantic motivation is morphological motivation, which refers to the relationship between the internal structure of a word (morphemes) and its meaning. In morphologically motivated words, the meaning of the whole word can be easily deduced from the meanings of its individual parts. This type of motivation makes it possible for speakers to interpret or construct new words by recognizing familiar morphemes and their combinations. In this regard, one-morpheme words are morphologically non-motivated as it is not possible to identify words' meaning purely from their structure.

Morphological motivation, thus, might be understood on the basis of the morpheme composition. Morphologically motivated words are made up of morphemes that contribute directly to the word's meaning. For instance, 'disrespectful' can be broken down into prefix dis- (negative meaning), root -respect- and suffix -ful (meaning of being characterized by, adj.). Overall meaning of the word then might be distinguished on the basis of its constituent morphemes: "showing a lack of respect or courtesy". However, in case of the word 'inflammable' it cannot be said that breaking it down into morphemes might provide with correct meaning,

as regardless of prefix in- conveying negative meaning, the whole word does not mean 'not flammable.'

Another example of morphological motivation might be observed via the usage of inflection, which at times helps to indicate grammatical relationships without altering the core meaning. For instance, in the verb 'sneezed' is used the inflection -ed, meaning the past tense of the verb and resulting in high morphological motivation. On the other hand, the verb 'borrowed' also having the inflection -ed is not so easy to identify grammatically. As belonging to the transitive verb, the -ed inflection might mean the past tense as well as past participle, resulting in less morphological motivation.

The degrees of morphological motivation can be easily observed on the basis of the compound words, the meaning of the which might be morphologically motivated by the meanings of the individual roots. For example, the word 'bookshelf' is highly motivated as its overall meaning is easily identified via its constituent roots: 'book' – "a written or printed work consisting of pages glued or sewn together along one side and bound in covers" [7] and 'shelf' – "a flat length of wood or rigid material that provides a surface for the storage or display of objects" [7].

On its turn, the noun 'chickpea' meaning "a round yellowish edible seed" is less motivated as its meaning cannot be easily understood based on its roots, where 'chick' means "a young bird, especially one newly hatched" [7] and 'pea' means "a spherical green seed which is eaten as a vegetable" [7], with only the second part is somehow closely connected with its general meaning. The noun 'breakfast' is even less motivated from morphological point as its constituent parts without referring to etymology have nothing to do with its overall meaning: neither meaning of polysemantic words 'break' and 'fast' deal with morning meal (besides 'fast' as "abstain from all or some kinds of food or drink, especially as a religious observance") [7].

Lexical motivation refers to the relationship between the form and the meaning of words within a language, specifically focusing on how the lexical structure (i.e., the vocabulary system) of a language provides clues or logic to the meaning of individual words. Lexical motivation encompasses various types of motivations – semantic, morphological, phonetic, and etymological – that help explain why words mean what they do and how they fit into the broader lexical system of a language.

Lexical motivation can be identified with the help of various relationships of words within the lexicon. Among them suffice to mention synonymy and antonymy. Synonyms being the words with similar meaning and antonyms – with opposite meaning – can create a network of lexical motivation, which helps speakers navigate the semantic relationships between words and understand nuances of meaning. For example, the adjective "hot" can be clearly understood only within

the meaning line ‘hot – warm – cool – cold’ and its relatively standard sense might be accepted in comparison with such synonyms as ‘fervent’ and ‘fiery’.

Lexical motivation might be observed in word families, where a group of related words shares a common root or base morpheme. This shared root provides a common thread of meaning, making it easier to see how the words are related and what they mean. For instance, such words as ‘communicate’, ‘communication’, ‘communicant’, ‘communicable’, ‘communicativeness’ having the same root carry the common sense of “sharing or exchanging information, news, or ideas”.

Another source of lexical motivation can be revealed through loanwords and borrowings, closely being connected with etymological motivation as well. Borrowed words can be lexically motivated on the basis of their initial meaning and the source of borrowing regardless of having passed through a considerable semantic shift or not [8, p. 224]. For example, the highly motivated word ‘biology’ has come from the Greek words ‘bios’ (life) and ‘logos’ (study), and it still means “the study of life” not having changed its initial meaning. On its turn, the English word ‘nervous’ has its source in the Latin ‘nervosus’ (meaning ‘sinewy’, ‘vigorous’). In Modern English, though, it means “of or belonging to the nerves” or “restless, agitated, lacking nerve” [7], which is totally different from the origin and cannot be easily understood. The word, thus, is less lexically motivated by the original meaning.

One more type of semantic motivation going to be observed in the article is the contextual motivation, which deals with the relations of a word within the language context. The meaning of the word here is shaped not only by its internal properties, but built by the surrounding linguistic or situational environment.

The context might be crucial in case of the polysemantic words or homonyms as only the relation with other words might provide for their actual meaning. The noun ‘bank’, for example, could refer to “a financial establishment that uses money deposited by customers for investment” or “the land alongside or sloping down to a river or lake” [7], still the meaning cannot be distinguished when the word stands on its own. In the sentence “We set up a picnic by the bank,” the context of ‘picnic’ and the connection ‘by’ presupposes that ‘bank’ refers to the edge of the river, not the financial institution. Still some ambiguity might exist as the reader/listener can imagine someone having a picnic near the financial institution. On the other side, the sentence “The bank has been washed down by the waves” is more context-motivated as it helps to avoid the ambiguity to the greater extent.

The relationship between speakers, the topic of conversation, or cultural background can also shape how words are interpreted contextually. Intonation here also plays important role, as one and the same phrase might be pronounced with provisionally negative and positive sense. For instance, the exclamation “Wonderful!” depending on the tone and the context might be an approval and a sarcastic comment.

The intentions of the speaker/writer and the interpretation of the listener/reader can also play their role in contextual meaning of a word resulting in a certain degree of motivation. Based on context a statement can function as a request, command, or suggestion. Still, a message with the implicit meaning, not given directly, may not be understood properly depending on the situation, background knowledge and contextuality.

All in all, semantic motivation helps not only with identifying the meanings of lexical units, but supports for building links between the form and the meaning and between the words within the language system. Understanding motivational properties provides for better memorization and usage of vocabulary. Thus, the distinction and the description of the motivational information not only sanctions or theoretically justifies much of the modern linguistic practice, but also serves as a matrix for the validity of the modern linguistic theory.

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CULTURAL AND HISTORICAL INTERRELATIONS OF ORNAMENTAL MOTIFS OF THE CRIMEAN TATARS

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Abstract. *The Crimean Tatar ornament takes a great place in multinational culture and art of Republic of Crimea. The Crimean Tatar ornamental motives are wide-spread in golden-stitch embroidery, jewelry handicrafts, carpet weaving, painting on wood, woodcarving and carving in stone. Ornamental heritage of the Crimean Tatars is based on symbols and patterns, which represent phenomenon and objects of the real world, transformed by creative fantasy of the talented artists' many generations. In the article it is isolated three groups of the Crimean Tatar ornament. By means of structural analysis museum collections and ethnological materials on the Crimean Tatar ornament of the 18th – early 20th centuries showed in decorative applied art were investigated. The author attempts to identify the cultural and historical connections, origin and evolution of Crimean Tatar patterns, as well as to give them an interpretation.*

Keywords: *Crimean Tatars, decorative and applied arts, ornamental motifs, cultural and historical relationships.*

The Crimean Tatar ornament is the most important part of the culture and art of the peoples of the Crimean peninsula. For many centuries, folk craftsmen not only preserved ancient ornamental patterns, but also constantly refined their form, introduced certain changes in the coloring and structure of compositions, created new motifs, which were also further improved. The basis of the ornamental heritage of the Crimean Tatars are signs-symbols and patterned motifs reflecting the phenomena and objects of the surrounding world, transformed by the artistic imagination of many generations of masters.

The origin and formation of the Crimean Tatar ornament is one of the most complex and poorly developed scientific problems in the history of culture and art of the Republic of Crimea. The absence of a unified point of view in historical science on the issue of the ethnogenesis of the Crimean Tatar people, the insuffi-

ciency of archaeological and ethnographic materials on the development of architecture and decorative art of the Golden Ardyn period and the first centuries of the Crimean Khanate, significantly narrow the possibilities of studying the origin of the Crimean Tatar ornament.

However, some researchers, such as S. Izidinova, A. Garkavets and others, come to the conclusion that the tribes of Kipchak and Oghuz origin, as well as the Greek population of the Crimean Peninsula, played an important role in the ethnogenesis of the people [1; 2, p. 18]. Based on the work of linguists, we tried to identify closely related analogs of the Crimean Tatar ornament, turning to the culture of the Kipchaks, Volga Bulgars, Ottoman Turks, Azerbaijanis, Greeks and Turkic-speaking peoples of Central Asia, who have both ethnogenetic and cultural-historical ties with the culture of the Crimean Tatars.

As researchers note, during the period of the Crimean Khanate, folk crafts and trades occupied an important place in the artistic culture of the Crimean Tatars. Gold embroidery, patterned weaving, filigree, carving and painting on stone and wood, decorated with complex ornamental patterns, developed fruitfully on the territory of the Crimean Peninsula. The products of Crimean folk craftsmen were well known outside the Crimean Khanate: in Turkey, Russia, Poland, in the Ukrainian, Balkan and North Caucasian lands. After Crimea became part of the Russian Empire, folk crafts gradually lost their former significance, and the most popular of them - weaving and embroidery - became part of households [3].

The Crimean Tatar ornament is mainly widespread in carpet weaving, embroidery, metal products and wood painting. All the diversity of ornament can be divided into three main types: plant, geometric and zoomorphic-anthropomorphic motifs, which are often closely interconnected, forming rich and multi-colored ornamental compositions.

The most common plant motifs include: stylized images of flowers; bindweed and algae; vegetation with geometric shapes, as well as trees, their fruits and various plants.

The image of the “tulip” as the main or subordinate element has become widespread in all types of decorative art. Among the Crimean Tatars, it is a sign of a young man or a man and symbolizes a “declaration of love”. The tulip originates from Persia, where poets praised its beauty, and came to Turkey where it became revered and loved. As a symbol of the love of wives for the sultan, this flower was always used to decorate various objects in palaces. Images of tulips with various interpretations were already common in the art of the Volga Bulgars of the 10th-13th centuries [4, p. 22] and was considered a symbol of rebirth. The tulip is common in the Muslim world, as it is associated with the name of Allah (Fig. 1).

The symbolic meaning of flower patterns among the Crimean Tatars can be completely different. For example, a tulip is a sign of a young man or a man, often depicted in the center of the tree of life; the placement of a rose on a head covering

symbolizes love, beauty, grace, joy; a carnation serves as the personification of constancy, loyalty, the ability to self-sacrifice [5, p. 56, 28, 48].

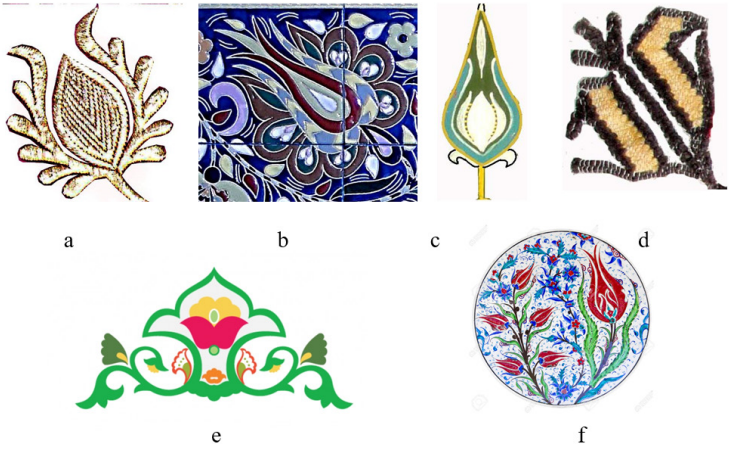


Figure 1. *Image of a tulip in decorative art: a, b, c, d) – among the Crimean Tatars; e) – among the Volga Bulgars; f) – in the Ottoman Empire.*

The almond motif, known in Iran since the Sassanid era under the name paisley, is one of the most popular types of decor among peoples of Iranian and Turkic origin. In Russia and Ukraine, the motif has become widespread under the name of "Turkish or oriental cucumber". In Crimean Tatar patterns, you can find double and triple almonds. Most often, it is depicted on women's things, symbolizing a girl, and a double almond is a wish to find a partner (betrothed) [11, p. 123; 12; 5, p. 17].

In Central Asia, in the decoration of Uighur, Uzbek and Tajik skullcaps, the motif is called "tus-tupi" and is distinguished by its special coloring and great diversity. Among Azerbaijanis, the "buta" pattern is common in carpets, fabrics, paintings and architectural structures. In each country, this ornament, despite the great similarity of the image, has a different meaning (Fig. 2).

The "bindweed" (sarmashyk) motif, used in embroidery, stone carving and engraving, is stylistically related to the ancient "islimi" pattern. This ancient type of decoration, distinguished by its many variations, can be found in the decoration of the iron helmets of the Kipchaks, in the applied art of the Volga Bulgars, the sedentary agricultural population of Chach, Sogd and the regions of the Middle East in the 10th-13th centuries. [8, p. 123; 4, p. 22; 9, p. 108]. For the Crimean Tatars, the "bindweed" motif symbolizes the continuity of life on Earth, its fading, death and birth. [5, p. 75] (Fig. 3).

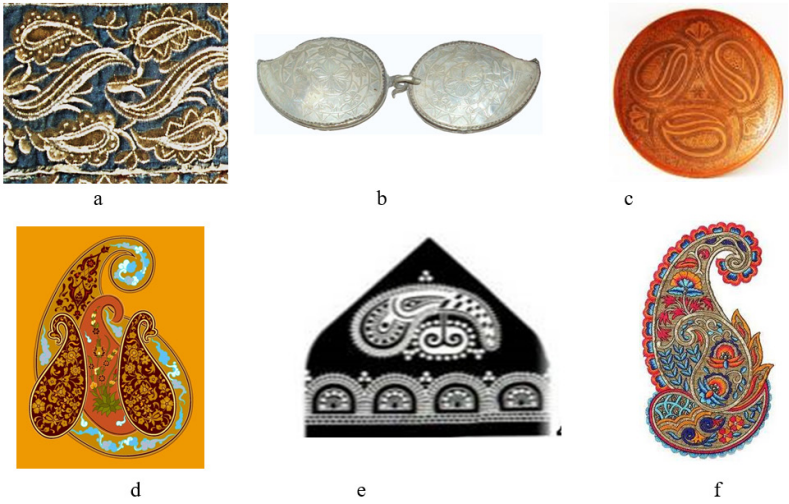


Figure 2. *Image of almond in decorative art: a, b, c) – "badem" among the Crimean Tatars; d) "Buta" among Azerbaijanis; e) – "Tus-Tupi" among the Uyghurs; f) – "paisley" among Iranians.*

Images of lilies, peas and burdock are typical of Crimean Tatar embroidery. The motif of "burdock", presented in section, in the form of a flower, fruit, is common in all regions of Crimea. This type of decor is found in Turkish ornamentation of the early 16th century. Images of algae, having an S-shape, are characteristic of the southern coastal region of the peninsula, starting from the XIVth century [6, p. 122].

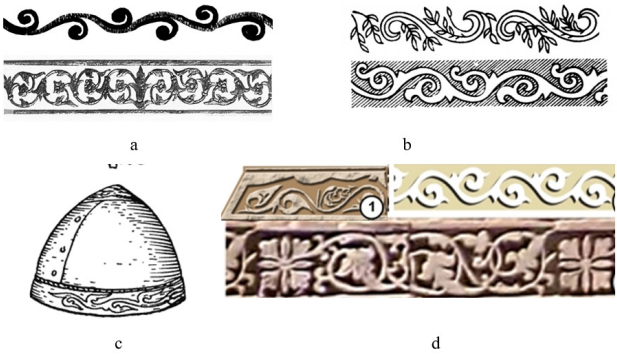


Figure 3. *Image of the ornamental motif "bindweed": a) – among the Crimean Tatars; b) – among the Volga Bulgars; c) – on a Polovtsian helmet; d) – architectural ornament of Sogd.*

The "pomegranate" motif, made in the form of a flower and a cut fruit, in addition to embroidery, was widespread among the Crimean Tatars in embroidery, wood painting and engraving of copper utensils. [5, p. 65, 105]. Both of these types of decoration apparently arose in Crimean Tatar art as a result of contacts between the ancestors of the Crimean Tatars and the Greeks, who had inhabited the Crimean peninsula since ancient times. Gardening and viticulture are traditional occupations of the Greek Chersonesos. In the ancient period, especially in rural areas, the cult of Dionysus, the god of the productive forces of nature, viticulture and winemaking, was of great importance. The motif of the "pomegranate fruit", symbolizing fertility, wealth and happiness, in addition to the Greeks, was widespread in the cults of Sumer, Assyria and Phoenicia, in various types of applied art of the Arabs, Jews, and the sedentary agricultural population of Central Asia. [10; 11, p. 122].

Particular attention should be paid to such ornamental motifs as the "tree of life", "flowerpot" and the curved S-shaped branch "egri dal", widely known in Crimean Tatar embroidery. From the main stem of the "tree of life" motif, which ends with a large flower or a bunch of leaves, large and small branches with petals, berries and flowers, often having a geometric shape, extend. This motif underlies the worldview of many peoples, personifies the world order, the axis of the world, its center. The ornamental theme in the meaning of "tree of life" is a deeply traditional phenomenon in the art of the Volga Bulgars and their ancestors, reflecting the ancient cult of the steppe flora. The further development of the "tree of life" motif was associated with the influence of Persian fabrics of the XVIth – XVIIIth centuries [6, p. 121-122; 4, p. 29, 36]. It is worth noting that the composition with the image of trees is very common in the folk art of Central Asia and the Caucasus, including Azerbaijan.

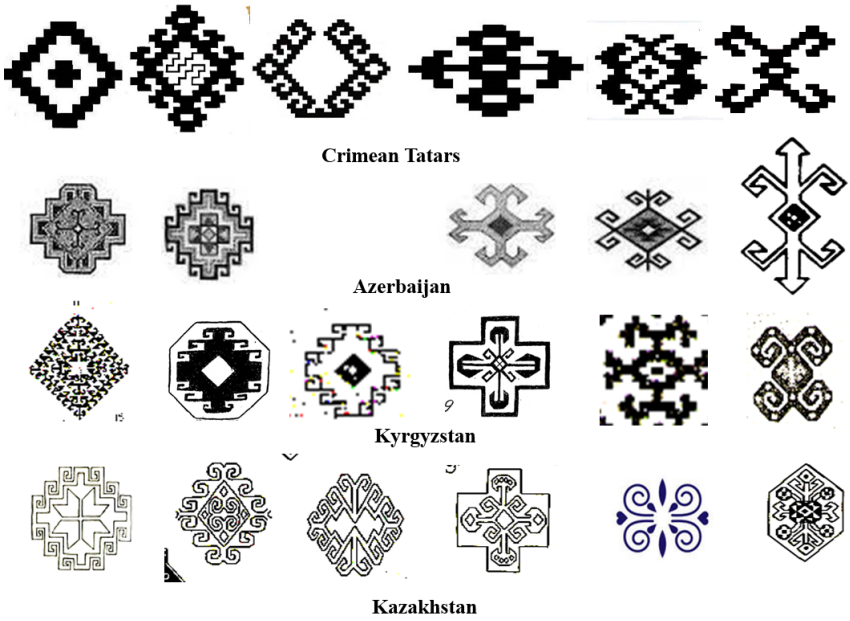
"Vase" with flowers is a variation of the "tree of life" motif. A vase, pot or basket is the compositional center from which the branches of a plant grow, filling the background of the items. You can find both a static image of the "vase" motif (the central location of the pot with symmetrically diverging branches of flowers) and a dynamic one (the branches are directed to one side of the vase). According to G.O. Maslova, such a motif was typical for the art of Eastern Europe in the XVIth – XVIIth centuries [7].

The tree of life and its variety, the vase, have a slightly different meaning in Crimean Tatar art, in contrast to the world tree. The structure of the motif, consisting of 9 elements and read both vertically and horizontally, allows us to consider it a kind of family coat of arms - an amulet, a sign of peace and integrity, happiness and prosperity of the family. Images of a jug, vase, basket, teapot at the base of the tree mean a house in which the family prospers.

The geometric motifs of the Crimean Tatar ornament, especially carpet ones, are: zigzag, swirl pattern, diamonds, concentric circles, S-shaped patterns, stars,

comb-shaped figures and paired triangles. Zigzags, diamonds, concentric circles, paired triangles and many other ornamental elements are typical for Crimean Tatar kilims.

In their ornamental patterns and color scheme, lint-free carpets have similar features to the decor of carpets of Azerbaijanis, Uzbeks, Karakalpaks, Kazakhs and Kyrgyz. [13, p. 187-188]. According to researchers, such symbols as a circle, a rhombus, a triangle and a zigzag are the most ancient archetypes of universal human culture and reflect the ancient cosmogonic ideas of farmers and nomads. Over the course of many centuries, the original meaning of these signs and symbols was forgotten, rethought, and therefore, among different peoples of the world, they have different, often opposite meanings. [14, p. 5–13; 15, p. 78–79; 16, p. 69-74].



The “sun” motif (kunesh), depicted as a circle with diverging rays-curls, is one of the types of decoration of the Crimean Tatar decorative and applied art, found in embroidery. This motif may go back to the “vortex rosette” pattern - another solar sign, originating in the complexes of the Scythian-Sarmatian period [17, p. 90]. Swirl rosettes were widely used on glazed ceramics and jewelry of the XXth–XIIth centuries in Sogd, Chach, Southern Kazakhstan, and the Talas and Chui valleys. [18, p. 21-22]. For the Nogai nomad, the sun represents life itself with its eternal renewal. [5, p. 45].

S-shaped woven patterns “water” (suv) and “lion’s mouth” (arslan agyz) under different names are widespread among many peoples of Central Asia from ancient times to the present day. S-shaped curls are found on copper coins and figured assuarii of the IInd century AD in Ancient Khorezm, on metal products of the Scythian tribes of the Apasiaks of the VIth-IVth centuries BC from Chirik-Rabat, in the architectural ornament of Southern Turkmenistan of the 10th-12th centuries. [19, p. 36-37; 20, p. 42, 44].

The star motif is one of the most ancient ornamental patterns used in all types of decorative and applied art of the Crimean Tatars, but especially often in embroidery and copper chased utensils, as well as in the jewelry top of the women’s headdress fes. Star motifs (girikhi), built on a combination of various polygons with multi-ray stars, were widely used in the Middle Ages in ganch carving and brick cladding in the Rabat-i-Malik caravanserai, the mausoleums of Uzgen, Magoki-Attari and Shah-i-Zinda [21, p. 86-87]. The crescent moon with a star, which is a symbol of Islam, is used in various variations in Crimean Tatar embroidery and jewelry: in head coverings, sofa cushions, brooches, belt buckles and other items [5, p. 9].

Zoomorphic-anthropomorphic ornamental motifs mainly include both fairly realistic and highly stylized images of birds, fish, scorpions, crabs, animal body parts, and images of an anthropomorphic nature.

Peacocks, eagles and doves embroidered on towels, headscarves and bedspreads often form heraldic compositions of paired figures, which was typical of the traditional art of Transcaucasia, Central and Western Asia in the Middle Ages. The oldest depiction of birds – a pair of doves – was found on a Crimean Tatar tombstone from the XVth century [5, p. 52].

Realistically executed images of fish became widespread in the decor of decorative fountain trays of the XVIIIth century and various copper water containers of the XIXth – XXth centuries. Fish in combination with fruits in the symbolism of the East are symbols of day and night [22, p. 140].

Horn-shaped motifs in Crimean Tatar decorative art are similar to horn-shaped motifs in the applied art of the Uzbeks, Turkmens, Karakalpaks, Kazakhs and Kyrgyz. The popular names of these motifs among the Turkic peoples are mainly associated with the horns of mountain goats and rams [19, p. 34-35, fig.VI, 2,5; 20, p. 40, 44].

Separately, it is necessary to dwell on the anthropomorphic ornament of varying degrees of stylization, depicted on three head coverings from the collection of the Bakhchisarai Historical and Cultural Reserve. In our opinion, these ornamental patterns represent a stylized image of the goddess of the Mongol-Turkic world Umai (Umai-ana) - the patroness of children and mothers, the goddess of fertility (in pre-Christian cults). In addition, in Altai, Central Asia, Kazakhstan, among the

Turks of Siberia, the Shors, the image of Umai can mean the reproductive female organs and at the same time a fabulous bird that supposedly nests in the air (Altai, Central Asia, Kazakhstan, the Turks of Siberia, the Shors) [23, p. 20-22].

Thus, the conducted research has shown that the Crimean Tatar ornament was formed over many centuries and experienced numerous cultural influences: Kipchaks, Volga Bulgars, Greeks, Ottoman Turks, Persians, nomadic and agricultural peoples of Central Asia. The ornamental decor of the Crimean Tatars of the 18th – early 20th centuries finds the closest parallels in the folk applied art of the Azerbaijanis, Kazan Tatars, Uighurs, Uzbeks and Tajiks, who in turn adopted much from the Arab-Muslim and Sogdian-Iranian artistic traditions. At the same time, revealing family ties with the ornamentation of other peoples, the Crimean Tatar ornament never loses its own artistic appearance, recognizable original features and national color. The evolution of Crimean Tatar ornamentation testifies to exceptional openness to various influences. Communication with neighboring ethnic groups living on the peninsula and the Black Sea coast, as well as trade routes connecting Crimea with the Northern Black Sea region, the Caucasus and Central Asia confirm the commonality of the depiction of many ornamental motifs with similar and different interpretations.

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ON THE QUESTION OF THE STATE AND TASKS OF MODERN MUSICOLOGY

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Abstract. *The article, using publications by individual Russian and foreign scholars as an example, shows some characteristic features in covering the problems of musical art, and indicates possible ways to overcome the uncertainty and confusion that exist in the humanities*

Keywords: *Classical harmony and its deviation. Romanticism as the beginning of the denial of fundamental principles. The Temple of Arts and the ecumenical community.*

Russian philologist, cultural scientist and musicologist, Professor Alexander Viktorovich Mikhailov (1938-1995) in one of his research works on the modern state of musical art notes an unusually wide amplitude of contradictions. Using the example of the analysis of the work of the German scholar Theodor Adorno (1903-1969), he comes to a number of conclusions that, in our opinion, are of interest not only to specialists in any one profile and direction. A. V. Mikhailov, who lectured on the history of culture at the Moscow Conservatory in the 1990s, drew attention to the state of musicological disciplines in somewhat unexpected or even bold conclusions. Thus, agreeing with researchers that reality can and even should seem to them to be chaos, and if they do not want to close their eyes to the complexity of the given, preferring to replace it with straightening or a straightforward verdict, then the task should be to exhaust the chaos, but... the result of research that undertakes to resolve problems in their extreme complexity (at least at first) - can be not only an analysis and exhaustion of chaos, but also something as an element of this chaos itself! [5.P.295]

In his other work - an essay, also devoted to the sociology of music, Alexander Viktorovich considers the phenomenon of fashion, "fashionable consciousness" as a kind of average consciousness that persistently processes the real questions posed by society by history in order, and only in order, to disperse them in a phrase, to level and neutralize their meaning! [6.P.400] The famous lines of Pushkin involuntarily come to mind: "You can be a practical person and think about the beauty of your nails. You can't argue in vain with the century - custom is a despot among people." Paying tribute to the insight and extraordinary erudition of the German scholar T. Adorno, A.V. Mikhailov cites the most striking characteristics of modern music given by him in his works: "Many significant works of modern times can no longer be understood as development - they seem to be cadences frozen in place" [7. [P.334] The Russian scholar is inclined to view the movements in the art of the 20th century not as a moment of a natural revolution, but simply as a coup, a violent overthrow of what was created earlier, a rejection of the existing, not the acquisition of something new, but rather a subjective action. [8.P.332] Preferring the position of the leading Swiss scholar Ernst Kurt (1886-1946) to the German researcher, A.V. Mikhailov focuses on the concreteness of the presentation of the material in the latter, as opposed to the often vague and "too persistent" definitions and conclusions of T. Adorno. Thus, speaking about the features of the classical form, he agrees with the clear and distinct characteristics: "This form is symmetrical and gravitates towards visibility ("towards spatiality"), the outlines are clear... form in music is a living struggle for mastery of the fluid by relying on the solid." [9.P.332] E. Kurt, whose work was highly valued by B.V. Asafiev, in his studies, unlike later musicologists, most of whom stood on the positions of "tolerance" and liberalism, did not hide his commitment to the values of the classical era, and in a number of the most characteristic aspects of romantic art, he used the richest possibilities of both the literary language and the arsenal of scientific and applied means, which makes his works timeless in significance and relevance. One is amazed at how accurately, without unnecessary words and scientific concepts, the author designates the most important processes in the world of music at the stages of the post-classical era: "while in the classical style the chord serves as an element of diatonic construction, in romanticism it acquires the character of tense instability, and its potential energies are heated in the quivering tension of all efforts," [1.P.131] Speaking about the peculiarities of romantic harmony, in particular using the works of R. Wagner as an example, E. Kurt introduces the definition of "pushing aside the tonic", which, among other things, achieves a feeling of vagueness and dreaminess, in the separation of sound streams from solid ground. Romantic feeling creates a touch of insatiability and dissatisfaction, the imaginary takes the place of the real, also in relation to the tonic, which leads to liberation from the feeling of fundamentality. The tonic chord often appears not

in its pure form, but veiled by a seventh or braided (sic!) by delays [2. P. 130]. Ernst Kurt in the indicated work, although he adheres to the etiquette of an academic researcher, in a number of cases reveals his position as a strict supporter of classical, but not romantic art: "The sparkling play of motley colors provides rich food for their unbridled (sic!) musical fantasy" [3. P. 135]. As the culmination of romantic quests, together with the desire for luxury and diversity in depicting the world, the presence of a tonic in finished constructions turns out to be not at all obligatory! This is the "reflection of ardent life impulses in the external-sensory form of artistic imagination." [4.P.134]

Do not the quests of romantics resemble the lines from V.F. Odoevsky's essay "Beethoven's Last Quartet": "I (i.e. Ludwig van Beethoven, author) will combine all the tones of the chromatic scale into one consonance and prove to pedants that this chord is correct!" [10.P.400] "Bells are the most harmonious instrument… I will introduce a drumbeat and gunshots into the finale… In the new symphony, I will transform all the laws of harmony, I will find effects that no one suspected, I will build it on the chromatic melody of twenty timpani; I will introduce into it the chords of a hundred bells, tuned to various tuning forks…" [11.P.401]

It can be assumed that the concerto for viola and orchestra created in 1987 by the Soviet composer Alfred Schnittke, where as different instruments enter, the circle of tonality expands in a chromatic sequence up to the simultaneous sounding of "all tones at once" - is a kind of embodiment of Beethoven's dream, however, ... not in the most flourishing period of the German composer's creativity! It is not superfluous to recall the sharply negative assessment of the activities of A. Schnittke, given at one time by G.V. Sviridov. It was he who attributed this figure to the "camp of Schoenbergians" [12.P.556]

In Soviet times, the concept of the "Temple of the Arts" had sufficient stability in the worldview of lovers of classical music.

This term, first of all, concerned educational institutions and philharmonic societies, where works that had passed strict censorship were performed. Unfortunately, today this definition has largely lost its relevance, and among the newfangled projects there is a "combination of the incompatible" - the so-called "crossover action" such as "Jazz and Symphony", "Estrado and Symphony", which cannot but remind one of the ecumenical movement in the Christian church, when instead of the supposed union "in Spirit and Truth" there are processes of rejection and even schism. With regard to musical art, one should recall the statements of the above-mentioned Ernst Kurt that romantics accustom the ear to the perception of alien chords and their inclusion in a single sensation of tonality. [12. P. 641] This phenomenon, in our opinion, is appropriate to compare with the concept of "heresy" - incidentally, one of the first to be introduced into circulation by V. F. Odoevsky with the adjective "musical heresy". At the same time, it cannot be as-

sumed that the victorious faction of the followers of "liberalism" in music "rules the roost" in Europe, as well as a group of similar "freethinkers" in the bosom of the Christian church. Among the fighters for the purity of the Catholic faith, one can include Archbishop Marcel Lefebvre (1905-1991), the author of the sensational book "They Betrayed Him". In the genre of musical journalism, the name of the British journalist Norman Lebrecht (born in 1948) has become known, whose book "100 Works That Ruined Classical Music" is today at the peak of popularity.

Unfortunately, nowadays there is no process of "self-healing" of art, in particular, music. Just as there is no "health epidemic", only diseases. An important task of musicological disciplines, therefore, is, perhaps, a greater dissemination of positive materials and research that could separate the "wheat from the chaff", teach a specialist "what is good and what is bad" in music. To teach, if you like, lessons of "moral musicology", as A. V. Mikhailov did in his time, and his "colleague in the shop", current professor of the Moscow State Conservatory V. V. Medushevsky; as V. F. Odoevsky and E. Kurt did, and, unfortunately, a few of their followers.

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INDUSTRIAL SIBERIA IN PAINTING

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Abstract. *This article examines the industrial sites of Eastern Siberia in the mid-to-late 20th century, depicted in the paintings of local artists in the industrial landscape genre. The monuments of the Soviet era still amaze with their power and strength. The conquest of Eastern Siberia in the fine arts of the region left a bright significant mark and did not go unnoticed. A great many paintings were created at that time, dedicated to the construction of, in particular: the Irkutsk, Bratsk and Ust-Ilimsk hydroelectric power stations.*

This study is based on the paintings of the artists: A. M. Ratnikov "Ust-Ilimsk Hydroelectric Power Station", 1975, located in the Regional State Budgetary Cultural Institution "Krasnoyarsk Art Museum named after V. I. Surikov"; V. S. Rogal "Irkutsk Hydroelectric Power Station - Conquest of the Angara", 1956, located in the Municipal Budgetary Cultural Institution of the City of Irkutsk "Museum of the History of the City of Irkutsk named after A. M. Sibiryakov"; A. I. Shatalov "Bratsk Hydroelectric Power Station under Construction", 1962, located in the State Budgetary Cultural Institution Irkutsk Regional Art Museum named after V. P. Sukachev".

Keywords: *industrial landscape, Irkutsk Hydroelectric Power Station, Bratsk Hydroelectric Power Station, Ust-Ilimsk Hydroelectric Power Station, Eastern Siberia, contemporary artists.*

The proposed research topic is relevant, since recently, in the period of widespread digitalization of all processes of human life, the latter, in order to maintain stability in the rapidly changing world of new technologies, has to again turn to its past, to the history of its region and homeland. The Soviet past of Eastern Siberia reminds of itself every hour, as it appears in the form of hydroelectric power stations, which were captured on their paintings by contemporary artists of those tru-

ly great events that took place in the fate of the country. “One of the most pressing topics - the theme of the great construction projects of socialism, the heroic feat of the Soviet people - was perceived by artists and reflected in their works” [4, 319]. The purpose of this article: to consider the paintings of artists A. M. Ratnikov, V. S. Rogal, A. I. Shatalov, executed in the genre of industrial landscape in the context of creating a general image of industrial Siberia. In accordance with the stated goal, it is necessary to solve the following tasks:

– to present an overview of scientific sources on the subject under consideration;

– to define the methods of the present study;

– to present a brief historical essay on the creation of hydroelectric power plants in Eastern Siberia in the mid- to late twentieth century;

– to define the genre of industrial landscape and consider its features;

– in the context of defining the genre of industrial landscape, to consider the paintings of the artists V. S. Rogal “Irkutsk Hydroelectric Power Station - Conquest of the Angara”, 1956; A. I. Shatalov “Bratsk Hydroelectric Power Station Under Construction”, 1962; A. M. Ratnikov “Ust-Ilimsk Hydroelectric Power Station”, 1975; to present the image of industrial Siberia in painting.

During the construction of industrial monuments in Eastern Siberia, many works of fine art were created, since such construction projects were of all-Union significance and gathered people of different professions, as well as creative people (artists, poets, writers, musicians), who tried to capture the peaceful feat of Soviet people in the harsh cold taiga in all available ways. “It would be correct to believe that every self-respecting artist should visit Siberia, touch this grandiose historical feat of the people with his talent, be involved in this matter,” said Deputy Minister of Culture of the RSFSR V. M. Striganov [4, 327].

This article has scientific novelty, since for the first time the above-mentioned paintings depicting hydroelectric power stations, executed in the genre of industrial landscape, are presented together in one study.

In further scientific research of fine art, this work can be used as practical material. The methodology of this study can be scientific works collected on this topic, which can be conditionally divided into two groups. The first group of publications is directly devoted to the concept and definition of the genre of industrial landscape, as well as culture and fine art in general. These include: - scientific article by Grigorieva E. A., Barsukova N. V., Poilova E. V. “Development of the cultural environment of the industrial city of Krasnoyarsk in the 1970s - 80s”, dedicated to the cultural component of this region, the features of its development in the field of culture and art [1];

– the work of I. E. Kozemaslova “Features of the Theme of Labor in the Works of Kuzbass Artists in the Second Half of the Twentieth Century,” which directly examines the depiction of the theme of labor in paintings of the Soviet era [2];

– the article by art critic L. R. Murina "Industrial Landscape in the Art of Western Siberia in the 1920s – 1990s" directly tells about the genre of industrial landscape, where the author highlights its features and gives an artistic description [5];

– the scientific publication of candidate of art history, associate professor N. S. Popova, associate professor T. Yu. Kazarina "Regional Features of Landscape Development (using the art of Kuzbass as an example)" is dedicated to Soviet art, including a description of the landscape genre at that time [6];

– the work of research fellow A. S. Potapova "Industrial Landscape in the Collection of the IRAM. Painting" provides specific examples of works made in the genre of industrial landscape from the collection of the Irkutsk Museum [7];

- an article by candidate of historical sciences, associate professor Trifonova G. S. "Formation of the art of the Urals and Siberia during the Soviet industrial era of the 1930s. The exhibition "Ural-Kuzbass in Painting" tells about the Soviet fine art created in the specified territory at that time [8];

- a scientific publication by Lisitsyna Ya. Yu. "BAM in Soviet fine art" describes the creation of works of fine art in the context of creative business trips and trips to large-scale construction sites in Siberia [4].

The second group of works is devoted directly to the construction of hydroelectric power plants in Eastern Siberia. This includes the collections "Chronicle of the affairs of Bratskgesstroy" [3] and "It was on the Angara" [9], which contain archival data related to the construction of industrial facilities. The above-mentioned sources of scientific and specialized literature fully allow us to reveal the topic of this work "Industrial Siberia in Painting".

Also, empirical and general scientific research methods were used in the work, such as description, comparison, generalization, deduction and induction, comparative analysis.

The following industrial objects are considered in this work:

1. The Irkutsk hydroelectric power station was built on the Angara River in the city of Irkutsk in the Sverdlovsk region, is the first largest hydroelectric power station in Eastern Siberia, is part of the Angara cascade as its first stage. During the construction of the Irkutsk hydroelectric power station, the level of Lake Baikal rose by about a meter.

The Irkutsk hydroelectric power station structures include: a combined dam building, spillways, a hydraulic structure, earth dams, feeder and outlet channels. A road runs along the upper trestle of the dam.

In 1949, a hydroelectric power station project was developed and approved, which was later slightly modified taking into account the terrain. The construction of the Irkutsk hydroelectric power station began in 1950.

Until 1954, preparatory work was carried out on the construction of the hydroelectric power station: a tent camp for builders was built, material bases were created, roads were laid; power lines were installed.

Work on the construction of the hydroelectric power station continued at temperatures below 45 degrees, in difficult production and living conditions.

In 1954, the first concrete was laid, and in 1956 the Angara River was blocked and its hydroelectric units were gradually put into operation. The Irkutsk hydroelectric power station was fully commissioned in 1959 [9].

The Irkutsk hydroelectric power station is the first and largest hydroelectric power station in Eastern Siberia.

2. The Bratsk hydroelectric power station, named in honor of the 50th anniversary of the Great October Revolution, was also built on the Angara River near the city of Bratsk, is one of the largest hydroelectric power stations in Russia and is part of the Angara Cascade as its second stage.

The construction of the Bratsk hydroelectric power station began in 1954. This event became the most significant in the history of the country and was marked as a "shock construction project". At that time, the Bratsk hydroelectric power station became the most powerful hydroelectric power station in the world. That is why there was such increased interest in it. The hydroelectric power station includes: a concrete dam, two earthen dams, a hydroelectric power station building, and distribution devices.

Trains, cars and pedestrians move along the Bratsk hydroelectric power station.

The development of the project for the construction of the Bratsk hydroelectric power station began in 1949. A new department, "Bratskgesstroy", was created for the construction of the hydroelectric power station, headed by I. I. Naimushin and A. M. Gindin.

The year 1954 in the construction of the Bratsk hydroelectric power station was marked by the fact that it was during this period of time that a lot of preparatory work was carried out, including: the construction of housing for the working personnel, the verification and laying of the logistics of production routes, the supply of electricity using power lines, the creation of auto repair shops and material bases. People had to work in very harsh conditions - impassable places and low climatic temperatures in winter. In 1955, the residential settlement of the hydroelectric power station builders received the status of the city of "Bratsk". A railway junction and a concrete plant were also built. In 1959, the Angara River was completely blocked. It was from this time that intensive concreting of the future hydroelectric power station began. Construction at that time was quite mechanized.

In 1967, the Bratsk hydroelectric power station was fully commissioned [1].

3. The Ust-Ilimsk hydroelectric power station was built on the Angara River in the city of Ust-Ilimsk in the Irkutsk region, and acts as the third stage in the Angara cascade, after the Irkutsk and Bratsk hydroelectric power stations.

The construction of the Ust-Ilimsk hydroelectric power station began in 1963, when the Bratsk hydroelectric power station was almost completed, and the Irkutsk hydroelectric power station was operating at full capacity.

The entire hydroelectric power station consists of the following rooms and structures: a gravity dam, a left-bank rock-and-earth dam; a right-bank sand dam; the building of the hydroelectric power station itself. The height of the upper point of the dam above sea level is about 300 meters. The upper trestle of the dam is equipped with a car passage. When the Angara River was blocked, the Ust-Ilimsk reservoir was formed, with an area of about 2,000 square kilometers. The Ust-Ilimsk hydroelectric power station is inferior in capacity to the Bratsk hydroelectric power station, but is also quite large in scale.

The area in the area of the city of Ust-Ilimsk was carefully studied by Moscow designers. After which, in 1959, a decision was made to build a hydroelectric power station further down the Angara River near the rocky cape "Tolstoy".

Construction of the Ust-Ilimsk hydroelectric power station began in 1966. Similar to the construction of the Irkutsk and Bratsk hydroelectric power stations, the construction of the Ust-Ilimsk hydroelectric power station also took place in two stages: preparatory and main.

The preparatory stage took five years from 1963 to 1967 and included the creation of a construction site on one of the banks of the Angara; construction of production shops (concrete, reinforcement, repair); arrangement of a residential village, connection to the power line. During the same period of time, the road connecting Bratsk and Ust-Ilimsk was opened.

After the preparatory stage, the first dam of the Angara was made in 1967. This circumstance served as the beginning of the second main stage of the construction of the hydroelectric power station, which lasted about seven years from 1968 to 1974. The main works included: the second dam of the Angara River (1969); laying a concrete overpass; filling the Ust-Ilimsk reservoir with water; supplying the first current (1979). In 1980, the Ust-Ilimsk hydroelectric power station began operating at full capacity [3]. Next, let's consider the industrial landscape, which is one of the types of landscape painting and differs from the classical landscape in that the main object of its depiction is not natural man-made objects, but those created by people - industrial monuments.

This type of landscape became especially popular during the Soviet period of "Komsomol construction projects" that took over Siberia, when industry, construction of factories, plants, hydroelectric power stations and other industrial enterprises began to develop everywhere [8].

By creating this type of landscape, the artist seems to recreate a panorama of large industrial facilities, fits them into the environment and reality, and displays the impact of man on nature [2].

Let's consider the work of the artist V. S. Rogal "Irkutsk Hydroelectric Power Station - Conquest of the Angara", 1956:

The composition of the work is horizontal. This work is directly dedicated to the moment of damming the Angara River. Almost in the middle of the work,

there are trucks on the overpass, dumping large boulders into the river. Behind them are construction cranes and other auxiliary objects. The peculiarity of this work can be called a unique artistic technique that the artist uses in creating this work - this is a schematic simplified image of the entire work. The artist conveys the unfolding events with large strokes, without describing the details. The painting lacks individual details and painted elements. Steam and splashes that occur when stones are dropped on the water seem to obscure the image, making it unclear. The color scheme of the work is presented in soft beige and blue colors, there are no clear boundaries of objects, one flows into another. The atmosphere of the work is a foretaste of the next stage of construction, when the river will already be blocked [6]. Let's consider the work of the artist A. I. Shatalov "Bratsk Hydroelectric Power Station Under Construction", 1962:

The composition of the work is also horizontal. The artist depicted the construction on a bright sunny day. The unusualness of this work lies in the unusual angle of the entire image. The artist seems to hover over the dam, paints it from above, from a bird's eye view. Therefore, from viewing this work, there is a feeling of the presence of some kind of plan or scheme. The color palette is very bright, sunny. The banks surrounding the future dam are very clearly visible. The river looks calm. A static working atmosphere is shown. The whole image is unambiguous, everything is in order – the construction of a hydroelectric power station. Work moments are shown deep below: the houses of the builders, trucks, construction cranes and individual figures of people. All the details and elements of the composition are painted very carefully. In general, the atmosphere of the picture is calm [5].

Let's consider the work of the artist A. M. Ratnikov "Ust-Ilimsk Hydroelectric Power Station", 1975:

The composition of the work is horizontal. The dam itself is located in the background as a clear dark silhouette. In the foreground are large boulders. They are made in a dark color. The artist uses this technique to highlight them, to emphasize their significance. Symbolically, they carry the meaning of the fact that the conquest of nature - the Angara River was difficult and they are a reminder that the confrontation between man and the elements is not over yet. Man needs to be on the alert, otherwise the forces of nature will take over and destroy everything he has created. The color scheme of the entire work is cold, gray-blue shades predominate. The dam is depicted during the day, the sky is in the clouds. Water is being released and splashes and steam can be seen rising from the water. The surface of the water itself is seething and shimmering. The work feels dynamic and moving [7].

These are the different works of artists who captured seemingly similar historical events.

If we consider the works of artists V. S. Rogal, A. I. Shatalov, A. M. Ratnikov, dedicated to the construction of hydroelectric power plants, as a whole, we can state that:

– all the artists' works are dedicated to the construction of hydroelectric power plants in Eastern Siberia "The very appearance of artists in the taiga, at a construction site, far from cultural centers introduced people to art" [4, 332];

– all the artists' works belong to the genre of industrial landscape;

– all the artists' works belong to the same Soviet period of development of Eastern Siberia;

- all the artists' works are done in the style of realism "The artists act as chroniclers of the Great Construction of the Century. The life and everyday life of people in harsh natural conditions is simple, unprepossessing, but filled with spiritual charm" [4, 347];

– all the artists' works have a horizontal composition, a certain dynamic associated with the plot of the works – the construction of a hydroelectric power station;

– all the works have their own unique artistic image of Soviet reality, dependent on the individuality and personality of the artist who presented it. "The artists were attracted by the theme of the development of wild nature, the forms of interaction between people and it. The paintings show the dynamics of the formation of the human world in new conditions" [4, 345].

Thus, in the course of the conducted research:

– a review of scientific sources on the topic under consideration was presented;

– the methods of the present research were determined;

– a brief historical essay on the creation of hydroelectric power stations in Eastern Siberia in the mid- to late twentieth century was presented;

– a definition of the industrial landscape genre was given, its features were considered;

– in the context of the definition of the industrial landscape genre, the paintings of the artists V.S. Rogal "Irkutsk Hydroelectric Power Station – Conquest of the Angara", 1956 were considered; A. I. Shatalova "Bratsk Hydroelectric Power Station under Construction", 1962; A. M. Ratnikova "Ust-Ilimsk Hydroelectric Power Station", 1975; the image of industrial Siberia is presented in painting.

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GENETIC RESEARCH IN THE MODERN WORLD. SUCCESS AND FORECASTS

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Introduction

Nowadays, when technology has reached incredible heights, science is doing everything possible to provide us with a healthy and long life. One such advance is genetic research, which gives us the ability to peer into our DNA and detect possible health problems even before they appear.

Thanks to extensive scientific research, geneticists have been able to gain unique knowledge about the human genome and have learned to diagnose numerous diseases through analysis of blood, saliva and other biomaterial. This approach allows you to quickly obtain the most complete and objective information about the predisposition of each individual patient to certain diseases, promptly identify fetal pathologies in pregnant women, and reliably determine paternity and degree of relationship. The list of genetic studies is expanding every day. This gives people a better chance of recovery and longevity and allows doctors to select the most effective treatments.

The goal of genetic testing is to promptly identify mutations and polymorphisms. Identification of mutations associated with monogenic diseases is used to diagnose these diseases in the presence of appropriate clinical signs. In addition, these tests can be used to assess the risk of these diseases in offspring in the case of a family history or a high frequency of the disease in the population. The study of gene polymorphisms is carried out in order to identify hereditary factors of

predisposition to multifactorial diseases and timely elimination of harmful environmental factors.

The essence of genetic research

Each person is the owner of a unique set of deoxyribonucleic acid (DNA) macromolecules. It is present in every cell of a living organism, and it is it that is responsible for storing and transmitting the development program from the progenitor to the descendants. Accordingly, by studying the sequence of arrangement of nucleotides in the DNA double helix, as well as the degree of its twisting, it is possible to decipher the human genetic code and diagnose congenital pathologies, determine physical and intellectual predispositions, and identify mutations and polymorphisms caused by hereditary or external factors [1].

Genetic testing includes several types, including:

• Predictive testing: This type of testing is used to determine the risk of developing certain genetic diseases.

• Diagnostic testing: This can help determine whether a certain condition is the result of a genetic disorder.

• Neonatal testing: This type of testing is done on newborn babies to detect genetic or biochemical diseases.

At the moment, almost 5,000 diseases that are inherited are already known. Of these, about 2,000 are classified as severe pathologies. Based on the deciphered transcription of the genetic code, doctors can not only select the most effective methods of drug therapy, but also identify predispositions to a particular disease even before the manifestation of clinical signs. This makes it possible to significantly alleviate the course of the disease or prevent its development altogether. The scope of molecular genetic research is quite wide: diagnosis of hereditary diseases, diagnosis of predisposition to various pathologies, including cancer, diagnosis of infertility, preimplantation genetic diagnosis of embryos, as well as identification or exclusion of pathological changes in the human genome, prevention of transmission of genetic diseases by inheritance [2].

Predictive medicine allows everyone to receive information about their propensity for disease or excess weight. Moreover, many multifactorial pathologies can develop only under certain conditions. Accordingly, by eliminating the risks, the patient can, if not avoid the disease, then significantly minimize its clinical manifestations. DNA screenings make it possible to identify in patients an innate predisposition to a particular disease long before its development and exacerbation and to confirm the diagnosis in case of atypical symptoms [3]. Genetic tests are also relevant for identifying diseases with gender factors: hemophilia, breast cancer, Klinefelter syndrome and others. Blood issues are the most difficult. DNA text allows you to confirm paternity and consanguinity of people. The analysis can, with a high degree of reliability, not only establish the primary degree of relationship, but also determine whether people are second-degree relatives.

Genetic predisposition is an increased likelihood of developing a certain disease. It occurs as a result of specific genetic variations that are often inherited from parents. These genetic changes contribute to the development of the disease, but do not directly cause it. Even within the same family with a predisposition to developing the disease, one person may get the disease and another may not.

Modern methods of genetic research

Currently, modern high-tech equipment is mainly used for genetic research and advanced world techniques are widely used. This makes it possible to quickly and at a high quality level perform numerous laboratory studies and genetic tests. Most often, genetic screenings are performed on the patient's venous blood and soft scrapings of the buccal epithelium (cheek mucosa). Research is also carried out on saliva, sperm, living hair and nail plates. The most popular genetic testing technologies in modern science and medicine can be divided into DNA microarrays and next generation sequencing (NGS) [4].

Chemical DNA synthesis is the most important method of molecular research. Characterizes the protein and nucleic structure and reactivity of biopolymers. It is carried out in several stages in an automated cycle, so it takes a long time and is characterized by high purity of the results.

Restriction digestion is a routine method based on DNA digestion and the study of restriction endonucleases. Allows you to obtain data on individual fragments and sequences of nucleotide locations and identify intracellular protective mechanisms, including the reaction to a foreign protein. Used in pharma-genetics and diagnosis of congenital and acquired pathologies.

PCR (polymerase chain reaction) is a molecular biological research method. Provides high analytical accuracy and allows successful amplification and splicing of DNA fragments. PCR is applicable both to confirm consanguinity and to identify predispositions to various diseases.

Hybridization using DNA probes. A reaction method aimed at studying structural sequences in DNA and determining the number of individual nucleotide fragments. Special markers (radioactive probes or plates with immobilized DNA probes) allow the process of hybridization to identify individual genes and their numerous copy fragments, as well as transcribed and non-transcribed DNA. The results of the study allow us to judge the differentiation of cells in the embryo.

Next generation sequencing (NGS). Unlike the hybridization method, sequencing provides a much larger amount of genetic information. Small sections of DNA from the biomaterial are first read and then put together to determine the primary sequence. Next generation sequencing can be used to read the entire genome and exome. NGS tests also make it possible to accurately identify pathogenic variants for specific diseases: epilepsy, autism, hereditary hearing loss, metabolic diseases and more. Tests based on this technology are usually more expensive than

microchip tests due to the high cost of the equipment. But the price is justified, since the high accuracy of NGS helps to identify or confirm the diagnosis of many types of diseases, including cancer [5,6].

In general, genetic tests are a complex and multi-step process that requires the use of specialized equipment and highly qualified specialists.

Prospects for the development of genetics

Every year we are getting a little closer to preventing the development of hereditary diseases during fetal development. The main tool capable of such magic is gene editing using CRISPR technology. It is this that allows you to literally get into DNA, remove or transform the necessary genes. With opening in 2012–2013 the CRISPR/Cas genetic engineering method, fundamentally new opportunities have emerged for manipulations at the genome level of higher organisms. The method turned out to be simple and accurate when affecting specified sections of DNA, which means it could be used in almost any modern molecular biology laboratory. Using the CRISPR/Cas system, you can make any changes to the genome: include point mutations and new genes in a certain region, remove large sections of nucleotide sequences, correct or replace individual gene sections [7].

The use of the CRISPR/Cas method in combination with cellular technologies opens up fundamentally new possibilities for the pathogenetic treatment of any human diseases [8]. Genome editing can be carried out at the level of the embryo, which will rid it of hereditary diseases.

According to geneticists, by the end of the third decade of the 21st century, genetic vaccines will replace conventional vaccinations, and doctors will have the opportunity to permanently put an end to such incurable diseases as Alzheimer's disease, diabetes, and asthma. Scientific research is being conducted in this direction, which has its own name - gene therapy [9]. According to some forecasts, around 2030, exceptionally healthy children will be born: already at the embryonic stage of fetal development, geneticists will be able to correct hereditary problems. Scientists predict that in 2050 there will be attempts to improve the human species. We will read everything that is written in our chromosomes, and we will learn to understand it, we will use it to correct all the errors found. By this time, we will learn to design people of a certain specialization: mathematicians, physicists, artists, poets, and maybe even geniuses. A person's dream will come true: the aging process, undoubtedly, can be controlled, and then immortality is not far away [10].

Conclusion

The value of genetic research in identifying congenital pathologies is that it allows future parents to learn in advance about the risks of their child inheriting certain diseases. This kind of analysis is an opportunity to diagnose existing DNA abnormalities in the fetus and not wait for the moment when signs of pathology become obvious. When studying genetic material in this case, we also take into

account the fact that many genes that can affect the development of congenital diseases are in a state of recession. But their stage of "inactivity" is often temporary - there is no guarantee that the altered genes in a recessive state will not be passed on to the child and will not cause serious health problems in the future.

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ADAPTIVE MECHANISMS IN PLANTS UNDER CONDITIONS OF ANTHROPOGENIC TRANSFORMATION OF THE ENVIRONMENT

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Abstract. *The adaptation system evaluated in unstable environmental conditions is based on visual and functional criteria of significance, which are compared over a long period of time for conducting an experiment and observation. It has been established that it is the structural and functional criterion that is controversial in assessing the success of the adaptive potential of plants under conditions of increased militaristic stress and a high level of technogenesis in the Donetsk economic region. The project was implemented within the framework of ongoing environmental monitoring based on data from phytoindication and phytoquantification of urbanized and industrially used territories of Eastern Europe, in particular the Azov Sea region and Central Donbass.*

Keywords: *Donetsk region, phytoindication, ecological analysis, environmental monitoring, Donbass, ecosystem transformation, phytomonitoring, pollution assessment, industrial regions, botanical examination technologies, plant survival strategies.*

The southern part of Eastern Europe is mainly a steppe area with a very high level of anthropogenic impact. Historically, this territory was defined as a mining zone, which means a high level of transformation of underground layers and the formation of new man–made landscapes during the construction of metallurgical plants and enterprises of mining and processing complexes, as well as at a high level of storage of coal mine dumps and industrial debris.

Previously, we raised the issue of conducting phytomonitoring activities to assess the state of pollution and ecosystem transformation [1, 2], where geoinfor-

mation technologies were also used in the process of observing and interpreting the results obtained [3]. In the ecosystem assessment system, the key indicator is biogeochemical [4, 5], as well as an assessment of the level of pollution in order to combine data with the state of public health [6], the level of disease and the receipt of occupational chronic diseases [7, 8].

In assessing the stability and geochemical stability, statistical and mathematical analysis methods were used [9], methods of structural botanical indication of various taxonomic groups of plants [10, 11], detailed bibliographic accounting of publications important for understanding on the topic of retrospective transformations in the region and current trends in ecosystem functioning in demand [12], as well as chemical and analytical control territories for the ingredient analysis of indicator plants [13].

Among the theoretically expected adaptation mechanisms, plant physiologists, for example, consider the dynamics of concentration and functioning of stress-resistant proteins, including metalloteoneins and various molecules that form the adaptive potential of a plant organism. If we diagnose the territory (as an element of the landscape) at the population level (cenopopulation structures), then the most important indicators of the success of the ecosystem from the point of view of geobotanical observations will be the assessment of the phenological state of individual elements of the community, the level of vitality and compliance with typical (progressive) stages of ontogenesis of separately short-lived and long-vegetating species. But in the conditions of specific equipment of the laboratory and instrumental base in research institutions of Donetsk State University, the first reliable criterion in assessing the adaptive potential is the morphological and structural indicator of compliance with the functional norm of individual macromarkers (leaf blade shape, plant habit, shoot formation system, branching, terate flower forms and leaf blade structure in pathology, pubescence of generative and vegetative structures of indicator plants). Therefore, in the listed published works, the main emphasis was placed on the conformity of structural units according to the structure of the norm – deviation from the norm in the range of variation was considered a response to the action of changing environmental conditions.

Over the past 30 years, criteria have been experimentally established for assessing territories using indicator plants and for establishing the level of imbalance in ecosystems [14]. According to the variability of structures, trends towards changing strategic behavior in the reproductive and generative spheres of higher plants (both flowering and mossy) are identified, which allows us to consider this as one of the mechanisms of adaptation to unstable environmental conditions [15], including data on the thanatogenesis of plant organisms with an increase in geochemical contrast of anthropogenic origin [16, 17]. Over the past 10 years, there has also been a situation of the impact of military events on the state of ecosys-

tems, such an influence factor was determined by the zone of polemostress and allocated to neo-technogenic provinces [18]. For formed natural ecosystems under strong anthropogenic influence [19], modern diagnostics using modern laboratory and analytical equipment with a detailed analysis of migration processes of toxic components is of particular importance [20].

Adaptive potential is also manifested at the level of interaction of toxic elements of industrial, militaristic and agricultural origin on the plant organism. From our point of view, the most optimal adaptive species for assessing evolutionary processes and inheritance systems are 1-2-year-old weed-ruderal herbaceous plants with a high percentage of survival both in mechanically disturbed areas and in ecotopes of toxic impact (wild chicory, shepherd's purse, odorless chamomile, medicinal dandelion, cornflower, plantain, bird's mountaineer, common tansy and other plant species).

Therefore, visual options for conducting a diagnostic field experiment become more adequate in the express analysis of factors of adverse effects on soil and vegetation cover. Detailing by microstructures and biochemical criteria can be considered as a further stage of analysis of both an individual and a local population at the level of adaptation to the landscape system, natural and territorial complex, and high levels of disturbance in the equilibrium of the ecosystem.

If we compare which features in the structure of weed-ruderal species are more adapted to a specific environment, then it is necessary to detail the process of direct contact of this organ with the contact medium. For example, according to the pubescence of the leaf apparatus (the nature, frequency, density and quality of the integumentary trichomes), it is recommended to assess the dustiness and quality of atmospheric air, directly the surface layer of the atmosphere. If we study the soil environment, then the place of contact will be determined by root systems, hairs and root morphology. An interesting pattern turned out to be the study of the quality of pollen grains of typical plant species by polymorphism: if you diagnose the locality, then you need to collect pollen directly from the anther, that is, a trap or sticky tape was placed in the flower, then data related to soil pollution (rhizoedaphosphere) is obtained. And, if you collect pollen grains that are in free flight in gas-air contaminated mixtures, then the diagnosis should be carried out correctly for air. The combinatorics of determining pollutants for the aquatic environment in contact with plants is divided into two principal parts: 1) according to the concentration of elements in precipitation, it is best to use mossy gametophytes, since structurally they absorb substances from the environment with precipitation and deposited dust, 2) according to the characteristics of the content of harmful substances and elements in the soil solution, which, by contact with the root system, is the immediate habitat, At the same time, it is necessary to distinguish the depth of analysis of the root system and distinguish the upper most anthropogenic soil layer

from the soil environment, which has a more conservative nature for the migration of new elements-pollutants.

In the strategy of plant behavior in relation to transformation factors, two trends are observed with an aggravation of the impact process: 1) in the direction of adaptations for mechanical disturbance of soils and plant horizons, the evolution of such processes can proceed very quickly and affect 3-4 generations when new adapted localities are obtained, however, this form of adaptations is more suitable for places of natural mobility of ground horizons, for example, in mountainous areas and during mud volcanic activity on slopes; 2) to adapt to chemical pollution, when pineomorphic signs of stress resistance are formed precisely to the concentrations of certain elements or complex organic compounds formed as a result of anthropogenic (technogenesis) emissions, discharges, as well as the introduction of various technologies for the combustion of fuel or garbage, storage and disposal of waste (during rotting and natural decomposition in particularly toxic conditions). Thus, in the conditions of technogenesis, R& S strategies are combined. And this adaptation mechanism is often combined if open landscapes are reshaped and polluted with substances, that is, the concentration of some elements exceeds permissible norms, therefore causes direct effects on the integrity of this system. Plants are not only the most sensitive indicators, but also carry the bulk of biogenic flows, involving elements in the cycle. At the same time, it is especially important to note their optimization role in reducing emissions into the environment. It is critically important for Donbass to develop technologies to reduce dust in the environment, since such natural and climatic factors and climate transformation exacerbate the process, which adversely affects the health of the population and has direct and long-term toxic effects.

When performing monitoring studies, a very important criterion is compliance with the principle of "experience – control", which is possible under particularly contrasting conditions of action of a particular factor in comparison with the state of the plant organism in reference territories where the level of human exposure is minimal. In most cases, such territorial objects are places of the nature reserve fund. Such participants in Donbass can be considered as refugiums with preserved typical vegetation. Many lands have been disturbed as a result of not only heavy industry, but also agriculture, since the steppe territory is mainly a plain, on which it is most convenient to cultivate row crops. This circumstance also creates additional impacts on natural systems as a result of the use of fertilizer and pesticide technologies in agriculture in the region. The idea of phytotesting such soils has a very wide application, since phytoprime determines the possibility of carrying out agrotechnical measures on a specific piece of land. In practice, such experiments have been worked out using the example of primary reactions of root systems of seedlings or meristem cells of the lower end engine with a differential approach

using different phytotestors, including plant seeds of the native flora fraction in the Northern Azov region and directly in the Central Donbass.

The study of marginal meristems and universal points of plant growth brings the study closer to understanding the densest contact of a plant organism with an ecologically unbalanced environment. That is, if totipotent plant cells meet with an environmental factor exceeding the norm of exposure, then a conflict of structures occurs, and differentiation can occur according to separate scenarios of transformation of the plant organism, which is reflected primarily in the analysis of morphological anomalies of plants. Transformation scenarios can include both well-known pathways, for example, the formation of dwarf structures or chloroses, and exclusive transformations, for example, in plants fasciation, dystopia, oligomerization, proliferation of individual cells and the initiation of new structures within the base. The latter cases are given very little place in the scientific literature on teratology, which generally attracts more attention in breeding work, but is also of great importance in diagnosing the state of ecosystems and the impact of man-made factors. Growth points are also strategically important in the study, since they represent the place of maximum physiological activity of the plant organism, as well as the place of concentration of the continuation system according to the vegetative scheme or in the generative question (during the formation of seed material).

An important stage in the assessment of plant adaptation mechanisms is the formation of a monitoring network over a large area, taking into account both monofactor and multifactorial pollution (anthropogenic impact). If we take into account the territory of Donbass, the system is a single information field with localization points in network nodes at 113 test sites. When analyzing territorial features and cartographic visualizations, intermediate results can be obtained, while taking into account that the localization node of the monitoring network should display the maximum contrast, that is, the highest and lowest values of the studied characteristics, so that the intermediate values during mapping would reflect the specifics of the transition and continuity. If the jumps between the intervals are located close, then this is reflected on the map in the toxicological contrast, if the relatively long distances of a smooth transition from one value to another (from smaller to larger). The intervals for 5, 7 and 10 stages of criteria and indicators conversion have been tested. In this series of experiments, the most accurate results are obtained in the analysis of the teratological component of plants in different places of growth, especially in neo-man-made anomalies, which need more detailed study, modeling and development of ways to rehabilitate and restore natural characteristics in this area. The monitoring network successfully allows us to identify areas of greater or lesser influence of destructive factors in assessing the integrity and functional norm of the ecosystem.

The statistical apparatus for evaluating the results of adaptations includes both classical approaches, for example, in estimating the arithmetic mean and correlation coefficients between paired samples. The model processes that are also used, as well as data recovery methods, have also been in demand recently. Because in practice, 4-7 % of the results can be spoiled as a result of transportation, storage or as a result of conducting military events. However, such methods of data processing, such as coordination in the first main components, are most often used both as an algorithm for restoring features, and as a way to prove the presence of conjugate groups between plant components and the environment – the habitat of those plants that have adapted to climate and soil factors, and are just beginning to adapt to dramatically changing conditions the environment as a result of human exposure. A promising way to further study adaptations is also to form an array of regional databases on the state of ecotopes so that analytical programs and artificial intelligence can recognize places of adverse impacts with further recommendations for optimization work in these territories.

Criteria of anthropotolerance according to the level of structural polymorphism are highlighted, while qualitative characteristics need to be transformed into quantitative indicators for a specific monitoring point or a specific ecotope location so that a comparison can be made for all characteristics and indices available for study. The mechanism of adaptation is a very complex, multi–stage process that is dialectically integrated into the system of transformation of living things in conditions of external transformation, testing the internal capabilities of the gene pool to develop such adaptations that will help preserve the integrity of the organism and ensure the condition for the prolongation of the genus in the next generations.

This is an obligatory and continuous process of life formation, however, in conditions of man-made disasters, including as a result of direct military events, such effects increase their speed and may have unpredictable development scenarios. And the human task is to prevent the aggravation of the destructive effect in the integrity of ecosystems, since violations occur at all levels of the structure of living things, therefore, the indicator abilities of plants are important in the diagnosis of the biosphere as a whole.

The experience of 30 years of adaptation of plants to adverse forms of impact on natural ecosystems and plant components directly, as the most energy-accumulating natural migration flows of new impacts, is analyzed. We believe that the importance of such a direction ensures the preservation of the resource potential of the natural possibilities of the territory for restoration after a long period of exposure to a destructive factor.

The study was carried out within the framework of the youth laboratory «Diagnostics and adaptation mechanisms of natural and anthropogenically transformed ecosystems of Donbass». The work is a direct association of scientists from

Donetsk State University and Donetsk Botanical Garden in the field of industrial botany, plant introduction and breeding in Donbass.

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DOREMA KOPETDAGH (DOREMA KOPETDAGHENSE) AND THE WAVY FERULA (FERULA UNDULATA) IS AN ECONOMICALLY VALUABLE PLANT IN THE CENTRAL KOPETDAG

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Abstract. *The article presents the results of the study on the harvesting of raw materials of the Kopetdagh Doremum, it is recommended to put into operation no more than 15-20% of plants annually at the fishing site, which ensures normal self-renewal of doremum thickets and its stability in the herbage. The widespread distribution of some species of the genus, as well as fairly high reserves of raw materials, make doremas promising objects for in-depth research and practical use.*

Keywords: *dorema, medicinal plants, general biological stock, biological resources, air-dry raw materials, resin, Central Kopetdag.*

Relevance. An urgent task of modern pharmacy and biochemistry is to expand the range of medicinal plant materials, the sources of which are common medicinal plants of the local flora. Despite significant advances in the synthesis of chemical drugs and their use, plants continue to be one of the promising sources of obtaining drugs [2; 4; 5; 9].

In recent years, medicinal and other useful plants of Kopetdagh, as sources of biologically active compounds and objects of economic use, have been studied very intensively. Despite the relatively small areas occupied by the mountain ecosystems of Turkmenistan, the plant communities of this natural region are distinguished by the largest flora of medicinal and other groups of useful plants.

The definition of the natural reserve of raw materials was studied - according to the generally accepted method [6; 8].

Morphological and phytochemical characteristics. Kopetdagh dorema (*Dorema kopetdaghense* M. Pimen.) is a perennial herbaceous plant of the celery family (Apiaceae Lindl.), 150–200 cm tall. Taproot monocarpic. The stem is cylindrical, tapering, round, branching in the middle into a pyramidal panicle, slightly drooping. The leaves are grayish-pubescent, trifoliate, their segments in turn are twice pinnately dissected into oblong-lanceolate sections. Umbels are 5-12-flowered, almost sessile. It blooms in May-June, bears fruit in June-July [2; 7].

Grows in the foothills and lower mountain belt. It settles on rocky and fine-earth-gravelly slopes, terraces, dry river beds.

In the Central Kopetdagh the following areas are noted: Germab, Gokdere, Archabil Gorge, Vannovsky, Neftonovsky, Yablonovsky, Kurtsuv, Babazav, Dushakerekdag, Kheyrabad, Karaagach, Mergenolen, Kurkulab Arvaz, Gaudan and others [2-4; 7].

The above-ground mass of the Kopetdagh dorema fern contains essential oil 0.09-0.12%, coumarins, flavonoids. The roots contain: resin 19%, terpenoids, coumarins (umbelliferone).

The extract from the roots of the dorema fern has weak antitumor properties. The resin can be used in the paint and varnish industry. In general, the useful (including medicinal) properties of the dorema fern of Turkmenistan have not yet been sufficiently studied [1; 5]. The wide distribution of some species of the genus, as well as fairly high reserves of raw materials, make doremas promising objects for deep research and practical use.

Bioresources. In the Central Kopetdagh, dense thickets of the plant, despite its wide distribution, are rare. We described one of such areas in the Suncha tract. Here, about 30 hectares are occupied by thickets of Kopetdag dorema. The density of plants fluctuates from 5-6 to 30-35 per 100 m2.

The average weight of the raw root is 2080.3 g. The aboveground mass of plants is 929.6 g. The yield of air-dried raw materials is 30 and 28%, respectively.

Taking the number of plants in the area as 36,000 thousand (on average 12 plants per 100 m2), we assume that the total biological reserve of air-dried raw materials in the area is 22.5 tons of underground and 9.4 tons of aboveground phytomass.

Harvesting of the raw material and its storage. For harvesting the roots of the dorema, perennial, well-developed vegetative individuals are used, and for harvesting the grass - and generative shoots.

It is better to dig up the roots after the plant has finished its vegetation.

The grass is harvested at the time of maximum development of the leaf mass, before it dries out. The cut leaves and shoots are pre-chopped and dried in small stacks in the shade.

After digging, the roots are cleaned of soil residues and immediately chopped into pieces no larger than 5-10 cm. The roots are dried in the shade or in the sun laying them out in a thin layer and constantly shoveling. Dry raw materials are stored in bales or bags in dry, well-ventilated areas separately from the raw materials of other medicinal plants.

The resin of the stems of the dorema is also harvested for medicinal purposes. Only flowering specimens are used for these purposes, since during the flowering and fruiting period the plant accumulates a large amount of juice, which includes various useful substances necessary for its vital needs, and their movement in the stems is also enhanced. Thus, the collection of resin should be carried out in the afternoon, cutting the stem with a sharp knife or knitting needle. The next day, milky juice accumulates in the cuts.

The finished raw material from the roots is packed in fabric or paper bags, the resin - in glass containers with a tight lid. Store in a dry, cool place. The shelf life of the roots is 3-4 years, resin - 3-5.

Morphological and phytochemical characteristics. Ferula undulata (*Ferula undulata* M. Pimen. et J. Baranova) – this species was described in 1976 in the Central Kopetdag. It is a perennial monocarpic plant, 80-100 cm tall. The stem is reddish-brown, thick, branching from the middle into an oval panicle. The leaves wither quickly, are smooth on top, and more or less downy on the bottom; basal leaves have short petioles. Mature plants have 2-4 (5) leaves, 40–50 cm long and 50–60 cm wide. Stem leaves are much smaller. It blooms in May and bears fruit in June-July [3; 7].

Ferula undulata grows on fine-grained gravelly, often almost bare scree slopes in the mid-mountain region (shiblyak belt) up to the lower belt of juniper groves, among sparse xerophytic shrubs and highland xerophytes in sagebrush-grass communities.

In the Central Kopetdag, it has been recorded in: Germab, Kheyrabad, Sulyukli, Degirmenli (Prokhladnoye), Chaek, Gökdere, Archabil, Yablonovsky, Kurtusuv, Gaudan, Kurykhovdan, Sherlock, Babazav, Dashtoy, Chopandag. It is endemic to Turkmenistan [3; 7].

The chemical composition is not studied. In folk medicine, the roots of Ferula undulata have long been used to treat various colds [2].

Bioresources. Economically significant thickets have been described by us in the area adjacent to the road from Gokdere to Chaek. Ferula undulata grows here in rather sparse groups in the sagebrush-grass shiblyak communities, covering an area of 150–160 hectares. On a transect of 100 m², an average of 11 Ferula undulata plants were counted. The productivity of its above-ground and underground mass was determined based on 112 randomly selected plants, excluding annual specimens. As a result, the average weight of one plant was 173.1 g of fresh

above-ground and 192.2 g of underground phytomass. The largest roots reached a weight of 500 g. The yield of air-dried raw material for Ferula undulata was 31% for the roots and 28% for the above-ground mass. The exploitable reserve of raw material in the Gökdere-Chaek area is about 8 tons of above-ground and 10 tons of underground phytomass.

Harvesting of the raw material and its storage. To ensure proper conditions for the development of the Ferula undulata population within its range, we suggest harvesting no more than 1/8 of its thickets annually, selecting the largest plants for root harvesting. Generative individuals should not be dug up, leaving them for seeding. The above-ground mass (leaves) is harvested before it dries, without damaging the plant's root collar. Drying and storage of raw materials are similar to those described earlier.

Thus, using the accumulated experience, when harvesting raw materials, we recommend annually putting into operation no more than 15-20% of the plants in the commercial area, which ensures normal self-renewal of the dorema thickets and its stability in the grass stand. A deep scientific study of the bioecological characteristics and economic significance of the Kopetdagh dorema growing in the Central Kopetdagh will allow to study their medicinal properties and their economic significance comprehensively in the future.

Thus, all types of ferula and dorema have medicinal values. Promising medicinal products of plant origin. Biological resources and phytochemical characteristics of some ecologically significant key species of the doremus and ferula genera of the flora of the Central Kopetdag have revealed the resource possibilities of their use in the pharmaceutical industry of Turkmenistan.

A deep scientific study of bioecological features and economic significance of economically valuable doremum species growing in Kopetdag will allow in the future to comprehensively study their medicinal properties and their economic significance.

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THEORETICAL SUBSTANTIATION OF THE CHOICE OF THE CALCULATION SCHEME FOR DETERMINING THE PROCESSING TIME OF HOLLOW AS A FUNCTION OF TEMPERATURE

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Annotation. *In the article the author proposes a method of taking into account the influence of temperature and concentration of the added chemical reagent on the rate of solution injection into the reservoir. It is established that thermal influence can enhance adsorption processes, which significantly affect the behavior of the curves of substance concentration change on the sorbent along the formation radius.*

Keywords: *calculation, scheme, treatment, reservoir, method, process, well, temperature, pumping, pressure.*

At the current stage of development of computer technologies and mathematical models describing various macro- and microprocesses based on physical modeling and special studies, the solution of problems of determining the potential productivity of wells and developing effective methods of intensifying the inflow should be solved by constructing models of the "well-bottomhole zone-formation" system that describe the geometry of liquid filtration in the vicinity of the well and take into account various formation and technogenic factors of change in reservoir permeability. Analysis of the results of laboratory studies conducted in the works of V.R. Syrtlanov, L.Kh. Ibragimov, and S.S. Miller [1], [2], [3] showed that with a constant flow rate of the injected agent, an intensive increase in the pressure gradient occurs, which continues until the polymers of the entire pore volume of the test sample are completely pumped. After pumping the polymer, it is pushed by water, and the pressure gradient begins to decrease (Fig. 1). After the polymer is displaced by water from the sample, the pressure gradient does not reach the initial value, which is associated with the adsorption of the polymer, leading to the emergence of a residual filtration resistance factor. The specified patterns of

change in the pressure gradient from the volume of injection of the agent are an important factor in modeling the flow of polymer solutions in the reservoir, which determine the features of the physicochemical processes during filtration. A mathematical model of the dynamics and evolution of the polymer solution rim, along with the material balance equations for oil, water and reagent, must take into account the non-Newtonian nature of the polymer solution and the interaction with the porous medium (adsorption) and reservoir fluids at high reservoir pressure and temperature.

Pressure gradient

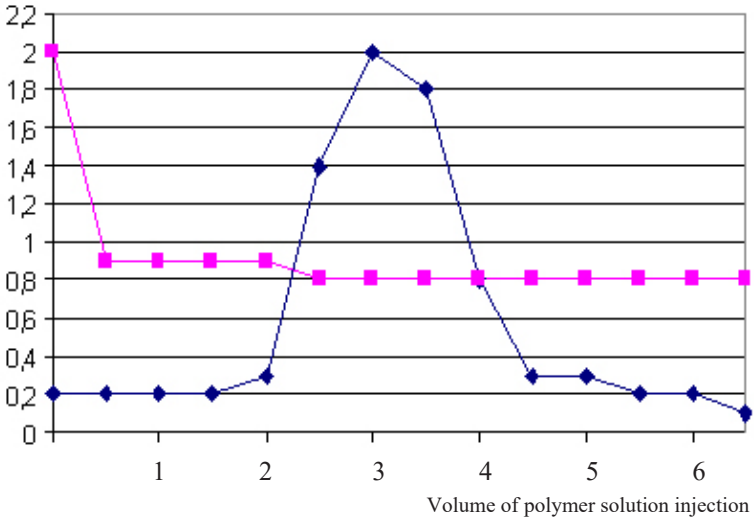

Figure 1. *Dynamics of pressure gradient (1) and oil saturation (2) during polymer solution injection*

Source: compiled based on the previously published work of the authors [4]

The following assumptions are made in the mathematical model used for calculations:

- the polymer does not affect the properties of the hydrocarbon phase;
- there is no free gas;
- polymer adsorption occurs according to Langmuir or Henry isotherms
- the properties of the solution depend on the mineralization of water;
- the model assumes that the density and volume factor do not depend on the current concentration of the polymer;

The process of injection of solutions containing dissolved and emulsified liquid substances into the formation is accompanied by their diffusion (mixing)

with the formation fluid and mass exchange with the liquid and solid phases of the rock. The most common types of mass exchange are sorption and desorption, ion exchange, dissolution and crystallization, colmatation and suffusion [5], [6]. All these phenomena at various stages of development operation can play both a positive and a negative role in the well productivity depending on how correct the choice of component and fractional composition of substances in solutions used in the treatment of the LL is.

To calculate the concentration of a chemical reagent in the liquid and solid phases of a rock during thermal acid treatment of the LL, the basic laws of diffusion processes and mass and heat transfer in a porous medium should be used.

Let us consider plane-radial symmetry and write down the basic equations of diffusion and mass transfer of a substance in a porous medium.

1. Generalized Fick's law of diffusion for determining the mass velocity of a substance associated with a liquid

$$u = cv - D\frac{\partial c}{\partial r} \tag{1.3}$$

2. The mass balance equation for the substance under consideration, containing in liquid and solid phases

$$\frac{\partial(cm+N)}{\partial t} + \frac{\partial u}{\partial r} + \frac{u}{r} = 0 \tag{1.4}$$

3. Equation of kinetics (isotherms) of exchange of matter between liquid and solid phases

$$\frac{\partial N}{\partial t} = f(c,N), \quad F(c,N) = 0 \tag{1.5}$$

4. Darcy's Law and the Continuity Equation

$$v = -\frac{k}{\mu}\frac{\partial p}{\partial r}, \tag{1.6}$$

$$\frac{\partial(m\rho_{ж})}{\partial t} + \frac{1}{r}\frac{\partial}{\partial r}(rv) = 0 \tag{1.7}$$

5. Thermal conductivity equations for each phase of a porous medium, taking into account heat exchange between components and the transfer of the liquid phase by its filtration in a porous medium

$$\frac{\partial T_1}{\partial t} + v\frac{\partial T_1}{\partial r} = a_1\left(\frac{\partial^2 T_1}{\partial r^2} + \frac{1}{r}\frac{\partial T_1}{\partial r}\right) + \alpha_1(T_2 - T_1) \tag{1.8}$$

$$\frac{\partial T_2}{\partial t} = a_2\left(\frac{\partial^2 T_2}{\partial r^2} + \frac{1}{r}\frac{\partial T_2}{\partial r}\right) + \alpha_2(T_1 - T_2), \tag{1.9}$$

where $u = u(r,t)$ - mass velocity of matter;

$c = c(r,t)$ и $N = N(r,t)$ - mass concentrations of a substance in the liquid (per unit volume of solution) and solid (per unit volume of porous medium) phases;

$v = v(r,t)$ - filtration speed;

$p = p(r,t)$ - reservoir pressure;

D - convective diffusion coefficient taking into account molecular and hydrodynamic dispersion;

m - porosity;

k - permeability;

μ - dynamic viscosity;

$T_i = T_i(r,t)$ - temperature in liquid $(i = 1)$ (and solid $(i = 2)$ phases, $a_1 = \frac{\lambda_{ж}}{c_{ж}\rho_{ж}}$, $a_2 = \frac{\lambda_s}{c_s\rho_s}$ - the corresponding thermal diffusivity coefficients for each phase;

$\lambda_{ж}$, λ_s - thermal conductivity coefficients;

$c_{ж}$ and $\rho_{ж}$ - heat capacity and density of the liquid phase;

$c_{ж}$ and ρ_s heat capacity and density of the solid phase, $\alpha_1 = \frac{\alpha}{c_{ж}\rho_{Ж}}$, $\alpha_2 = \frac{\alpha}{c_s\rho_s}$, α - heat exchange coefficient between phases of a porous medium.

Equations (1.3)-(1.7) contain 7 unknown functions

$u(r,t)$, $v(r,t)$, $c(r,t)$, $N(r,t)$, $p(r,t)$, $T_1(r,t)$ and $T_2(r,t)$

In what follows, we assume that the parameters and included in equations (1.3)-(1.9), except for the dynamic viscosity , are constant values. In this case, we assume that the viscosity depends only on the temperature T_1, i.e. $\mu = \mu_0 f(T_1)$ $(\mu_0 = const)$. Under these assumptions, the system of equations (1.3)-(1.5) with unknowns $u(r,t)$, $c(r,t)$ and $N(r,t)$ - can be considered independently of the filtration equations (1.6)-(1.7) and heat propagation (1.7)-(1.9). The problem of diffusion and mass transfer is solved after determining the filtration rate $v(r,t)$, i.e. after solving the corresponding filtration problem, which after excluding from the system (1.7)-(1.8) the speed $v(r,t)$ comes down to the form

$$\frac{\partial p}{\partial t} = \kappa_0 \frac{1}{r}\frac{\partial}{\partial r}\left(\frac{r}{f(T_1)}\frac{\partial p}{\partial r}\right), \qquad (1.10)$$

where $\kappa_0 = \frac{k_0 K}{\mu_0 m_0}$ - piezoconductivity coefficient, k_0, m_0 - initial values of permeability and porosity;

K - reduced bulk modulus of elasticity.

Thus, the filtration problem is solved after determining the temperature of the liquid phase from the system (1.8) - (1.9).

Assuming in the equation (1.5) $\frac{\partial(mc)}{\partial t} = m_0\frac{\partial c}{\partial t}$ taking into account (1.6), we obtain the equation of diffusion of matter:

$$\frac{1}{r}\frac{\partial}{\partial r}(rD\frac{\partial c}{\partial r})-v\frac{\partial c}{\partial r}-\frac{\partial N}{\partial t}=m\frac{\partial c}{\partial t} \tag{1.11}$$

It has been experimentally established that for practical calculations it is possible to adopt a linear dependence D on the filtration rate:

$$D=D_m+\lambda v\,, \tag{1.12}$$

where $D_m=\Psi m_0 D_{0m}$ - the coefficient of molecular diffusion in a porous medium, which for solutions of mono- or divalent salts is of the order of $n10^{-10}\ м^2/с$;

λ - a parameter characterizing the heterogeneity (dispersion) of a porous medium, for the calculation of which an empirical formula is proposed:

$$\lambda=6\cdot10^3\frac{\sqrt{k}}{m_0} \tag{1.13}$$

Eliminating the concentration from equation (1.9) $N(r,t)$ using isotherms (1.3), one equation can be obtained for the concentration $c(r,t)$. In particular, in the presence of the Langmuir isotherm (Rabinovich, 1980) we have:

$$\frac{N}{N_0}=\frac{k_4c}{1+k_2c}\,, \tag{1.14}$$

where N_0 - exchange capacity of the sorbent at saturation under conditions of equilibrium with a solution of concentration c_0;

k_2 and k_4 - constant, at $k_2=0$ we obtain the Henry isotherm (Γ-Henry's constant)

$$N=N_0k_4c=\Gamma c(r,t)$$

In the latter case, solving the equation to determine the concentration, we obtain the equation:

$$D_m(\frac{\partial^2c}{\partial r^2}+\frac{1}{r}\frac{\partial c}{\partial r})-v\frac{\partial c}{\partial r}=(m+\Gamma)\frac{\partial c}{\partial t} \tag{1.15}$$

The main objective of the work is to calculate the concentration of the substance in the liquid and sorbent, the length of the zone of penetration of the solution into the formation with a known flow rate of the liquid injected into the formation Q_0. Based on the calculated values of the concentration of the substance in the solid phase $N(r,t)$ the values of porosity and permeability of the formation are specified using formulas (Rabinovich, 1980):

$$m=m_0+\frac{N}{\delta},\quad k=Ad^2\frac{m}{(1-m)^2}, \tag{1.16}$$

where δ - density of the sorbent;

A - constant;

d - average particle diameter.

Based on calculated values $\mu(T_1^*)$ ($T_1^* = T_1(R_c, t_k)$, t_k - well treatment completion time) and the specified data k it is possible to calculate the flow rate of a well:

$$Q = 2\pi\varepsilon_n \frac{\Delta p}{\ln(R_k / R_c) + S^*}, \quad (1.17)$$

where ε_i - hydraulic conductivity in the absence of a colmatation zone;

S^* - skin factor index after thermal acid treatment of the LL.

Before the start of treatment, the radius of the colmatation zone and the change in the permeability of the LL depending on the coordinate are considered to be known. Equations (1.12) - (1.14) are integrated under the following initial and boundary conditions

$$T_1 = T_2 = T_н = const \quad p = p_0(r), \; c(r,t) = 0 \;\text{ at }\; t = 0 \quad (1.18)$$

$$T_1 = T_{1c}, \; T_2 = T_н \;\text{ at }\; r = R_c, \; T_1 = T_н, \; T_2 = T_н \;\text{ at }\; r = R_1, \quad (1.19)$$

where $T_н$ - initial formation temperature;

T_{1c} - solution temperature after heat exposure;

R_c и R_1 - well radii and colmatation zones to be treated.

Using the proposed calculation scheme, it is possible to determine the processing time of the wellbore depending on the temperature T_{1c} and calculate the viscosity values of the filtered fluid after acid treatment of the contaminated section of the formation.

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ORGANIZATION OF PAID MEDICAL SERVICES AT VARIOUS STAGES OF MEDICAL CARE DEVELOPMENT IN RUSSIA

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Abstract. *Currently, the Russian Federation is experiencing horizontal development of the medical services sector due to the inclusion of new areas of medicine and the expansion of segments of solvent consumers willing to use paid medical services. The need to increase the efficiency of providing medical services to the population without increasing public funding has become relevant. In this regard, the features of the development of paid medical services in the country are of interest, the experience of which should serve to further improve their quality, which is presented in the article.*

Keywords: *paid medical services, development of paid medical services, competitiveness factors.*

Relevance. Currently, the Russian Federation is experiencing horizontal development of the medical services sector due to the inclusion of new areas of medicine and the expansion of segments of solvent consumers willing to use paid medical services. The need to increase the efficiency of providing medical services to the population without increasing public funding has become relevant. In this regard, the history of the development of paid medical services in the country is of interest, the experience of which should serve to further improve their quality.

Purpose of the study. To study the experience of forming the organization of paid medical services at various stages of medical care development in Russia.

Material and methods of the study. The analytical method was used to study literary sources in the Scopus, Web of Science, MedLine, The Cochrane Library, CyberLeninka, eLibrary.ru, and RINTS databases for the last 10 years.

Results and discussion. Currently, the Russian Federation is experiencing horizontal development of the medical services sector due to the inclusion of new areas of medicine and the expansion of segments of solvent consumers willing to use paid medical services (Figure 1) [1].

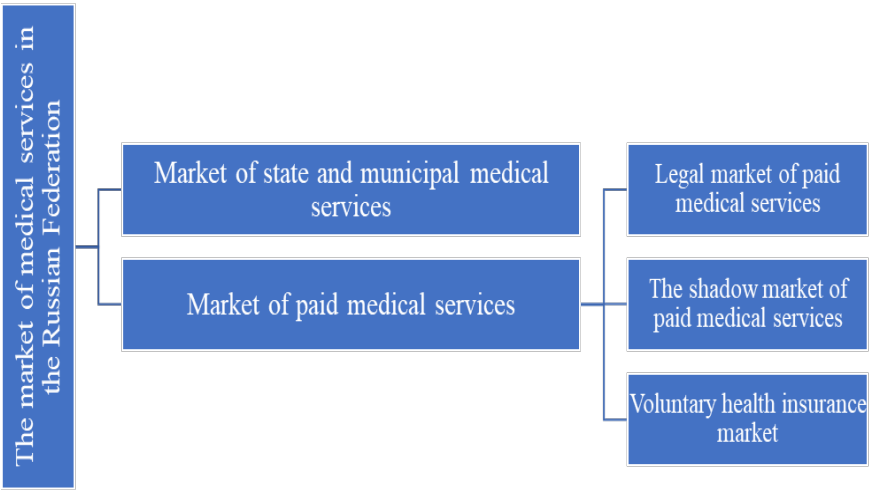

Figure 1. *Structure of the Russian medical services market (I. A. Boldyreva, Yu. D. Osipova, 2021)*

The development of paid medical services naturally implies the presence of competition in this industry, with the need to manage medical activities in a competitive environment. At the same time, the factors that can influence the competitiveness of a medical organization providing paid medical services include:

- the reputation of a medical organization;
- the quality of paid medical services provided by a medical organization, in the form of the results of citizens' requests for services (in particular, the results of treatment);
- the level of qualification of medical workers providing paid medical services;
- the availability of a sufficient material and technical base, modern equipment, components and consumables;
- the uniqueness of the medical services offered;
- the adequacy of prices for paid medical services, their accessibility to the consumer and compliance with competitors' prices [3].

It is social and economic viability that are considered the most explainable and measurable indicators for assessing the competitiveness of a medical organization providing paid medical services [3].

During the Soviet era, paid medical services were provided to the population in self-supporting clinics, but they were not widely used due to, on the one hand, the unwillingness of the population to pay for medical services, and on the other hand, the lack of interest in promoting paid medical services to the population on the part of medical workers, whose salaries did not depend on the type of medical service they provided (paid or free).

Subsequently, as market relations were introduced into various spheres of society with simultaneous decentralization of management, along with limited funding for the medical industry and the growing need for high-quality, including high-tech medical services, the issue of introducing paid medical care became even more pressing.

In recent years, the need to increase the efficiency of providing medical services to the population without increasing government funding has become more pressing in domestic healthcare. It is the provision of medical care on a paid basis that is considered a promising direction for solving the issue of increasing the efficiency and quality of medical care while simultaneously attracting financial resources to medical organizations, which is relevant for both commercial and budgetary organizations. In 2012, the Government of the Russian Federation approved the "Program for the phased improvement of the remuneration system in state (municipal) institutions for 2012-2018", according to which it was planned to attract at least 30% of funds to increase the salaries of medical workers, which it was proposed to save through the reorganization of ineffective medical organizations and the development of promising types of medical activities, with the intensive development of the range of paid medical services [4].

M. S. Oborin (2019) notes that the development of the paid medical services sector in domestic healthcare has a pronounced regional character, due to the formation of regional markets for paid medical services, the activities of which are formed on the basis of many natural-geographical, socio-economic, environmental and other factors that have pronounced regional specifics. At the same time, the problem of unification of management and regulation of the activities of medical organizations providing paid medical services is becoming more relevant in order to protect the rights of consumers and ensure uniformity in the provision of such services [5]. Currently, both state and private medical organizations have the right to provide paid medical services to the population.

In public healthcare organizations, the funds earned through the provision of paid medical services to the population are distributed in one of the following ways:

- directly by the departments or divisions providing paid medical services, using their own or rented equipment and materials;

- on the basis of departments operating in a healthcare organization without allocating separate premises and individual specialists, during regular working hours, using the main equipment and materials that are the property of the organization;

- a mixed option by combining individual elements of the first and second methods [6].

V. A. Tyotushkin (2017) notes that different social strata of the population currently use the same set of paid medical services, with a difference in the quantitative ratio of the use of such services [7].

In the study by I. A. Ramazanov and E. S. Grigorieva (2019), the authors provide evidence that in the near future a reduction in the share of the paid services segment is expected, with a simultaneous increase in its physical capacity due to an increase in the demand of potential consumers of these services for high-quality paid medical services. In this assumption, the authors proceed from the expected reduction in the elderly population due to natural decline, with a simultaneous relative increase in the segment of the economically active baby boom generation. At the same time, the authors emphasize that economic management of the organization and provision of paid medical services is necessary, with the introduction of scientifically based marketing principles and taking into account the socio-psychological characteristics of potential consumers of paid medical services and medical workers directly providing them [8]. Opposite conclusions are made by E. V. Ivanova and A. Yu. Bratishko (2020), indicating that an increase in the general morbidity of the population determines the trend of expanding the number of paid medical services. At the same time, the authors also note the relevance of improving the quality of paid medical services [9].

Conclusions. Thus, at present, the paid medical services market is an actively developing segment of medical services in the Russian Federation, due, on the one hand, to an increase in the segment of potential consumers of such services willing to pay for the quality and timeliness of their provision, and on the other hand, due to an objective lack of financial resources and public resources to meet the growing needs of the population for medical care through the provision of exclusively free medical services.

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DENTAL MORBIDITY AND ITS MEDICAL AND SOCIAL SIGNIFICANCE

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Abstract. *Attention is drawn to the high prevalence of dental diseases both in Russia and around the world. Of particular concern to dentists is the increase in odontogenic infections and the total number of complications in dental practice. Considering not only medical but also economic aspects, they require close attention and, first of all, the development of preventive measures.*

Keywords: *dental morbidity, medical and social aspects.*

Relevance. Dental diseases are among the socially significant human pathologies, while the population's appeal for dental care is also one of the most widespread.

This is dictated by the high prevalence of dental diseases, which, despite the measures taken, remain at a significant level. It should also be noted that, despite the achievements of modern science, the number of complications in dental practice has not decreased to this day.

All this requires strict monitoring of the situation. In this regard, the purpose of the study was to study the main trends in the prevalence of dental diseases.

Research material and methods. The analytical method was used to study literary sources in the databases Scopus, Web of Science, MedLine, The Cochrane Library, CyberLeninka, eLibrary.ru, RINTS for the last 10 years.

Results and discussion. A large number of modern studies are devoted to the study of the features of the organization of dental care for the population based on morbidity rates in different regions, age, sex and social groups of the population [1].

According to the World Health Organization, the prevalence of dental diseases among the population of the globe ranks first [2]. Epidemiological studies conducted in various regions are valuable material for planning and developing effective methods for the prevention and treatment of dental diseases. However, it should be noted that due to the fact that the "Outpatient Coupon" (form No. 025 - 6 / y - 89) is not filled out in dental institutions of our country, there are no data on the primary incidence of various diseases of the oral cavity, as the most important indicator of dental status. The practice of recording diseases of the dental system that has developed in our country allows us to calculate the prevalence rate of dental diseases only with a certain conventionality [3, 4].

According to numerous epidemiological studies, the prevalence of caries in our country among the adult population fluctuates within quite wide limits [5]. The results of studies by foreign authors also indicate a high level of prevalence of periodontal pathology. According to A.S. Aleykov [6], 88.2% of the examined students were found to have pathological changes in the periodontium, and the results of comprehensive studies by the same A.S. Aleynikov [7] made it possible to establish that in different age groups of the working-age population, 95-99% of those examined have pathological processes in the periodontium.

As A.N. Malinin points out, "94.0% of patients need treatment for dental caries, 54.6% for pulpitis and periodontitis, and 81.1% for periodontal diseases." S.G. Pavlova also cites high rates of prevalence and intensity of dental diseases based on the data from St. Petersburg [8]. According to V.V. Masumova, the prevalence of caries complications in the population of the Saratov region was 88.23%, the intensity of caries was 4.03 teeth, and more than half of the endodontically treated teeth were subject to retreatment [9].

I.N. Prokudin [10] points to the high rate of appeals to dental orthopedic care by the urban population. According to his data, this is 1038.2 per 1000 population of the Belgorod region - higher than the average for the Russian Federation of 928.9‰, which the author associates primarily with good accessibility of dental care. The number of sanitized per 1000 population was also higher here than the average for Russia (217.0 and 172.6, respectively) with a smaller number of visits (4.78 and 5.38 per 1 sanitized). Only 21.5% of Saratov region residents report good health, the rest report satisfactory and poor health, with a negative trend [11]. The high prevalence of major dental diseases leads to significant tooth loss. On average, each resident of Western Europe up to the age of 70 retains 20.2 teeth; up to 80 years - 18.6 teeth, and over 80 years - 16.6 teeth. It should also be noted

that in our country up to 60 - 80% of teeth are removed due to periodontitis, which indicates the low quality of endodontic treatment.

Of particular concern to dentists is the growth of odontogenic infection, in the development of which apical periodontitis and wounds after tooth extraction play a major role [12].

According to M.A. Ivanova et al. [12], in 90% of patients, odontogenic sinusitis occurs due to perforations of the maxillary sinus floor during tooth extraction and other surgical interventions on the alveolar process of the upper jaw, and in 10%, the inflammatory process develops in the presence of an odontogenic infection focus in the immediate vicinity of the sinus (odontogenic granuloma, radicular cyst, etc.).

Severe course of odontogenic inflammatory diseases of the maxillofacial region, frequent development of complications in the form of mediastinitis, cavernous sinus thrombosis, meningitis, meningoencephalitis, sepsis often pose a serious threat to the lives of patients [5]. Mortality from intracranial complications, mediastinitis and sepsis ranges from 34 to 90%. In this regard, the urgent task of dentistry is the prevention and adequate treatment of odontogenic complications.

It should be noted that, despite the achievements of modern science, the number of complications in dental practice does not decrease and amounts to an average of 4 deaths per 1 million dental interventions.

It is also important to consider not only medical, but also economic aspects of dental diseases. The results of S.A. Kulikova's studies [13] showed that economic losses, including the costs of providing medical care, financing social benefits and losses associated with unmanufactured products in only one case of alveolitis amounted to 339,693 D.M., of which the main part - 65% - was production losses.

Conclusions. Thus, dental morbidity remains at a fairly high level throughout the world. Taking into account not only medical, but also economic aspects, they require close attention and, first of all, the development of preventive measures.

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CORRELATION OF FOCI OF CHRONIC ODONTOGENIC INFECTION AND VERIFIED SOMATIC PATHOLOGY IN CHILDREN

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Annotation. The aim *of the work is to determine the ratio of chronic odontogenic infection foci and verified somatic pathology in children on the basis of a retrospective study of medical records.*

Objects and methods. *111 outpatient medical records of children aged 1-16 years were analyzed. The following were taken into account: sex of the patients; age; caries index of extracted tooth fillings (CFE); caries intensity level (CIL); simplified oral hygiene index (OHI-S); somatic status of the patient. The obtained data were processed statistically using the application program package "Statistica 10.0".*

Results. *Dental and somatic examination of 61.3% (68) boys and 38.7% (43) girls were analyzed. A CFE value of 0 to 3 was in 41.0% (45) of the individuals and multiple foci of odontogenic infection were in 59.0% (66) of the subjects. Of the total sample, 42.3% (47) individuals were practically healthy and 57.7% (64) had somatic diseases. In persons having multiple foci of odontogenic infection, 54.5% (36) were practically healthy and 45.5% (30) had somatic diseases. Of those who have even a small number of foci of odontogenic infection only 24.4% (11) are practically healthy, and 75.6% (34) of patients have somatic diseases.*

Conclusion. *The presented results convincingly prove the necessity of dispenserization of persons with multiple foci of odontogenic infection and raise the question about the need to improve the known and develop new preventive measures for the group of patients with low caries intensity.*

Keywords: *focal infection center; somatic disease; odontogenic infection; pediatric population; generalized pathological process.*

Introduction. It is known that focal infection is the occurrence of foci of secondary infection with lesions of remotely located organs and tissues [8]. The focus of primary infection can be the sinuses, tonsils, adenoidal vegetations, as well as otogenic [7], urogenic, abdominal, and odontogenic foci [5]. The negative impact of foci of focal infection on the development and course of somatic diseases is recognized by specialists all over the world [6]. From the analysis of special literature, it is obvious that chronic foci of odontogenic infection in children represent an immunopathological process, a focus of sensitization and chronic intoxication of the developing organism [9]. At the same time, the available domestic and foreign special periodical literature lacks information on the prevalence of foci of chronic odontogenic infection in children according to gender and age groups of observation recommended by the World Health Organization (WHO). In the anals of special information there are no clear data on the correlation between foci of chronic odontogenic infection and the presence of somatic diseases in the pediatric population.

All the above facts together determine the relevance and social significance of the research topic chosen by the authors.

The aim of the work is to determine the ratio of chronic odontogenic infection foci and verified somatic pathology in children on the basis of a retrospective study of medical records.

Objects and methods. The study was carried out in accordance with the Universal Declaration on Bioethics and Human Rights (1997), the Council of Europe Convention on Human Rights and Biomedicine (1997) and the norms of the Helsinki Declaration of the World Medical Association on the Ethics of Scientific and Medical Research as amended in 2000-2008. This work was approved by the Bioethics Commission of the Belarusian State Medical University.

111 outpatient medical records of children aged 1 to 16 years who applied to the Minsk City Children's Clinical Center for Dentistry for preventive examinations were retrospectively analyzed.

Medical records were analyzed according to the following parameters: sex of patients; age; caries index of extracted tooth fillings (CFE); caries intensity level (CIL) calculated on the basis of CPI; simplified oral hygiene index (OHI-S) J. C. Green, J. R. Vermillion (1964) [3]; somatic status of the patient taking into account nosological forms [1].

Dental and somatic examination reflected in medical records was performed on the basis of clinical protocols approved by the Ministry of Health of the Republic of Belarus. Nosologic forms of somatic diseases were noted in accordance with the International Classification of Diseases (ICD-10). The obtained data were processed statistically using the application program package "Statistica 10.0".

Results of the study. Analysis of medical records showed that dental and somatic examinations were analyzed for 61.3% (68) of boys and 38.7% (43) of girls.

When analyzing the CFE index, the following was revealed. The minimum number of carious lesions in the sample was 1, and the maximum was 14. The index value from 0 to 3 was found in 41.0% (45) people, and multiple foci of odontogenic infection occurred in 59.0% (66) of the examined.

At the same time, 37.0% (41) of patients had a low CIL, 20.0% (22) had a medium CIL, 14.0% (16) had a high CIL, and 29.0% (32) had a very high CIL. The distribution of the sample patients by age groups depending on their CIL is presented in table 1.

Table 1

Distribution of the sample patients by age groups recommended by WHO, depending on the defined CIL (abs./%).

Caries intensity levels	Age groups of patients allocated according to WHO recommendations					
	0-5 years old	6 years old	7-11 years old	12 years old	13-15 years old	16-19 years old
Low	8 (7.2%)	5 (4.5%)	12 (10.9%)	1 (0.9%)	14 (12.6%)	1 (0.9%)
Medium	5 (4.5%)	2 (1.8%)	10 (9.0%)	1 (0.9%)	4 (3.6%)	1 (0.9%)
High	2 (1.8%)	3 (2.7%)	10 (9.0%)	0 (0.0%)	1 (0.9%)	0 (0.0%)
Very high	19 (17.1%)	4 (3.6%)	8 (7.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Note: The number of individuals in the sample (111) was taken as 100.0%.

The analysis of the oral hygiene index OHI-S was revealed that it was determined in 91.0% (101) of patients and was not determined in 9.0% (10) of individuals. A good level of oral hygiene was found in 15.3% (17) of patients, satisfactory – in 67.6% (75) people, unsatisfactory – in 8.1% (9) of individuals, no persons with poor level of hygiene were found.

Based on the analyzed medical records, it was determined that out of the total number of the sample, somatic diseases were verified in 77.0% (86) of the patients, and 23.0% (25) were practically healthy. At the same time, the sample patients had the following somatic lesions: allergic conditions – in 18.0% (20) people; infectious diseases – in 7.2% (8) patients; pathology of cardiovascular system – in 6.3% (7); respiratory diseases – in 36.0% (40); pathology of gastrointestinal tract – in 2.7% (3); diseases of the endocrine system – in 0.9% (1); immune diseases – in 0.9% (1); diseases of the nervous system – in 1.8% (2); blood diseases – in 0.9% (1); pathology of the genitourinary system – in 2.7% (3) of people.

One somatic disease was present in 52.3% (45) individuals, two in 17.4% (15), and three in 3.5% (3) patients. It should be emphasized that of the total number of patients with one somatic disease, 57.8% (26) individuals had a low CIL, 13.3% (6) – medium, 8.9% (4) – high, 20.0% (9) – very high caries intensity. Of the individuals with two somatic diseases, 33.3% (5) individuals had low CIL, 20.0% (3) had medium, 20.0% (3) had high, and 26.7% (4) had very high CIL. Of those

with three somatic diseases, 66.7% (2) individuals had a low CIL and 33.3% (1) had a very high CIL. A comparative assessment of the number of patients with low and average CIL and with high and very high CIL with somatic pathology is presented in Figure 1.

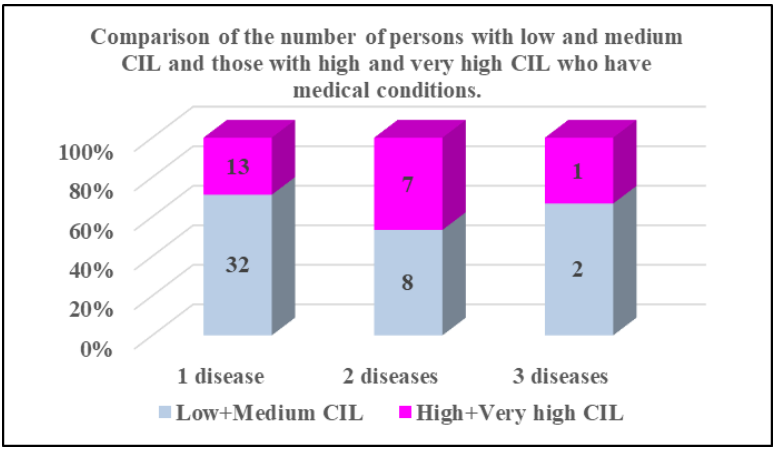

Figure 1. *Comparative comparison of the number of patients with low and medium CIL and those with high and very high CIL and medium CIL and high and very high CIL with 1, 2 and 3 somatic diseases.*

It is noteworthy that in patients with somatic diseases the total number of persons with low and average CIL is 1.7 times higher than in patients with high and very high CIL.

Combined pathology was stated in 20.9% (18) of patients. Combination with allergic reactions took place in 12.8% (11) patients, with infectious diseases – in 5.8% (5), with diseases of cardiovascular system – in 1.2% (1), with pathology of respiratory organs – in 16.3% (14), with diseases of gastrointestinal tract – in 3.5% (3), with diseases of genitourinary system – in 3.5% (3) people.

Of the total sample of patients, 42.3% (47) were practically healthy and 57.7% (64) had somatic diseases. In persons with multiple foci of odontogenic infection, 54.5% (36) people are practically healthy and 45.5% (30) have somatic diseases. Moreover, 30.3% (20) of persons have one disease; 13.6% (9) have two diseases and 1.5% (1) have three diseases. The predominant proportions come from respiratory system pathology, 51% (21) of verified facts and 22% (9) from allergic conditions. It is noteworthy that only 24.4% (11) of persons with even a small number of foci of odontogenic infection are practically healthy, and 75.6% (34) of patients have somatic diseases. Moreover, 57.8% (26) people have one disease;

13.3% (6) – two diseases, 4.4% (2) – three diseases. The predominant proportions come from respiratory system pathology, 41% (18) verified facts and 25% (11) allergic conditions.

The fact that the sample of children from somatic diseases is dominated by respiratory system pathology and allergic diseases is consistent with the information provided by E. G. Asiran (2013) and A. Kamalova, H. Ilhomova (2023) [2, 4], but at the same time represents fundamentally new data that require further in-depth fundamental research.

Conclusion. Firstly, the presented results convincingly prove the necessity of medical examination of persons with multiple foci of odontogenic infection. Secondly, the results of the analysis indicate the need for further targeted studies of the relationship between foci of odontogenic infection and foci-related somatic pathology based on the principles of evidence-based medicine. Thirdly, it raises the question of the need to improve the known and develop new preventive measures for the group of patients with low caries intensity.

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THE EFFECT OF MECHANICAL RESPIRATORY SUPPORT ON THE INFLAMMATORY RESPONSE OF YOUNG CHILDREN WITH COMPLICATED INFECTIOUS DISEASES

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Abstract. *The circadian rhythm of body temperature in children of group 1 (with spontaneous breathing without mechanical respiratory support) was closer to physiological than in patients of group 2 (with mechanical ventilation). The difference between children of group 2 and group 1 was revealed in concomitant chronic neurological diseases, as well as acute severe hypoxic brain injury caused by complications of a burn of the oropharynx, a foreign body in the respiratory tract, acute severe pneumonia with grade 3 ARF. Differences in the structure of the circadian rhythm of the temperature response indicated a more pronounced tendency to a hyperthermic reaction in patients of group 2.*

Keywords: *mechanical respiratory support, young children, infectious diseases.*

Relevance. In early age periods (in newborns, infants and young children), the systemic inflammatory response is characterized by two main features: when an inflammatory focus occurs, a tendency to generalization is clearly defined due to the inability of the macroorganism to limit the local process, which depends on the age, anatomical and functional immaturity of the organs of immunogenesis and barrier tissues, which facilitates the penetration of pathogens and their toxins into

the bloodstream and lymph; in newborns and infants, some special types of alterative and productive inflammation are observed, which are close to the inflammatory reaction of the intrauterine period and reflect the formation of this reaction in phylo and ontogenesis. At the same time, the authors of numerous studies take into account that the presence of special forms of inflammation does not exclude the development of exudative, even purulent inflammation in the fetus, newborn and infant. The listed features are characteristic of a young child, when his reactions are close to reactions during the period of intrauterine development. Later, these features lose their significance, but the tendency to generalization of the local process during inflammation accompanies almost the entire period of childhood [Ivanovskaya T. E., 1978; Essbach H., 1960], therefore, a primitive form of infectious disease, sepsis, easily develops in young children. The systemic inflammatory response (SIR) is considered to be the main pathogenetic link in sepsis. The leading place in the development of SIR is given to inflammation mediators. More than 300 inflammatory mediators are known, but only dozens of them are used in clinical practice as markers, while the rest need to be discussed from the standpoint of reliability, sensitivity and specificity. None of the markers can be considered universal, which is why difficulties arise in identifying the key moments of the pathogenesis of SIR. The most severe complication of SIR is progressive multiple organ failure (POF). Mortality from MOF remains extremely high, reaching 80% of the total mortality in intensive care units. Patients with childhood neurological diseases often have the following disorders of the bronchopulmonary system: insufficiency of effective inhalation and exhalation due to impaired muscle innervation and their atrophy; ineffective cough reflex; imbalance between the production and resorption of sputum; dyskinetic changes in the bronchi; decreased immunity and a tendency to chronic infection; frequent intercurrent infections; congestive manifestations in the lungs due to limited range of motion; high risk of aspiration pneumonia due to frequent disruption of the swallowing process; impaired mucociliary clearance can contribute to the development of atelectasis, which leads to ventilatory perfusion of the respiratory muscle and respiratory failure. The peculiarities of the course of pneumonia in children with childhood cerebral insufficiency are due to: a decrease in the vital capacity of the lungs due to muscle weakness or spastic scoliosis; weakening of the cough reflex; frequent dysphagia and vomiting with development of aspiration; gastroesophageal reflux disease; severe protein-energy malnutrition with manifestations of cachexia; frequent antibiotic resistance of pathogens; rapid development of metabolic acidosis and hypercapnia; development of seizures - both true and febrile.

Aicardi-Goutieres syndrome is a progressive encephalopathy with onset in early childhood, calcification of the basal ganglia, leukodystrophy, lymphocytosis and increased levels of interferon-α in the cerebrospinal fluid in the absence of data on the course of a viral infection. The combination of non-infectious leuko-

encephalopathy with multifocal epilepsy in patients in early childhood suggests a hereditary nature of the disease. Werdnig-Hoffmann amyotrophy - childhood spinal muscular atrophy, "floppy infant syndrome" - a hereditary pathology, encoded by a breakdown in the genetic apparatus responsible for the survival of motor neurons, underdevelopment of motor neurons in the anterior horns of the spinal cord. Due to the lack of information on the specifics of managing young children in critical condition, an attempt was made to assess the effect of mechanical respiratory support on the inflammatory response of complicated infectious diseases in young children based on the study of circadian rhythms of temperature response monitoring data [1-5].

Objective. To study and assess the effect of mechanical respiratory support on the inflammatory response of complicated infectious diseases in young children.

Material and methods. The results of continuous prolonged monitoring with hourly recording of body temperature, hemodynamic parameters, and respiration were studied in children admitted to the ICU of the RRCEM in critical condition due to infection complicated by acute cerebral and respiratory failure at the age of 5.5 months to 2.5 years. Intensive care was carried out in accordance with the recommendations in the relevant clinical protocols. Group 1 included 7 children aged 12.6±6.5 months, who had no indications for mechanical respiratory support upon admission to the clinic and throughout intensive care, which did not exclude oxygen therapy without mechanical ventilation. Almost all patients in Group 2 (8 children) aged 17.4±8.1 months were transferred to mechanical ventilation according to indications from the moment of admission to the clinic. Impaired cerebral function was assessed according to the Glasgow scale in Group 1 9.3±0.5, in the second 6.6±1.0 points, which corresponded to a reliably significant suppression of brain function by 29%, which determined the duration of MCI, the duration of intensive care in the ICU and in the hospital as a whole (Table 1).

Table 1.

Characteristics of the clinical material

	gender, m/f	**age months**	**G S, points**	**continued artificial ventilation, days**	**b/d in intensive care unit**	**b/d in hospital stay**
1 group	2/5,	12,6±6,5	9,3±0,5	0	12,3±5,2	**16,3±4,1**
2 group	5/3,	17,4±8,1	6,6±1,0	20,4±12,0	28,3±14,7	29,3±9,5

Severe pneumonia was detected in children (100%) of group 2 (Table 2). The peculiarity of patients of group 2 was concomitant chronic neurological diseases, such as Aicardi syndrome, floppy child syndrome (26%), as well as acute severe hypoxic brain injury caused by complications of oropharyngeal burns (12%), foreign body in the respiratory tract (12%), acute severe pneumonia with grade 3 ARF (50%).

Table 2.

Diagnosis	1 group	2 group
Bilateral pneumonia	85% (6)	100% (8)
Sepsis	42% (3)	12% (1)
Acute renal failure	42% (3)	12% (1)
Acute respiratory failure	28% (2 patients 1-2 degree)	50% (4 patients 3 degree)
DS	0	12% (1)
Congenital anomaly of the central nervous system (see Aicardi, see ” flaccid child”	14% (1)	26% (3)
Thermal burn of the oropharynx, post-hypoxic encephalopathy	0	12% (1)
Post-resuscitation disease, CPR, foreign body in the respiratory tract.	0	12% (1)
total	100% (7)	100% (8)

As the condition improved, the impaired organ functions were effectively corrected, reflexes and consciousness were restored, the patients were transferred to a specialized department. Thus, in group 1, by the 14th day, 4 children (56%) needed intensive care, in group 2, 5 patients (62%) (Fig. 1).

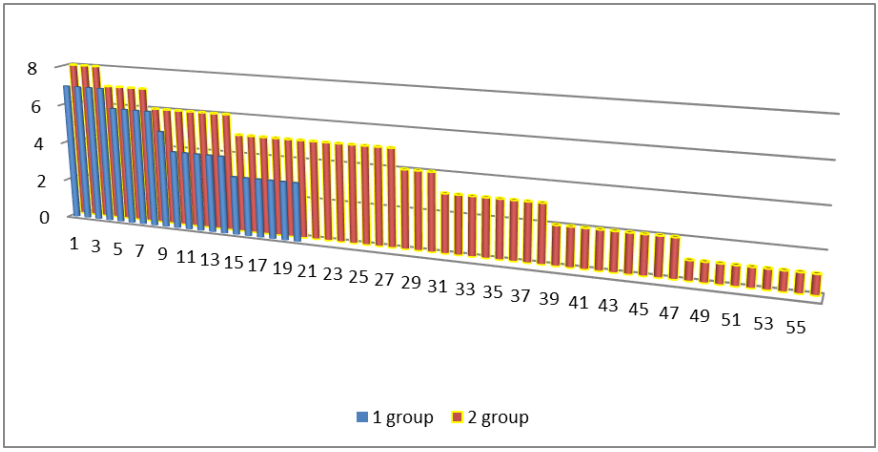

Figure 1. *Number of patients under 3 years of age*

No significant differences were found in the average values of the parameters of the phase structure of the circadian rhythm of body temperature (Table 3).

Table 3.

Average values of the parameters of the phase structure of the circadian rhythm of body temperature for the first 20 days of intensive care in degrees Celsius.

Groups	Mesor	Acrophase	Batiphase	Amplitude	Range of oscillations
1	36,8±0,1	37,1±0,2	36,6±0,1	0,3±0,1	0,5±0,2
2	37,1±0,1	37,4±0,1	36,9±0,1	0,3±0,1	0,6±0,1

Table 4.

Dynamics of the mesocircadian rhythm of temperature response

Days	1 group	2 group
1	36,8±0,2	37,1±0,1
2	36,7±0,1	37,4±0,1*
3	36,8±0,1	37,2±0,1*
4	36,8±0,1	37,1±0,1*
5	36,8±0,1	39,1±3,8
6	36,8±0,1	37,1±0,1*
7	36,7±0,1	37,2±0,1*
8	36,7±0,02	37,0±0,1
9	36,8±0,1	37,2±0,1*
10	36,7±0,1	37,2±0,1*
11	36,8±0,1	37,2±0,1*
12	37,1±0,2	37,2±0,2
13	36,9±0,1	37,1±0,1*
14	36,8±0,1	37,1±0,1*
15	36,8±0,1	37,1±0,1*
16	36,8±0,1	36,9±0,1
17	36,8±0,1	36,9±0,1
18	36,8±0,1	37,1±0,1*
19	36,9±0,2	37,0±0,1
20	36,7±0,1	37,0±0,2

Table 5.

Average circadian rhythm of body temperature

Days	1 group	2 group
8	36,8±0,2	36,9±0,2
9	36,8±0,1	36,9±0,2
10	36,8±0,1	36,9±0,2
11	36,8±0,1	36,9±0,2
12	36,8±0,1	36,9±0,2

13	36,7±0,1	36,9±0,2
14	36,7±0,1	36,9±0,2
15	36,8±0,1	36,9±0,2
16	36,8±0,1	36,9±0,2
17	36,8±0,1	36,9±0,2
18	36,8±0,1	36,9±0,2
19	36,8±0,1	36,9±0,2
20	36,8±0,1	36,9±0,2
21	36,8±0,1	36,9±0,3
22	36,9±0,1	36,9±0,2
23	36,9±0,2	36,9±0,2
24	36,8±0,1	36,9±0,2
1	36,8±0,1	36,8±0,2
2	36,8±0,1	36,8±0,2
3	36,8±0,1	36,8±0,2
4	36,8±0,1	36,8±0,2
5	36,8±0,1	36,8±0,2
6	36,8±0,1	36,8±0,2
7	36,8±0,1	36,8±0,2

*- reliably relative to the indicator in group 1

As can be seen from the data on the average circadian rhythm of body temperature presented in Table 5, no significant differences indicating a more severe condition of patients in group 2 were identified.

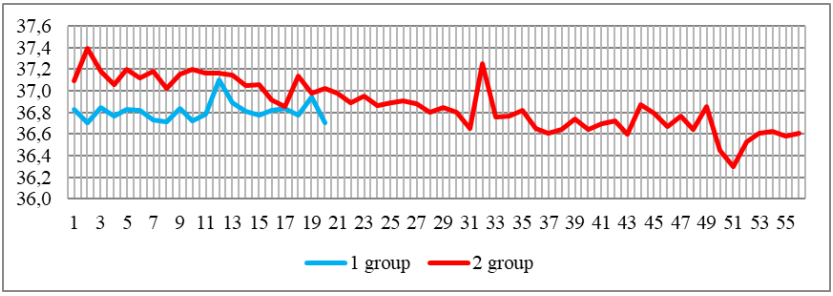

Figure 1. *Dynamics of the mesomorphic circadian rhythm of body temperature*

A significantly significant increase in the average daily body temperature in children of group 2 during the period from the 2nd to the 18th day, as well as on the 31st day (Table 4) characterized a more pronounced systemic inflammatory reaction of young children, despite more radical anti-inflammatory intensive therapy

with oxygenation support by mechanical ventilation of the lungs, sedatives, hypnotics, and relaxants, which contribute to enhancing the stress-limiting effect of complex treatment of an infectious disease (Fig. 1).

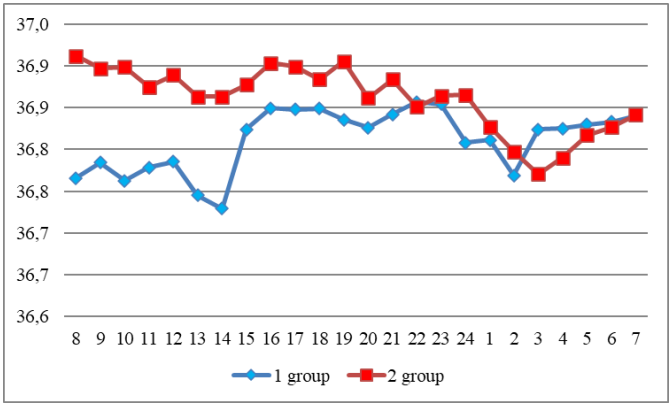

Figure 2. *Average circadian rhythm of temperature response up to 3 years*

In the average circadian rhythm of temperature response up to 3 years in group 2 (Fig. 2), a shift in the acrophase of the circadian rhythm of body temperature to daytime hours was found, while the projection of the acrophase in group 1 was shifted to the nighttime hours of 22-23 hours.

The circadian rhythm of body temperature in children of group 1 turned out to be closer to the physiological one than in patients of group 2.

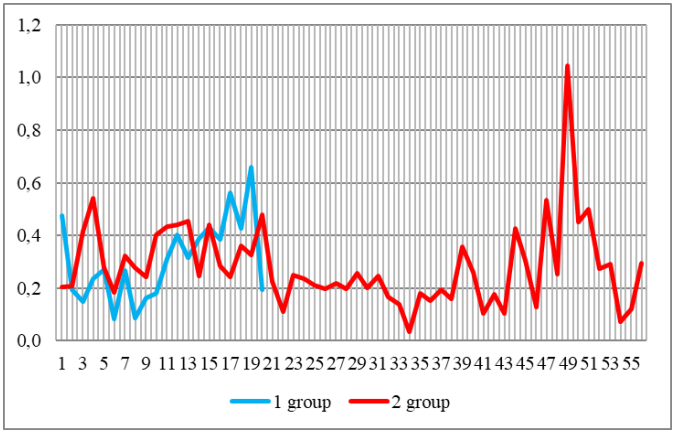

Figure 3. *The amplitude of the circadian rhythm of body temperature in degrees Celsius*

Fluctuations in the amplitude of the circadian rhythm of body temperature in both groups occurred within 0.2-0.4°C (Fig. 2). Only one patient in Group 2 with the ”floppy child” syndrome on the 49th day retained instability of the thermoregulation function with a fluctuation of 0.8°C per day.

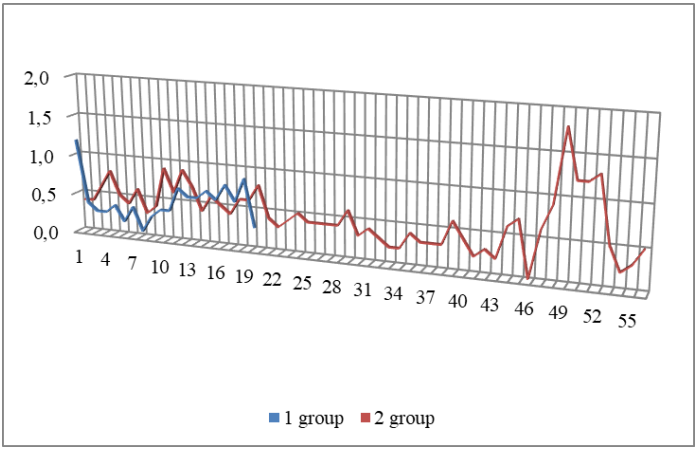

Figure 4. *Daily fluctuations in body temperature*

Diurnal fluctuations corresponded to wave-like fluctuations in the amplitude of the circadian rhythm of body temperature in (Fig. 4).

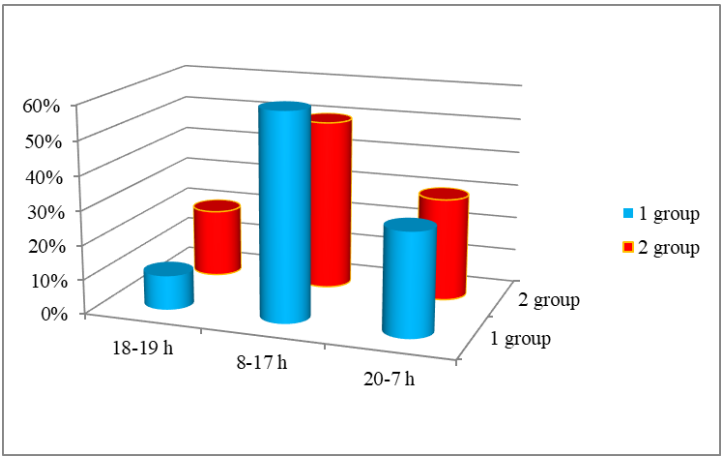

Figure 5. *Duration of the shift of the acrophase of the circadian rhythm of body temperature*

During the observation, the moderate duration of the shift of the acrophase of the circadian rhythm of body temperature to the daytime-morning hours prevailed, amounting to 60% in group 1, and 50% of the duration of intensive care in group 2.

Conclusion. The circadian rhythm of body temperature in children of group 1 was closer to the physiological one than in patients of group 2. Children of group 2 differed from group 1 in concomitant chronic neurological diseases, as well as acute severe hypoxic brain injury caused by complications of a burn of the oropharynx, a foreign body in the respiratory tract, and acute severe pneumonia with grade 3 ARF. Differences in the structure of the circadian rhythm of the temperature response indicated a more pronounced tendency to a hyperthermic reaction in patients of group 2.

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CLINICAL VARIETIES OF PSORIASIS

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Abstract. *Psoriasis remains a fairly common disease. Signs of psoriatic disease can be veiled by erythrodermal manifestations, joint pain, inflammatory phenomena in them. The article presents the varieties of clinical forms of psoriasis described to date in the specialized literature.*

Keywords: *psoriasis, clinical forms of psoriasis.*

Relevance. Psoriasis remains a fairly common disease. Signs of psoriatic disease can be veiled by erythrodermal manifestations, joint pain, inflammatory phenomena in them. Clear knowledge of the clinical forms of psoriasis contributes to their timely diagnosis and the appointment of adequate therapy. In this regard, the aim of this study was to examine possible clinical forms of psoriasis described in the literature.

Research materials and methods. The analytical method was used to study literary sources in the Scopus, Web of Science, MedLine, The Cochrane Library, CyberLeninka, eLibrary.ru, and Russian Science Citation Index databases over the past 10 years.

Results and discussion. Psoriasis is a chronic inflammatory skin disease that affects approximately 1 to 8% of the world's adult population [1], depending on the region. Compared with Asian and African American populations, it is more common among Caucasians and Scandinavians [2].

In some Northern European countries, the prevalence can reach 8–11% due to climatic and genetic factors. In general, psoriasis occurs equally in men and women, and its prevalence is slightly higher in high-income countries compared to low-income regions such as South Asia or Africa [3-5], with a prevalence of 0.03 to 0.07% in children [6].

According to the 2019 Global Burden of Disease study, the total number of psoriasis cases worldwide is approximately 4.6 million per year, corresponding to an average global incidence rate of 57.8 per 100,000 people. Interestingly, the

incidence of psoriasis has decreased by approximately 20% from 1990 to 2019, indicating progress in diagnosis and treatment of the disease [5]. For example, the prevalence of psoriasis in the United States is estimated at 1.4%, which is approximately 7 times higher than the estimated prevalence of psoriasis in China - 0.21% [4]. However, the large population of China means that psoriasis affects 2.3 million people, making China the third largest country in the world in terms of the number of patients with psoriasis [7].

In addition, psoriasis is often accompanied by various comorbid conditions, such as psoriatic arthritis, which is undiagnosed in 10-29% of patients, and other systemic diseases. Comorbid conditions negatively affect the quality of life and require significant efforts in treatment [8]

Psoriasis in Russia occurs in approximately 1.5-2% of the adult population, which is comparable to global rates [9]. In a study covering 300 Russian patients with psoriasis, the average age of patients was 43.6 years, and the average duration of the disease was about 10 years. Approximately 67% of patients had manifestations of psoriasis on visible parts of the body, which greatly affected their quality of life and ability to work [10].

Also, a study conducted in various regions of Russia showed that the prevalence of psoriasis varies depending on the region and climate. The highest incidence rates were recorded in the regions of the Northwestern and Central Federal Districts, such as the Sverdlovsk Region and the Komi Republic [11].

The most common type of psoriasis is plaque psoriasis (psoriasis vulgaris), which accounts for more than 80% of cases [1]. It is characterized by the appearance of clearly defined papules and plaques with silvery scales. It is most often localized on the elbows, knees, scalp and lower back. In addition, there is guttate psoriasis (small drop-shaped rashes, often after an infection, especially in children and adolescents). Generalized pustular psoriasis (GPP) is a rarer and more severe form of psoriasis. It is characterized by sudden and extensive eruption of superficial sterile pustules, accompanied by fever, discomfort, and fatigue [12].

Erythrodermic psoriasis is a separate condition characterized by intense redness and peeling of the skin, may affect the entire skin surface, and is often accompanied by fever and malaise. Erythrodermic psoriasis is a difficult-to-treat variant of psoriasis associated with a potentially life-threatening severe clinical course [13,14], characterized by widespread erythema affecting almost the entire body surface (from 75% to more than 90%). EP is one of the most common causes of erythroderma, responsible for approximately 25% of all cases. This condition usually develops rapidly or more gradually (from several days to several weeks) in patients already suffering from poorly controlled psoriasis vulgaris. Prevalence is estimated at 1%–2.25%, with a male to female ratio of 3:1 [15]. Several factors are considered triggers of EP: sudden discontinuation of systemic psoriasis medi-

cations, taking lithium-containing drugs, taking antimalarial drugs, and systemic infections [16]. Due to the rarity of this condition, there is currently no consensus on the best treatment algorithm for EP [16, 17]. Immunosuppression, including cyclosporine and infliximab, is considered effective in unstable patients [18].

In addition, there is inverse (fold) psoriasis; it is localized in large folds of skin, accompanied by bright red rashes, smooth, with virtually no scales; it is often complicated by bacterial or fungal infection. Common symptoms include itching, burning, and soreness of the skin [3].

A separate form is nail psoriasis, localized in the nail plates. It manifests itself by a change in color, point depressions, thickening of the nails, their delamination and fragility.

According to the stages, there are progressive, stationary and regression stages.

The progressive stage of psoriasis is manifested by the expansion of the rash along the edges, the merging of papules into large plaques and the appearance of new lesions at the sites of skin damage (Koebner phenomenon). The rash is pink and covered with silvery-white scales, and an erythematous rim ("growth zone") can be seen on the periphery, which is not covered with peeling. Psoriatic signs are expressed positively. At this stage, new rashes appear, old lesions increase, and peripheral growth is observed.

The stationary stage of psoriasis is characterized by the absence of new rashes. The plaques acquire a red tint, are slightly infiltrated and covered with light peeling. The scales completely cover the affected areas. The psoriatic triad is mild and itching is almost not felt. At this stage, the process stabilizes: new elements do not appear, but the old ones do not disappear either.

In the regression stage, scaling disappears, infiltration decreases, and plaques begin to disappear from the center, forming a pseudoatrophic rim of Voronov at the edges. Subjective symptoms such as itching are absent. Inflammation and scaling decrease, the rashes become pale and disappear. [19].

In addition to plaque psoriasis, psoriatic arthritis is another important clinical manifestation of psoriatic disease. It involves painful inflammation of the joints and surrounding connective tissue [13]. Psoriatic arthritis usually affects the fingers and toes, causing them to swell and take on a sausage shape, a condition known as dactylitis. Other joints can also be affected, such as the knees, buttocks, sacroiliac joint, and spine [20]. Approximately one third of patients with psoriasis will develop psoriatic arthritis, a seronegative arthritis associated with psoriasis [21]. Seventy-five percent of patients with psoriasis had dermatological manifestations of the disease before arthritic manifestations [18]. Psoriasis is also associated with many comorbidities, such as cardiovascular pathologies, metabolic syndrome, obesity, inflammatory bowel disease, and mental disorders that are associated with a systemic inflammatory process. [3]. When joints are affected, arthropathic psoriasis is diagnosed, accompanied by severe pain, swelling, and

limited joint mobility. It can lead to deformities and disability. Psoriatic arthritis occurs in 6-41% of patients [22]. According to official data, the prevalence of psoriatic arthritis in the Russian Federation in 2022 was 13.9 per 100 thousand population, the incidence rate was 1.97 per 100 thousand population [19]. Difficulties in diagnosing the psoriatic nature of arthritis are sometimes complicated by the fact that arthritis manifests itself before skin manifestations [19]. Psoriatic arthritis is a common medical and social problem and often leads to disability of patients [23]. On average, PsA appears in the first 7 years of the disease [24]. With late diagnosis of arthritis, the potential effectiveness of therapy is significantly reduced [25].

Conclusion. Psoriasis remains a fairly common disease. Signs of psoriatic disease can be veiled by erythrodermal manifestations, joint pain, and inflammatory phenomena in them. Clear knowledge of the clinical forms of psoriasis contributes to their timely diagnosis and the appointment of adequate therapy.

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GLOBAL TRENDS IN PANCREATIC CANCER INCIDENCE STATISTICS

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Abstract. *Based on domestic and foreign sources and data from the cancer registry in the Russian Federation, the main statistical data on pancreatic cancer incidence are presented and its possible causes are presented.*

Keywords: *pancreatic cancer, malignant neoplasms.*

Relevance. Population health is one of the most important indicators of a country's well-being, and its protection and strengthening are a priority for the development of any civilized state [1]. The journal of the American Cancer Society presented a systematic analysis of cancer incidence and mortality worldwide, based on data from Globocan, an international oncology database developed and operated by the International Agency for Research on Cancer (IARC). According to their data, the number of cancer cases may increase from 20 million recorded in 2022 by 77% and reach 35 million by 2050.

At the same time, digestive diseases (DDS) are among the most common chronic diseases in economically developed countries and, according to a number

of studies, their share is 8-10% [2]. Inflammatory diseases of the pancreas (DP) are a common cause of premature mortality, forming a negative demographic balance in our country and the world [3]. The incidence of chronic pancreatitis (CP) in developed countries fluctuates between 5-10 cases per 100 thousand people, in the world as a whole - 1.6-50 cases per 100 thousand people per year. All these diseases lead to malignant neoplasms of the pancreas (MNP), among which pancreatic adenocarcinoma should be highlighted - this is an extremely aggressive form of cancer with low survival rates [4, 5]. Pancreatic ductal adenocarcinoma is a malignant tumor that is globally recognized as the most complex type of cancer and is predicted to become the third leading cause of cancer death worldwide by 2026. The mortality rate of patients with pancreatic adenocarcinoma accurately reflects the incidence rate due to the short survival period, usually less than one year [6].

In this regard, the aim of the study was to examine global trends in pancreatic cancer incidence statistics.

Material and methods of the study. Analytical, statistical, literature review, cancer registry data, etc. methods were used.

Results and discussion. Globally, pancreatic cancer is the twelfth most common cancer in men, the eleventh most common cancer in women, and the seventh leading cause of cancer death [7]. Pancreatic cancer develops more often in older patients, usually after 60 years of age, and the incidence rate in men is slightly higher than in women [8]. According to the International Agency for Research on Cancer (IARC) estimates of cancer incidence and mortality, the incidence of pancreatic cancer was 510,566 newly diagnosed cases and 467,005 deaths from this nosology in 2022, which corresponds to 2.6% of all new cancer diagnoses and 4.8% of all cancer deaths, respectively [8]. Given the low survival rate associated with pancreatic cancer, the incidence and mortality rates are almost the same. In 2018, according to world statistics, the incidence and mortality rates from malignant neoplasms of the pancreas were 4.8 and 4.4 per 100,000 people, respectively. The incidence of pancreatic cancer has increased over the past decades and is projected to continue to increase. The mortality rate of patients with pancreatic adenocarcinoma accurately reflects the incidence rate, due to the short survival period, usually less than one year [9].

Experts predict that pancreatic cancer will soon surpass breast cancer in the countries of the United Europe and become the third cause of cancer death, as has already happened on the North American continent. Pancreatic cancer is the fourth leading cause of cancer death in the United States, resulting in more than 30,000 deaths each year [10].

Pancreatic ductal adenocarcinoma (PDA) accounts for 90% of all pancreatic malignancies and is characterized by a five-year survival rate of less than 5%, which is a global health problem [11, 12]

In the Russian Federation, according to the cancer registry, pancreatic cancer accounted for 3.2% in 2018, and pancreatic cancer mortality accounted for 6.1% of the total cancer mortality [4, 13]. According to the same registry from 2022, pancreatic cancer was diagnosed in 9,302 cases in men in Russia, which is more than in 2012, when 7,649 cases of cancer were diagnosed [3]. In women, respectively, in 2022 there were only 10,174 cases, and in 2012 - 7,544 cases. We see that over 10 years, both men and women have seen an increase of about 20%.

According to the indicator per 100 thousand population, there is also an increase from 10.6 cases in 2012 to 13.21 cases per 100 thousand population in 2022. The increase was more than 20%. Thus, in the Russian Federation, as in world practice, a gradual increase in the number of patients with malignant diseases of the pancreas is noted. Currently, pancreatic cancer is the sixth most common malignant gastrointestinal disease in the Russian Federation [14].

The suspected causes of pancreatic cancer include factors such as tobacco smoking, obesity, diabetes, physical inactivity, and high-calorie/high-fat diets in some countries [15-17]. In addition, the incidence of pancreatic cancer may be affected by improved pancreatic cancer diagnostics and increased life expectancy.

Most authors are inclined to believe that approximately 25% to 30% of pancreatic adenocarcinoma cases may be associated with tobacco consumption; smokers are 2.5–3.6 times more likely to develop the disease than the population average. Smoking is mentioned in most publications as the most likely factor in the development of pancreatic cancer (PC) [18]. The widespread prevalence of obesity in the modern world is one of the reasons for the increase in a number of chronic diseases, such as diabetes, atherosclerosis, tumors and hypertension. In recent years, obesity has become a growing global public health problem. Epidemiological studies show that obesity increases the risk of various tumors, most of which are neoplasms of the digestive system [19]. Malignant lesions of the stomach, esophagus, liver, pancreas and rectum, more often occur in obese people and are one of the main causes of death in the world [20, 21]. In addition, family history is an established risk factor for pancreatic cancer. Studies indicate that about 7-10% of patients with pancreatic cancer have a family history of the disease [22]. For families with three or more individuals with malignant pancreatic diseases, the likelihood of developing pancreatic adenocarcinoma is approximately 32 times higher compared to families with no mention of cancer. In families with four or more people with pancreatic cancer, the risk may increase 57-fold [23-26]. Several studies suggest that hereditary factors, obesity, diabetes mellitus, chronic pancreatitis, alcohol abuse, chronic hepatitis [27], breast cancer and non-polyposis colorectal cancer may also increase the risk of developing pancreatic cancer [22, 28, 29].

Considering the etiopathogenetic role of deteriorating nutrition quality (insufficient food quality control), increasing stress, alcohol abuse (insufficiently effec-

tive anti-alcohol policy), tobacco smoking in the occurrence of pancreatitis, its growth in the future should be assumed, leading to an increase in temporary disability and disability.

Conclusions. Thus, malignant neoplasms of the pancreas are becoming the third cause of cancer mortality in the world. However, the exact etiology of the disease remains unknown. This fatal disease is usually diagnosed at a late stage, often already with metastases, due to the absence of early clinical manifestations. All this requires further study of risk factors and pathogenesis of malignant neoplasms of the pancreas.

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RESEARCH OF SOWING QUALITIES OF SOYBEAN SEEDS IN SEED FARMS OF AMUR REGION

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Abstract. *An analysis of soybean seeds prepared for sowing in the farms of the Tambov, Konstantinovsky and Ivanovo districts of the Amur Region was carried out. In the farms of the surveyed areas, in the structure of sown areas, the main soybean crop is cultivated, which constitutes a share in the structure of crop rotation of more than 70 %. For sowing, 9 varieties of soybean are prepared by the Soybean Institute and 2 varieties of breeding in Canada and Ukraine. Of the 9 varieties, 7 belong to medium ripe and 2 varieties to late ripe groups. The area of soybean sowing in the region is 70 % occupied by the breeding varieties of the Soybean Institute. The quality of the tested seeds of 9 soy varieties is not at the proper level. Of the 27 seed lots tested, 9 varieties of 10 lots (37%) belong to the second category (according to the purpose, these seeds of the second and third reproductions sown on seed plots of seed farms). Weather conditions in 2020 unfavorably developed on the quality of soybean grain harvesting. To improve the situation under the sowing of 2021-2024, in the whole region, the share of elite soybean seeds, the production of the Soybean Institute, increased 1.8 times.*

Keywords: *soybeans, variety, seeds, harvester, damage, carcasses of cotyledons and embryo, part, laboratory and field germination.*

1. Introduction

In the Amur Region, according to the Ministry of Agriculture, the sown area of soybeans in 2021-2024 was 882 thousand hectares. Soybean saturation in crop rotation is maintained at a level of slightly more than 70% [1, p. 20]. Recently, agricultural producers are purposefully increasing their own production and use of seed material of the necessary reproductions, as they are provided with appropriate support from the state [2, p. 16].

Seed quality is a critical factor in increasing crop yields, including soybeans. Only with high biological and qualitative characteristics of seeds are the potentials of the variety fully used [3, p. 56].

All mechanized work related to the production of soybean seeds is currently carried out by machines designed for sowing, harvesting and harvesting grain crops. The used complex of machines with structural features and technological modes of operation does not fully meet the requirements of the whole set of physical and mechanical properties and features of soybean culture [4, p. 55].

The great disadvantage of machines used in the harvesting and underworking of soybean seeds is noted in the high degree of mechanical damage to grain [5, p. 9]. The amount of mechanical damage to soybean during harvesting together with frost and damaged pests in some years is up to 20% [6, p. 60].

Soybean grain is mechanically damaged during harvesting. Harvesting in the climatic conditions of the Far East is often complicated by sharp changes in night and day temperatures, which in some years range from + 18 to - 13° C, and with precipitation. Late ripe, and partially medium ripe soy varieties, due to over wetting, sown at suboptimal dates, do not have time to mature [7, p. 153]. This leads to the establishment of rigid soaking regimes, as a result, the crushing of soybean grains reaches 12-15 %, micro-damage up to 8-10 %, the content of frost seeds and damaged by pests is more than 5 % [8, p. 73].

Soy grains are brought to sowing conditions at complex grain treatment complexes, which also mechanically damage soy. In this regard, when developing the technology of obtaining quality seeds, it is necessary to consider the issue of their preservation from mechanical impacts leading to high crushing and micro-damage during harvesting and underwork [9, p. 549].

Soybean grain, as a whole, under the action of external forces arising during threshing and underwork, is mechanically damaged and to a greater or lesser extent changes its shape or is destroyed with the appearance of cracks on the seed, the recaptured part of the cotyledons of grain, halves and the finely divided part of grain (Fig. 1, 2, 3).

Figure 1. *Grain cracks contained in seeds prepared for sowing*

This type of soybean grain damage, when mined, is practically undisclosed, due to almost identical dimensional characteristics with the whole grain and, depending on the variety, occupies a certain percentage in terms of content in the seed material and, together with frost and damaged pests, significantly degrades the quality of soybean seeds. This part of the seeds in laboratory and field conditions only germinates by 10% and produces seedlings and not all plants, remaining for harvesting, provide yields at the level of the corresponding variety.

Figure 2. *Part of the grain is recaptured*

Figure 3. *Halves and finely divided portion of soybean grain contained in seed material*

In size 1 and 2, the type of damaged seeds differs little from whole seeds. They cannot be isolated during part-time work, and they are contained and sown in a certain amount along with prepared seeds. The 3rd type of damage, although significantly different in dimensional characteristics from whole seeds, is not completely sorted and up to 4-5 % is contained in seeds.

The purpose of the research was to identify the content of micro in developed seeds by soy varieties in the seed farms of the main sowing districts of the Amur region. The main task was to identify a decrease in their laboratory and field germination during the sowing of these damaged seeds.

2. Methods

The research of sowing qualities of seeds of early ripening and mid-season grades of soy was conducted on the seeds prepared for crops in large-scale seed-growing enterprises of Tambov, Konstantinovsky's and Ivanovo Districtc of the Amur region of the Amur region. Samples weighing 2kg (using the sampling method) and laboratory conditions in accordance with GOST 12036-80 - GOST 12047-80 were taken in farms from a batch of soybean seeds prepared for sowing.

On the isolated damaged and whole seeds of soybeans of fast and medium-ripe varieties, a field finely divided experiment was carried out according to the scheme of the selection process. The purpose of the experiment was to determine the effect of the use of micro (fractured) and macro (part of cotyledons is beaten) damaged seeds on their laboratory and sowing qualities. Whole seeds were sown for control. The repetition of experiments is quadruple. The sowing rate was 220 thousand germinating grains. Statistical processing of the study results was carried out according to the method of Dospekhov B.A. [10, p. 256].

An analysis of the quality of soybean seeds selected from the farms of the Tambov, Ivanovo and Konstantinovsky districts of the Amur Region showed that in these areas seed farms cultivate and receive seeds of 11 varieties of soybeans, of which 9 varieties of selection of the Soybeans Institute, one variety «Prudence» of the Canadian selection and «Terek» of the Ukrainian selection.

For the harvesting of soybeans in the farms of the region there are 2.4 thousand pieces of combine harvesters of various brands and modifications, which are 73 % obsolete in terms of operational life up to 10 years. For one combine on average in the region there are 510 hectares, for Russia this figure is 354 hectares. But given that in the structure of the combine park, 20 % are Yenisei harvesters, physically and mentally worn out, the actual load on the combine harvester reaches 700 hectares, and in individual farms reaches 1000-1200 hectares.

3. Results

Given the use of obsolete equipment and the wear and tear of grain cleaning equipment, it is not necessary to expect good quality of own soybean seeds grown and mined directly in the farms of the main neighborhoods of the region.

Table 1

Analysis of the quality of soybean seeds of various varieties taken from farms of the Tambov, Konstantinovsky and Ivanovo districts of the Amur region

Area, soy grade	Crushing, %	Cracks in the cotyledon and embryo region, %	Sick, frosty, pest-damaged, %	Weight 1000 seeds, g
Tambov District, Soybean Variety: «Kitrosa»	1,3	1,6	0,5	156,8

«Person»	6,34	2,71	0,73	117,86
«Evgenia»	1,8	3,65	0,35	186,5
«Azure»	4,30 5,41	4,35 4.14	0,15 0,8	171,06 161,85
«Alyona»	5,73	4,34	0,53	167,0
«Prudence»	3,2 1,09	4,97 2,6	0,13 0,91	174,8 192,3
«Luxury»	1,01 0,38	1,71 2,0	0,57 1,47	148,1 161,7
«Umka»	3,88	2,54	1,0	173,5
Konstantinovsky Districtc, Soybean Variety «Umka»	3,55	1,31	1,34	176,6
«Bonus»	1,64	1,66	2,28	174,1
«Luxury»	1,67	1,84	2,41	163,15
«Prudence»	5,74 4,32	1,87 5,89	0,72 3,10	174,7 168,7
«Azure»	2,59	1,24	1,92	180,3
«Person»	3,44	0,73	0,74	114,4
«Alyona»	3,76 2,16	5,14 2,63	1,09 5,14	167,7 162,76
Ivanovo District, Soy Variety: «Terek»	1,26	1,53	2,49	168,8
«Umka»	4,64	1,77	3,56	188,1
«Alyona»	1,0	1,48	1,34	171,0
«Luxury»	1,34	1,80	1,55	154,3
«Dauria»	3,21	2,52	1,01	165,8
«Prudence»	2,44	3,94	1,60	187,1

4. Discussion of results.

It has been established that the breeding seeds of the Soybean Institute, Canadian and Ukrainian varieties have different contents of crushed and micro-damaged seeds. The largest amount of crushing (6,34, 5,41, 5,73 %) and micro in tervention (4,97, 4,14, 4,34 %) was found in the seeds of the Tambov district of the varieties «Persona», «Alena», «Lazurnaya», «Prudence» (Table 1), in the seeds of the Konstantinovsky district «Prudence», «Alena» and «Umka» the crushing value is slightly lower and is (5,74, 3,76, 3,55 %), but much higher (5,89, 5,14, 1,34 %). The amount of crushing and micro-damage is significantly lower in the seeds of the Ivanovo region. Here, crushing is (4,64, 3,21, 2,44 %) and micro-damage (3,94, 2,52, 1,77 %) in seeds of the varieties «Umka», «Dauria» and «Prudence».

The smallest mass, of 1000 seeds, in the indicated varieties, are small seeds of soybeans of the «Person» variety (114,4-117,9 g), the highest «Prudence» and «Lazurnaya» (180,3-174,8 g). The above seed quality data for the three regions of the region show that the highest value of mechanically damaged soybean seeds is found in the Canadian selection variety «Prudence», from the selection varieties of the Soybean Institute: «Persona», «Alena», «Lazurnaya», and soybeans of the Ukrainian variety «Terek» and the selection varieties of the Soybean Institute «Bonus», «Nega» more resistant to mechanics.

As the experience shows, damaged seeds germinate under laboratory conditions, and give 32-26 % lower germination energy and laboratory germination (Table 2). The speedy variety «September» and the medium-ripe «Nega» in the control version had almost the same germination energy of 95 and 94 %, laboratory germination of 97 and 96 % and field germination of «whole» seeds under control, amounting to 96,4 and 96,0 % (NSR_{05} = 2,09 and 3,64 units). Seeds with cracks in the area of cotyledons and embryos in the field germinated by 30% (NSR_{05} = 4,62 and 4,13 units). Seeds with a broken part of the grain in the region of the embryo and cotyledons germinated in the field by 26,8 and 27,8 % (NSR_{05} = 4,33 and 4,66 units).

Table 2

Laboratory and field germination of soybean seeds of speedy and medium-ripe soybean varieties of Soybean Institute selection

Control, type of damage	Energy of germination, %		Laboratory viability, %		Field viability, %			
	Sentyabrinka	Luxury	Sentyabrinka	Luxury	Sentyabrinka	HCP_{05}	Luxury	HCP_{05}
Control, whole seeds	95,0	94,0	97,0	96,0	96,4	2,09	96,0	3,64
Fetal and cotyledon cracks	25	30,0	31,6	33,0	30,4	4,62	30,0	4,88
Part of the grain in the germ and cotyledons region is beaten off	25,0	31,0	27,6	29,0	26,8	4,33	27,8	4,66

Germination energy, laboratory and field germination of damaged seeds are significantly reduced.

In the field, damaged seeds show a worse pattern, where fractured seeds germinated by 10.4 and 13.0 % and seeds with a broken part in two grades by 10,8 %. This part of the damaged seeds reduced field germination by 3 times, compared to laboratory, while whole seeds practically did not reduce field germination.

Soybean seeds of the first and subsequent reproductions sown on seed plots in the farms of the surveyed area belong to the second category (according to the

purpose, these seeds of the second and third reproductions sown on seed plots of seed farms). They should have a seed content of the main crop of at least 95 %. Then if sick, frosty and damaged by pests, as well as micro-damaged seeds, giving 10 % of seedlings in the field, are added to the crushing, then. of the 27 seed lots tested, 9 varieties of 10 lots (37 %) belong to the second category, the rest of 63 % of the seeds can be sown in commercial areas.

An innovative update of the soybean harvesting technology, based on the creation of two-phase threshing devices with two-stream cleaning to combine, improving the quality of soybean seeds, due to the isolation and collection of the most mature, biologically full-fledged grain with less crushing, from under the first threshing drum. Cleaning and transporting this seed fraction into a separate hopper with minimal damage, and using this seed fraction on the sowing without additional processing, leads to the production of quality seeds. The relevance of the technical solution is confirmed by Russian Patent No. 2679508. The practical implementation of this technology for producing quality seeds ensures an increase in soybean yield up to 0.3 tons/ha.

5. Conclusion

1. In the seeds of soy prepared for crops from the checked 27 parties in farms of the seed-growing direction Tambov, Konstantinovsky and the Districts of Ivanovskoye, 9 grades of selection of Institute of soy and 2 grades of selection of Canada and Ukraine, the size of crushing of grain is from 2,44 to 6,34 %, micro damages from 1,77 to 4,97 %. From the checked seeds of 9 grades of 10 parties of the second and subsequent reproduction, treat seeds of the second class, can be sowed on seed sites of seed-growing farms of the listed areas, the rest of 63% of seeds has to be sowed on the areas of commodity appointment.
2. Field experiment on crops of jointed seeds of soy and seeds with the beaten-off part of grain in the field of a germ and cotyledons shows that the field viability is lower than their laboratory viability and makes a little more than 26-27 %, i.e. this part of seeds in field conditions for 74-73 % doesn't give shoots.

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NEW VERSION OF THE WORLD'S FIRST BELASHOV'S ELECTRIC DISK MACHINE

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Abstract. *The article is devoted to the invention of a new version of the world's first disk electric machine, which has a plurality of multi-turn stator windings without changing the direction of current flow in the multi-turn windings, can operate without any electronic or mechanical switching devices. The rotor excitation system, consisting of electromagnets or permanent magnets and their combined combination, rotates freely around the multi-turn stator windings. The modules of the disk electric machine can have a large internal active resistance with a complete absence of reactive resistance and have a large torque on the rotor, and also be well regulated by current and voltage. Disk electric machines are highly reliable and can quickly repair or replace failed modules. The invention can be used in power engineering, industry and the national economy as an ideal DC generator for wind power and hydropower having good characteristics of the DC output signal with a large internal active resistance and a complete absence of reactive resistance designed for a large output voltage without any rectifier systems. This invention can also be used as a device for lifting or rotating technical structures, power drives, vehicles, lifting mechanisms, conveyors, automatic regulation and control systems for mechanical devices, as well as for military purposes.*

Keywords: *the world's first disk electric machine, electric machine modules, DC electric machines, power engineering, electrical engineering.*

Belashov's laws and mathematical formulas are known, which introduce fundamental changes in the level of knowledge of electrical and electrical phenomena in the field of generating and measuring electrical signals of direct or alternating current. See the patent of the Russian Federation No. 2175807 KL H 02 K 23/54, 27/02 - analog.

Belashov's modular electric machine is known, which, without a collector, with the help of a control system for working rows of multi-turn windings

connected to an electronic commutator, rotates the rotor of an electric machine relative to the magnetic systems of the stator. See the patent of the Russian Federation “Belashov’s brushless universal electric machine”, No. 2130682 KL H 02 K 23/54, 27/10 - analogue.

The world’s first electric machine by Belashov is known, which has a multitude of multi-turn rotor windings that pass through a multitude of excitation systems without any switching devices. See the description of the application for invention No. 2005129781 of September 28, 2005 - analogue.

A new version of the world’s first electric machine by Belashov is known, which has a multitude of multi-turn rotor windings that pass through a multitude of excitation systems without any switching devices. See the Interuniversity International Congress “Higher School: Scientific Research”. Collection of scientific articles based on the results of the congress held in Moscow on October 17, 2024, pages ???-??? - prototype.

The purpose of the invention is to reduce the copper consumption for a multitude of multi-turn windings and to create conditions for the rotation of the rotor with a constant direction of current in the multi-turn windings of the stator.

Fig. 1 shows the internal structure of the new version of the world’s first disk electric machine Belashov.

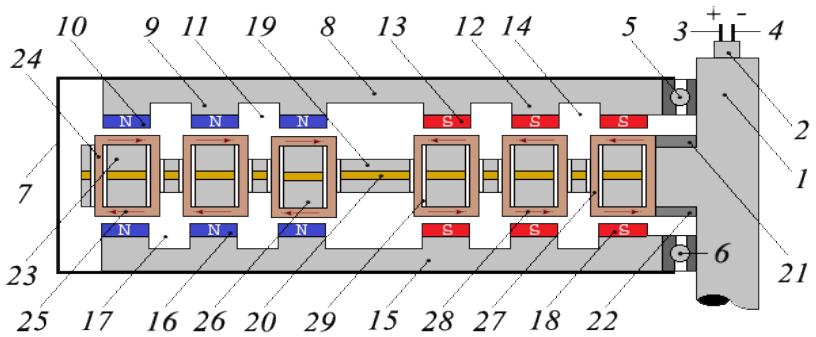

Figure 1

The new version of the Belashov disk electric machine Fig. 1 contains a stator shaft 1, a device for supplying direct voltage 2 with a positive conductor terminal 3 and a negative conductor terminal 4. The rotor shaft is connected to a movable housing 7 via rolling or sliding elements 5 and rolling or sliding elements 6. Two identical excitation systems are fixed inside the movable housing. The first excitation system 8 has a plurality of projections 9 with fixed

north pole magnets 10 separated by air gaps 11 and a plurality of projections 12 with fixed south pole magnets 13 separated by air gaps 14. The second excitation system 15 has a plurality of projections with fixed north pole magnets 16 separated by gaps 17 and a plurality of projections with fixed south pole magnets 18 separated by air gaps. Inside the rotor excitation system, two identical composite magnetic circuits 19 are placed, separated from each other by an insert with a fixation device 20. The composite magnetic circuits of the rotor are attached to the stator shaft 1 by means of fastening elements 21 and fastening elements 22. The magnetic circuits of the excitation system 19 contain a plurality of projections 23, on which a plurality of multi-turn stator windings 24 wound in direction 25 are placed, and a plurality of projections 26, on which a plurality of multi-turn stator windings 27 wound in direction 28 are placed. All multi-turn rotor windings are placed in the gaps of the stator 29 and are electrically connected to each other with a device for supplying direct voltage 2 having a positive conductor terminal 3 and a negative conductor terminal 4.

The new version of the world's first Belashov disk electric machine operates as follows. The first excitation system of the rotor 8 consists of a plurality of permanent magnets of the north pole 10 and a plurality of permanent magnets of the south pole 13. The plurality of poles of the first excitation system 8 create a magnetic flux coming out of the plurality of north poles 10. Then the magnetic flux crosses a plurality of multi-turn windings 24 wound in the direction 25 and passes to the projections 26 of the first composite magnetic circuit 19. Then the magnetic flux continues to move along the magnetic circuit 19 and passes to the plurality of projections on which the multi-turn windings 27 wound in the direction 28 are placed. The magnetic flux, crossing the multi-turn windings 27, passes to the plurality of south poles 13 of the first excitation system 8. The second excitation system of the rotor 15 consists of a plurality of permanent magnets of the north pole 16 and a plurality of permanent magnets of the south pole 18. The plurality of poles of the excitation system 15 create a magnetic flux coming out of the plurality north poles 16. Then the magnetic flux crosses a plurality of multi-turn windings 24, wound in direction 25 and goes to the projections of the second composite magnetic circuit. Then the magnetic flux continues to move along the magnetic circuit and begins to go to a plurality of projections 26, on which multi-turn windings 27 wound in direction 28 are placed. The magnetic flux, crossing the multi-turn windings 27, goes to a plurality of south poles 13 of the second excitation system 15. Then we connect the new version of the world's first disk electric machine to a source of direct voltage to the positive terminal 3 and the negative terminal 4, which are connected to a plurality of multi-turn windings 24

and a plurality of multi-turn windings 27. All multi-turn windings of the rotor are connected to a source of direct current, which never changes its direction of current in the conductor during operation of the electric machine. After the magnetic lines of force cross the plurality of multi-turn windings 24 and the plurality of multi-turn windings 27, a repulsive force arises, which acts on the conductor according to the left-hand rule. If the left hand is positioned so that the magnetic field lines enter the palm perpendicular to it, and the four fingers are directed along the current, then the thumb set back 90° will show the direction of the acting force on the plurality of multi-turn windings 24 and the plurality of multi-turn windings 27.

Moreover, it should be noted that when using the new version of the world's first disk electric machine as an ideal DC generator for wind power and hydropower, it has good output signal characteristics with high internal active resistance. The high internal resistance of many multi-turn windings is designed for a high output voltage, which can be used without any rectifier systems by rotating the rotor body 7 with the excitation system 8 and the excitation system 15.

It should be especially emphasized that obtaining DC voltage from the new version of the world's first disk electric machine without any converters gives a great positive effect in transmitting DC electrical energy over long distances.

Since the transmission of electrical energy over long distances by alternating current worsens these characteristics and leads to:

- power losses due to the presence of capacitance in the AC transmission lines,
- a large voltage drop associated with the effect of inductance,
- it is necessary to strictly synchronize the frequency of alternating current from different incoming sources of electrical energy, since AC transmission lines can only connect synchronized AC electrical networks that operate at the same frequency and in phase,
- it is also necessary to take into account that the overload of generators due to increased voltage levels, the reactive power generated by the line can become so large that it will lead to overheating of the generator windings, etc. ... The main advantage of transmitting electrical energy over long distances by direct current is that such a transmission line can serve as an accumulator of electrical energy by accumulating electrical energy due to a significant increase in voltage in it, while there is no need to synchronize anything, but simply increase the voltage. Nowadays, everyone is trying to switch to energy-saving technologies, such as LEDs, but many such devices operate only on direct current, and I have patented the basic circuit and operating principle of the converter from high-voltage direct current to an electrical signal of alternating current of industrial frequency in the patent of the Russian Federation No. 2435982. In conclusion, it can be said that when the new version of the world's first disk electric machine Belashov operates, inside all

multi-turn windings of the rotor and stator, the current in the conductors constantly moves in one direction, which never changes its direction without any switching devices. The invention can be used in power engineering, industry and the national economy as an ideal DC generator for wind power and hydropower, having good characteristics of the DC output signal with high internal active resistance and a complete absence of reactive resistance, designed for a high output voltage without any rectifier systems. This invention can also be used as a device for lifting or rotating technical structures, power drives, vehicles, lifting mechanisms, conveyors, automatic regulation and control systems for mechanical devices, as well as for military purposes.

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TECHNOLOGY OF MULTI-PURPOSE PROCESSING OF RYE GRAIN FOR BAKERY PRODUCTION

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Abstract. *The article discusses the technology of processing rye raw materials in combination with other cereals and pseudocereals for the production of multigrain bread. The technology is low-waste due to the use of whole rye grain and the application of various processing methods. The result of applying the technology is the production of several new useful semi-finished products and goods: rye extrudate, "rye cream", rye cake, semi-finished dough for freezing, multigrain bread, rye biscuits. The proposed technology allows to speed up a number of the most inertial stages of bread production on rye cream, reduce waste in flour milling and bakery production, increase the bioavailability of biologically active components initially present in whole rye grain, and increase the antioxidant potential of multigrain bread.*

Keywords: *rye grain, rye extrudate, "rye cream", bioactivation, rye cake, multigrain bread, adaptogenic potential, antioxidant activity.*

Introduction. The range of modern bakery products is dominated by bread made from wheat flour, although multigrain bread based on rye grain is more useful and in demand [1]. The use of various types of cereals (rye, oats) and pseudo-cereals (buckwheat) with high nutritional value allows to form a biologically active complex in the composition of bread as a food product for everyday consumption. Ground buckwheat [2] and oat [3] grains allow to reduce the level of undesirable prolamins in the target product, and also create a new taste and activate digestion. However, these ingredients are underused in bakery products. The modern flour-milling industry frees cereal grains from seed and fruit shells containing valuable nutrients. At the same time, baking regulations require to replenish the removed biocomplexes by introducing artificial additives into the food system.

This makes it relevant to search for resource-saving methods of processing plant materials, in which useful natural components would remain in its composition and provide adaptogenic properties of the target product.

The purpose of this work was to discuss the use of various methods of processing whole rye grain in the process of manufacturing multigrain bread and related target products with adaptogenic potential.

Materials and methods. In the proposed multigrain bread technology, the role of the main component is assigned to rye grain, which is introduced into the food matrix in various forms: rye extrudate with phytoadditives of herbs, rye flour and "rye cream". The latter form is unconventional, previously not used in the technology of manufacturing bakery products. A feature of the proposed technology is the production of several target products based on low-waste processing of rye grain as the original type of plant raw material. In this regard, the authors use the term "multi-purpose processing". The target products were: 1) rye extrudate; 2) rye cream as a new type of food ingredient of natural origin; 3) rye cake as a secondary raw material for the production of additional food products; 4) long-term storage semi-finished bread product in a frozen state; 5) multigrain bread based on rye cream; 6) biscuits based on rye cake.

Results and their discussion. The scheme of the main processing stages of the original raw materials is presented in Figure 1.

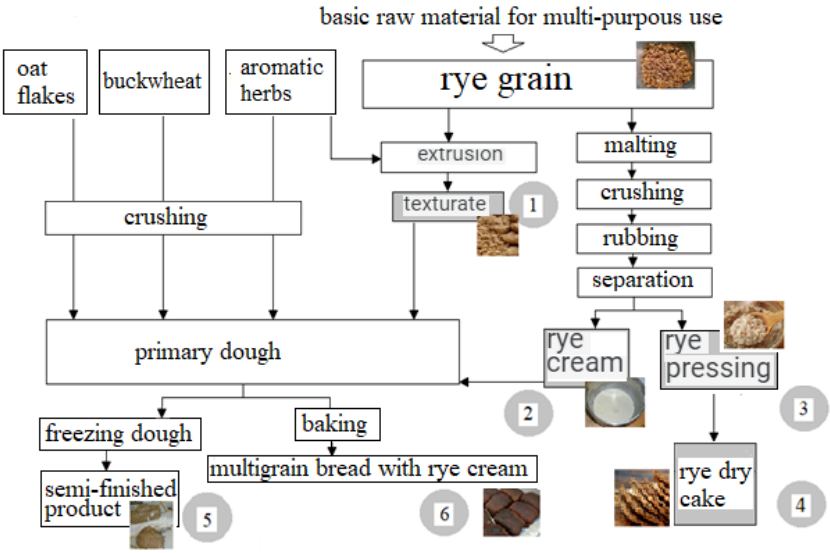

Figure 1. *Scheme of the main stages in multi-purpose processing of rye grain*

The technological chain of rye grain processing included two processes carried out in parallel. The first process was the extrusion of rye grain, preliminarily tempered to a resulting moisture content of W_H = 14.8% in accordance with the described method [4] to obtain a finished product (extrudate) with a moisture content of 6.5%. During tempering, an aqueous 10% infusion of a spicy plant - oregano - was used. In previous experiments, it was found that oregano extracts have weak prooxidant activity [5]. On this basis, oregano extract was used as a stimulator of oxidation-reduction processes, primarily reactions catalyzed by oxidoreductases. These reactions occur during loosening of the grain cell membranes and contribute to the acceleration of the hydration process [6].

The second process was the bioactivation (malting) of rye grain. During this process, the catabolic stages of protein and complex polysaccharide metabolism are activated, which allows for the food system to be enriched with an endogenous concentrate of metabolites and enzymes in a short period of time and eliminate the need for technological additives - artificial improvers, stabilizers, etc. A special feature of this stage was the use of free radical process regulators. Hydrogen peroxide and oregano served as factors stimulating the production of free radicals. Thyme was used as an inhibitory factor. The composition of the reaction mixture and the conditions for carrying out the bioactivation stage were determined experimentally in preliminary studies; as a result of stimulated bioactivation of rye grain, the malting process was reduced to 10 hours [7].

Subsequent processing consisted of grinding the malted grain and separating the resulting emulsion from the cake. The second target product was an emulsion of raw malt (rye cream). The emulsion was a food ingredient that was resistant to coagulation, could be stored at +4°C, and was ready for use in various food products (confectionery and bakery products, jellies, dressings, sauces, etc.). In this study, rye cream was used as a base for kneading dough, followed by the addition of other components, including texturate.

When separating raw malt, the separated fraction was rye cake (target product 3). This product was considered as a secondary raw material, which is a concentrate of dietary fiber, polysaccharides, peptides, vitamins, replaceable and essential amino acids. The product is intended both for use fresh and for cumulative storage in a frozen state (minus 15°C). Rye cake can be used as a base for making biscuits, crispbread, chips, or other types of healthy snacks (target product 4). The dough was mixed using the sponge method using rye textured flour, rye cream, crushed oat flakes and buckwheat. The target product 5 was a semi-finished dough product that could be stored in the refrigerator for at least 12 days. The final product was multigrain bread (target product 6).

The adaptogenic potential of the obtained products was assessed by measuring the antioxidant activity using the chemiluminescent method. It was shown that rye

cream and cake had prooxidant properties, which can be explained by the stimulation of redox processes during accelerated malting of rye grain. During subsequent processing (dough mixing, proofing, baking), redox inversion was observed, and as a result, the target products were characterized by a high antioxidant capacity, the level of which exceeded that of the reference product (Borodinsky bread) [8].

Conclusions. The developed technology for multi-purpose processing of rye grain allows:

- to reduce waste in flour milling and the bakery industry,
- to speed up a number of the most inertial stages of bread production,
- to increase the bioavailability of biologically active components initially present in whole rye grain,
- to expand the range of useful functional products.

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