



SCIENTIFIC RESEARCH OF THE SCO COUNTRIES: SYNERGY AND INTEGRATION

上合组织国家的科学研究：协同和一体化

Materials of the
International Conference

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countries: synergy and integration”

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Foreword

We thank all participants of our conference "Scientific research of the SCO countries: synergy and integration" for the interest shown, for your speeches and reports. Such a wide range of participants, representing all the countries that are members of the Shanghai Cooperation Organization, speaks about the necessity and importance of this event. The reports of the participants cover a wide range of topical scientific problems and our joint interaction will contribute to the further development of both theoretical and applied modern scientific research by scientists from different countries. The result of the conference was the participation of 56 authors from 7 countries (China, Russia, Uzbekistan, Kazakhstan, Azerbaijan, Tajikistan, Kyrgyzstan).

This conference was a result of the serious interest of the world academic community, the state authorities of China and the Chinese Communist Party to preserve and strengthen international cooperation in the field of science. We also thank our Russian partner Infinity Publishing House for assistance in organizing the conference, preparing and publishing the conference proceedings in Chinese Part and English Part.

I hope that the collection of this conference will be useful to a wide range of readers. It will help to consider issues, that would interest the public, under a new point of view. It will also allow to find contacts among scientists of common interests.

Fan Fukuan,

Chairman of the organizing committee of the conference

"Scientific research of the SCO countries: synergy and integration"

*Full Professor, Doctor of Economic Sciences,
member of the Chinese Academy of Sciences*

前言

我们感谢所有参加本次会议的“上海合作组织国家的科学研究：协同作用和整合”，感谢您的演讲和报告。代表所有上海合作组织成员国的广泛参与者都谈到此次活动的必要性和重要性。参与者的报告涵盖了广泛的主题性科学问题，我们的联合互动将有助于不同国家的科学家进一步发展理论和应用的现代科学研究。会议结果是来自7个国家（中国，俄罗斯，乌兹别克斯坦，哈萨克斯坦，阿塞拜疆，塔吉克斯坦，吉尔吉斯斯坦）的83位作者的参与。

这次会议的召开，是学术界，中国国家权力机关和中国共产党对维护和加强科学领域国际合作的高度重视的结果。我们还要感谢我们的俄罗斯合作伙伴无限出版社协助组织会议，准备和发布中英文会议文集。

我希望会议的收集对广大读者有用，将有助于在新的观点下为读者提供有趣的问题，并且还将允许在共同利益的科学家中寻找联系。

范福宽，
教授，经济科学博士，中国科学院院士，会议组委会主席“上合组织国家科学研究：协同与融合”

从精神决心的立场出发，竞争是一种社会互动的方式
**COMPETITION AS A WAY OF SOCIAL INTERACTION
FROM THE POSITION OF SPIRITUAL DETERMINATION**

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抽象。在本文中，作者认为理想竞争是人类历史上从未存在过的，而且原则上也不存在。

史密斯(A. Smith)的“看不见的手”概念的有效性取决于个人竞争行为的精神术语。正是这种精神上的决定使我们能够将竞争视为基于人们的精神社会化的一种社会互动方式。今天，需要作出巨大的努力来重新考虑竞争的重要性，即竞争的真正实质。

作者使用模糊集理论分析“竞争”的定义，模糊集是一种现代数学工具，可以对模糊概念进行正式描述(形式化)，以期对其加以说明并在实践中加以使用。结论是，竞争行为只是现代人整体行为的许多特征之一。

关键词: 精神决心, 社会互动, 自由竞争, 道德调节者, 社会, 行为, 亚当·斯密, 人类历史, 社会乌托邦, 社会实践的主体, 完全竞争, 市场, 不公平竞争, 纯竞争。

Abstract. *In the article, the authors argue that ideal competition has never existed in the history of mankind and cannot exist in principle.*

The validity of the concept of "invisible hand" by A. Smith is conditioned by the spiritual terminization of competitive behavior of the individual. It is this spiritual determination that allows us to consider competition as a way of social interaction based on the spiritual socialization of people. Today, great efforts are needed to rethink the importance of competition, its true essence.

The author analyzes the definitions of "competition" using the theory of fuzzy sets, a modern mathematical apparatus that allows to formally describe (formalize) fuzzy concepts, with the aim of accounting for them and use in practice. It is concluded that competitive behavior is just one of many characteristics of the behavior of modern man as a whole.

Keywords: *spiritual determination, social interaction, free competition, moral regulator, society, behavior, Adam Smith, human history, social utopia, subject of social practice, perfect competition, market, unfair competition, pure competition.*

At the beginning of the 21st, more and more scientists are paying attention to this usual and well-known from the school bench the concept of "competition". Perfectly conceivable competition, often referred to as the free (A. Smith), then pure (E. Chamberlin), then perfect (D. Robinson), then genuinely marketable (J. Stiegler), is possible, as most researchers claim, only in the context where the number buyers and sellers are large (enough) when the volume of purchases is a small fraction of the total volume of a particular product, when, finally, buyers and sellers have the same choice. The opposite situation is called monopolism.

With careful analysis of all these conditions, it becomes clear that such competition has never existed in the history of mankind and cannot exist in principle. The ideal for that and the ideal that it reflects some imaginable (desirable) image, which is unattainable in practice. Otherwise, this image would not be called ideal. The same is the case with the concept of "competition." Trying to reduce its essence to a certain ideal, researchers sometimes build social utopias, posing as scientifically sound models, which then offer to implement in practice. But imagine for a moment that competition is not regulated by spiritual grounds (the highest values of human existence), nor by the norms of law and morality, nor by tradition. Will such competition be a competition? Will it be free? And even more perfect and pure? No, of course not. In such a situation, competition will turn into a fight without rules, in total enmity of all with all. The result of such "free" competition will not be the development of social interaction, but its collapse, some wilds (J. K. Gelbraith), in which even elementary common sense is lost.

The refusal of some researchers to develop a general (essential) definition of "competition" and to replace such a definition with purely private concepts (pure, free, or perfect competition) is reductionism, i.e. the addition of the general concept to a private concept. to a simpler phenomenon - to the simpler, the essence of the phenomenon to its form. On this theoretic and methodological basis, it is impossible to achieve a truly scientific and objectively correct understanding of the essence of competition as a means of social interaction. And, therefore, it is impossible to give a balanced assessment of it.

The fact that even in a situation where people have "equal opportunities to make choices", competition, it turns out, takes sometimes perverted, criminal forms, speaks for itself. From opportunities to reality - a distance of huge size. For the last three hundred years, this distance has been tried to comprehend world and domestic science. The point of the report in the scientific development of the concept of "competition" can perhaps be considered the formulation of A. Smith's famous concept of "invisible hand". The essence of this concept was that, according to the English economist, the market has an "invisible hand" of Divine providence, which regulates the relationship of honey people, turning their selfishness, greed and other vices into virtues. Reflecting on the human propensity for exchange, A. Smith, in his

essay "Research on the Nature and Causes of the Wealth of Nations" (1776), wrote that man "can achieve his goals if he turns to the selfishness of others and is able to show them that in their own it is in his interest to do what he demands of them." And then there was the famous fragment, quoted, perhaps more often than any other provisions of A. Smith's book: "Give me what I need, and you will get what you need - that is the meaning of every sentence. This is how we get much more of the services we need from each other. Not from the benevolence of a butcher, brewer or baker we expect to get our lunch, but from their own interests. We turn not to their humanity, but to their selfishness, and we never talk about our needs, but about their benefits."

Since then, there has been a way in science: naked rationalism has taken the place of morality. Hedonism rejected morality in the sphere of human activity on the basis of the fact that the researchers blindly believed in the postulate of A. Smith. But it was forgotten that A. Smith lived in a puritanical society in which the role of social and moral regulator was performed by religion. Well-known Christian commandments in England of the 18th century were a kind of spiritual and social regulators, norms of behavior.

It's a different matter today. In today's atheistic (secularized) society, these moral standards and moral regulators have been significantly devalued and deformed. Promiscuity (sexual revolution, unconventional orientations, drug addiction and substance abuse, mass conformism and slackness, etc.) like cancer are corroding modern (and not only Western) "one-dimensional society" (G. Marcuse), the whole whose life is based on consumer psychology and commodity fetishism. Copying this social structure at home, our society is simply infected with already known diseases. Including in the economic sphere of his being.

In addition, for some reason this fact is forgotten: formulating his concept of competition, A. Smith, who was, first of all, a philosopher, devoted his first book to the analysis of morality in the behavior of people. In his book "The Theory of Moral Feelings" (1759), he warned man against self-seduction (wealth, money, luxury) and vices (accumulations, greed, bribery, etc.). Calling people to benevolence and virtue, the author argued that the property of virtue is to serve the maintenance of society, while the property of vice is to disturb the order.

These two circumstances - the high degree of religious morality of English society and the particular focus on morality as a social regulator of human behavior - justify A. Smith's somewhat straightforward and sarcastic reasoning that for to satisfy one's needs, not to the virtues of another person, but to his selfishness. In today's situation, such an interpretation of competition would be archaic.

Publishing his main work, A. Smith believed that it is the competition, governed by the invisible hand of Divine conduct, that turns evil into good, selfishness into altruism, lies into truth. If we recall the context of that era, the validity of the conclusions of the Scottish philosopher is due to the spiritual termie of competitive behavior of the individ-

ual. It is this spiritual determination that allows us to consider competition as a way of social interaction, based on the spiritual socialization of people, recognition by them of higher (albeit religiously formed) values as fundamental attitudes of their own activities.

According to most of Smith's followers, in the case of ideal (perfect) competition, it would have to be the way A. Smith had intended. The very term "perfect competition" by A. Smith was used as evidence of the perfection of all that comes from God. After all, it is said in St. Scripture: "Be perfect as your father is heavenly." But neither God in the soul nor the will to perfection (I.A. Ilyin) many modern people no longer have. In the 20th world, society turned out to be a "depraved civilization" (A. Toynbee). In this situation, the preservation of free competition began to turn it from a benefit into a vice, from an incentive - to a brake, from a creative factor of development - to a destructive factor. Today, great efforts are needed to rethink the importance of competition, its true essence.

Today, it is generally accepted that in the process of competition, social practitioners are fighting for the most advantageous conditions and areas of activity. This applies not only to business or politics, but also to culture and education. Considering the evolution of the concept of perfect competition, J. J. Stiegler is repelled in his reasoning about the essence of competition from the five conditions of competition defined by A. Smith: competitors should act independently, not in collusion; The number of competitors, potential or existing, should be sufficient; Competitors must have acceptable knowledge and opportunities; Freedom from social constraints is needed. It takes sufficient time for a particular activity to become desirable for their subjects.

The thing is, as J. admits. Stiegler, economists have traditionally been fixated on understanding competition as a struggle for the market. If we look at the original conditions of competition, it becomes obvious amorphousness in their interpretation. What do the terms "enough," "acceptable, and "desirable" mean, for example? These are the so-called "fuzzy sets" that imply the possibility of different interpretations. But in this case, developing common unified ideas about the essence of competition as a way of social interaction becomes problematic. If we take into account that in each case the person is guided by his ideas about morality and ethics, the problem in general becomes insoluble.

The way out of this situation, in our opinion, can be the use of the theory of fuzzy sets - a modern mathematical apparatus that allows to formally describe (formalize) fuzzy concepts, with the aim of their subsequent accounting and use on Practice.

The fuzzy α -set a set on the universal X set is called the set of pairs of the species (X_i, α) , where $\alpha \in [0, 1]$, and the function of $\alpha: X \rightarrow [0, 1]$, which is called the function of the α -type α . belonging to the fuzzy set A (Figure 1 a). Ordinary sets make up a subclass of fuzzy sets. Indeed, the function of belonging to the usual set $B \subset X$ is its characteristic function of the $\chi_B(x)$ (Figure 1 b).

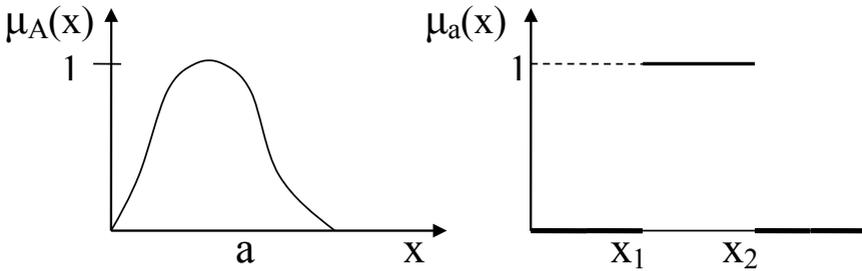


Fig. 1 a, b. Belonging features

To correctly describe the concept of competition, you need to build a function of belonging. You can propose a specific algorithm for building a function of belonging for fuzzy concepts (example of "competition," "free competition," "perfect competition," etc.), the essence of which is to highlight some common concepts components of these fuzzy concepts from the many interpretations that exist.

Let's say that fuzzy concepts that include the term "competition" will be characterized by uncertain features such as 1) the norm; 2) Tradition); 3) Value; 4) persuasion; 5) Behavior; 6) Totality (e.g. norms or traditions); 7) Installation; 8) Feature. Then the original concepts will be presented as a set of original (most general) parameters. The process of fleshing out fuzzy sets can continue until the components of a fuzzy concept under consideration are measured in one way or another. In addition, the frequency of use of specific parameters should be taken into account when defining a fuzzy concept. In the graph above, the function of belonging is given when decomposition of this concept at the first (most general) level.

You can see what and with what meaning the components of the function of belonging can be included in some "standard" definition of the concept of "competition." For example, we can agree with the thesis that competition is a behavioral phenomenon (behavior characterizes any manifestation of competition). In addition, it can be recognized that competition is not always a value. For example, in the face of unfair competition, it becomes simply pointless to talk about value thinking outside of a conscientious act.

It is obvious that each of the components of a particular concept of parameters is in turn a fuzzy set, with its inherent function of belonging. Thus, the general concept of competition will represent a superposition of the functions of belonging to each of the components, which is described by its function of belonging. This allows you to formalize the idea of each of these concepts in the general form of the function of belonging to this particular concept, using as a factor of significance the index of fuzzy component of the set.

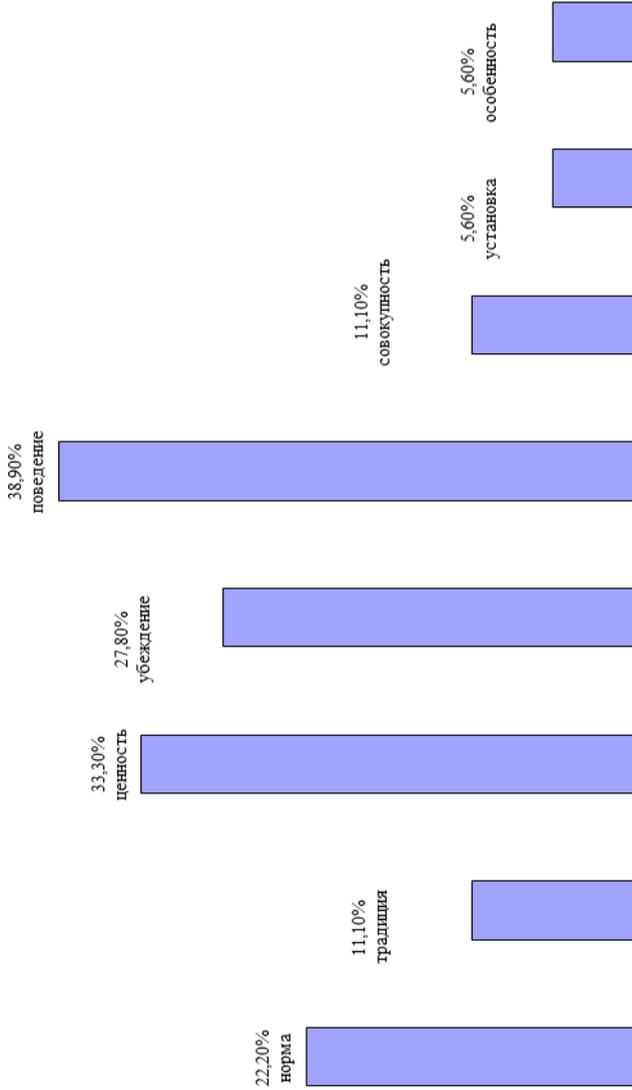


Fig. 2. Algorithm of accessories function for fuzzy sets

The mathematical calculation in this case may be the following. Let the measured value (in the sense of fuzzy sets) be obtained at the k-level of decomposition of the original concept, i.e. the method of measuring it is known and it is described as a function of belonging:

$$A_{kq} q_{ki} q_{ak} (k_i); \tag{1}$$

Each such size can be matched by a fuzziness index:

$$v(A_k) n^2 d(A_k, q_{Ak}); \tag{2}$$

where $d(A_k, q_{Ak})$ is a hemming measure (distance) between two sets.

$$N \\ d(A_k' A_k) A_k(h_i) - z_{A_k}(h_i); \tag{3} \\ i'1$$

It remains to be explained what the symbol means. Indeed, the A_k is a common set closest to the fuzzy A_k set. Its membership function will take the following look:

$$0, \text{ if } q_{A_k}(h_i) < 0.5 \\ q_{A_k}(h_i) \geq 0.5 \text{ if } q_{A_k}(h_i) \geq 0.5 \\ 0 \text{ or } 1 \text{ if } q_{A_k}(h_i) < 0.5 \tag{4}$$

It is easy to notice that using such an algorithm, you can move from the totality of fuzzy sets of k-level to the totality of fuzzy sets k - 1 level. At the same time, the recreational formula is fair:

$$A_{k-1}(h_i) v(A_k); \tag{5}$$

Continuing this process to the first level, we will get the function of belonging to the original concept, i.e. "competition."

The above formula allows you to move from level to level without changing the structure of the components, getting the functions of belonging to intermediate components. It is clear that the resulting algorithm is universal and can be applied to any similar fuzzy set, for example, to assess forms of social interaction such as cooperation (cooperation), solidarity, partnership, etc. Take into account that any of these concepts are precisely a fuzzy set, i.e. a set of certain parameters and characteristics, each (a) of which has a conditional definition, then the method of their definition proposed by us by building the accessories can be considered quite effective. It allows to adequately formalize each concept and thus create preconditions for their further use.

Today, there is a more "definite" interpretation of competition. As many dictionaries define this term, competition is a "permanent mechanism of free competition, or competition." This definition is not scientifically correct for two reasons. First, competition is not always synonymous with free competition; secondly, it is far from identical to the permanent mechanism; thirdly, adversarialness and rivalry are by no means synonymous, as may seem at first glance.

E. Chamberlin, who developed the theory of monopolistic competition in the 1920s, convincingly proved that competition can be carried out in conditions of non-freedom and not constantly (discretely).

E. Chamberlin believed that "pure competition" (in the terminology of modern authors - free competition) is a set of actions in which "competitive and monopolistic factors are intertwined". Thus, E. Chamberlin, trying to dilute the concepts of "pure competition" and "perfect competition", still admitted that competition in its pure (free) version simply never existed anywhere else. Therefore, this concept is a fiction, a false image (utopia). In particular, he wrote that the traditional theory of competition "is not suitable because competition ... is incomplete and highly uneven." As they say, in theory there is no difference between theory and practice, but in practice it is. But the total opinion that dominates science today is that competition is not just a fundamental good inherent in a democratic society and a free individual, but also of the highest value. Such scientism, when the values of the market order are "recorded" in the category of higher (absolute) values of existence, is a theoretical and methodological error.

Modern competition turns the user into a measure of the effectiveness of entrepreneurial efforts. For example, there are increasing suggestions that employers themselves should be the criteria for assessing the quality of education. But in this case, the objective character in understanding competition as a scientific category is lost. After all, the employer by and large needs narrow specialists, not people who have fundamental and diverse knowledge. And here the creation of a competitive environment, its protection from monopolistic tendencies are a condition of the transition from civilized society to a truly cultural society. However, it should also be borne in mind that competitive behavior is just one of many characteristics of the behavior of modern man as a whole. And its value should not be hypertrophied.

Today, there is a more "definite" interpretation of competition. As many dictionaries define this term, competition is a "permanent mechanism of free competition, or competition." This definition is not scientifically correct for two reasons. First, competition is not always synonymous with free competition; secondly, it is far from identical to the permanent mechanism; thirdly, adversarialness and rivalry are by no means synonymous, as may seem at first glance.

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uneven." As they say, in theory there is no difference between theory and practice, but in practice it is. But the total opinion that dominates science today is that competition is not just a fundamental good inherent in a democratic society and a free individual, but also of the highest value. Such scientism, when the values of the market order are "recorded" in the category of higher (absolute) values of existence, is a theoretical and methodological error.

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高科技工业生产：现代化过程建模的方法
**HIGH-TECH INDUSTRIAL PRODUCTION: APPROACHES
TO MODELING MODERNIZATION PROCESSES**

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抽象。 本文介绍了科学密集型高科技企业的现代化和技术更新的最重要领域。 已经建立了一种经济数学模型，该模型可以使人们在主要技术重新装备和高科技企业的进化现代化之间做出明智的选择。 所创建工具的实际应用将提高国内高科技企业创新发展的效率和步伐。

关键词：高科技企业，现代化，技术装备，数学工具，创新产品。

Abstract. *The article shows the most important areas of modernization and technical re-equipment of science-intensive and high-tech enterprises. An economic-mathematical model has been built that allows one to make an informed choice between cardinal technical re-equipment and evolutionary modernization of high-tech enterprises. The practical application of the created tools will increase the efficiency and pace of innovative development of domestic high-tech enterprises.*

Keywords: *high-tech enterprises, modernization, technical re-equipment, mathematical tools, innovative products.*

Introduction

In making effective management decisions, the predicted structure of the created or modernized industrial production enterprises plays an important role [1-3]. For example, if now modern innovative models of technical products for various purposes are being produced at an accelerated pace, then as the domestic market becomes saturated with new science intensive and high-tech equipment (SIHTE), demand will inevitably decrease. This means that for enterprises of innovative

industries, in order to avoid a decline in science-intensive and high-tech production, reduce the load of modern equipment and employ scientific and engineering personnel, it is necessary: to develop the foreign markets of SIHTE, which continues to retain demand for manufactured technical samples; provide expansion of products and services for Russian and foreign counterparties; actively train highly qualified specialists [4-6].

In the world science-intensive and high-tech industry, the civilian sector accounts for about 75% of production volumes, and at the same time, the need to comply with this proportion is declared. In the long run, the expected changes in the production strategy of the industry must be taken into account when drawing up re-equipment programs for enterprises manufacturing SIHTE, when choosing between universal and specialized types of equipment, etc. [7].

Methods and materials

The global technical re-equipment of domestic industry in the future would allow to master the creation and production of a new generation SIHTE with minimal costs, loss of time and money. However, this decision will require significant capital expenditures, which are difficult to obtain due to the existing budgetary restrictions of the state and enterprises, as well as due to the numerous sanctions restrictions imposed by foreign states on the supply of innovative types of production equipment to Russia. It should be borne in mind that the modernization and technical re-equipment of the domestic high-tech production complex was largely carried out on the basis of the use of imported software, technologies and equipment of foreign manufacture. In modern conditions of uncertainty in the resumption of production of samples of equipment of the previous generation, the following dilemma arises [8]:

– whether to create universal production on the basis of modern equipment and new technologies, reconfiguring it to produce products of advanced technological level;

– or, through evolutionary modernization, to recreate at some points in the production chains productions of an outdated level.

Results and discussion

We denote by V the capacity of the new production being created, (the number of units of equipment per year). The average unit price is p . Design capacity is the basis for management decisions. In the framework of the model under development, the duration of production of modernized technical products, denoted by ΔT is a weakly defined parameter. The average annual output of these products is defined as q . It must satisfy actual demand and cannot be more than production capacity:

$$q \leq V. \quad (1)$$

Then ΔQ SIHTE samples will be released over the planned production duration:

$$\Delta Q = q \cdot \Delta T \quad (2)$$

Let us denote the average direct costs of manufacturing SIHTE products on the equipment available at the enterprise c^{ctap} , and the fixed costs associated with its content – FC^{ctap} . Suppose that the available equipment has sufficient power to carry out the SIHTE imaging program planned for implementation. Suppose that there is the possibility of introducing a new technology that provides average direct costs c^{hob} and unit fixed costs associated with the maintenance of equipment equal to fc^{hob} . However, the new technology requires additional capital costs.:

$$I^m = b^m \cdot V \quad (3)$$

where b^m – capital intensity of the introduced technology.

However, it should be noted that the depreciation of capital costs will continue until the end of the production period. Prior to the exhaustion of its resources $Q^m = V \cdot I^m$ units of scientific, technical and industrial products will be produced on new equipment (T^{hob} – is the operating time of the equipment). With the

release of ΔQ units of products, the share of $\frac{\Delta Q}{Q^m}$ resource of innovative equipment will be spent, and a proportional part of capital costs should be attributed to the corresponding time period. Therefore, during the period ΔT the costs will be:

– in case of using the equipment available at the enterprise:

$$IC^{ctap} = c^{ctap} \cdot q \cdot \Delta T + FC^{ctap} \cdot \Delta T; \quad (4)$$

– in case of using new innovative equipment:

$$IC^{hob} = b^m \cdot V \cdot \frac{q \cdot \Delta T}{V \cdot I^m} + c^{hob} \cdot q \cdot \Delta T + fc^{hob} \cdot V \cdot \Delta T. \quad (5)$$

Therefore, the new technology will be preferable for use by the criterion of minimum integral costs when the following conditions are met:

$$\frac{b^m \cdot V}{V \cdot I^m} < (c^{ctap} - c^{hob}) + \frac{(FC^{ctap} - fc^{hob} \cdot V)}{q}. \quad (6)$$

Along with the continued use of old equipment and the acquisition of innovation, another alternative should be considered - the modernization of long-running equipment. We define the model parameters for it: averaged direct costs c^{mod} , fixed unit costs associated with the maintenance of equipment fc^{mod} , the amount of capital costs – $I^{mod} = b^{mod} \cdot V$, where b^{mod} – is the technology intensity. We will assume that the upgraded equipment can be used only until the end of the production time of technologically obsolete SIHTE products i.e. ΔT . In this case, the total costs will be:

$$IC^{mod}(\Delta Q) = b^{mod} \cdot V + c^{mod} \cdot q \cdot \Delta T + fc^{mod} \cdot V \cdot \Delta T. \quad (7)$$

Modernization will be more profitable than acquiring new innovative equipment if the following conditions are met:

$$\frac{b^{mod} \cdot V}{q \cdot \Delta T} < \frac{b^{mod} \cdot V}{V \cdot T^{mod}} - (c^{mod} - c^{old}) - \frac{(fc^{mod} - fc^{old}) \cdot V}{q} \quad (8)$$

In a similar way, we can compare the continued operation of the equipment available at the enterprise and its modernization.

Conclusion

Using the proposed tools in the face of uncertainty and risk [9, 10], rationally acting and competent enterprise management will be able to choose the least costly and most effective of the three alternatives considered. But the most interesting and significant is the scientifically based choice between the acquisition of new innovative equipment and the modernization of existing equipment, i.e. Comparison of conservative and radical options for the technical re-equipment of modern industrial enterprises creating and producing SIHTE, which is in demand by national and international markets.

In the context of the observed resumption of production of technical devices of a traditional technological level, problems arise in determining the directions of modernization of various parts of existing technological chains. Preservation of evolutionary modernization based on obsolete technologies is allowed, but the most promising is the implementation of a radical modernization of high-tech industrial enterprises, carried out on the basis of the most innovative technologies and new equipment.

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实施创新项目期间的风险指标建模
**MODELING OF RISK INDICATORS
DURING THE IMPLEMENTATION OF AN INNOVATIVE PROJECT**

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抽象。科技密集型和高科技企业执行的创新项目具有风险,因此需要对其可行性进行初步评估。本文提出了数学工具,可以计算项目先验风险的价值,并获得项目成功实施的可能性以及可能的财务损失的预测值。

关键字: 先验风险, 概率和预测指标, 创新项目, 财务费用, 项目阶段, 竞争事件, 数学模型。

Abstract. *Innovative projects carried out by science-intensive and high-tech enterprises are risky, therefore, they need preliminary assessments of their feasibility. The article proposes mathematical tools that allow to calculate the value of the a priori risk of the project and obtain the predicted values of the probability of its successful implementation, as well as possible financial damage.*

Keywords: *prior risk, probabilistic and forecast indicators, innovative project, financial expenses, project stages, competitive events, mathematical modeling.*

Introduction

The implementation of innovative activities by enterprises of science-intensive and high-tech sectors of the Russian economy contributes to fundamental changes in the organization of the whole complex of production processes, as well as significantly increases its dynamics and increases the uncertainty of the results of enterprises. Since entrepreneurial activity in the innovation sphere is characterized by growing situations of uncertainty, then, ultimately, the implementation of any innovation project can be considered as a random event in the activities of enterprises in science-intensive and high-tech industries in market conditions. For successful development in a market economy, enterprise management needs

to make timely management decisions aimed at introducing innovative technologies and manufacturing innovative products. Naturally, these actions are inextricably linked with the strengthening of all types of risks in the activities of enterprises. To increase the efficiency of entrepreneurial activity in market conditions, it is necessary to timely and correctly assess the degree of risk, as well as be able to manage risk. The authors of the article will justify mathematical tools that allow to calculate the magnitude of the most significant risks of implementing an innovative project, as well as determine the probabilistic forecasts of its successful implementation or possible financial losses.

Main part

The mathematical formulation of the problem of modeling the risk level of the implementation of an innovative project is reduced to determining the initial conditions, possible options for the trajectory of its movement, the conditions for the end of its implementation, as well as a certain set of acceptable control functions by which the project is transferred from the initial state to the final state. For optimal control of this process, a certain extremum of the optimality indicator is usually set, for example, a minimum of costs, a reduction in project implementation time, etc. However, as practice shows, in most such cases, a rigorous mathematical formulation of the problem is fundamentally impossible, since it is impossible to accurately determine the whole complex of initial conditions that precede the implementation of an innovative project. The desire to obtain higher accuracy of measurements will only increase their error and, thereby, contribute to the expansion of possible deviations from the predicted project path [2, 3]. We must not forget that this process will be affected by external disturbances and inaccuracies in determining all the conditions for completing the project. In other words, in each case, the accuracy of the measurements will depend on the nature of the situation, the instruments used for measurements and the set of possible trajectories of the project, on which it is necessary to determine the level of risk using the accepted optimality criterion.

The traditionally used formulas for calculating P – probability of successful implementation of an innovative project, P_{cp} – s the probability of financial damage that the customer will receive in case of failure to complete the project, and M_y – the mathematical expectation of this damage allows us to essentially characterize the value of the a priori (before the start of work on the project) risk of fulfillment project [1, 4, 5], i.e. receive the predicted values of P, P_{cp}, M_y before starting work. We further designate these values, respectively as P^0, P_{cp}^0, M_y^0 , and the initial (a priori) risk of the project implementation characterized by them as R^0 .

It is obvious that in the process of project implementation after the successful completion of each stage, the risk will change, and its value will be determined by the initial risk and the number of successfully completed stages [6, 7].

Denoting by P_{cp}^i – the probability of failure to complete the innovative project if the first i stages are successfully completed, we obtain the calculation formula for its determination by substituting $p_i = 1 - P_{cp}^i$ – successfully completed stages of the project in the calculation formula $P (P = \prod_{i=1}^n P_i)$:

$$P_{cp}^i = 1 - \prod_{i=1}^n P_i. \tag{1}$$

Bearing in mind that in this case the a priori probability of failure $P_{cp}^0 = 1 - \prod_{i=1}^n P_i$, is easy to express P_{cp}^i through P_{cp}^0 and the likelihood of successful execution of completed steps p_i , i.e. determine the nature of the dynamics of the probability of disruption of the project during its implementation:

$$P_{cp}^i = 1 - \frac{1 - P_{cp}^0}{\prod_{i=1}^i P_i}. \tag{2}$$

For example, when $i = 1$ $P_{cp}^1 = 1 - \frac{1 - P_{cp}^0}{P_1}$, when $i = 2$ $P_{cp}^2 = 1 - \frac{1 - P_{cp}^0}{P_1 P_2}$, when $i = n - 1$ $P_{cp}^{n-1} = 1 - \frac{1 - P_{cp}^0}{P_1 P_2 \dots P_{n-1}} = 1 - p_n$, when $i = n$ $P_{cp}^n = 0$.

The values of $M_y (M_y^n)$ for each project (project version) after the successful completion of the i -th stage of its implementation are calculated by substituting in formulas (3) and (4), where C_i – is the cost of the i -th stage of the project, Q_i – is the amount of financial resources, expended by the customer to pay for the completed stages, values:

$p_i = 1$ for all successfully completed stages, if these stages were performed for only one project (project option);

$p_i = 1, C_i = S_i, q_i = S_i^n$ for all successfully completed stages.

Here S_i, S_i^n – customer expenses for payment of competitive events for the implementation of the i -th successfully completed design phase, the same for all options of the innovation project.

$$M_y = C_1 + C_2 p_1 + C_3 p_1 p_2 + \dots + C_n p_1 \dots p_{n-1} - Q_n p_1 \dots p_{n-1} = C_1 + \sum_{i=2}^n \left[C_i \prod_{i=1}^{i-1} p_i \right] - Q_n P. \tag{3}$$

$$M_y^n = q_1 + q_2 p_1 + q_3 p_1 p_2 + \dots + q_n p_1 \dots p_{n-1} - P_1 \dots P_n = q_1 + \sum_{i=2}^n \left[q_i \prod_{i=1}^{i-1} p_i \right] - P. \tag{4}$$

In the general case, the dependence $P_{cp}^i = f(i)$ is a monotonically decreasing function, the specific form of which is determined by the value of the product of the probabilities of successfully completed stages. Examples of possible dynamics of the probability of failure of two projects are presented in Fig. 1

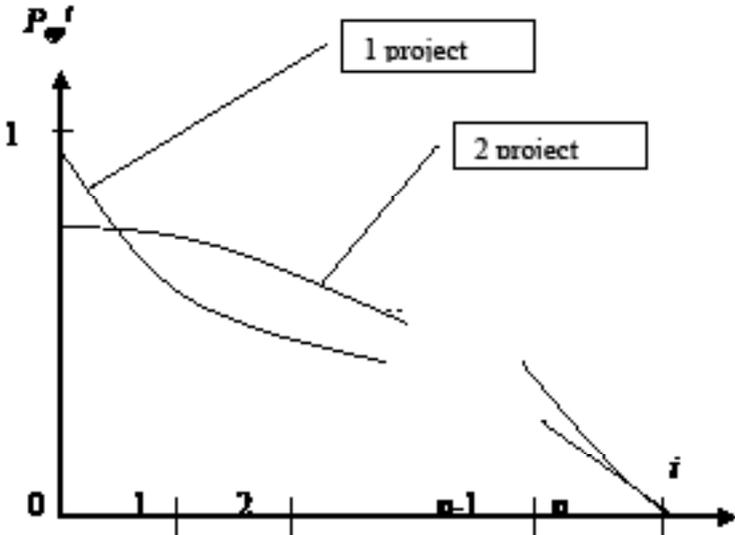


Fig. 1. Possible dynamics of the probability of disruption of projects

After substituting the indicated values p_j , C_j , q_j in the formulas for calculating (3) and (4), these formulas take the form:

- upon successful completion of i stages of only one project:

$$M_y^i = C_1 + \dots + C_{i+1} + C_{i+2}P_{i+1} + C_{i+3}P_{i+1}P_{i+2} + \dots + C_n P_{i+1} \dots P_{n-1} - Q_n P^0 =$$

$$= \sum_{j=1}^{i+1} C_j + \sum_{j=2}^n \left[C_j \prod_{l=1}^{j-2} P_{l+1} \right] - Q_n P^0, \quad (5)$$

$$M_y^* = q_1 + \dots + q_{i+1} + q_{i+2}P_{i+1} + q_{i+3}P_{i+1}P_{i+2} + \dots + q_n P_{i+1} \dots P_{n-1} - P^0 =$$

$$= \sum_{j=1}^{i+1} q_j + \sum_{j=2}^n \left[q_j \prod_{l=1}^{j-2} P_{l+1} \right] - P^0; \quad (6)$$

- upon successful completion of i stages of several projects:

$$M_y^i = S_1 + \dots + S_i + C_{i+1} + C_{i+2}P_{i+1} + C_{i+3}P_{i+1}P_{i+2} + \dots + C_n P_{i+1} \dots P_{n-1} - Q_n P^0 =$$

$$= \sum_{j=1}^i S_j + C_{i+1} + \sum_{j=2}^n \left[C_j \prod_{l=1}^{j-2} P_{l+1} \right] - Q_n P^0. \quad (7)$$

$$M_y^* = S_1^* + \dots + S_i^* + q_{i+1} + q_{i+2}P_{i+1} + q_{i+3}P_{i+1}P_{i+2} + \dots + q_n P_{i+1} \dots P_{n-1} - P^0 =$$

$$= \sum_{j=1}^i S_j^* + q_{i+1} + \sum_{j=2}^n \left[q_j \prod_{l=1}^{j-2} P_{l+1} \right] - P^0. \quad (8)$$

It should be noted that the value of the mathematical expectation of financial damage to the customer, calculated according to formulas (5) - (8), can no longer be taken as the starting point for determining the amount of the reserve or insurance. This is due to the fact that the formulas contain the terms $C_j(q_j)$ and $S_j(S_j'')$, which are the costs of the completed stages of work, i.e. volumes of actually spent funds that are not subject to reservation (insurance). Therefore, as the initial value for determining the size of the reserve (insurance amount) of the selected innovative project (project option), it is advisable to take the mathematical expectation of the financial losses of the customer at the stages of the project that were not completed at the time of selection: $i+1, i+2, \dots, n$ -th, i.e. value:

$$M_{y_{\text{sum}}}^i = M_y^i - \sum_{j=1}^i C_j \text{ or } M_{y_{\text{sum}}}^m = M_y^m - \sum_{j=1}^i q_j \tag{9}$$

In view of (5) - (8), we have:

$$M_{y_{\text{sum}}}^i = C_{i+1} + \sum_{t=2}^n \left[C_t \prod_{j=1}^{t-2} P_{j+1} \right] - Q_n P^0, \tag{10}$$

$$M_{y_{\text{sum}}}^m = q_{i+1} + \sum_{t=2}^n \left[q_t \prod_{j=1}^{t-1} P_{j+1} \right] - P^n. \tag{11}$$

Conclusion

Since in the process of implementing an innovative project after the completion of each stage, the criterial value of the risk indicator will change, and its value will be determined by the value of the initial risk indicator and the number of stages completed, using the proposed mathematical tools, it is possible to calculate the value of a priori for any stage or project as a whole risk of its implementation and to obtain forecast values of the probability of either its successful implementation or possible financial losses. Naturally, all the calculated indicators will contribute to the timely adoption of an informed and correct decision regarding the choice of a specific path for the implementation of a specific innovative project, taking into account the most significant risks.

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使用计量经济学模型预测外国直接投资流入

THE USE OF AN ECONOMETRIC MODEL TO FORECAST FOREIGN DIRECT INVESTMENT INFLOWS

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抽象。评估外国直接投资动态对不同国家经济发展速度的影响的问题似乎很重要。这项研究的方法学基础是通过科学知识, 计量经济学, 统计和认知分析工具进行的。本文讨论了吸引外国直接投资进入国民经济的有效机制和方法。基于宏观经济指标, 作者开发了一种预测经济计量模型, 该模型考虑了许多因素对外国投资流入俄罗斯的动态的影响。该模型准确反映了外国直接投资流入的动态, 这已得到俄罗斯中央银行的证实。计算结果显示, 对于跨国银行而言, 变化对国内生产总值增长率的重大意义。

关键词: 跨国资本, 外国投资, 计量经济学模型, 预测。

Abstract. *The problem of assessing the impact of the dynamics of foreign direct investment on the pace of development of the economies of different countries seems relevant. The methodological basis of the study was made by methods of scientific knowledge, tools of econometric, statistical and cognitive analysis. The article discusses effective mechanisms and methods for attracting foreign direct investment in national economies. Based on macroeconomic indicators, the authors developed a predictive econometric model that takes into account the influence of a number of factors on the dynamics of the inflow of foreign investment into Russia. The model accurately reflects the dynamics of foreign direct investment inflows, which is confirmed by the Central Bank of Russia. The calculations showed the greatest significance of changes for multinational banks in the growth rate of gross domestic product.*

Keywords: *transnational capital, foreign investment, econometric modeling, forecasting.*

Introduction

The problem of attracting foreign direct investment (FDI) to the Russian economy on a large scale is acquiring strategic importance, since it contributes to the long-term and strategic goals of creating a socially-oriented system in the country based on market principles and ensuring a fairly high standard of living [1, 2].

In the Russian Federation, direct investment is legally understood as the organization of enterprises with foreign capital or with mixed (both domestic and foreign). Foreign investment can be considered direct if the foreign partner holds at least ten percent of the shares in the enterprise.

An important role in the methods and ways of attracting FDI is played by foreign banks that are actively working in the banking system of Russia, so special attention should be paid to the problems of studying the specifics of the functioning of transnational financial organizations as sources of formation of foreign banks in the country [5].

The importance of studying the activities of a transnational bank lies in the fact that it acts as the primary source in shaping the policies of subsidiaries and independently determines a development strategy. Transnational capital in the form of FDI freely moving from one country to another is a creative force in the development of the banking sector of a particular state, but at the same time has a negative impact on competition and, in some cases, subjugate the weak national financial sector by monopolizing the banking services market [6].

However, when the interests and goals of the transnational bank and the national state coincide, transnational capital provides it with significant competitive advantages in the world market. The arrival of foreign banks not only contributes to the inflow of additional financial resources (in terms of cost - cheaper, which, using FDI allows more efficient development of the real sector of the economy), but with the introduction of international standards of corporate governance and new banking technologies increases the scale and speed of transformation of financial savings, first of all, domestic investments.

Research Methods and Tools

To assess the degree of influence of various macroeconomic indicators on the dynamics of foreign direct investment in the Russian economy on the basis of existing methods and approaches [3, 4], an econometric model was developed that allows one to obtain a forecast of the potential inflow of foreign direct investment.

The volume of FDI entering Russia (Y) was considered as an endogenous (dependent) variable. Then, the influence of the following exogenous macroeconomic indicators was analyzed:

G – gross domestic product, which is determined using the production method in the form of the amount of added value obtained from various sectors of the economy, billion rubles (in prices actually in effect during the corresponding years);

O – URALS oil prices (including delivery), US dollars per barrel;

I – investments allocated to fixed capital and intended to compensate for the costs of technical re-equipment, reconstruction and expansion of actively functioning industrial, transport, trade, agricultural and other enterprises, as well as the costs of creating new production capacities, cultural and residential and housing construction, billion rubles (at prices actually in effect during the relevant years);

CO – final consumption expenditures of households, calculated as a result of retail trade, the result of public catering, as well as the amount of paid services provided to the population, which was determined on the basis of an expert assessment of informal (hidden) market activity, billion rubles (in prices actually in force during the period corresponding years);

P – consumer price index (cumulative),%.

Research results

The analysis was based on the estimation of the values of the determination coefficients and the values of t-statistics in the corresponding regression equations. As a result, the following type of model was determined:

$$\ln(Y) = \alpha_0 + \beta_1 \ln(G) + \beta_2 DUMMY + \varepsilon, \quad (1)$$

where: α_0, β_i – estimated parameters (regression coefficients) of the model;

$DUMMY$ – logical variable that takes on a value of 0 for observations up to the third quarter of 2012 (inclusive) and 1 for observations starting from the fourth quarter of 2012;

$\varepsilon_i = \varepsilon_i(t)$ – random regression residues.

When calculating the model, we used quarterly data at the end of the quarter (exchange rate data are presented on average for the quarter), starting from the fourth quarter of 2008 and ending with the second quarter of 2017. All data were presented in dollar terms, the obtained time series were attributed to the fourth quarter of 2008 and are logged in.

The equation is identified using the least squares method (taking into account the autocorrelation of first-order residues).

As a result, on the basis of model (1), an estimated model of foreign direct investment was obtained with the following parameters:

$$\ln(Y) = 0,33 + 1,50 \ln(G) + 0,79 DUMMY. \quad (2)$$

Based on the results of t - tests performed according to model (2), the coefficients β turned out to be statistically significant.

When selecting variables for the regression equation, all the aforementioned macroeconomic indicators were used, however, taking into account the determination coefficients and the results of the F -tests for the inclusion of additional variables in the model, the FDI dynamics in Russia is most adequately determined by changes in the GDP growth rate.

Discussion

However, this model does not fully reflect the dynamics of FDI. This is evidenced by the relatively low coefficient of determination $R^2 = 0,52$.

As a result, it was concluded that at the present stage of development of the Russian economy, such parameters that are difficult to estimate in numerical terms have a significant impact on the volume of attracted foreign investment, namely:

- development of the legislative framework;
- openness of the economy to foreign investment;
- legal protection of a foreign investor;
- the degree of development of market relations;
- availability of skilled labor, etc..

The proposed econometric model does not take into account all these factors, which, obviously, significantly affect the attractiveness of the domestic economy for foreign investment. Nevertheless, this model reflects the general dependence of the FDI volume on GDP dynamics.

Conclusion

As a result of the practical use of the developed econometric model and the conducted econometric analysis, it was concluded that among the selected macroeconomic indicators (Y, G, O, I, CO, P), the GDP growth rate has the greatest influence on the dynamics of FDI inflow into the Russian economy. However, at present, in order to clarify the forecast calculations, it is necessary to take into account additional poorly formalized parameters, which include sanctions against Russia, as well as a set of regulatory and legal measures to regulate, control and attract foreign investment in the Russian Federation [7].

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太空火箭活动的概念建模

CONCEPTUAL MODELING OF SPACE ROCKET ACTIVITY

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抽象。以文本文件的形式制定用于实际执行火箭和太空工业发展的科学，技术和生产计划的战略方向和方法，其中包含对火箭和太空活动的语义描述。本文提出了一种基于超文本技术构建概念模型的方法，该模型旨在将语义信息系统化，并优化和改进用于各种目的的创新技术的创建过程。

关键字：语义模型，信息和分析技术，太空火箭活动，监管文件，创新项目，高科技和高科技产业。

Abstract. *Strategic directions and methods for the practical implementation of scientific, technical and production plans for the development of rocket and space industries are formulated in the form of text documents that contain a semantic description of rocket and space activities. The article proposes a methodology for constructing a conceptual model based on hypertext technology designed to systematize semantic information and to optimize and improve the processes of creating innovative technology for various purposes.*

Keywords: *semantic model, information and analytical technology, space rocket activity, regulatory documents, innovative project, high-tech and high-tech industries.*

Introduction

To increase the efficiency and quality of design, as well as the functioning and maintenance of economic systems, a stage of conceptual modeling should be present in their life cycle. The traditional informational representation of the system includes a holistic and interconnected description of models of at least three lev-

els: conceptual, logical, physical. The construction of models is carried out using special methods and technologies developed for each specific level. There is currently no systematic, theoretically justified, and software-implemented approach that allows covering the entire modeling process in a single cycle, from obtaining conceptual level models to physical databases, processing programs, and operational documentation for the designer. Moreover, if systems have been developed and are functioning for the physical and logical levels that automate the processes of constructing the corresponding models, then among the methods and means of conceptual design, as the most intellectual type of activity, it is difficult to single out sufficiently effective and practically used application software packages. The article will reveal some approaches to solving the above problems in the field of rocket and space activities.

Main part

The absence of a fully developed general procedure for modeling economic systems is explained not only by the unsolvedness of a number of problems, but also by a significant increase in the influence and growth of the importance of the rapidly developing theory of databases and data models, as well as the need for mutual coordination of the general principles of information systems development, on the one hand, methodologies for building and using databases - on the other. Modeling tools should provide an end-to-end cycle when creating models of various levels, and allow for comprehensive adjustment and modernization.

The most complex and difficult to formalize is the stage of conceptual modeling of the subject area. The absence of a theoretically justified solution to this problem and the practical unrealizability of the specified level of modeling does not allow to fully implement a systematic approach to the design of economic systems.

In order to carry out a system analysis of science-intensive and high-tech industries where rocket and space technology is created, national and international markets for its implementation, as well as to identify products and dual-use technologies produced on them, it is advisable to build a conceptual (logical-linguistic, semantic) model of the studied subject area [1]. The practical use of such a model makes it possible to assess the economic security, significance and risk of these industries [2-4], to identify the main (most important) objects that determine, shape and carry out space-rocket activity (SRA), organizational, economic and production relationships between them, as well as processes in which these objects take part. The conceptual model of SRA defines the properties of its components, its structure, various types of relationships that have a significant impact on this type of production activity.

It must be emphasized that both before and at present, new approaches to the

formulation and solution of complex problems arising in the implementation of SRA are formulated in text form, which usually contains its semantic description from different points of view. The definitions given in strategic, methodological and regulatory documents (see, for example, Russian Foundation for Basic Research documents [5]) may differ not only in the vocabulary, but also in the terms used in them, in the structure, sequence of presentation of the material and many other textual characteristics. To increase the efficiency of the practical application of the indicated logical-linguistic (semantic) materials, to assess their quality, to conduct a theoretical assessment, rationality and prospects of the problems and developmental features of the SRA formulated in the documents and ensuring its innovative functioning of production, it is necessary to be able to develop and practically use a comprehensive conceptual model of SRA and models related to this activity subject areas of science and production.

The need to create and use macro-level conceptual models is explained by the following circumstance - with their help, optimization and improvement of the entire process of creating and using rocket and space technology, as well as its individual stages and components, is ensured. And since the expression “project to create innovative rocket and space technology” is difficult to formalize using mathematical tools, the role of mathematical expressions and formulas can successfully fulfill conceptual models that can be built using various types of modern information-analytical systems and technologies.

A promising and important approach to solving the problem of conceptual modeling of SRA is the use of hypertext technology designed to work with semantic information [6].

The collection, study and systematization of strategic, methodological and regulatory documents that describe and regulate SRA make it possible to develop real conceptual models. Typically, models of this type are interpreted as semantic networks or frames and have a graphic structure, the work with which requires the use of special tools. The use of hypertext technology contributes to the creation of effective and adequate to the reality conceptual models, as well as the identification of new innovative mechanisms for their practical implementation.

A fragment of the conceptual model of the hypertext type containing a semantic representation of the economics of production on which modern rocket and space technology ($M_{\text{economics_of_space-rocket_companies}}$) and innovation and investment activity ($M_{\text{innovation_and_investment_activity}}$), are created, in a formalized form can be represented as follows:

$$(M_{\text{economics_of_space-rocket_companies}}) = \{R (\text{State economy}), U (\text{Space-rocket activity}), v (\text{Economics of space-rocket companies} \mid \text{Economics of scientific, scientific technical and industrial enterprises}), f (\text{Production and scientific potential} \mid \text{Financial$$

and raw materials | Rocket and space industry enterprises and organizations | Production personnel of space-rocket enterprises | Scientific personnel of space-rocket enterprises | Civil products and services | Technology and dual-use products), c (Mechanisms for managing the economy of the rocket and space industry | Economic competition in national and international markets | Development and restructuring of the economy of the space rocket industry), p (Meeting the needs of the country on space rocket technology), s (National security of the state | Domestic economic potential), a (National socio-political system)};

($M_{\text{innovation_and_investment_activity}}$) = {R (Commercial activity), v (Prohibited innovation and investment activities | Investment activity of individual Russian citizens and legal entities abroad | Innovation and investment activities of foreign investors in the Russian territory | Capital investments), r (Innovation and Investment Projects | Investment | Sources of financing of innovation and investment activities | Objects of innovation and investment activity | Subjects of innovation and investment activity | Certificate (license) for innovation and investment activities), e (Protection of innovation and investment activities | State regulation of innovation and investment activities | Disputes in the implementation of investment activities | Suspension or termination of innovation and investment activities), p (Raising funds for the implementation of innovation and investment projects)}.

All types of interconnections are combined into groups following each other in a certain order: synonymy (=); species-genus relationship (R); part-whole relationship (U); process-superprocess relationship (n); genus-species relationship (v); whole-part relationship (f); the relationship of the process executing the role (r); process-to-process relationship (e); subject-process relationship (c); effect-cause relationship (p); cause-effect relationship (s), associative relationship (a). When building a model, only relationships with the closest related objects are indicated.

The existing methodology for predicting and analyzing the development of space-rocket activities in general allows us to take into account the requirements of the new conditions. However, to conduct more comprehensive and detailed studies, it is necessary to improve the methodology in the direction of expanding the number of factors taken into account, evaluating the final results from the provision of services for their recipients, constructing a system of indicators to measure the degree of implementation of programs, formulating strategic goals, tactical objectives and quantifying the effectiveness of budget expenditures.

Conclusion

An analysis of the list of necessary work to improve the methodology shows that they basically do not require new formalized procedures that provide quantitative results. As a rule, in order to take into account new conditions, the solution of partially or completely unformalized tasks is required. To ensure the solution of such problems, appropriate procedures are necessary, the implementation of which

requires compliance with only a certain sequence of actions and the implementation of certain rules. Such procedures can be used to clarify the goals, objectives and priorities of space activities for the medium and long term. Separately, there is a particularly important and difficult task - the formation of a system of indicators for assessing the final results of space activities, i.e. methods for measuring the effect of the provision of space services to their consumers.

The paper shows that the complex structure of space-rocket activities and the large number of scientific, technical, industrial, and trade and economic processes observed in it complicate the analysis and forecasting of its development using traditional modeling methods. To study such poorly structured systems, it is proposed to use a conceptual methodology based on the hypertext approach to systematization and processing of semantic information.

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俄罗斯现阶段发展中的国有经济活动的主要领域

**THE MAIN SPHERES OF ACTIVITY OF THE STATE SECTOR
OF THE ECONOMY AT THE PRESENT STAGE OF DEVELOPMENT
OF RUSSIA**

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抽象。 本文讨论了俄罗斯经济公共部门的职能。 研究了公司通过所有权和固定资本投资（包括环境安全）的分布。 在现阶段实施为国民经济提供创新发展计划的国有公司。 分析了公共机构的数量以及该国的国内生产总值用于公共行政的情况。

关键词: 国民经济, 公共部门, 所有制, 投资, 国有企业, 公共行政

Abstract. *The article discusses the functioning of the public sector of the Russian economy. The distribution of companies by ownership and fixed capital investment, including environmental safety, was studied. State-owned companies that implement at the present stage innovative development programs for the national economy are represented. The analysis of the number of public authorities and the use of the country's GDP for public administration was carried out.*

Keywords: *national economy, public sector, form of ownership, investment, state corporations, public administration*

Currently, the public sector is a necessary element of the national economy of Russia, and the need for its functioning is due to the fact that there are spheres of economic activity that are not very attractive from a financial point of view for private business. Such areas include education, healthcare, social protection of the population, environmental safety, development of transport and territorial infrastructure, and a number of others aimed at the production of public goods. The public sector also contributes to the implementation of fundamental scientific research, the implementation of projects to ensure the country's defense capability and its information security. In addition, there are strategic sectors for the state's economy, where business interference is simply unacceptable, namely the gas and oil industries, electric power, railway transport, the postal service, etc. It is in these spheres that the public sector of the economy dominates.

In Russia, the public sector is a subsystem of the national economy, which is represented by a set of enterprises, institutions and organizations of various industries that are fully or partially owned by the state, and are also managed by state authorities. A distinctive feature of the state sector of the economy is the ability of the state to carry out direct and operational management of economic entities that are a part of it [3, P. 116]. The main task of the public sector is to preserve and increase the national wealth of the country, as well as providing the prerequisites for sustainable socially-oriented economic growth. Particularly important is the role of the state during the development of crisis phenomena in the economy, when it guarantees the fulfillment of social obligations to citizens and supports the business sector.

In Russia, the state sector of the economy includes all state corporations, companies and enterprises, as well as budgetary institutions and various state organizations whose property is federal property, property of constituent entities of the Russian Federation and municipalities. At the same time, the state is not only the owner of the property, but also the subject of management and regulation of the financial and economic activity of all objects within the public sector of the economy.

One of the components of the public sector of the economy in Russia are various state and municipal enterprises that carry out their activities, primarily in the field of public goods production. Such enterprises include public road transport, land improvement and urban infrastructure development companies, housing and communal services, and a number of others. Also included are state corporations operating in strategic sectors of the economy. In practice, the Russian government management of a state-owned enterprise refers to the organization of the entrepreneurial sector of the economy, which is fully or partially owned by the state and is controlled by an authorized body of state administration. Table 1 shows the distribution of Russian enterprises and organizations by ownership, highlighting the public sector companies.

According to table 1, it can be seen that the number of enterprises and organizations in state ownership has a steady downward trend. If in 2005 there were 160.4 thousand companies in state ownership, then in 2013 - already 116.1 thousand companies, and in 2017 - only 103.1 thousand companies and in 2018 - already 98, 8 thousand companies. A similar picture is observed for enterprises and organizations that are in municipal ownership: in 2005 - 252.1 thousand, in 2013 - 225.3 thousand, in 2017 - 195.9 thousand companies and 2018 - 189.9 thousand companies. Also in Russia, the number of state corporations has significantly decreased from 264.7 thousand in 2005 to 185.2 thousand in 2018. The share of companies with state participation in the total number of Russian enterprises and organizations also has a tendency to decrease from 14.2% to 11.2%.

Table 1

Distribution of enterprises and organizations of Russia by ownership

| Indicators | 2005 year | 2010 year | 2013 year | 2014 year | 2015 year | 2016 year | 2017 year | 2018 year |
|---------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 1. Total (thous.), including by ownership | 4767,3 | 4823,3 | 4843,4 | 4886,0 | 5043,6 | 4764,5 | 4561,7 | 4214,7 |
| - state | 160,4 | 119,4 | 116,1 | 113,7 | 110,7 | 108,0 | 103,1 | 98,8 |
| - municipal | 252,1 | 246,4 | 225,3 | 218,9 | 212,0 | 203,0 | 195,9 | 189,9 |
| - state corporations | 264,7 | 196,8 | 197,6 | 196,7 | 197,7 | 187,4 | 186,3 | 185,2 |
| 2. Total of companies (thous.) with state participation | 677,2 | 562,6 | 539,0 | 529,3 | 520,4 | 498,4 | 485,3 | 473,9 |
| 3. Share of companies with state participation (%) | 14,2 | 11,7 | 11,1 | 10,8 | 10,3 | 10,5 | 10,6 | 11,2 |

Source: Compiled by the author according to Rosstat [5,6]

The next element of the public sector of the Russian economy are state corporations. Of greatest interest from the point of view of developing forms of corporate governance is the management of state share capital, that is, a set of blocks of shares owned by the state in the form of specific institutions [7, P. 18]. Currently, in Russia, the scope of activity of state corporations is quite diverse. The state sector of the economy has 102 state-owned corporations, of which 43 are companies in the military-industrial complex, 19 in the space sector, 13 companies in the shipbuilding sector, and 10 in the energy sector. State-owned corporations in Russia cover the main strategic and innovative developing sectors of the economy. Figure 1 shows the structure of state-owned companies of innovative development in the economy by joint industry groups.

State-owned corporations in Russia have the strongest positions in the defense-industrial complex, mining and processing of raw materials, energy, shipbuilding and engineering, as well as transport infrastructure. At the same time, the military-industrial complex accounts for 42.2% of state-owned corporations, or the vast majority of innovative sectors of the national economy. For the space sector - 18.6%, and for shipbuilding and marine equipment - 12.7%. This is the second and third place in innovative development. About 10% is energy. The extraction and processing of raw materials occupies 5.9%, and transport and infrastructure - 4.9%. Thus, in Russia priority is given to the development of strategic sectors of the national economy. As a modern institution of economic development, state-owned corporations also play an important role in ensuring the sustainable development of national economic systems, leveling market failures and creating the necessary conditions for overcoming crisis phenomena [2, P.11].

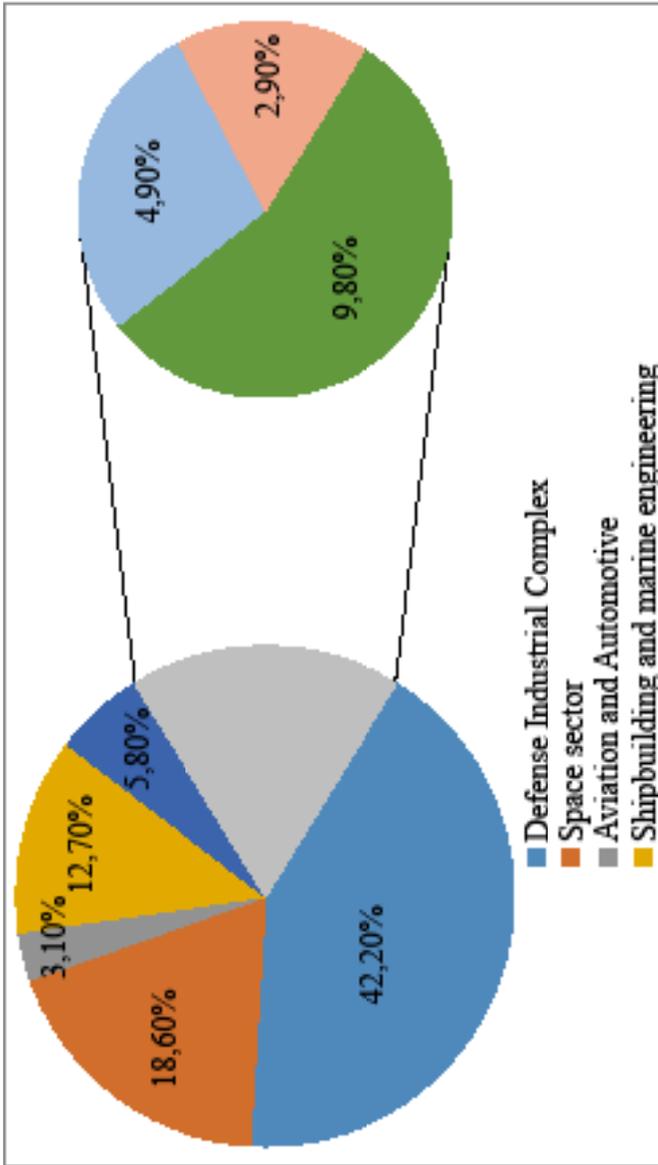


Figure 1. Structure of state-owned Russian companies for innovative development.

Table 2

Investments in fixed assets by ownership in Russia

| Indicators | 2005 year | 2010 year | 2013 year | 2014 year | 2015 year | 2016 year | 2017 year | 2018 year |
|---------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 1. Total investment (bill. rub.) | 3611,1 | 9152,1 | 13450,2 | 13902,6 | 13897,2 | 14748,9 | 16027,3 | 17595,0 |
| - Russian, incl. | 2909,0 | 7886,6 | 11540,5 | 11975,6 | 11720,5 | 12251,7 | 13426,8 | 15056,9 |
| - state | 677,7 | 1577,1 | 2315,5 | 2069,7 | 2052,2 | 2238,1 | 2309,2 | 2429,9 |
| - municipal | 137,6 | 294,5 | 462,8 | 466,3 | 414,1 | 404,2 | 394,8 | 394,8 |
| - state corporations | - | 111,1 | 230,0 | 239,0 | 200,7 | 207,7 | 193,7 | 209,4 |
| 2. In% of the total | 100,0 | 100,0 | 100,0 | 100,0 | 100,0 | 100,0 | 100,0 | 100,0 |
| - Russian, incl. | 80,6 | 86,2 | 85,8 | 86,1 | 84,3 | 83,1 | 83,8 | 85,6 |
| - state | 18,8 | 17,2 | 17,2 | 14,9 | 14,8 | 15,2 | 14,4 | 13,8 |
| - municipal | 3,8 | 3,2 | 3,4 | 3,4 | 3,0 | 2,7 | 2,5 | 2,2 |
| - state corporations | - | 1,2 | 1,7 | 1,7 | 1,4 | 1,4 | 1,2 | 1,2 |
| 3. Investments in environmental protection (bill. rub.) | 58,7 | 89,1 | 123,8 | 158,6 | 151,8 | 139,7 | 154,0 | 157,7 |

Source: Compiled by the author according to Rosstat [5,6]

In modern conditions, the innovative development of the economy in Russia is of considerable assistance to organizations carrying out research and scientific development, which are also part of the public sector. These organizations carry out fundamental scientific research that provides innovative, technical and technological development of the most important sectors and contributes to sustainable economic growth. Therefore, another important element of the public sector of the economy in Russia are research organizations, as well as various research institutes and higher education organizations with scientific potential.

In modern conditions, enterprises of the public sector of the Russian economy have the authority and ample opportunity to formulate an investment-production strategy for the long-term development perspective. Despite the decrease in the number of Russian companies with state participation, investment in fixed assets by ownership forms is steadily increasing, which expands the production potential of enterprises and contributes to their innovative and high-tech development. Therefore, in table 2 we consider the dynamics of investments in fixed assets.

According to table 2, it can be seen that total investment in fixed assets in Russia as a whole is steadily increasing. In 2017 amounted to 16027.3 billion rubles, and in 2018 - 17595.0 billion rubles. Of these, 13426.8 billion rubles, and 15056.9 billion rubles, respectively, were invested by Russian investors, which favorably affects the economic development of the state. At the same time, investments in fixed assets in the public sector also tend to grow. Investments in fixed assets in the form of state ownership in 2018 amounted to 2,429.9 billion rubles, in the form of municipal property - 394.8 billion rubles, and in the ownership of state corporations - 209.4 billion rubles. Their slight decrease compared with the previous years does not have a significant impact on the economic development of companies with state participation.

In the structure of investments in fixed assets, the share of Russian investors is about 85.0% and is characterized by a fairly constant value. While the share of investments in fixed assets of companies with state participation tends to decrease: in the form of state ownership to 13.8%, in the form of municipal property to 2.2%, and in the form of ownership of state corporations to 1.2%.

In Russia, investments in fixed assets aimed at protecting the environment and ensuring environmental safety are increasing annually. If in 2005 such investments in various environmental measures amounted to only 58.7 billion rubles, then by 2017 they amounted to 154.0 billion rubles, and in 2018 - already 157.7 billion rubles, that is in recent years, Russia has seen a significant increase in investment in environmental protection and the rational use of natural resources.

The public sector of the economy also includes objects of the social sphere, the functioning of which is designed to ensure the satisfaction of public needs. They fulfill state socio-economic guarantees to society. The public sector is widely used as a tool in combination with other means of regulation to achieve almost all state socio-economic goals [8, P. 2]. The activities of such state facilities lead to an increase in the quality of life of the population, an increase in the level of well-being and a decrease in unemployment, as well as an increase in life expectancy. Such objects, first of all, include educational organizations and medical institutions, as well as various social services, cultural and art institutions, and environmental organizations.

The public sector of the economy is managed both at the federal level and at the regional level. The federal government includes the military-industrial complex, space exploration, aircraft manufacturing, shipbuilding and auto-building, mining and processing of strategic raw materials, nuclear energy, transport, communications and telecommunications. Regional authorities are responsible for the effective management of municipal property and the development of public infrastructure, and "the system of principles ... of management ... must meet the modern requirements of the economic development of society" [4, P. 19-20]. Therefore, the government sector of the economy includes various authorities, both at the federal level and at the level of constituent entities of the Russian Federation. The costs of public administration occupy a fairly significant part of budgetary resources, therefore, in the process of research, an analysis of the number of employees of state authorities and public expenditures is required, which are shown in table 3.

Table 3
Key performance indicators of state authorities in Russia

| Indicators | 2005 year | 2010 year | 2013 year | 2014 year | 2015 year | 2016 year | 2017 year | 2018 year |
|-----------------------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 1. Number in state bodies (thous.peop.) | 1462,0 | 1648,4 | 1548,1 | 2211,9 | 2176,4 | 2146,3 | 2172,9 | 2156,3 |
| 2. Number in federal bodies (thous.peop.) | 766,8 | 868,8 | 793,3 | 1454,3 | 1434,1 | 1409,7 | 1438,4 | 1427,7 |
| 3. Number at the federal level (thous.peop.) | 41,1 | 47,5 | 48,6 | 49,6 | 49,1 | 49,0 | 49,7 | 49,6 |
| 4. GDP at market prices (bill.rub.) | 21610 | 46309 | 71017 | 79058 | 83094 | 86014 | 92101 | 103876 |
| 5. Use of GDP for public administration (bill.rub.) | 3646 | 8671 | 13552 | 14173 | 14684 | 15729 | 16649 | 18049 |
| - in % to total | 16,7 | 18,5 | 18,5 | 17,9 | 17,6 | 18,2 | 18,1 | 17,5 |

Source: Compiled by the author according to Rosstat [5,6]

According to table 3, it can be seen that the number of employees of state authorities in Russia over the past few years has increased significantly. If in 2005 the number of employees in state bodies was 1,462.0 thousand people, then in 2010 there was an increase to 1648.4 thousand people, and in 2014 it increased to 2211.9 thousand people. However, in recent years, the number of managerial staff began to decline and in 2017 the number of employees amounted to 2172.9 thousand people, and in 2018 – 2156.3 thousand people.

At the same time, the bulk of the number of officials falls on the executive authorities. In 2005, the number of employees in the federal authorities was 766.8 thousand people. In 2010, it already grew to 868.8 thousand people, and in 2014 - up to 1454.3 thousand people. In recent years, it has declined, but only slightly. In 2017, the number of employees amounted to 1,438.4 thousand people, and in 2018 - 1,427.7 thousand people. A similar picture is observed at the federal level: 2005 - 41.1 thousand people, 2010 - 47.5 thousand people, and 2014 - 49.6 thousand people. In 2017, the number was 49.7 thousand people, and in 2018 - 49.6 thousand people. At the same time, the main number of employees falls on the federal executive bodies. Naturally, the large bureaucratic apparatus of state authorities in Russia leads to a significant increase in government spending on management.

The data presented in table 3 indicate an increase in the share of GDP use in public administration. If in 2005 GDP at market prices amounted to 21610 billion rubles, and expenditures on public administration 3646 billion rubles, then the share of using GDP for these purposes amounted to 16.7%. In 2010-2013, there has been an increase in the use of GDP for public administration to 18.5%, in 2016 to 18.2% and in 2017 to 18.1%. In this period, the proportion of the indicator has a fairly constant value, which largely justifies the increase in the number of employees in the general government sector. In 2018, the picture is slightly changing in a positive direction. GDP growth in 2018 amounted to 103,876 billion rubles, while an increase in its use in public administration amounted to 18049 billion rubles. The share of government spending in GDP in 2018 decreased to 17.5%, which is a positive factor.

Thus, the public sector of the economy in Russia performs important functions aimed primarily at sustainable socio-economic development. It includes the sector of state enterprises and corporations, the budget sector, which ensures the implementation of the basic social and public functions of the state, as well as the government sector. In modern conditions of economic development, the public sector performs important tasks for society, including the stabilization of the national economy, and also covers the system of “enterprises, institutions and organizations operating on the economic and legal basis of state ownership in order to implement the functions of the state in economic, social and political spheres” [1, p. 2028]. The public sector of the Russian economy fully satisfies the necessary social needs, timely fulfills the state's social obligations to the population, receives the maximum possible socio-economic effect and creates the prerequisites for sustainable growth.

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中国税收制度监管的特点

FEATURES OF TAX SYSTEM REGULATION IN CHINA

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抽象。 本文的目的是评估在紧张的经济条件下中国税收制度的监管效率。从历史上看，中国税收收入增长的主要突破点是税收分配模式，这种模式经常导致增长超过GDP增长率超过20年。然而，面对国际贸易的减少是增长的主要驱动力，增值税和企业所得税相应地缩小了税收能力。文章的主要发现指出，从长远来看，降低税率不足以填补产能缺口并提高税收收入增长率。

关键字： 税收制度法规，税收共享，税收能力，税收努力，税收，增值税，企业所得税

Abstract. *The purpose of this article is the assessment of the China tax system regulation efficiency in stressed economic conditions. The main breakpoint of China tax revenue growth historically considered the tax sharing model, which frequently led to the growth exceeding the GDP growth rate for more than 20 years. However, facing the reduction in international trade affects the main drivers of the growth the VAT and corporate income tax commensurately narrowing the tax capacity. Main finding of the article states that the tax rates cutting will not be enough to fill the capacity gap and improve the tax revenue growth rate in long term.*

Keywords: *Tax system regulation, tax sharing, tax capacity, tax effort, tax revenue, Value-added tax, corporate income tax*

Introduction

Tax system regulatory choices are considered a distinctive feature of any sovereign state, as they reflect the role and destination of the state in civil society value systems. On the other hand, the regulation of tax relations represents the core of the vision and economic policy of the state¹. However, in nowadays globalized world, many government officials often make the regulatory decisions based on external geo-economic and geo-political factors. In this article, we attempted to identify the features

¹Pietro Boria (2017), “Taxation in European Union”, p. 19, Second edition, Faculty of Law, Sapienza University of Rome, Italy, Available at: www.springer.com ,DOI: <https://doi.org/10.1007/978-3-319-53919-5>

of tax system regulations of China, as well as to assess their impact on the economic development of the country in the context of the State-of-the-Art world economy.

The article is structured as follows: Firstly, we will evaluate the efficiency of tax system regulatory approach of tax sharing mode, therefore for that purpose we will firstly examine the tax revenue structure of China. We assume, that the Governments tax cutting policy in long-term will not be enough to recover the tax revenue growth in long-term. To prove our assumption, we conducted a model analyses based on Stressed VAR using monthly data on tax revenue and its components. We will further simulate the model, with the assumption of overall tax rates cuts of 3%. Lastly, we will discuss the results and make our conclusions.

The tax sharing model implementation as a driver of China tax revenue growth

The rapid growth rate in tax revenue has been observed in China starting from 1994, which frequently exceeded the GDP growth rate as well as and has been the subject of academic discussions for a long time. Some authors find the reasons of the growth in regulatory changes started by the tax sharing model implementation in 1994 and the introduction of the Golden Tax Project. Others contribute to the structural changes in the Chinese economy to the supply-based model². In contrast many find the reasons in external factors including foreign trade acceleration and innovative imitation strategies, which lead to higher added value creation³.

Bingyang et al. (2012) suggests that the tax sharing reform and further taxation decentralization incentives have boosted the tax capacity and the tax effort leading to the growth in tax revenue. Applying the Cournot game model he concluded that the tax decentralization leads to intensives maximization both with regard to State Government and the Local Government revenues. One of the main drivers of growth according to him, is the expansion of tax capacity and commensurate tax effort. Mainly through the shift from fixed rent contracts and share contracts to tax sharing contracts, tax sharing reform has provided strong incentives for taxation, bringing about a rise in taxation capacity and tax effort and hence a rapid growth of tax revenue⁴. However, tax sharing model creates difficulties in regulatory process and its legal basis formation and adoption, as in core it is a system of intra-government contracts between the Central government and Local governments. Taking into account the regulatory instruments of more precise accountability and management included in the Golden Tax Project, we assume, that despite it is stable in long run, in short-term stress situations these tax regulatory incentives become not efficient, which affects the tax revenue.

²Nolan Cormac Sharkey (2012), "China's Tax Integrity in Context of the Emerging International Tax System", p.59-60, *The Chinese Economy*, 45:3, 56-75

³Муранова А.П., 2017, "Воздействие глобализации на налоговую политику стран Юго-Восточной Азии", сс.2-4, РАН Отдел экономических исследований, Москва 2017.

⁴Lü Bingyang & Guo Qingwang (2012), "Why China's Tax Revenue Is Likely to Maintain Its Rapid Growth: An Explanation within the Framework of Tax Capacity and Tax Effort", pp.4-5 *Social Sciences in China*, 33:1, 108-126, DOI: 10.1080/02529203.2012.650413

The evaluation of Chinese Government regulatory incentives in stressed economic conditions

To evaluate the efficiency of tax system regulatory approach of tax sharing model we first examine the tax revenue structure of China. In developing and transition economies, indirect taxation usually outweighs direct taxes⁵. It is evident from figure 1 that the overwhelming share in tax revenue of China still belongs to the VAT, and the second place remains after the corporate income tax⁶. As a supply-based economy China is highly dependent on international trade, and the decrease in trade scale and the loss of international market share as a consequence of so-called “trade war” between the

USA and China will have statistically significant impact on the tax revenue through tax capacity decline, which may fall into a long-term issue.

Therefore, the tax capacity will continue to suffer mainly from the decrease in foreign trade through the Business tax and the VAT reduction. After the “trade war” between the USA and China was escalated, the Chinese government is repeatedly cutting the corporate income tax rate to support local producers, on the other hand expanding the fiscal gap. The major tax cut-offs of approximately 1% of GDP resulted in a rapid tax revenue growth during the first quarter of 2019 expanding the tax capacity⁷.

However, the growth rate turned into the sharp decline already by the end of February (figure 2). The last but not least cut-off was announced on the September 6-th 2019⁸. We assume, that the Governments tax cutting policy in long-term will not be enough to fill the tax capacity gap.

To prove our assumption, we put the tax revenue monthly data in the Stressed VAR model⁹. S-VAR allows us to assess the statistically significant changes with the confidence level of 99.9%. All calculations are carried out through the EViews 9 Statistical program packages. We compare the dynamics of 2018-2019 monthly data trend with the results. We simulate the series, with the assumption of the tax cut-offs up to 3% (figure 3).

As we can see the change in the main driver of the tax revenue dynamics the VAT still leads to the reduction of tax revenue. Therefore, although there is a positive trend in tax revenue forecasting due to the unclenching tax policy and growing government expenditures, there is a little room left for further growth and the incentives of Chinese government towards support of national producers may not be enough in the long term.

⁵Bernardi, Luigi and Gandullia, Luca and Fumagalli, Laura (2005), “Tax Systems and Tax Reforms in South and East Asia: Overview of Tax Systems and main policy issues”, p.16, Dipartimento di Economia pubblica e territoriale - Università di Pavia - Italia

⁶<https://data.worldbank.org/indicator/GC.TAX.TOTL.GD.ZS>, Last accede 10/10/2019

⁷Wang Tao: The Size and Effect of China's Tax Cuts, Available at: <https://www.caixinglobal.com>, Last Accede 10/10/2019

⁸E NOW: Federal Reserve Chairman Jerome Powell Speaks at NABE Economics From Rates to Tax Cuts, These Are the Tools China May Lean on for Easing Bloomberg News September 6, 2019, Last Accede: 10/10/2019

⁹Statista.com: <https://muse.aua.am:3531/statistics/456170/china-tax-revenue-by-month/>

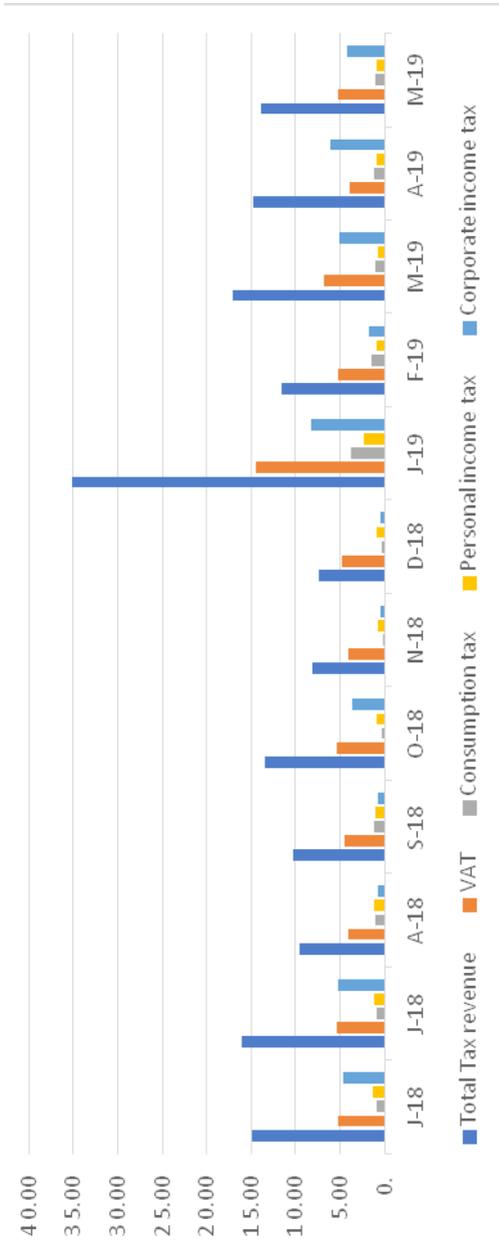


Figure 1. Tax revenue structure in China 2018-2019

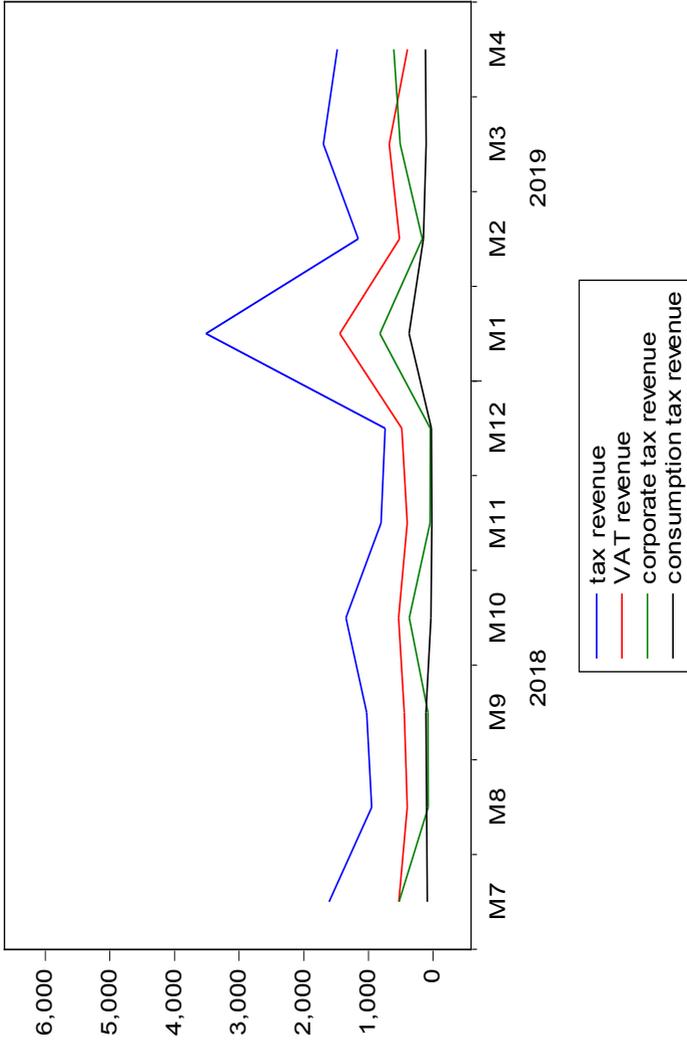


Figure 2. China tax revenue and its components

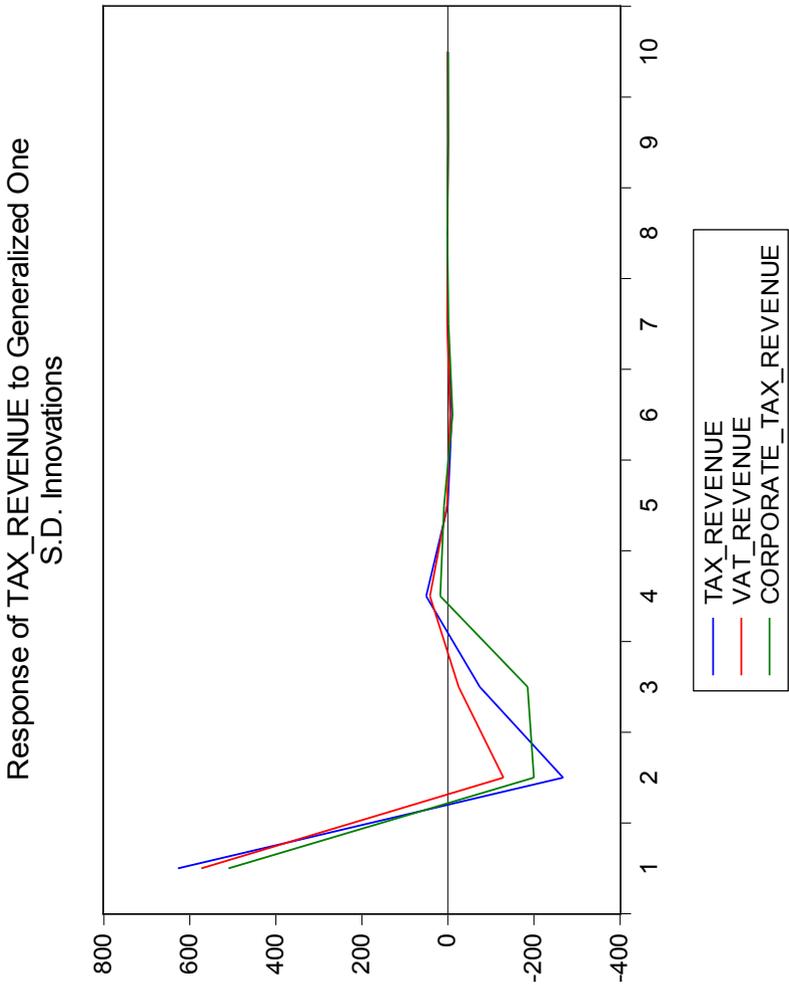


Figure 3. China tax revenue simulation dynamics

One way of compensating VAT growth decline may be the expansion to new markets, but the revenue will be much lower with regards to lower consumption and prices.

Conclusion

Although historically tax sharing model succeeded in China, latest evidence shows that in short-term stress situations the Government regulatory capacity to affect the tax revenue growth is limited by the lowering tax capacity. Besides, the regulation difficulties in legislative and implemental processes don't allow to respond quickly. Tax reduction and government expenditures don't lead to the improvement of two main components of tax income, i.e. VAT and the corporate income tax revenues. Recovering the tax capacity is a long-term issue, as depends mostly on economic conditions and market share. One way to improve the tax revenue dynamics may be the boosting of tax efforts through the raised accountability and regulations advancement.

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有罪的债务人在监狱中的法律地位：对俄罗斯帝国立法的简要分析
**LEGAL STATUS OF FAULTY DEBTORS DETAINED IN PRISON:
BRIEF ANALYSIS OF LEGISLATION OF THE RUSSIAN EMPIRE**

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抽象。 文章讨论了被关押在监狱中的有缺陷债务人的法律地位特征

关键词：有缺陷的（资不抵债）债务人； 逮捕； 监狱； 警察拘留和监狱宪章；
规范； 法律地位； 规定

Abstract. *The article discusses the features of the legal status of faulty debtors detained in prison*

Keywords: *faulty (insolvent) debtor; arrest; prison; Charter on police custody and prisons; norm; legal status; regulations*

The charter on police custody and in prisons was an integral part of the “Code of Institutions and the Charter on detainees” [1]. The third section concentrated on the main provisions governing the maintenance of faulty (insolvent) debtors under arrest in prison. It contained seven articles (211-217) and one note. A significant number of norms supplementing the legal status of the debtors themselves, the regulations of legal (Prison locks, Committees and Departments of the Guardian Society of Prisons) [2], as well as officials (Custodians of prison castles, Directors of Committees and Divisions of the Guardian Society of Prisons, guard officers), contained in other legislative acts of the Russian Empire. So, the procedure for the redemption of debtors was provided for by Art. 59 of the Charter of the Guardian Society on Prisons, the specifics of food provision were disclosed in Art. 214-217 of the Charter on Police Detention and Prisons.

Scientists [3], specially investigating the issue of insolvent debtors, note that this problem has been known since ancient times, the regulation of certain issues was contained in the legislation of the Russian Empire. It is called not only Russian Truth, but also the Bills of Charter of 1729, the Charter of the Deanery of 1782, the City Regulation of 1785 [4]. It should be noted that insolvent debtors were mentioned in the Council Code of 1649 (Articles 204, 206, 260). Article 65

of the Criminal and Correctional Sentences Code of 1845 stated: “Those guilty who do not have any means of remuneration for the harm done by them, loss or insult, may, if they are not subjected to criminal punishment, be, at the request of the offended party, imprisoned, on the basis of the general rules on insolvent debtors” [5].

Russian Truth and legal sources of that period, as we would say today, gave a classification of insolvency. It could be:

- 1) not malicious, as a result of natural elements;
- 2) malicious, as a result of the wrongful acts of the subject - loss of goods due to the merchant's drunkenness, argument, playing cards;
- 3) especially malicious when the debtor hid in another state [6]. The order of returning the debt was also considered: at first it was paid to the prince, secondly to foreign creditors, and only then to everyone else.

Analysis of the legislation of the Russian Empire by

Yu.S. Speranskaya, allowed her to conclude that insolvency and its consequences were mentioned in separate acts, however, there were no procedures determining the subject of bankruptcy [7, p. 18]. The situation changed significantly after December 19, 1800, when the Bankruptcy Charter was adopted. It consisted of 2 parts,¹ cases of trade insolvency regulated by the first.

On June 23, 1832, the Charter on Trade Insolvency was adopted. It was designed to be applied only to persons belonging to the commercial estate. The practical application of the provisions of this Charter indicated the need for their distribution to all persons involved in trade, which was done in 1846. With minor amendments, this Charter was applied until 1917.

The designated normative legal document defined bankruptcy as follows: “Trade insolvency is recognized when someone in the trade comes to such a state of affairs that he not only does not have cash to satisfy his debts, but there are signs by which to conclude that his debts cannot be repaid, that is, all his property will not be enough for their full payment.”

The 1832 Charter also classified insolvency. Its types were considered: simple, false or malicious in the presence of intent and forgery; in the absence of fault, the debtor was declared insolvent by misfortune and in this case he was not subject to arrest.

Depending on the person conducting trading activities, trade and non-trade insolvency were distinguished. These definitions contributed to the identification of entities that could be considered insolvent. For the subject matter of this article,

¹The first part was called "For merchants and other trading who have the right to make promissory notes." The second part, "For Nobles and Officials", established the rules of non-commercial insolvency, however, out of 111 articles, it devoted 12 issues to bankruptcy, the rest were intended to regulate situations aimed at minimizing and abstaining noblemen and officials from bad debts. They set forth the rules for the participation of noblemen and officials in legal obligations.

legislative forms of insolvency proceedings are of particular interest. At that time there were three of them: 1) at the request of the debtor; 2) at the request of creditors; 3) at the initiative of the court. The initiative to open the competitive process was provided to creditors, but the debtor's initiative was also allowed: stating own insolvency before their creditors. The confession of the debtor was considered an important circumstance that determines the subsequent fate of such an entity, since, firstly, the creditors could be convinced of its good faith, and secondly, in the case of a statement of its own, the debtor could avoid negative consequences and not be arrested.

It should be said that the legislation and the public are especially lenient, in a sense, empathising, to this category of offenders. Noteworthy in this regard is the content of one of the articles of the regulatory legal act² of the period in which it was said: "It often happens that a virtuous father of a family, a good citizen, an honest man, without any guilt, but by unexpected coups of fate and incidents that human forces cannot foresee may be, by the loss of the whole state, dragged in debts for which the government is forced ("compelled") to imprison him.

In accordance with Art. 2 of the Code of Institutions and Charters on Detention in the Russian Empire, five places of detention were established. These included prison castles or jails in cities³, which mainly contained faulty debtors (the law called them prisoners). Detention was a measure of collecting debts from them.

In St. Petersburg, the House for the Detention of Faulty Debtors was specially built as a special institution independent of the city prison. It was run by a special Caretaker and a staff of employees directly assigned by the police authorities (Art. 27). The costs of maintaining the regular number of employees for the House for the maintenance of faulty debtors in St. Petersburg were allocated from city incomes mutually, before it was transferred to other sources. This was due to costs that were required elsewhere in separating bad debtors from detainees for crimes. It should be said that the Minister of the Interior was empowered, depending on the circumstances, if it would be possible in other cities of the Empire, where it would be convenient for local reasons, to separate broken debtors from persons held for crimes.

In accordance with the established competence, the Minister of Internal Affairs, in agreement with the St. Petersburg Military Governor General, developed for the House for detention of unlawful debtors caretaker (with reference to the instructions to the Caretaker of the Provincial Prison Castle) special instructions in accordance with the legislative norms on bad debtors.

²This is article 232 of the Instructions to the Custodian of the Provincial Prison Castle in 1831.

³This was regulated by legislative norms of 1782, 1802, 1803, 1822, 1827, 1828. See: Code of Laws of the Russian Empire, 1857 edition. Volume fourteenth. Charters on passports, on crime prevention, on censorship, on detention, and on exiles. Sankpeterburg. In the Printing House of the Second Division of His Imperial Majesty's Office. 1857.

Article 213, with reference to Art. 211 and 212 of the analyzed Charter, it was specifically stipulated that in other places, faulty debtors are held in prisons⁴ separately from those under investigation and other prisoners.

Their placement and detention differed from those detained for crimes. When such a prisoner was taken to the prison castle, the warden allowed him to remain in the clothes and shoes in which he arrived, but at the same time carried out a thorough search so that there were no "harmful weapons" left in his clothes and shoes. Prisoners for debts were allowed daily visits with those wishing to visit them (unlike other categories of prisoners), but at different times with those under investigation. At such meetings, faulty debtors, as well as other prisoners, were forbidden to transfer clothes, drinks, money, letters, notes "or any other paper, in a word, absolutely nothing ...". However, prisoners for debts, during visits, had the right to receive food from visitors for their own consumption. At the same time, the duty of the guard officer was charged with a thorough search of the goods.

The legal status of the category of prisoners under consideration had a set of differences that created specifics in the provision of food, meetings, provision of clothing, linen, movement within the prison, visiting a prison church, and receiving food. For example, the food of persons held for debts required money from their lenders. Moreover, this amount was half more than that which was set for ordinary prisoners (there was no ban on the lenders' desire to increase the amount of money).

If we operate with more specific meanings, the following legislative provisions of that time should be given. When the money was left from the treasury for the food of each prisoner, the soldiers rations were taken into account: two and a half pounds of flour (pound - 400 g) per day; one and a half garnerz of grain (garnerz - 3.28 l) per month by the highest reference prices that existed for foodstuffs in November last and in April this year. The calculation did not include meat or fish, as well as other components (for the so-called improved food), which were purchased at the alms of benefactors (Article 118).

It should be noted that without the lenders' contribution of feed money, private debtors were not accepted into prisons. The lender was given the right to contribute feed money for such a period as he considers necessary. If the lender fails to bring in fodder money for food of the debtor, who was personally detained at his request, as the amount that was presented upon his expenditure was used up, the insolvent debtor was released from imprisonment (Article 216). However, the footnote to Art. 216 said: "Insolvent debtors, recognized as malicious bankrupt, entering the general category of criminal offenders, are detained at the expense of the treasury." Half of the fodder money was allocated to prisoners held in prisons under state penalties than was determined for prisoners, but in the same amounts that were determined for private debtors (v. 118, 214, 217).

⁴In paragraph 3 of Art. 95 it was said: "... in prisons are contained: ... 3) in those cities, to which the articles 211 and 212 do not apply, faulty debtors."

It should be specially noted that the indicated issue was the subject of consideration by the State Council on November 13, 1839, after which a version of the decision was approved by His Imperial Majesty. The document had the following content: "The State Council, having considered the report of the departments of the Governing Senate on the issue: what to do with the identity of insolvent debtors recognized as malicious bankruptcy when creditors refuse to pay feed money to keep them in custody? and finding that the insolvent debtor, recognized as malicious bankrupt, under 743 Art. of Criminal Code V.15, is included in the general category of criminal offenders, who, by virtue of Article 37 of Prison Detention Code V.14, kept in custody at the expense of the treasury, stated: the exact basis of this legalization, which does not require any addition in the present case, providing the Government Senate to resolve the present case, in the form of a special case.

Resolution. His Imperial Majesty, following the moments in the General Assembly of the State Council on the issue; what to do with malicious bankrupt when the creditors refuse to pay feed money to keep them in custody? Deigned to approve and ordered to execute" [8, p. 841-842].

The Charter of the Guardian Society on Prisons established the procedure for the redemption of prisoners incarcerated for debts. It consisted of the following:

1. Debtors wishing to use the "good will" redemption, appealed (asked) the Company's Committee of Trustees of the prisons. In an appeal, they indicated the amount of debt, reasons for insolvency, age, marital status.

2. Based on the contents of the request, the Director, who is responsible for the repayment of prisoners for debts according to his functional duties, collected detailed information about the applicants. In those cases when he came to the conclusion that a particular candidate is worthy of the requested beneficence, then he met with creditors in order to convince them of certain concessions. After that, lists were submitted to the Committee with all the collected information about debtors worthy of a ransom. Based on the results of the consideration of such an issue by the Committee, the most deserving of such good deeds were redeemed, after which, if there was a certain amount, then money was paid to creditors through appropriate public places.

3. There was a special rule that established a ban on the redemption of a debtor for five years twice. To this end, the Chancellery of the Committee kept an alphabetical book of redeemable debtors, which indicated the title, surname, size of the debt, the amount paid to creditors, and the time of release of the debtor.

4. Every four months ("after the end of every third of the year"), statements were published in the statements of persons who donated amounts for the repayment of debtors with an indication of a specific size. Such announcements indicated the number of redeemed debtors, the amount of their debts, the amount of money that the creditors ceded, the amount paid to them.

Thus, the foregoing allows us to conclude about the specifics of the legal status of faulty (insolvent) debtors held in prisons for debts, which was caused by the nature of the offense, the procedures and grounds for the arrest, the peculiarity of detention in prisons, which differs from other prisoners in the prison castle. As well as the length of stay and release procedures: non-payment by the lender of fodder money for food, redemption of debtors from prison.

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在学生, 未来的化学老师的化学教育中, 辅导作为协同作用的要素

TUTORING AS AN ELEMENT OF SYNERGY IN THE CHEMICAL EDUCATION OF STUDENTS, FUTURE CHEMISTRY TEACHERS

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抽象。 本文对以下方面的研究进行了分析: 提高内容, 学生的独立工作的组织性以及培养未来专家的过程中为之做好准备的问题。 作者阐明了“准备独立工作”的概念, 并根据拟人化原则的实施提出了其形成方式。

关键字: 导师, 学生, 化学方法论, 专业能力, 学校, 老师, 学生。

Abstract. *The article presents an analysis of studies on the problem of improving the content, organization of students' independent work, as well as the formation of readiness for it in the process of training of future specialists. The authors clarify the concept of "readiness for independent work" and suggest ways of its formation based on the implementation of the principle of personification.*

Keywords: *tutor; student, chemistry methodology, professional competencies, school, teacher, student.*

The training of competent specialists in the field of teaching staff is an urgent problem at all stages of the formation and development of the educational system. A certain cyclical nature of this process can be traced quite clearly, since only a successful teacher can raise and educate successful students. New demands are made on the knowledge, skills and abilities of students, not only from the standpoint of the federal state educational standard, but also at the request of the main customers of this process - the state, society, and employers. These requirements define the competencies of high school graduates, take into account the practical component of the professional training of students, future chemistry teachers. One of the components of a holistic training system for a future teacher is a gradual immersion in the educational activities of students, starting from the first year [1; 2; 3; 4].

In this paper, we will not reveal the features of the formation and development of the process of synergy itself, which is an incentive for the transition of quantity into quality. Today there are several definitions of this term, but the basis is its single root -syn-, which in Greek means "together", "mutually."

We are interested in the transition of this phenomenon into pedagogical activity and practice in the field of chemical education from the standpoint of tutorial support. This direction meets the requirements of the new generation of state educational standards for modern teachers. The Professional standard "Specialist in the field of education (activities for the social and pedagogical support of students)", developed by the Ministry of Labor and Social Protection of the Russian Federation in 2013, determined the basic requirements of the tutor as a specialist. The generalized labor function "Tutoring support for students" is highlighted.

We have defined this term and note the multivariance of the definitions "tutor" and "tutor support". For example, in the studies of E. A. Andreeva [5], tutoring is considered as individual counseling, during which the teacher accompanies the student in his educational trajectory. EM Andreikovets defines tutor support only in conjunction with teaching practice to create certain conditions for students to learn, taking into account the age characteristics of students [6].

Our four-year study was conducted in 2016-2019, 168 respondents. The empirical bases were the Alexander Butlerov Institute of Chemistry (44.03.01 "Pedagogical Education" Profile: Chemistry) and the Faculty of Law (44.03.05 "Pedagogical Education" Profile: Law and Foreign Language (English) of Kazan Federal University; educational institutions (secondary school № 39 with in-depth study of the English language "and" Secondary school №165 with in-depth study of the English language "in Kazan).

A generalized theoretical and methodological nature of tutoring in general and in the field of chemical education in our country and abroad was carried out. Distinctive features of tutoring from similar (at first glance) such concepts as a mentor, coach and facilitator are determined.

Summarizing the advanced and personal pedagogical experience, as well as analyzing the results of the production (pedagogical) practice of 3-4 year students, we confirmed the relevance of studying the phenomenon of tutoring as an element of the synergy of variable technologies and methods of teaching chemistry in modern schools. Here it is necessary to consider several areas of tutoring at chemistry classes and at extracurricular (extracurricular) events. Tutoring as an element of mentoring is seen as accompanying children with certain educational opportunities. Currently, inclusive education is being implemented in mass domestic schools. As part of the experimental pedagogy of the Republic of Tatarstan, Kazan schools № 1, 65, 97, 156, 168, 142 for children with disabilities began to use various models of tutoring in accordance with the implementation of the state program "Accessible Environment" [7]. It is necessary to methodically prepare not only

future chemistry teachers, but also practical students for the optimal choice of variable methods for teaching children with disabilities. One of the main tasks in the tutor's work in this case is the creation and organization of conditions for the successful inclusion of a student in the educational environment of the school.

The next aspect of tutoring is aimed at children of migrants who experience certain difficulties in the process of adaptation to new social and educational conditions. Such children begin to learn on certain educational routes that allow the child to gradually immerse themselves in a new educational environment. The training of students, as future chemistry teachers, is determined in the development of the necessary complex, which includes invariant components of tutor support, regardless of the country of the child's arrival.

In our pedagogical practice (2018/2019 academic year), a chemistry teacher at the Kazan school "School № 39 with in-depth study of the English language" we used the tutor's methodology in chemistry classes. The work was carried out in a lesson on the topic "Types of chemical reactions." Tutor Yu.A. worked with small groups of students of different levels of training in parallel with a leading chemistry teacher. To prepare such a lesson, a technological map of a chemistry lesson was developed, which provided not only the achievement of the planned learning outcomes (subject, meta-subject and personal) through the formation of universal educational actions of students in unusual situations. A comprehensive program was developed for individual-group methods of working with students using a student's chemical experiment. This interactive program meets the requirements of the standard and allowed to achieve the implementation of the goal.

We have developed one of the thematic blocks for the methodological training of future chemistry teachers on the formation of their professional competencies as an element of the digital educational resource (DER) at the MOODLE site (<https://edu.kpfu.ru/>). The block "Features of the system of tutoring in chemical education in a rural school according to the requirements of the Federal State Educational Standard" includes the necessary materials for self-study of students, allowing motivating the student to study this discipline in the direction 44.03.01 "Pedagogical education. Chemistry".

The developed tasks for students on the following issues are presented: drawing up a technological map of a chemistry lesson with the participation of a tutor in grade 8; analysis of the tutor's activity at a chemistry lesson in Russian schools and abroad; analysis of the tutor's activity during a chemical experiment (demonstration and student), etc. A glossary on the topic was developed and presented, as well as a list of recommended literature for independent study.

We conducted a study to identify initial knowledge of tutoring in chemical education in students of 2-4 courses in the direction 44.03.01 "Pedagogical education. Chemistry".

The study determined that the majority of students (75%) are not ready to use tutorial accompaniment in their chemistry lessons. But on the use of tutors in the preparation and conduct of extracurricular activities 71% of respondents responded positively.

Next, we analyzed the students' readiness to see themselves as a tutor or work with a tutor in the lesson and received somewhat conflicting data. Almost a third of students (72%) rate their confidence in the professional sphere as high, 80% of the respondents noted the skills of presenting their material to the audience, 63% assess articulation and organizational skills. Thus, the bulk of students are ready to work in the field of tutoring in chemical education - either as a tutor, or together with a tutor. But the lack of methodological development of this material during the training of future chemistry teachers leads to a certain rejection of this fact.

Questions of independent work remain one of the most important problems of modern educational practice. In this we agree with the opinion of Sudakova [8], which notes the main indicators of students' independent work as its awareness, commitment, planned nature, and fullness implementation. This choice of optimal methods will contribute to the varied selection of materials, analysis of various sources and the identification of problems using a methodologically correct and competent organization of a teacher at all stages of independent work.

Thus, the question of synergy of tutoring and varied methods of teaching chemistry in chemical education has several directions for further and deeper study in the preparation of students, future chemistry teachers.

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根据曼陀罗原理对信息进行个人编码的教育技术
**EDUCATIONAL TECHNOLOGY FOR INDIVIDUAL CODING
OF INFORMATION BASED ON THE PRINCIPLES OF THE MANDALA**

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抽象。 本文介绍了从学生的项目活动结果中收集的经验。 培训的基础是基于系统活动方法的培养过程。 本文介绍了发达的信息处理技术在教育过程中的应用结果, 这些信息有助于信息的吸收, 揭示作者对学生的自我意识以及掌握现代人必需的自我调节技能。 世界。

关键词: 个人能力, 价值语义调节, 青少年的创造性自我实现, 联想图像, 曼陀罗结构。

Abstract. *This article presents the experience gathered from the results of project activities of students. The basis of training is the process of inculturation based on a system-activity approach. The paper presents the results of the application of the developed information processing technology in the educational process, which contribute to the assimilation of information, the disclosure of the authors' self-awareness of students and the mastery of self-regulation skills necessary in the modern world.*

Keywords: *personal competencies, value-semantic regulation, creative self-realization of a teenager, associative images, mandala structure.*

The mysteries of primitive people reflected the ancient understanding of the structure of the universe and its manifestation in rhythm: the eternal cycle of life in the duality of day and night, winter and summer, birth and death, in which there is no gap between the beginning and the end. Therefore, symbolically, the universe was represented by a circle or concentric structure. Later, the syncretic image of the mystery, presented in a theatrical dance, turned into a visual image of a mandala, where the circle represents the sphere of Heaven, and the square correlated with the rectangular shape

of the Earth. Their interaction determines the order and rhythmic movement of everything in the universe. Marking the space by color determines the sides, top and bottom.

The most characteristic use of the mandala in the historical and cultural sense can be found in the ornaments of ceramics, clothing, religious tools of ancient peoples. For the first time the word "mandala" is found in the Rig Veda, in the meaning of "space", "circle", "totality". Until today, the traditional use of mandala symbols is preserved in the countries of the Far and Middle East, African countries. Moreover, in India, the symbol of the mandala is recognized by Buddhist and Hindu followers. In the traditional mandala, the first, outer, circle is a miniature of the Universe, the second, inner, is the sphere of deities, buddhas and bodhisattvas, and the square between them is oriented to the cardinal points. Typically, the mandala pattern has a gate on four sides that symbolize the four cardinal points. A path from each gate leads to the center, which is a symbol of Infinity. Thus, the Mandala is a geometric representation of the rhythmic movement of the universe and symbolizes the spiritual, cosmic or mental order.

Despite its eastern roots, the principle of the mandala, often used in architecture, turned out to be so universal that it began to be applied in temple architecture of various faiths.

During the European Middle Ages, a Gothic rose appears everywhere in the churches, which has a certain Doomsday structure, and in later times it is often devoted to the image of the Virgin Mary. The origins of the Gothic rose lead to the Roman oculus, through which not only air but also light fell into the room, which correlated with the divine mystery.

Despite the diversity of cultural and historical interpretations and the subtlety of semantic shades, this complex design is by no means just a combination of geometric figures.

The ability to read the structure of the traditional mandala of a given region allows to get additional information about the philosophical foundations of the life of people of a given culture, since the symbolism of the circle has always been present in one way or another in the collective unconscious of humanity. Therefore, the Mandala is nothing more than a universal way of presenting information.

In the 20th century, K. G. Jung, analyzing the mandala symbol from the point of view of psychology, identified it as an archetypal symbol, which contributed to the application of the principles and structure of the mandala in psychological sessions. Jung saw in the mandala a tool for the internal transformation of man, which later made it possible to talk about the possibilities of the technique of self-knowledge. It is no coincidence that in difficult life periods, the subconscious of a person encourages them to draw something similar to a mandala. A symbol is born spontaneously and is an expression of a person's internal state, his desires, aspirations, opportunities and resources [10]. The mandala is nothing but a material version of the cosmo-psycho-logos of a particular person.

Features of modern culture with the priority of the visual way of transmitting information reflect changes in the usual perception of the world.

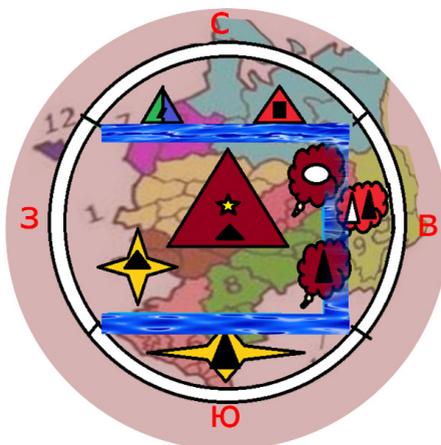
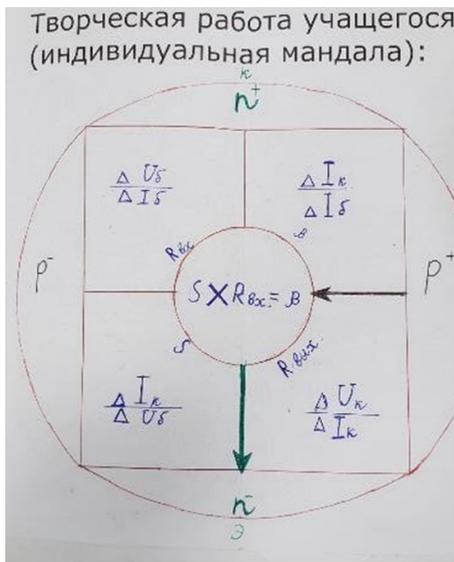
This is manifested in the person's internal motivation to perceive the world, in self-organization and self-determination. "I - a source of information and at the same time a consumer of it. I shape myself and independently determine the path of my development" [5].

At the very beginning of the last century, in his works, Jean Piaget pointed to the main feature of the sign function, which leads to a "doubling" of the objective world, when one object ceases to be itself, receives a new symbolic content and begins to point to another object or group of objects. There is a sign mediation of the subject field of the image and its translation into semantic content. However, according to the "Image Structure" model, F.E. Vasilyuk [2], "The outside world is represented by objective content. The world of culture is the meaning, the representative of the language is the word, and the inner world is the personal meaning. Each of the nodes of the image is a borderline entity, with one side facing an objectively existing reality, and the other with direct subjectivity; nevertheless, together these nodes set the volume in which the living image pulsates and shimmers" [8.50]. Moreover, correlation with one or another pole of the structure allows the individual to reveal the image in one form or another.

Speaking about the modern education process in the era of globalization and the rapid change of technology, we understand that the modern teenager easily assimilates information, but it does not always become personally appropriated by knowledge. In addition, the difficulty for the younger generation is not so much in obtaining specific knowledge, but in the development of the ability to independently work with information: to see, feel and understand it, and also, using various cultural languages, to form and transmit their own thoughts. And in order for the generation of one's own thought to occur, a teenager needs to learn to rely on images that arise on an emotional-sensual level. Thus, a teenager is trying to learn to make a "transition, as a result of which processes external in their form with external, material objects are transformed into processes that occur in the mental plane, in the plane of consciousness" [7]. This is possible when operating with information includes not only individual reading skills of the topic under study, but also the ability to read information at different levels of communication, taking into account the historical context and individual characteristics of the subject in modern conditions.

The formation of their own statements on the basis of conscious personal experiences allows students, drawing on their own experience in using images arising on an emotional-sensual level, to form their own meanings and personal attitudes to informational material [4]. In the process of creating an individual image of a mandala, students analyze the subject field of the information flow, highlighting the necessary elements of the future structure.

It should immediately understood that it is impossible to create a single mandala on the topic under study. Each creates such associative images that will be clear and visually understood by the author himself, then he will be able to read the mandala as a book, textbook, brochure. This is the individuality of each mandala. Thus, creating a projection of the presentation of information through fine motor skills, an associative image is rethought and representation, which gives rise to a new set of knowledge about the known in the students' minds. Below are the options for the individual image of the mandala created by students on the topic of economic geography and physics.



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第四次工业革命期间继续教育的趋势
**TRENDS IN CONTINUOUS EDUCATION
DURING THE FOURTH INDUSTRIAL REVOLUTION**

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抽象。 这篇文章提出了一个紧迫的问题,即在第四次工业革命时代必须修改继续教育的趋势。 有人认为现代教育者应该遵循“通过创造学习”的方法。 强调了全球思考的重要性,近年来,这一点变得非常重要。 具有全球能力的学生的四个关键特征脱颖而出:

关键词: 第四次工业革命, 教育, 继续教育, 物联网, 批判性和创造性思维。

Abstract. *The article raises the urgent question of the need to revise the trends of continuous education in the era of the Fourth Industrial Revolution. It is argued that modern educators should follow the method of "learning through creation." The importance of global thinking, which has become very important in recent years, is emphasized. Four key features of globally competent students stand out:*

Keywords: *the Fourth Industrial Revolution, education, continuous education, the Internet of Things, critical and creative thinking.*

The Industrial Revolution is a historic period, when there have been significant changes in the transformation of production, which have gradually turned most countries of the world into industrial societies. It was characterized by the use of new technologies, which were used in mass production. Many people in those days, as they are now, were afraid of the changes and achievements that were made by technology. Today, however, we see clearly that all these technologies have improved the way of life of mankind.

The Fourth Industrial Revolution is, of course, three words that you have heard very often lately. We must now recognize that we are already beginning to live in the Fourth Industrial Revolution, which excites many and makes many people think about a future where machines are replacing the work that people do today.

How do you raise children for the future, the main characteristic of which is a ambiguous change? How will new technologies affect what we need to learn, and how do we do it?

The first industrial revolution led to the spread of new educational models as society adapted to new technologies and the economies they create. It is reasonable to expect something like this this time, when a whole generation of reformers and "innovators" teachers is already experimenting with new learning tools and new educational priorities.

However, education and training systems, which for decades have remained largely static and underinvested, are largely insufficient to develop new labour markets. This will require the development and transformation of more flexible regulatory approaches, new forms of public-private cooperation and new norms and values. Millions of technology jobs remain unfilled today due to a shortage of skilled workers, while other jobs are outsourced for automation. It is vital that we have an education system that provides students with the 21st century knowledge and skills necessary to thrive in our transformable world.

At the same time, teachers are tasked with keeping pace with technological advances and applying them in the learning process. Modern educators should follow the method of "learning by creation," what is called constructivism. Many successful educators today have cast aside any uncertainty about working with technology and have turned their classrooms into an empirical, practical learning environment. A hands-on approach to learning helps students develop the competencies needed to be career-ready, self-solve, teamwork, creativity, and critical thinking.

The industrial revolutions experienced by mankind have brought about significant changes in economic, social and technological processes. Therefore, to talk about revolution in this context means to consider the gaps caused by scientific and technological advances that lead to the transformation of production and the adaptation of the economy to new forms of supply and demand. History shows that after the beginning of industrial revolutions, change happens rapidly. Entrepreneurs turn inventions into commercial innovations. They give rise to new companies that are growing rapidly and definitively; consumers are demanding new products and services that improve their quality of life. As soon as the mechanism of this process begins to work, industry, economy and society are transformed at full speed.

The Fourth Revolution brings with it exciting opportunities, new solutions to global problems and employment opportunities in new jobs that have yet to be invented. At the same time, this is due to the potential for technological unemployment, which leads to lower incomes of the working population and social inequality, while society adapts to technological progress. Combined with climate change

and rapid global population growth, this 21st century is the most difficult that humanity has ever faced. Governments, educators and parents around the world must ask how they can prepare present and future generations for prosperity in this transformable world. In recent years, economists, futurists and other experts have given many predictions about global automation and job losses in manufacturing, but very little about what professions of the future will be in demand.

The reality is that the jobs of the future will be as automated as possible, and people will be able to work where machines are powerless. This is good news because it means that we can automate work and humanize jobs. There is no doubt that education is at the heart of preparing present and future generations for competitiveness in the labour market. As a result, it is vital in the learning process to focus on human development rather than contrasting it with machines. The modern education system is designed for the industrial economy. It is being automated, requiring transformation, from a "knowledge system" based on facts and procedures to a system that actively uses this knowledge to solve problems together.

Changing the system of education that has been in place for centuries will not be easy, given that since the late 19th century, learning has been seen as a "knowledge delivery" rather than a "creative process" that works ahead of time. We have been hearing more and more recently that the teaching process will be automated and teachers can eventually be replaced by computers. But that's not right. The nature of teaching and learning is a unique personal and social activity between people that serves each student, changing needs, individual abilities and interests. In fact, the very competencies that separate us from the machines and appear as part of this next industrial revolution.

Alvin Toffler, in his book *Future Shock* (1970), argued that "the illiterate slates of the 21st century will not be those who cannot read and write, but those who cannot learn, learn and relearn." Toffler did not expect reading and writing to become inconsequential, he stressed that in times of rapid change in an uncertain future, learning to learn rather than just reading a set of facts and procedures would be the most valuable skill.

Changing the continuous education system, curricula and the use of traditional, as well as the development of new teaching methods, in the era of the Internet of Things will be the key to prosperity in this century. We will succeed by working with our machines, not competing with them, programming them, rather than programming them.

At the international economic forum, scientists from different countries announced that 85 percent of the jobs that will exist in 2030 have not yet been invented, today's graduates face a future in an uncertain job market. Many experts believe that we are now in the early stages of the Fourth Industrial Revolution, an

era that combines digital, physical and biological systems in a way that has never been seen before. Virtual reality (VR), augmented reality (AR), artificial intelligence (AI) and robotics are changing not only the labor market, but the whole way of life.

According to The Economist: Intelligence Unit for 2018, very few countries have begun to consider the impact of automation through education policy: "Intellectual automation is expected to increase the importance of both STEM education (science, technology, engineering and mathematics) and so-called soft skills that allow employees to trade their unique human capabilities." Klaus Schwab, founder and executive chairman of the World Economic Forum (WEF) and author of the Fourth Industrial Revolution, believes that the pace of change creates opportunities like never before: "The opportunities of billions of people connected with Mobile devices, with unprecedented computing power, memory and access to knowledge, are limitless... these capabilities will be multiplied by new technological breakthroughs in areas such as artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3D printing, nanotechnology, biotechnology, materials science, energy storage and quantum computing."

Interestingly, among this high-tech manufacturing process with automation replacing low-skilled jobs, it is the demand for human skills that outstrips supply, as shown in the WEF report on future jobs.

The report interviewed the heads of nine industries in the world's 15 largest economies to find out how technological advances could change the labor market. These were not the STEM and digital skills that managers wanted. Instead, the prize was awarded to creative skills such as critical and creative thinking and collaboration. It seems that technological advances make human skills more important than ever. In the world of the "Internet of Things" great importance must be attached to non-cognitive, characteristic skills that a person possesses. Knowing that artificial intelligence is developing rapidly, students will increasingly need to demonstrate skills that robots don't have.

So, what skills should the continuing education system instill in students? Globalization means that people will have to be able to work in an intercultural space and have interdisciplinary knowledge. "For example, teachers will not teach history from the point of view of one country, but will use examples of historical themes and changes from around the world. Students develop global thinking and learn about many different cultures. It is this global thinking, or "international thinking," that will give international schoolchildren an advantage in hiring in the future.

The importance of global thinking has become very important in recent years, as it is included in the OECD 2018 Program for International Student Assessment (PISA). The OECD identifies four key traits of globally competent students: 1)

they explore the world beyond their immediate environment, addressing issues of local, global and cultural importance; 2) They recognize, understand and appreciate the perspectives and worldviews of others; 3) They effectively exchange ideas with different audiences, engaging in open, appropriate and effective interactions between cultures; 4) They are taking steps to ensure collective well-being and sustainable development, both locally and globally.

To meet the new labour market, "adaptation to new cultures" and "adaptation to new experiences" is an integral part of a person's lifestyle. Choosing a curriculum in an educational institution that can international is a key aspect of the global mobile lifestyle, as it ensures a smooth transition from one country's knowledge system to another. In building modern education, it is essential to keep the direction of the global perspective.

Proponents of the STEAM movement (science, technology, engineering, art and mathematics) believe that today's students should be encouraged to develop creativity and critical thinking, creating and solving problems necessary for entrepreneurial and the innovative work of the future.

As Klaus Schwab says: "... neither technology nor the destruction that comes with it are a force over which people have no control. We are all responsible for guiding its evolution in the decisions we make daily as citizens, consumers and investors. At the end of the day, it comes down to people and values. We must shape a future that works for all of us, putting people first and empowering them."

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在特殊医学团体的学生中形成对职业体育文化的兴趣（以远东联邦大学为例）
**FORMATION OF INTEREST IN OCCUPATIONS PHYSICAL CULTURE
AT STUDENTS OF SPECIAL MEDICAL GROUPS (ON THE EXAMPLE
OF FAR EASTERN FEDERAL UNIVERSITY)**

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抽象。 本文专门通过提问的方式，确定了远东联邦大学（FEFU）学生在特殊医学团体（SMG）中从事职业体育文化活动所产生的心理和社会问题。对FEFU学生的体育职业动机进行了分析，在俄罗斯和外国的教育机构中进行了有关该问题解决方案的信息搜索，并制定了SMG体育发展和加强体育职业动机的措施计划。FEFU的学生考虑了远东的地区条件。

关键字。 体育，动机，特殊医疗团体。

Abstract. *Article is devoted to identification of the psychological and social problems arising at students of Far Eastern Federal University (FEFU) on occupations physical culture in the special medical group (SMG) by means of questioning. The analysis of motives to occupations by physical culture at students of FEFU, information search about solutions of this problem in the Russian and foreign educational institutions is carried out, the plan of measures on development and strengthening of motivation to occupations by physical culture in SMG at students of FEFU taking into account regional conditions of the Far East is offered.*

Keywords. *Physical culture, motivation, special medical group.*

Preservation and strengthening of health is one of the most important problems of human society especially relevant for younger generation – bases of future state and economy. Despite appeals to the healthy lifestyle in the social environment, real practice demonstrates deterioration in health of youth, increase in quantity of

chronic and infectious diseases, and the modern urban saturation and scientific and technical progress is the reason of chronic "motive hunger" [2,3]. The students, especially at the initial stage of training, are the most vulnerable part of youth, facing the number of the difficulties connected with increase in the academic load, the low physical activity, relative freedom of student's life, problems in social and interpersonal communication. The motivational incentive is necessary for the students carried to the special medical group (SMG) for improvement of indicators of health and physical development. Besides, speaking about motivation of students to recreational activity, it is necessary to consider instability of motives which part has situational character. At student's age they are quite changeable and mobile because of various incentives causing them, not finally created identity of the student, not ended process of its socialization [1]. Identification of psychological and social problems at students of SMG of Far Eastern Federal University and finding solutions for successful formation at them the motivational and valuable relation to occupations physical culture and sport became the purpose of our research.

It became clear that the main problem at occupations physical culture at students of SMG of FEFU is the lack of motivation at the majority engaged. Students are informed on positive results of occupations by physical culture, the healthy lifestyle actively moves ahead in modern society, both the state, and media surrounding students with social groups. But at the same time there is the current trend of acceleration of life and the lack of time on sports activities at young people. Most of students live in strongly urbanized cities, quantity of professions, for mastering which the physical force is necessary, it is constantly reduced, and mental capacities are more and more appreciated. Modern researches in the field of medicine and psychiatry revealed dependence of life expectancy, level of mental capacities, conditions of mentality and level of adaptation to various external irritants, from the general tone of the human body [4]. The high tone is supported by active lifestyle and the correct diet and the dream, it requires constant intake of oxygen in blood arteries. At the same time the most part of young people, especially students, lead the sedentary life, and it is connected not so much with their personal choice how many with features of educational process. According to World Health Organization, in 2017 in the developed and advanced countries more than 74.0% of aged people of 15-25 years were influenced by the consequences of the inactive lifestyle which are reflected in the condition of the immune system, esthetic appeal, brain and muscular activity, contributing to the development of chronic diseases. According to us, the main reason for the arising problems with health lies in the field of psychological and social motivation of students. When questioning 160 students of FEFU carried for health reasons to SMG the following main psychological and social problems interfering regular trainings by physical culture were revealed:

- lack of time and its wrong distribution during the day;
- administrative coercion to occupations physical culture;
- shyness and, as a result, rejection of occupations physical culture and sport because of internal complexes;
- lack of appliances.

The lack of time, its wrong distribution, is the most widespread and typical answer for all students. Students consider the main reason the shortage of experience in the household sphere of life and also the curriculum of FEFU according to which educational process occupies the most part of active day time. Administrative coercion to occupations physical culture generates negative emotions in relation to this subject matter and also creation in student's consciousness of the routine image of vigorous physical activity that can seriously do much harm to social and physical health of the student. The shyness and internal complexes is the internal barrier on occupations physical culture, many students can't go for contact with the teacher coach as are afraid to be worst and not to meet expectations. The lack of finance doesn't allow some students to eat, buy properly necessary sportswear and footwear for occupations physical culture, and, especially, extreme sports for which the specific expensive sports equipment is necessary.

Motivation to physical activity – the special condition of the personality directed to achievement of optimum level of physical fitness and working capacity. Process of formation of interest in occupations physical culture and sport is not one-stage, but multistage process: from elementary hygienic skills to knowledge of the theory and the technique of physical training and intensive sports activities. As a result of the analysis of scientific and educational and methodical literature, poll and questioning of students of SMG FEFU we revealed the main groups of motives to occupations physical culture:

1. Improving motives. The strongest motivation of youth to occupations physical exercises is the possibility of strengthening of the health and prevention of diseases. Salutory impact on the organism of physical exercises is known long ago and doesn't raise doubts, it can be considered in two interconnected directions: formation of the healthy lifestyle and reduction of probability of development of diseases, including, both professional, and medical impact of physical exercises at already available pathology.

2. Motive and activity motives. Continuous cerebration leads to decrease in perception of information, increase in quantity of mistakes. Performance of special physical exercises for muscles of all body and the visual device increases efficiency of the relaxation, introducing pleasure from the process of occupations physical exercises.

3. Competitive and competitive motives. This type of motivation is based on the aspiration of the person to improve own sporting achievements. All history of mankind, process of evolution was formed on spirit of rivalry, competitive relationship. The aspiration to reach the certain sports level, having won competitions of the opponent, is one of powerful regulators and significant motivation to active occupations physical exercises.

4. Esthetic motives. The motivation of students to occupations physical exercises consists in improvement of appearance and the impression made on people around (improvement of the physical build, underlining of "advantageous" features of the figure, increase in plasticity of movements). This motivation is closely connected with development of "fashion" for occupations by physical culture and sport.

5. Communicative motives. Occupations physical exercises with group of associates, for example, in clubs on interests (jogging, tourism, cycling, sports, etc.), are one of considerable motivations to visit of sports constructions. Joint occupations physical culture and sport promote improvement of communication between social and sexual groups.

6. The informative developing motives. This motivation is closely connected with the aspiration of the person to learn possibilities of the organism, having improved them by physical culture and sport. It is in many respects close to competitive motivation, but is based on desire to defeat itself, the laziness, but not the opponent on the competition. The presented motivation consists in desire as much as possible to seize physical capacities of the organism, to improve the physical state and to increase physical fitness.

7. Creative motives. Occupations physical culture and sport give unlimited opportunities for development and education in students of the creative person. Through knowledge of resources of own organism at occupations physical exercises the personality begins to look for new opportunities in the spiritual development.

8. The professional focused motives. The group of this motivation is connected with the occupations physical culture focused on professionally important qualities of students of various specialties for increase in level of their preparation for the forthcoming work. Professional and applied physical training of students promotes development of psychophysical readiness of the student for future profession.

9. Administrative motives. Occupations are physical culture obligatory in higher educational institutions of Russia. Need of timely passing a test on this discipline in order to avoid the conflict with the teacher and administration of educational institution induces students to be engaged in physical culture.

10. Psychological motives. Occupations physical exercises positively affect psychological state of youth, promoting finding of self-confidence, removal of emotional pressure, the warning of development of stressful states, derivation from unpleasant thoughts, to removal of intellectual tension, restoration of mental working capacity. Certain types of physical exercises are irreplaceable means of neutralization of negative emotions at the person.

11. Educational motives. Occupations physical culture and sport contribute to the development of skills of self-preparation and self-checking, moral and strong-willed qualities, fostering patriotism and civic consciousness.

12. Status motives. Thanks to development of physical qualities, the resilience increases, the personal status at emergence of the conflict situations resolved during physical impact is raised.

13. Cultural science motives. This motivation is caused by the impact made by mass media, society, social institutes on formation at the identity of need for occupations physical exercises. It is characterized by influence of the cultural environment and laws of society.

During questioning it became clear that the most part of the interviewed students doesn't attend class in the subject matter "Physical culture" only for the administrative reasons. At the same time more than a half of students (55.0%) consider that they lead enough active lifestyle, visiting gyms, the fitness centers in nonearning time, going to hikes. It follows from this that the most part of young people is interested in the healthy lifestyle, but at the same time rejects the options of physical activity offered in FEFU. Having analyzed available scientific and educational and methodical literature, we found out that in 2007 R.S. Nagovitsyn made the experiment at the Glazov state teacher training college of V.G. Korolenko and the Glazov engineering and economic institute which basis was the transformation of the training model of discipline "Physical culture" by introduction of new modules [5]. The number of occupations in the week increased from four class periods to six, and on each direction implemented the unique program of physical training. It allowed to increase motivation of students to occupations physical culture for improving motives by 9 times and to reduce indicators of administrative motives from 59.0% to 36.0%. According to the educational program of Chukotka Autonomous District, at district schools since 2005 the program for development of motivation of pupils by means of organized departures affects the nature with training in practical skills of survival under natural conditions. In Japan in the prefecture of Nagasaki in 2010 the program for students for visit of ecological tracks and development of practical skills was entered. During the research offers which implementation in FEFU will promote, in our opinion, increase in motivation of students to

visit of the practical training on discipline "Physical culture" and to active lifestyle were developed. First, this introduction of the defended territory in the form of the ecological track on Russky Island and also introduction of the complex of the actions calculated on increases in level of practical skills outdoors with use of this track. Many students have no due skills and knowledge of how it is necessary correctly and safely for itself to be engaged in outdoor activities. The relief of the city of Vladivostok has the big range of heights, it affects the population most of which part is forced to lead active lifestyle. Development of tenacity and agility will help students to go down quicker from slopes, it is correct to hold the grip, to have steadily the foot on the surface, will prevent sprain and muscles, changes. Secondly, expansion of the existing sports grounds, use of the park zone of the campus is necessary. Creation of the tennis court, platforms for beach volleyball and soccer, badminton, construction of the skating rink for doing winter sports, the equipment of the empty rooms in hostels exercise machines and tables for table tennis is represented perspective.

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关于全纳教育环境中信息技术的使用
**ON THE USE OF INFORMATION TECHNOLOGY
IN AN INCLUSIVE EDUCATIONAL ENVIRONMENT**

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抽象。文章将信息和通信技术作为一种功能工具，用于向残疾学生教授外语。该研究是在莫斯科国立人文与经济大学进行的，这是一所独特的为残疾人提供高等教育的教育机构。教授外语需要采用新方法，以利用信息和通信技术的潜力来发展残疾学生的个性并促进他们的思维创造力。Internet资源的选择提供了广泛的教育机会，并且作者考虑到Internet的特殊性，将其视为提高学生教育背景质量的特殊辅助工具，并且是掌握外语的优化因素。全纳教育。

关键字：信息和通信技术（ICT），健康局限性，个性化培训方法，动机，个人教育途径，技能，能力，媒体门户网站，数字教育资源，背景知识。

Abstract. *The article dwells upon information and communication technologies as a functional tool for teaching foreign language to students with disabilities. The research was conducted at the Moscow State University of Humanities and Economics which is a unique educational institution that provides higher education for people with disabilities. Teaching a foreign language requires new approaches to using the potentials of information and communication technologies to develop the personality of students with disabilities and promote their thinking creativity. The options of Internet resources offer a wide range of educational opportunities, and the authors consider them as special kind of auxiliary tools to improve the quality of students' educational background and as an optimization factor in mastering a foreign language, taking into account the peculiarities of inclusive education.*

Keywords: *information and communication technologies (ICT), health limitations, personalized approach to training, motivation, individual educational path, skills, abilities, media portal, digital educational resources, background knowledge.*

In recent years, the process of integration of students with disabilities into the general educational environment together with their healthy peers has become a burning issue in Russia, and this is one of the most important and promising areas for improving the education system for people with disabilities. The disabled are the least protected, not competitive members of the Russian labor market, as modern society places more and more demands on specialists. Training people with disabilities, in the context of high competition in the labor market and increasing requirements for specialist qualifications, make the issue of adjustment of persons with disabilities particularly important.

ICT or Information and Communication Technologies are technological tools and resources used to communicate, and to create, disseminate, store, and manage information. These technologies include Computers, the Internet, broadcasting technologies (radio and television), telephone, mobile phones and other latest gadgets [4, p.247]. In contemporary society, there is a growing understanding that information and communication technology is not just an efficient tool for social integration of people with disabilities, but also a growing educational resource that significantly increases the individual's potential based on free access to knowledge and information. Ensuring equal access to quality education is a right recognized by the UN Convention on the Rights of Persons with Disabilities. Thus, the paramount task of modern society is to create conditions under which people with disabilities can receive a quality and competitive education in order to fully participate in the economic, cultural and social life of the country. One of the key areas of activity is the effective use of information and communication technology (further referred to as "ICT") to ensure accessible education; they provide access to information and knowledge, offer various ways of communication, promoting opportunities for learning and self-study [1, p. 251].

One of the common obstacles encountered by students with disabilities is their reduced mobility. Although a barrier-free environment has been created at the Moscow State University of Humanities and Economics, the motivation of people with disabilities to learn is often low due to their health conditions. Students may miss classes and teachers don't always receive the expected feedback or cannot see the dynamics of the learning outcomes. In this regard, using up-to-date technical means and information technologies in the educational process, especially when teaching a foreign language, is becoming increasingly relevant. Through modern technology, students with disabilities can remotely receive teacher's advice or study up while at home, for example, via Skype.

There is an argument in favor of the ICT use which is the individualization of the learning process, which allows each student to develop in accordance with their talents and peculiar features. Interactive PowerPoint presentation, combined with handouts made using Microsoft Word Office, allows visualizing educational

topics, which can motivate even those students who seem to be bored to learn. In addition, such a means of communication as the Internet expands the field of personal and professional contacts between people. One of the types of work on the Internet is the use of e-mail, as well as social networks. Practical tasks of these resources are limited in number; however, such types of work significantly increase students' motivation. For example, using e-mail, you can develop and improve foreign language writing skills. Developed written language skills provide further opportunities for integration into the international system of higher education, doing scientific research, participation in educational exchange programs and internships, passing exams of an international standard, external studies abroad, etc.

In addition, written language skills development provides further opportunities for integration into the international system of higher education, participation in educational exchange programs and internships, taking exams of an international standard, external studies abroad, etc. The Internet's potential in teaching students with disabilities is vast, in particular, audio and video resources can be used to improve listening and speaking skills; online dictionaries, virtual libraries, as well as educational sites allow students to improve vocabulary and grammar skills, test themselves independently and correct mistakes, which is important for students with the cerebral palsy, who write slowly and inaudibly.

P.V. Sysoev claims that "there can be many options for building an individual educational trajectory based on the use of ICT in teaching a foreign language. It is obvious that ICT didactically significantly expand the possibilities of education. At the same time, it should be noted that building an individual educational path is possible under the following conditions: the desire of the student and the ability of the teacher to build the educational process of a particular student along an individual path; providing the student with a choice in building an individual educational trajectory (various forms and teaching methods, learning content and the speed of mastering the material); developing educational tools in accordance with the principle of redundancy and alternative material on the topic; the ability of the teacher to conduct pedagogical observations of the student and monitor the independent learning activities of the student or student in order to make the necessary adjustments"[8, p. 128].

Students with disabilities should be helped to navigate in the huge information flow, quickly find sites where relevant material is presented. That is why it is so important for the teacher to have their own website, where all the learning material necessary for classes is collected and systematized, as well as links to other educational resources in accordance with the students' major are given. For example, authentic websites of various companies related to economics, management, marketing can be referred to when teaching a foreign language to Economics students; educational portals on psychology can offer relevant training background to Psychology students, etc.

Each teacher is free to choose knowledge gateways corresponding to the level of students' foreign language performance, their motivation and training program. Using teacher's personal Internet page gives a unique opportunity to more effectively and authentically solve a number of didactic tasks at the lesson, such as:

- forming reading skills, directly using learning content of varying complexity from the Internet;
- improving listening skills based on authentic Internet phonic texts;
- improving the skills of speaking based on problematic discussions;
- getting acquainted with the cultural realia, including speech etiquette, namely the speech behavior of various peoples in communication, culture, traditions of the country of the language being studied [6].

Let us consider the functional features of the teacher's personal website using an example of a resource that has the Internet address <http://vsdzhabrailova.narod.ru/> [4]. This media portal is an educational bank that can be useful to English students:

- in preparation for practicals in certain disciplines (on the "Work" page, hand-outs were posted both for preparing for seminars in the discipline "Theory and Practice of Translation", as well as for the disciplines "Spoken and written speech practice", "Verbal communication practice");
- when writing term papers and dissertations (on the "Resources" page there are links to download electronic textbooks, monographs and articles that can form a theoretical basis for research in the field of translation theory);
- to expand the thesaurus and deepen background knowledge (links to authentic sites with educational potential, such as the Library of Foreign Literature, the website of the Ria Novosti news agency in English, the Merriam-Webster online dictionary, etc., are posted on the same page).

The site also offers links to resources providing students majoring in translation studies with additional material, of both theoretical and practical value. In particular, the site's menu contains the tabs "Interesting / Translation" and "Warehouse of Ideas" (<http://vsdzhabrailova.narod.ru/index/0-4>), which presents options for translating poetry from Russian into English and from English into Russian, made by both famous translators and by the students themselves. This page allows to get acquainted with the most successful translations of students participating in the translation contest held annually at the Moscow State University of Humanities and Economics, which significantly increases students' motivation. The functional component of the site is enhanced by the possibility of feedback, in particular, the forum allows it to be implemented, by registering as a user, a student can receive both individual teacher advice in public or private access, and create their own topics within which educational issues can be solved. In fact, the feedback option allows receiving feedback regardless of where the student or teacher is located providing they have access to the Internet; for students with disabilities this part of the functional seems especially significant.

At present, the subject of inclusion has received a wide scope of discussion in German didactics as well [2], [3], [7]. In the second foreign inclusive language classes (German), teachers of the Moscow State University of Humanities and Economics also use various electronic resources, such as:

- <http://www.de-online.ru/index/germanija/0-210>;
- <http://www.meindeutschbuch.de>;
- http://www.multikulti.ru/German/info/German_info_136.html;
- <http://crazylink.ru/deutsch/cities-in-german.html>.

Using these electronic links, students can find the material related to the lesson topic, review it, and perform various tasks. Depending on the objectives of the lesson and certain linguistic tasks, using these resources, a student can develop written and oral speech skills, find interesting and unknown facts about Germany, and prepare a project. To restore performance and attention, which is especially important for students with disabilities, these electronic pages offer music and songs that contain rich authentic material.

ICT in the education of people with disabilities should not be regarded as a goal in itself as it is a solution which offers a tool to increase effective access and full participation in educational opportunities. The ultimate goal of access to education should focus on broadening the opportunities for people with disabilities with ICT accessibility viewed upon as part of a wide variety of educational opportunities in lifelong learning. ICT supporting the training of an individual should be available in any formal or informal learning situation in which they want to participate [1, p. 265].

Summing up, we consider it necessary to emphasize that systematic practical use of ICT enables to make additions, corrections to the methodology for conducting classes and extracurricular activities for students with disabilities. Digital educational resources allow qualitatively changing the control of student activities, thus ensuring the flexibility of managing the educational process. The use of ICT offers new opportunities for the creative growth and professional development of students with disabilities, and their properly organized use can significantly change the quality of education.

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在1920年代至1930年代的俄国文学中教育“自然感”的任务
**THE TASK OF EDUCATING "SENSE OF NATURE"
IN THE RUSSIAN LITERATURE OF THE 1920S-1930S**

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抽象。 这篇文章描绘了1920-1930年代小说和科普作品中反映自然主题的反思，这些作品主要供儿童阅读，同时反映了该时代的自然科学，教育和纪律任务。分析的主题是一些发展环保思想的作品，这些思想有助于形成时代人物的环境意识。介绍了今天保留其价值和意义的作家的立场。结论是，文学在现代文明最重要问题的制定和促进中起着领导作用。

关键词：自然感，保护态度，科学的世界图景，自然的全面描述，“第一”自然。

Abstract. *The article characterizes the reflection in the fiction and popular science works of the 1920-1930s, intended primarily for children's reading, of the theme of nature in the totality of the natural scientific, educational and disciplinary tasks of the era. The subject of analysis is a number of works that develop environmental protection ideas that contribute to the formation of the environmental consciousness of a person of the era. The positions of writers who today retain their value and relevance are presented. It is concluded that literature played the role of a leader in the formulation and promotion of the most important issues of modern civilization.*

Keywords: *sense of nature, conservation attitude, scientific picture of the world, comprehensive description of nature, "first" nature.*

The interpretation of nature and man in the science and culture of Russia had several periods of active demand in society: the turn of the 19th and 20th centuries, the 1920s and 1930s, and the 1960s and 1980s. This article discusses two of the three named periods. Each time, the actualization of the theme of nature was associated with the transition of the era - primarily with a situation of acceleration of scientific and technological development. At the turn of the nineteenth and twentieth centuries, this was facilitated, for example, by a set of causes and conditions, the main of which was a change in the way of life of peasant Russia

and, more broadly, a change in world civilizational guidelines. By the 1920s, after the catastrophes of the world and civil wars, a social demand was formed for a cardinal change in conditions of human life, which was associated with global industrialization and the development of science and technology. This led to a wide discussion of the relationship between man and nature, the defense of the idea of a radical transformation of nature, the recognition of science and technology as tools to achieve this goal, and man as the main transformative force. This point of view, technocratic in its ideas, often acquired a radical character in the practice of culture. The position was formed mainly among the proletarian culture and academics close to it; her activity gave strength to the opposing position, which should be called environmentally friendly; its essence lies in the recognition of the main force of terrestrial civilization as natural ("first") nature, and the assessment of its structure as expedient, with great stability and strength; man was offered to build harmonious relations with nature.

The article characterizes precisely this position, which has proved its long-term value. By the 1920s, which are mainly discussed in this study, it had extensive experience in interdisciplinary study and putting ideas into practice; this experience gained wide demand in the new historical era, because various forces found in a discussion relationship perceived it as an unconditional value. The point of intersection of interest in this experience was the sphere of education, in which various social forces set the task of educating a new person. Significant interest in the context of the discussion of the issue was caused by the concept of "sense of nature" as integrating various aspects of the impact on the human personality (see details: 3).

An important role in the development of an environmentally friendly position was played by pedagogy at that time, as it was addressed to a children's audience and offered new concepts for raising children in the context of the ideal of a person of the future. This ideal, even of the proletarian sense, did not contradict the concept of "sense of nature", which also meant the popularization of natural-scientific knowledge, which created the conditions for an "upward elevator" in the field of education for broad social strata that previously occupied a place at the bottom of the social hierarchy.

At this time, they remembered the innovative contribution to the pedagogy of K.D. Ushinsky, who back in the 1860s proposed changing school curricula to "put the study of nature with its phenomena, forces and forms higher than the study of grammatical forms of dead languages" [5; v.2, p.370]. We are talking about the purposeful education in children of a sense of nature, which K.D Ushinsky calls "sympathy for nature" [5, v.2, p. 366]. Practically solving this problem, K.D Ushinsky first publishes the children's book "Children's World" (first edition - 1861), and then the reading book "The Native Word" (1864), which combines natural-

scientific sections on the life of nature, literary texts and guidelines for educators. In post-revolutionary time, the ideas of K.D. Ushinsky were supported by V. A. Sukhomlinsky: together with his students, he created, following the example of K.D. Ushinsky's books, "The Book of Nature", which includes sections "Living and Inanimate", "Inanimate is Connected with Living", "Everything in nature is changing", "Seeds of life", "The sun is the source of life", demonstrating the provisions of materialistic dialectics [4].

K.D. Ushinsky considered it important to give children a materialistic picture of the world, with explanations of its natural forces and processes. Books were very popular among teachers and parents (this is confirmed by the number of publications: in 1899, the book "Native Word" was published as the 117th edition, and continued to be reprinted in the 1920s); they stimulated the appearance in Russia of a whole series of books on the life of nature for children's reading.

Under the influence of authoritative educators, children's books were published at the end of the 19th century, which also set the goal of educating the emotional world and the mind of the child, awakening a conscious sense of nature (they were massively reprinted in the 1920s). We name at least the following authors and their works. M.N. Bogdanov, curator of the Zoological Museum of the Imperial Academy of Sciences, participant in the expeditions of the Russian Geographical Society - stories, tales, essays about animals and the forces of nature "Mirskie Zhebrebniki" and "From the Life of Russian Nature"; E.N. Vodovozova, student of K.D. Ushinsky, children's writer - a collection of short stories "From Russian Life and Nature"; E.E. Gorbunova-Posadova, teacher and writer - "Our green friends", "Our animals", "Observe nature!"; I.I. Gorbunov-Posadov, teacher, writer and publisher of the anthology "Around the World" (parts 1-2, 1901-1908), "Humanitarian and Zoological Readings" (parts 1-2, 1902-1913), author of the collection "Friend of animals", etc.

At the turn of the century and in the first decades of the twentieth century, the preparation of popular science publications became popular among natural scientists. So, in his works of the 1890-1910s, the famous scientist D.N. Kaygorodov - teacher, phenologist, ornithologist, professor of the Forest Institute, chairman of the phenological commission of the Russian Geographical Society, author of numerous popular scientific works on nature - set the task of instilling a sense of nature - "From the kingdom of birds. Popular essays from the world of Russian birds"; "From native nature"; "Conversations about the forest", etc., of the biographical book "P. Tchaikovsky and nature."

In the 1920s, many natural scientific works of the last century, often based on materials from expeditions, were published and reprinted; in the new era they also carried out the task of popularizing knowledge about the natural world and, which is important in line with our reasoning, instilled in the reader respect for the living, a sense of

nature. E.A. Elachich is the author of a series of books about the life of nature, books for children and children's literature. He was a supporter of the idea of raising a child by intimacy with nature (Art. "On reading books by children on natural sciences"). He shared the idea of K.D. Ushinsky about the importance for the "development of the world outlook" of knowledge about the life of nature. Was the author of literature reviews on nature. He translated the books of A.E. Bremm "Tundra, its fauna and flora", "Bird Mountains in Lapland". It is noteworthy that nature was presented in them, most often, as a man grade phenomenon, forming with him a single living world, a harmonious sound whole; consequently, these reprints supported in the literature of this period the opposition to the rapidly growing "negative attitude" towards nature. A.N. Beketov - the author of the fundamental works "The Botany Course" and "Plant Geography" writes popular science books "Conversations about the Earth, Water, Air and Various Creatures", "From the Life of Nature and People", "Conversations about the Beasts". He considered natural science Important for the education of morality.

This center of educational influence on the younger generation was joined by writers who began to travel across the country, especially in its little studied regions, in order to describe them and present them as part of a great country (the concept of "sense of nature" entered into a useful interaction with the concept of "sense of homeland "). It is useful to recall that many authoritative scientists and writers, arguing about the "sense of nature", believed that it was based on broad patriotism; we can say that this is a typological understanding of the sense of nature for Russia.

Often, travel writers are organized and financially supported by the authorities, who expected them to support plans for the industrial development of remote areas. Travel: V. Arsenyev, P. Nizova, A. Yakovlev, M. Prishvin, I. Sokolov-Mikitov, A. Vesely, L. Seifullina and others. So, A. Vesely in the spring of 1927 sailed along the Chusovaya, Kama and Volga rivers to the Caspian, then headed to Siberia to get along the rivers from the southern border of the Siberian territories of Russia to the Arctic Ocean and "look at the place of the Kara-Kyrgyz , Tabarin Tatars, fishermen and hunters of the taiga and tundra ... "(2, p. 3-4).

An unexpected side of these trips was that many writers became interested not so much in the possibilities of industrializing the territories as in their natural world. This has promoted the theme of nature in literature.

An extensive array of works has been formed, the authors of which discovered nature not as material for building a new life, but as a huge independent rich world. Traveling, observing and describing real natural life, writers, often unexpectedly for themselves, maintained a dialogue with nature, in which they discovered its beauty and meaning, its greatness and human dependence on it, and understood the versatility of man's sensual connections with the natural world. Consequently, travel literature, born of the practice of active industrial development of lands, actively supported the environment conservation position.

One of the most famous travel writers is Vladimir Klavdievich Arsenyev (1872-1930), the author of the widely known works "Dersu Uzala" (1923), "In the Wilds of the Ussuri Territory" (1926), "Through the Taiga" (1930) and many others [1]. For 30 years (1900-1930), he explored the vast territories of the Far East and Manchuria: he studied plant and animal worlds, the Sikhote-Alin mountain system, life, religious beliefs of the indigenous population, explored Kamchatka, the Komandorski Islands, and the Avacha Volcano. In the 1920s, he was elected professor of the Department of Geography, Ethnography and Local History of the Far Eastern University. He continued the tradition of "complex-geographical research" of Russian scientific travelers (N.M. Przhevalsky, N.N. Miklukho-Maklaya, etc.) (D. Chartier calls this a plural disciplinary approach - 6, p. 86): he was a geographer, botanist, zoologist, geologist, chemist, archaeologist, ethnographer, author of 62 serious scientific works - an encyclopedic scientist, prone to philosophical understanding of phenomena, gifted with figurative perception of the world.

The works of V.K. Arsenyev described: trees (daur larch, ayan spruce, Erman's birch, cork tree, Korean cedars, Manchurian ash, yew, poplar, cedar, linden), undergrowth (jasmine, eleutherococcus, hazel, creepers, Amur grapes, ferns, astragalus, alder, boar mountain ash, honeysuckle), animals (tigers, lynxes, bears, red wolves, foxes, deer, martens, ferrets, sables, wild cats, wolverines, otter, badgers, red deer, wild roe, pigs, seals), birds (long-tailed duck, mollusk). The author creates whole essays - artistic monographs about animals and plants, fully describing them as a species: habitats, appearance, size, lifestyle, relationships with other animals, etc. He saw nature as a grandiose whole, a living system of systems, a virtuoso creation of the birth forces of nature. Arsenyev's books had a strong influence on writers of the era.

The main ideas expressed in many of the above-mentioned works, often aimed at a children's audience, can be represented as follows. Literature should solve the problem of educating a new personality, the core of which will be a developed "sense of nature": it has equally important scientific, reliable knowledge about the structure of nature and the nature of its laws and the emotional component: reverence for the diversity, complexity and beauty of the natural world and its elements. The writers sought to find a form of a sense of nature that could harmonize the relationship between man and the natural world in the context of their rapidly growing conflict. They were actively solving this problem, using the functions of education and upbringing fully retained by literature even in the post-Soviet era.

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“干扰”的语言文化规范及其历史和哲学理解

**THE "INTERFERENCE" LINGUISTIC-CULTURAL CODE AND ITS
HISTORICAL AND PHILOSOPHICAL UNDERSTANDING**

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抽象。本文专门探讨在跨文化交流和直接与外国文化互动的条件下产生的干扰问题。外国文化的相互作用意味着两种相反元素的相互作用，在我们的理解中，两种或多种文化也相互作用。只有在逐步解码新的语言文化规范的情况下，才能感知新世界，即新的语言和文化。理解语言文化规范就是要实现世界的语言图景，外国文化的每个代表都在努力创造自己的世界通用图景。我们申明，正是世界的语言图景帮助我们从人的需求的完整性和共生性的角度更好地理解语言和文化。语言和文化意识是对民族文化特征和外国文化内在世界的认识。关键字：语言文化规范，干扰，世界语言图景，融合，外国文化

***Abstract.** The article is devoted to the problem of interference arising in the conditions of intercultural communication and directly the interaction of foreign cultures. The interaction of foreign cultures implies the interaction of two opposite elements, and in our understanding, two or more cultures. The perception of a new world, namely, a new language and culture, is possible only under the condition of gradual decoding of a new linguocultural code. To understand the linguocultural code is to realize the linguistic picture of the world, where each representative of a foreign culture strives to create his own universal picture of the world. We affirm that it is the linguistic picture of the world that helps us to better understand the language and culture in terms of the integrity and symbiosis of the needs of human being. Awareness of language and culture is an awareness of national-cultural specificity and the inner world of a foreign culture.*

Keywords: *linguistic-cultural code, interference, linguistic picture of the world, convergence, foreign culture*

Starting from the 19th century, linguists and philosophers assigned a significant role to understanding the processes of convergence in the conditions of interaction of foreign cultures. It was believed that it was interlanguage contacts that generated the convergent restructuring of languages and the comprehension of the new world. However, the language system could not be a tear-off point in the generation of convergence. The interaction of foreign cultures implies the interaction of two opposite elements, and in our understanding, two or more cultures. The perception of a new world, namely, a new language and culture, is possible only under the condition of gradual decoding of a new linguocultural code. To understand the linguocultural code is to realize the linguistic picture of the world, where each ethnos, on the basis of its own worldview principles, strives to create its own universal picture of the world. It is the linguistic picture of the world that helps us to better understand the *language* and *culture* in terms of the integrity and symbiosis of the needs of human existence. Awareness of language and culture is an awareness of national-cultural specificity and the inner world of a foreign culture. By comprehending, studying, introducing into foreign culture, we thereby contribute to the process of integrating languages and cultures, the result of which is not only understanding and awareness of the very essence of *foreign culture*, but also the emergence of interfering models that lead to a change in the norms and standards of language and culture.

Speaking about the interference as a whole, as a phenomenon arising in the process of interaction of two or more cultures, polyglots, linguists, methodologists in the field of teaching foreign languages focused only on the nature of multilevel errors in the communication process generated by their native authentic language. In the theory and methodology of teaching, where the main goal of teaching foreign languages is the formation of communicative competence, this factor was not taken into account, namely, language and culture are taught in the framework of my own culture in the context of artificial bilingualism, where the native language and native culture are dominant. It is difficult to understand authenticity in the conditions of *artificial bilingualism*. The scope of authenticity depends on a number of factors, one of which is the linguistic and cultural distance. If the distance between languages and cultures is large, in other words, languages are not genetically related, then in this case the process of mastering foreign culture is faster, but cultural adaptation is more complicated. The authenticity of inter-linguistic and cultural studies is hindered by unjustified transposition of the phenomena of one language into another, by the divergence of linguistic and cultural worldviews among different ethnic groups. And each ethnic group sometimes considers its own culture, its own language from the perspective of ethnocentrism.

Speaking about communicative competence as a whole, about understanding the essence of achieving authenticity, linguists concentrated their attention only on the linguistic component as on the knowledge of the linguistic code itself, i.e. understanding of morphology and syntax, and theorists in the field of teaching methods for understanding various types of situational statements, the ability to choose linguistic means depending on the type of communication, use adequate language forms, grammatically correctly structure the sentence both verbally and in writing.

Of course, both strategic and sociocultural, as well as discursive and sociolinguistic competencies are components of communicative competence, and they are laid down in the process of learning languages through the educational and methodical complexes used in the education system, they are the main condition in the learning process, which is provided for by the educational standard, but at the same time, it is these components that make up the message layer of communication and generate interfering phenomena in the context of the integration of cultures. To understand the discourse in the context of communication means to understand and build holistic, coherently logical statements of different functional styles; to understand the strategy of utterance means the ability to use strategies of verbal and non-verbal nature; to understand sociolinguistics in the conditions of communication and to be able to use it means the correct differentiation of linguistic forms and means. And the main condition for understanding foreign culture is the mastery of sociocultural (linguocultural) competence, namely knowledge of the cultural characteristics of the language, traditions, norms of behavior, etiquette and the ability to understand, recognize, and in time switch the cultural code and language code from *my language and culture* to language and *foreign cultures* and adequately used in the process of communication.

At one time, V. Fon Humbold gave a true definition of language, for language is not a product of activity (Ergon), but activity itself (Energiea) [1: 22]. And in the process of communication, because communication is an activity, it is important to establish the scope of possible interference both in language and in culture. The desire to minimize interfering phenomena in the process of speech generation and adaptation in the new realities is, of course, the desire to minimize communicative frustration. Communicative frustration at both the verbal and non-verbal levels arises as a result of differences in the national consciousness of *foreign cultures*. To know *foreign culture* suggests awareness of the mental code of a *foreign culture*. In his work "Philosophical problems of psycholinguistic semantics" Tarasov E.F. correctly noted: "*The modern world is a world in which there are no homogeneous national cultures, moreover, there are no identical images of consciousness displaying identical or even the same cultural object*" [2: 27-28].

Important in the process of mastering foreign culture and understanding the essence of interference is an understanding of the mental code of *foreign culture*. Each culture, each ethnic group has its own mental code. Any perception of the world, both internal and external, is known through the prism of its culture, in other words through its mental code. Mental code has inherent traits of a national character. In this regard, the anthropologist Margaret Mead in 1953 made an important conclusion in her work, "Modern Anthropology: Encyclopedia of the Researcher," pointing out that "*The national historical tradition and its inherent cultural model in the process of socialization (in our case, integration) determine the national character.*" [3: 647]. "*For example, comparing two cultures, the cultures of the West and the East, we see that these cultures are different in their origin, form of expression, uniqueness of thinking and behavior.*" [3: 649]. Thus, we can proceed from the fact that the mental code is a code for perceiving the world through a system of values as the basis of one's own mentality, as a comprehensive category of culture; it can be universal, if we consider it as an integral component of a national character, national self-awareness and the culture's own spirit.

Sociocultural errors arise as a result of a different perception, a different interpretation. A different form of being is perceived, evaluated through the prism of the native model of culture (in other words, world outlook). To realize the differences inherently leads to the basis of rapprochement of foreign culture knowledge, the development of authentic intercultural dialogue and adaptation in *foreign culture*.

When analyzing interfering phenomena in the process of integration of cultures, a logical question arises whether interference is a consequence of interpretation. Cognition of the world through the prism of one's culture is an interpretation. Thus, knowing the world, we interpret any phenomena in foreign culture, both linguocultural and historical events. If culture is closely connected with the history and philosophy of an ethnos, then the phenomenon of interference in the historical event of a *foreign culture* is unconditional. The interpretation of a historical event as a knowledge of a foreign culture from the position of my "I" is an interfering phenomenon. For example, a comparison by historians of different cultures on the same objects, phenomena and events reflected in the texts. It is the generative discourse that historians carrying foreign cultures has a significant impact on the interpretation of historical events and the analysis of historical facts, the result of which is studied, perceived, transmitted event or historical fact is presented from the point of view of participants in different sociocultural situations of communication. the linguistic form of an event is filled with new content, endowed with new meanings that play an important role in the process of interpreting a historical event. There is an impact on human thinking, one and the same historical thought in a different culture can be expressed differently and perceived differently, based on its own system of linguistic and cultural historical codes of this community.

Interference affects the entire layer of the need code of human existence. To minimize interfering phenomena, a thorough understanding of the linguistic-cultural codes of the West and the East is necessary. Speaking about the East as a whole, we should proceed from an understanding of the essence of the mental code: the eastern mentality is formed by dialectical thinking, the basis of which is in Confucianism, Buddhism and Taoism, the main trends of traditional oriental culture. What is the essence of the mental code - essence is inconsistency, integrity and practicality. In other words, the task of traditional Chinese philosophy is not to increase actual knowledge, but to improve intellectual abilities. Eastern culture is collective in contrast to the individualism of the West, for example, the *middle ground* determines the Chinese national identity.

Representatives of *foreign cultures* have their own peculiarities of thinking, their own systems of moral values, which affect both intercultural interaction and integration of cultures.

The neutralization of interference in a dialogue is possible with a comprehensive study of the specifics of the linguistic consciousness of native speakers of *foreign cultures*. For example, through the associative fields of moral values in the linguistic picture of the world of the West and the East, we determine the similarities and differences in their content and systemicity, which is determined by the specifics of a particular culture, history, philosophy, religion.

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促进全纳教育心理学中的社会互动
**FACILITATION OF SOCIAL INTERACTION
IN THE PSYCHOLOGY OF INCLUSIVE EDUCATION**

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抽象。 和平二分法意味着反对有关行为者的相对利益,即冲突(统一和对立斗争),特别是在全纳教育中。 这些对立会产生张力,而张力本身就是一种驱动力。 如果互动的主体将自己确定为社会认同中具有共同利益和目标的新的集体主体,那么具有不同特征的人的交流就可以具有创造性。 作为本体论方法的一部分,传播者被视为观察者,通过他的出现,可以帮助从外部观察自己并将身份从个人变为社会。 将个人身份识别转换为社会身份识别是您自己以及他在更高意识水平(集体,世界)下的使命的愿景。

关键词: 促进社会互动, 交流者, 观察者, 本体论方法, 全纳教育心理学, 社会心理失调。

***Abstract.** The dichotomy of peace implies opposing the opposing interests of the actors involved, that is, conflict (unity and the struggle of opposites), especially in inclusive education. These opposites create tension that manifests itself as a driving force. Communication of persons with different characteristics can be creative if the subjects of interaction identify themselves as a new collective subject in social identification, who have common interests and goals. As part of the ontological approach, the communicator is seen as an observer who, through his presence, helps to look at himself from the outside and change the identification from personal to social. Changing personal identification to social identification is a vision of yourself and his mission at higher levels of consciousness (collective, world).*

***Key words:** facilitation of social interaction, communicator, observer, ontological approach, psychology of inclusive education, psychosocial dissonance.*

Introduction. Due to the increasing pace of development of mankind (economy, technologies, transport, communications, etc.), the density of social interaction increases, the spectrum of perceptions of interaction subjects expands - the boundaries of perceptions are blurred and stretched. And accordingly, there is psychosocial dissonance (mismatch of perceptions and mental tensions) between the

subjects of inclusive interaction (Khalitov, 2014). A pre-conflict state can develop in two scenarios: either (1) conflict and related consequences (destruction of social relations, disease, etc.), or (2) cooperation as a prerequisite for the development of social relations and the actors of interaction themselves. The choice is made consciously or unconsciously by the subject of the interaction itself. What affects this choice? The supposed factors influencing choice are: 1) the personality characteristics of the interaction subjects; 2) the situation in which they interact. Most likely, images (representations) about these factors in the memory matrix of interaction subjects. Changes in these images in the memory matrix of interaction subjects lead to changes in social interaction (Nalimov, 2013). Difficulties in psychology of inclusive education were dealt with by L.V. Artischeva (2018), A.I. Akhmetzanov, T.V. Artemiev, I.V. Krotov (2019).

When psychosocial dissonance occurs between actors of inclusive interaction in a pre-conflict state, two scenarios can develop: conflict or cooperation. The selection is influenced by the communicator (observer) through the change in the memory matrix of the interaction subjects of the interaction images (representations) of the interaction situation and the personal characteristics of the interacting. So one of the factors of image change is the effect of facilitation, which was discovered in the last century. In the popular American journal "Science" on July 16, 1965, Robert Zajonc's article "Social Facilitation" appeared, which started a whole direction of social and psychological research (Zajonc, 1965).

Formulation of the purpose of the article. As part of the ontological approach, the communicator is seen as an observer who by his presence helps to look at himself and his interaction from the outside and change the identification from personal to social (Vasina, 2016).

Presentation of the main material of the article. The word "facilitation" in English is infrequently found and almost exclusively in a psychological context - as derived from the verb facilitate - to facilitate, assist, facilitate. The "short psychological dictionary" explains this concept as follows: "increasing the speed or productivity of the activity of the individual due to the updating in his mind of the image of another person (or group of people) acting as a rival or observer of the actions of the individual." The presence of an observer has been shown to have a marked impact on the performance of virtually any activity by humans. And the influence can be both positive and negative. The latter phenomenon has been called social inhibition (suppression).

R. Zajonc offered an elegant explanation for this effect. First, the presence of others increases physiological arousal, and second, with increased arousal, light tasks are performed better, while performing difficult tasks is prevented. In other words, the presence of others helps to carry out well-studied stable reactions and prevents new, not yet learned ones. In recent years, along with Zajonc's theory,

other views on the nature and essence of the phenomenon of facilitation - inhibition - have become common. One is the so-called "attention/conflict" distraction model. This model is based on the idea that the presence of other people always attracts our attention.

As a result, there is an internal conflict between the two main trends that appear in almost any situation of public activity: 1) pay attention to the audience and 2) pay attention to the task itself. This conflict can increase excitation, which further helps or hinders the task, depending on whether the correct solution to the problem is associated with a dominant response or not. In addition, such conflict can cause cognitive overload if the efforts necessary to necessarily pay attention to the complex task and other people exceed the level of cognitive abilities of the individual. Of particular interest to the influence of the level of group development is the manifestation and degree of expression of the phenomenon "facilitation - inhibition." As practice has shown, in groups of high level of socio-psychological type of development, presence of others and interaction with them has a clearly expressed financial influence in the process of complex intellectual activity. A practical social psychologist, planning any individual-specific as well as functional-role influence and interaction of the members of his group of interest, should take into account the phenomenon of "facilitation - inhibition" and realize that the resulting funding effect may be both an essential resource for achieving the goals set and a serious obstacle that will not allow these goals to be achieved.

Let us highlight the effect of facilitation in social interaction in the psychology of inclusive education, where the presence of "other" people who do not interact directly at this moment - an outsider, an observer, a communicator - plays an important role. Teachers, teachers, administrators, etc., or colleagues, fellow students, etc., may have such functions at any given time. It is at the moment when they act as observers (facilitators). At what this influence affects both pupils (students), and teachers (teachers and so forth). The concept of facilitation is used in quite broad spheres of human activity (management, pedagogy, psychotherapy, etc.), and therefore the definitions are blurred, and the facilitation is mixed (confused) with the concepts of direct activity in these spheres (management, training, counselling, for example, as non-policy). The effect itself in the course of activity is present, but it is not necessary to mix with the activity itself. Therefore, we introduce the concept of the state of social interaction facilitation. An individual in his activities moves from one state (or role) to another. I would like to clarify this concept, or explain how we understand the concept of the facilitation of social interaction in the psychology of inclusion.

There is system status (the person, group): the main and excited (changed). If in social interaction of subjects the system is in the status at the moment, then at appearance of the observer-facilitator the system passes into other status, i.e. the interaction status changes.

Researchers found out that expressiveness of a social and psychological phenomenon "a facilitation - the inhibition" in many respects depends on gender and age, status and role and a number of other social and social and psychological characteristics of the personality. At the same time it is necessary to understand that similar "inclusion" in process of the analysis of the additional konkretiziruyushche-personifying variables the facilitation - an inhibition" and a phenomenon of real personalisation sets for the researcher a task at a stage of interpretation of empirical data by means of additional experimental efforts to differentiate a phenomenon ". It is necessary to distinguish intrinsic mismatch of phenomena of a facilitation and personalisation. In a "fasilitatsionny" situation only the fact of the presence of another not significant as the specific personality, and significant is updated only because it is present and therefore that it is "another". The effect of a facilitation is an effect of the observer, another. The role of the observer in knowledge and of development of the world and itself is very considerable. If we consider the world in me and I in the world (ontologic approach), then quite naturally there is a question: who considers also what considers. These questions are connected both in terms of science, and in terms of human life. They are connected with creation of model of (the world in me) and models of the world around, the behavior in it (I in the world).

By functional characteristic, the role of the observer can be divided into: external and internal, researcher scientific (goal scientific) and by life (goal - development, knowledge of the world). In meaning, the observer of the United and its gnoseological essence - impartial assessment (image) of objects (subjects) (social) interaction and situation; And acceptance of new submissions. The changes relate mainly to a better understanding of the limitations placed on interaction processes by the need to take into account the role of the observer. Depending on the role of the observer in the situation under investigation, there is a distinction between included and not included observation.

Let us consider the problems of facilitation in terms of ontological approach. Ontologic approach [ontological approach] - a way of a research when the attention is concentrated on objects of a research. Ontology is an attempt at the most general description of the universal of the existing, which would not be limited to the data of individual sciences and perhaps not reduced to them. Types of ontologies: Meta-ontologies - describe the most general concepts that are independent of subject areas. Subject area ontology is a formal description of the subject area, usually applied to clarify concepts defined in meta-ontology (if used) and/or to define the general terminology base of the subject area. The ontology of a specific task is the ontology that defines the common terminology base of the task, the problems. Network ontologies are often used to describe the end results of actions performed by objects in a subject area or task. The ontology of psychology describes the form (sematic space, consciousness) and content (psyche) of being this level (3 levels in our level model).

The definition and construction of ontology includes analysis of the subject area, identification of basic ontological elements (objects, their attributes, relations and processes), carrying out operations on these ontological elements. The priority in the production of the ontological approach to man in domestic psychological science belongs to S. L. Rubinstein, who analyzed key aspects of being and characterized man as a subject of life (Rubinstein, 2003).

At present, the ontological approach justified by N.I. Leonov is implemented in the study of social and psychological phenomena by researchers such as D.A. Borovikov (organizational behavior), M.M. Glavatsky, N.A. Karimov (conflict behavior), E.N. Molchanov (political behavior), T.A. Naumova (active behavior), I.Vlova. The ontological approach, defining a person as active, designing social reality, makes it possible to understand the relationship between the image of the social world and the social behavior of the subject (Leonov, 2013).

Our vision, understanding of ontological approach is based on the author 4-level model of description of social-psychological phenomena (and its correspondence to the three-level model in philosophy):

1 - separative, substantive, material, physiological level (real - from the point of view of philosophy); I am in peace; The outside world;

2 - energy, field, emotional, level of sensations;

3 - informational, mental, conceptual, categorical level (real - from the point of view of philosophy); Peace in me; Internal peace;

4 - non-spherical, transcendent, quantum level (possible - in terms of philosophy), the whole world.

Any psychological problems can be considered in terms of these four levels and the phase psychological space of characteristics. Interaction occurs on all four levels at the same time, but at each moment some one level dominates. Since it is not important to the person of the communicator, but to the role he plays in the interaction, consider the levels:

Level 1 - The benefactor is perceived as a separate separable person, which can mechanically affect the individual.

Level 2 - The communicator is perceived as a "mass shadow."

Level 3 - The benefactor is perceived as an "idea."

Level 4 - The benefactor is perceived as everything that is, as God, as a patron, beloved and loving, giving, etc.

Conclusion. On the basis of the above, we will give the following definition of the concept of "facilitation of social interaction": the facilitation of social interaction is an increase (change) in the productivity of the social interaction of the subject of social interaction (individual, social group, society) due to the updating (change) in the mind of the subject of the image (representation) of another subject and the situation of social interaction in the continuum of facilitation-inhibition in the presence of an observer (facilitator).

We have expanded the concept of facilitation to the interaction of social groups, society, because there are concepts of collective consciousness, noosphere, and accordingly, there is an image (representation) of the observer in the corresponding memory matrix. On the basis of this understanding, the technique "Propensity to Perception of Financial Impact" (Michelson 's Test of Communicative Skills in the V.V. Vasina Modification) was developed to identify the impact of the communicator on social interaction. Pilot studies were carried out. The sample consisted of students and teachers of Kazan, only 100 people. The average age is 26 (± 7) years. The test defines three types of communicative response: competent (confident), aggressive (we interpreted as independent) and dependent. In terms of probabilistic approach, all types of responses are present in the individual, but the probability (dominance) is different in the continuum "dependent-moderate-independent."

The main characteristic that changes the levels of states in social interaction, in our opinion, is identification: when changing from personal to social, and vice versa, there is a change in the level of the state of the system. The communicator affects the interaction of subjects, including in inclusive practice, and their interaction is transferred to another state of interaction (to another level of interaction), i.e. the state of interaction is changed under the influence of the communicator observer.

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纳克什班迪·塔里卡与伊斯兰极端主义：互动的方式
NAQSHBANDI TARIQA AND ISLAMIC EXTREMISM: WAYS
OF INTERACTION

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注解。 本文专门研究极端组织“纳克什班迪军队”的活动。 特别注意研究该团体与伊斯兰国际恐怖组织的联系。 作者预言中亚国际极端主义活动的加剧，作为实施伊斯兰激进国家计划的新跳板。

关键词：侵略，极端主义，激进主义，仇外心理，恐怖主义，国家。

Annotation. *The article is devoted to the study of the activities of the extremist organization “Naqshbandi Army”. Particular attention is paid to studying the contacts of this group with Islamic international terrorist organizations. The author predicts the intensification of manifestations of international extremism in Central Asia, as a new springboard for the implementation of state projects of Islamic radicals.*

Keywords: *aggression, extremism, radicalism, xenophobia, terrorism, state.*

Recently, the extremist group “Army of Men of Naqshbandi Tariqah” (Jaysh Rajal al-Tariq al-Naqshbandiyya) or “Army of Naqshbandi”, whose activity is noted in Iraq, Syria, Central Asia (Uzbekistan, Tajikistan, etc.), has been making more and more confident of themselves. .). This group cooperates with jihadist organizations such as the Islamic State, Jebhat-en-Nusra, and the Taliban (everyone’s activity is prohibited on the territory of the Russian Federation) and the traditional contradictions between Sufism and radical Islamism do not stop it. Indeed, jihadists and Sufis are traditionally in difficult relationships (there are statements - fatwas of jihadist ideologists about Sufis as apostates from true Islam, etc.), but not necessarily irreconcilable.

There are many examples of cooperation between Sufis and Islamic radicals. So, for example, one of the famous theoreticians of “pure Islam” Ibn Taymiyyah himself was a follower of “faithful Sufi sheikhs, whose names he called” [2, p. 85]. Constant relations with the Sufis were supported by a radical movement - senusiya. This movement, operating in Algeria, used various Wahhabi ideas. So, what is the Sufi tarikat Naqshbandiya and what is its role in the modern history of Asia?

To date, the Naqshbandiya tariqah along with the Kadiriya tariqah are the two most influential Sufi orders in the Middle East, with Naqshbandiya the most influential among the Sunnis of Iraq and Syria. According to V. Prokhvatilov: "Naqshbandi is a Sufi brotherhood (tariq), which received this name at the end of the 14th century by the name of Muhammad Bahauddin Naqshbandi al-Bukhari. The worldview of the tariqa is a combination and adaptation of "moderate" urban mysticism, reflected in the doctrines of Abdul-Khalik al-Gidzhduvani, and the nomadic "Turkic" - Ahmad al-Yasawi. On the issue of attitude to the authorities, the Naqshbandi Tariqah remains the only fraternity that considers it obligatory to come into contact with the authorities in order to influence their policies regarding the masses [4].

Members of the Nakshbandi tariqah became more active in 2003, when the Nakshbandi Army they created began to be replenished by immigrants from various government structures of Saddam's Iraq and the Ba'ath Party. In fact, it was a military structure of the High Command for Liberation and Jihad led by Isaat Ibrahim al-Duri, one of the deputies of Saddam Hussein. Therefore, it can be argued that the Naqshbandi Army group was created by the decision of Saddam Hussein and with the participation of his closest advisers and senior functionaries of the Baath Party.

At the same time, some of the former officers and party officials of Saddam Hussein participated in the creation of the "Islamic State" (at that time - ISI). Hence the absence of hostile relations between the Sufis of the Naqshbandi Tariqah and ISIS jihadists (banned on the territory of the Russian Federation). By the way, during the capture of Mosul by the Ishilovites, the Army of Naqshbandi assisted them and then formed the city administration. Under the gun, the "Naqshbandi Army" has about 10-12 thousand people, however, unlike ISIS, the Army operates underground, although in some desert areas of Iraq there are territories under its control [5].

In addition to Iraq, the Naqshbandi Army took part in the fight against the Bashar al-Assad regime in Syria, but as an independent formation, rejecting the proposal for close cooperation both from ISIS and the more moderate SSA (Free Syrian Army).

At the same time, the interests of the Sufis of the "Naqshbandi Army" are not limited only to Iraq and Syria, Central Asia and cooperation with the Taliban are no less important directions of its expansion. Interaction with the Taliban seems more promising, as their beliefs are not exclusively Wahhabi. And the traditions of the Deobandi school are a unifying beginning for cooperation.

Deobandism arose in British India at the end of the 19th century. as a movement for reform and the unification of the Muslim ummah under conditions of

colonial rule and government by non-Muslims. The founders of this movement were Mohammad Kazim Nanotavi and Ahmad Gangohi, who founded the first madrassah in Deoband, in the Delhi region. The founders considered the opening of the madrassah an important step for the upbringing and education of young Muslims, who would revive the former glory of Islam, based on Sharia law, spiritual experience, Sufi practices. The deobandists, trying to protect the Islamic faith from any innovations, rather rigidly interpreted the provisions of traditional Islam - rejected other directions, accusing their adherents of unbelief, seriously limited the position of women, demanded strict observance of Islamic rites, prayer practices, etc.

At the same time, adherence to the Hanafi madhhab contributed to the growing popularity of the views of the Deobandists and the spread of their teachings, especially in South Asia. Many Deobandi madrassahs arose in Pakistan, after its creation in 1947. Graduates of the madrassah were engaged in the propaganda of their views in various provinces of Pakistan, including in Afghan refugee camps. The Tal-Taliban leadership had a significant impact on the Dar-ul-Ulum Hakkania madrassah, which was completed by many leaders and some Taliban field commanders.

In addition, one of the Deobandi centers was created by the followers of Valiullah Shah, a theologian who belonged to the Naqshbandi tariqa and then adopted the Wahhabi approach to Islam. Therefore, a significant part of the teachers of Deoband belonged to the followers of Sufism.

At the same time, the Deobandi movement considers it acceptable and necessary to participate in the struggle for a form of government and influence on rulers. Hence the Deobandi's interest in the events in Afghanistan and their participation in the creation of the Taliban.

The Deobandi movement itself has developed in line with the tradition of Islamic renewalism, formed in India since the time of the Naqshbandi theologian renewalists Ahmad Sirhindi and Valiullah Shah. But Deobandi has the most direct connections with the modern fare. So, for example, the Deobandi movement refers to the Order of Naqshbandiyya-Uvaisiya actively active in modern Pakistan.

According to M. Podkopaeva: "The Taliban movement associates with the Naqshbandiyah the traditional prevalence of Naqshbandiya among the Pashtuns (the Mujaddi clan is an example of this), let us point out that the Taliban was under the powerful influence of Deobandism in the era of its inception. That is, modernized Islamic radicalism cultivated in Pakistani madrassas. Many researchers are convinced that the roots of the Taliban go directly to the Deobandi training centers" [3].

In addition, according to J. Bensi: “Wahhabi views brought into the Taliban worldview were also under the scrutiny of deobandist teachers. Thus, it was the representatives of Deobandi who managed to ensure that the Afghans were trained in Deobandi madrassas in the work of the most authoritative for Pakistan, Abu l-Al Al Moududi, who is considered a reformer of Central Asian Islam based on the combination of Deobandi and Wahhabism. And it was precisely the concept of “theodocracy” of Moudoudi that laid the foundation of the Taliban movement “[1].

Thus, the Sufis of the “Naqshbandi Army” have common ground with the Taliban movement and if the Taliban actively expand into Central Asia, the Sufis of the Naqshbandi tariqa will not remain mere observers, as was already the case in Iraq and Syria. Therefore, there is a very high probability that Central Asia will become the next “boiling pot”, where the Taliban, the Naqshbandi Army, and the Islamic State defeated in Syria can take part in an attempt to create a “new caliphate”, not counting more small groups of local extremists, including the most radical Uyghur separatists who left China. Undoubtedly, the intensification of international extremists in this region directly threatens the state integrity of Russia, China, and the countries of Central Asia and will require from them not only response, but also preventive actions (diplomacy, “soft power”, actions of intelligence services, etc.).

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文化考古的渊源 洛特曼

SOURCES OF ARCHEOLOGY OF CULTURE OF YU.M. LOTMAN

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抽象。在俄罗斯文学批评中，创造者和创造力的问题与建立作者身份的方法的发展，“作者位置”和“叙述者位置”的分离，“真实作者”和“作者作为艺术作品”的关系有关。图片”。Yu.M.的方法当移交给其他国家和社会文化背景时，洛特曼提出了文化翻译和系统转换的问题。在构建研究对象的模型时，所需的模型将始终简化对象，并包含研究人员意识中引入的要素。因此，洛特曼(Lotman)开发了一个程序，用于在语言学中应用结构主义和符号学的方法。对思想史家的客观分析涉及作者的位置与总体文化状况的相关性，文学作为社会政治领域的考虑以及作者文化个性的确定。对历史过程的一般研究和对人类单位的具体描述是不可能的，彼此之间是不可能的，并且它们的价值相同。文化作品(人或文本)模型的重建是文化考古学的有机组成部分。每一件特定的作品都会重建一个文化现实的图像模型，该模型反映人们在这种文化类型中的存在-日常生活，思想，现实和日常生活。文化考古学旨在提供客观研究的可能性。

关键字：Yu.M.洛特曼(Lotman)，文化哲学，创造哲学，关于创造力的研究方法，文化历史，文学批评方法，文化个性，文化作品模型，作者的问题，作品文本，文化考古。

Abstract. *In Russian literary criticism, the problems of creator and creativity were posed in connection with the development of methods for establishing authorship, the separation of “author’s position” and “narrator’s position”, the relationship of “real author” and “author as an artistic image”. Approach of Yu.M. Lotman raised the problem of cultural translation and transformation of the system when transferred to other national and sociocultural contexts. In constructing the model of the object under study, the desired model will always simplify the*

object and contain the elements introduced by the consciousness of the researcher. Therefore, Lotman developed a program for applying the methods of structuralism and semiotics in philology. An objective analysis of the historian of ideas involves the correlation of the author's position and the general cultural situation, the consideration of literature as a socio-political arena, and the identification of the author's cultural personality. General studies of historical processes and a specific description of a human unit are impossible without each other and are equal in value. The reconstruction of a model of a work of culture - a person or a text - is an organic part of the archeology of culture. Each specific work recreates an image-model of cultural reality, which reflects the existence of people in this cultural type - everyday behavior, thinking, realities and everyday life. The archeology of culture is designed to give the possibility of objective research.

Keywords: *Yu.M. Lotman, philosophy of culture, philosophy of creativity, methodology of research on creativity, history of culture, methodology of literary criticism, cultural personality, model of a work of culture, author's problem, work-text, archeology of culture.*

The range of fundamental problems in the modern philosophy of creativity: the problem of the subject, his freedom and degree of consciousness of creative activity, the problem of the elitism of creativity, the criteria and hierarchy of species, the problem of the source of resources and impulses of creativity, which can be either autonomous subjectivity or contacts with culture [26]. In Russian literary criticism, the problems of creator and creativity were posed in connection with the development of methods for establishing authorship, the separation of "author's position" and "narrator's position", the relationship of "real author" and "author as an artistic image". In the 1930s, there was a turn to the *historical* problems of art: "the examination of a literary work, on the one hand, as a historical monument, an epoch document among other documents, and, on the other hand, as a work of art, a text of a completely special nature, made it possible to see the facts literature in that double combination of historicism and internal organization" [17, p. 68]. Yu.M. Lotman's approach to Russian literature as part of the movement of social thought reflected such a turn: the problem of cultural translation and transformation of the system was raised when transferred to other national and sociocultural contexts, which implied a review of the technique of analyzing the internal organization of the work-text.

The results of Lotman's first research [16] became relevant in the changing political situation in the 1950s, which was reflected in philosophical discussions "on the role of Radishchev in the social struggle of the 1780s" in the "Philosophy Issues" journal [2,3,6]. The inner ideological inconsistency of the writer's works is problematized. An analysis of the problem by Lotman shows that the author's

system of views that is controversial for the historian of ideology does not just reflect conflicts of social reality: “a system can appear as contradictory from the point of view of a modern researcher and monistic, consistent from the point of view of its creators” [19, P. 8], and visible contradictions often turn out to be connected with the incompleteness of the “research model”. Lotman demonstrates this on the problems of the immortality of the soul and revolutionary tactics in the work of Radishchev.

Lotman believes that the reason Radishchev turned to a philosophical idea alien to him is connected with the peculiarity of the question. For the study, “you have to go beyond the limits of the “philosophical” issues and turn to the circle of ethical problems that Radishchev faced” [19, p. 17-18]. Rousseau Radishchev put Helvetius' ethics in the idea of a social contract: entering into dormitory, a person realizes all his private interests, in a rational society that is not distorted by violence and deception, egoism will be reasonable, a person can easily separate his genuine benefits from imaginary antisocial ones. The transition from a “real” slave state to a “philosophical” free people should be initiated by the contagious example of a hero: “the word “husband is firm and enterprising” takes people out of a state of slavish obedience. In the future, the parody moves according to the laws of society, exercising its sovereignty” [19, p. 20]. Here, the ethics of Radishchev require transformation, going beyond the limits of the Helvetian ethics: the death of a hero is necessary to give strength to his words, but the willingness to die for a national cause cannot be explained by personal gain. Lotman concludes that the treatise "On Man..." justifies itself: the theme of personal immortality arose in the work of Radishchev when he addressed the problem of a fighter going towards death. Radishchev's goal is not a system linking general philosophical theses and the problem of personal immortality, but ethics, reinforcing man's courage. On the way to inevitable personal death, he offers the reader two possible solutions: the first, denying personal immortality, propagates immortality in the memory of posterity; the second assuming the immortality of man, calls with readiness to sacrifice his life for the common good. Thus, this contradiction does not testify Radishchev's weakness as a philosopher: “Radishchev came close to problems that revealed the fundamental weakness of the materialistic ethics of enlighteners” [19, p. 25].

Following the same research logic, Lotman shows how the concept of the author's position changes depending on our ideas about the addressee of a literary work. In the controversy in “Questions of Philosophy” around “Traveling ...”, Radishchev's assessment as a “consistent liberal,” not a “revolutionary thinker,” was oriented toward destroying the ideological cliché. As part of this discussion, Lotman publishes an article [9], where Radishchev was traditionally considered: as an exponent of the interests of the peasantry and a supporter of the revolution. Radishchev, as was shown, is

faced with the impossibility of building a revolutionary theory on the Helvetic ethics: it was the protection of man as a unit that provided the basis for justifying the revolution, otherwise the adoption of the idea of the dictatorial power of society over man in Russian conditions would justify government violence. The position "Radischev - liberal" would suggest the hope of the liberation of the peasants "from above", and, consequently, the appeal of "Travel ..." to the philosopher on the Throne "[14, p. 387], but Catherine II's assessment excludes this. Radischev's appeal with the "program of liberal concessions" to the landlords seems improbable; the peasantry is not an addressee either. The tasks of the liberation struggle required the training of conscious revolutionaries who were able to lead the speeches of the peasants. Lotman leads to the "idea of Radischev's open installation on the creation of a revolutionary propaganda work. <...> the material here is located not on the basis of unity of development of the author's image, but on the basis of consistent agitation influence on readers" [14, p. 388]. At the end of the XVIII century. There were two social forces that could give such figures: on the one hand, heterogeneous intelligentsia from the rural clergy and democratic sectors of society, on the other, the best part of the noble intelligentsia, to which people like N.I. Novikov and A.M. Kutuzov belonged. Therefore, "Radischev did not appeal to like-minded people, but to people who, before becoming such, had to learn the whole complex of ideas of a revolutionary writer. The demand for the liberation of the peasants was, undoubtedly, one of the main links" [14, p. 406]. Lotman dwells on the fact of Radischev's participation in the political life of the country. A detailed analysis of documents [21, p. 410] gives the researcher the opportunity to show that even during his legislative activity Radischev remains in revolutionary positions. Radischev did not fundamentally distinguish serf rights from a free "citizen" in his projects: "in the whole treatise <...>, which should determine the legal norms of civil life in modern Radischev Russia, the word "serf" is mentioned only once in a tertiary issue, which also refers to least developed part of the project. <...> The once occurring word "landowner" is deprived of its usual social content and is interpreted as "owner" in general"[21, p. 413]. Radischev, setting out the state legal norms, consciously and systematically ignored the fact of the existence of serfdom in Russia. This technique makes, according to Lotman, thinking people see the injustice of the current state of affairs. Radischev draws from the position of materialistic jurisprudence of the XVIII century. a picture of normal social and legal relationships, in which there is no place for the terminology of the feudal monarchy. Radischev expresses all the most critical provisions in the secondary clauses of the "Code" with the intention of not attracting the attention of the approving authorities to them; the goal here is not to influence the government [21, p. 415 - 416]. Consequently, Radischev sets the goal of his campaigning effect on society, showing the contradictions between the fair principles of the "Code" and the feudal system. Thus, Lotman shows the consistency and internal non-contradiction of Radischev's ideological heritage.

If in the case of Radishchev, Lotman uses biographical data to clarify ideas, then in the study of Karamzin's life and work, an analysis of the historian's literary and publishing activities helps to reconstruct his biography [1]. Lotman distinguishes several periods in Karamzin's creative biography: "N. M. Karamzin <...> can be divided into three distinct periods: the time of publication of the Moscow Journal, the work of 1793 - 1800. and the period of the "Herald of Europe"" [23, p. 122]. In 1961, in the article "Ways of development of Russian prose of the 1800s - 1810s" Yu.M. Lotman first raised the question of "History of the Russian State" as a work of art. Like any other work of art, "History ..." reflects the author's ever-changing life. Karamzin, as a thinker and writer, is considered by Lotman in the process of formation and change, which at the time was at variance with the generally accepted perception of Karamzin as a "monarchist" and "reactionary". As noted by B.F. Egorov, "Yu.M. Lotman stands at the origins of modern Karamzin studies, he is the discoverer of the "real" Karamzin, more precisely, he rehabilitated an outstanding Russian writer" [5, p.6].

From the late 1950s - early 1960s Yu.M. Lotman gradually turned to the study of social movement and literature of the first quarter of the XIX century. Lotman conducts a detailed analysis of the reception of educational ideas of Russian thinkers of the late XVIII - XIX centuries. Specific authors and their works are considered in the context of the socio-political system and the ideological struggle of the early 19th century. In the article "Ways of Development of Russian Enlightenment Prose of the 18th Century" (1961) Lotman shows the dependence of the appearance and development of literary genres on the ideological goals of the authors of this period. In Russian literature at the beginning of the 18th century, there are two main types of novel: "high" - political, and "low" - crooks. The political novel embodied the principles of the rationalist aesthetics of classicism, solving the "high" state tasks. Instead of the ecclesiastical ideal of suffering and the subordination of a real person to the requirements of abstractions, the Plutovskii novel puts forward a rejection of the hero's abstracts and a struggle for earthly happiness. According to Lotman, "destroying churchly and abstractly rationalistic ethical views, defending a person's right to happiness, asserting interest in empirical reality, introducing a broad picture of real life struggle, the rogue novel prepared an enlightening novel that appeared in Russian prose in the last third of the XVIII century." [20, p. 213]. For the history of Russian social thought, Lotman notes, the important fact is that the rationalists, even before the ideologists of noble absolutism, who did not raise the question of the elimination of the feudal order, the struggle with the church worldview but waited for the solution of social conflicts from this very order, began the struggle with the church worldview. Therefore, the enlighteners of the last third of the 18th century in Russia, continuing in many respects the rationalists of the 17th - early 18th centuries, simultaneously criticized them. Enlightenment, as a special form of social consciousness, gave rise to a new form of work - a philosophical novel of the

18th century, which differed both from a rationalistic novel and from a rogue one. The two previous forms of the work, Lotman notes, had only one ideological and stylistic plan: a rationalistic novel - a world of ideas, all everyday life was considered as lying outside of literature; a rogue novel is a world empirically given. The philosophical novel of the enlighteners combined both planes, juxtaposing real socially ugly and "natural" life. If the writer focused on "natural" development, providing a comparison with the reality of the reader, the work was utopian in nature ("Wild European", 1804). If the work reflected a pronounced negative attitude of the author to the existing order, deliberately emphasized the abnormalities and especially the stupidity of social institutions, then we are dealing with a satirical novel (works by I.A. Krylov).

Neither type of novel could become the bearer of the idea of a popular revolution. A qualitatively new stage in this regard were A.N. Radishchev, who is convinced, Lotman shows that, the reader himself must observe specific phenomena and build a theory on their basis. According to these goals, the "Journey from St. Petersburg to Moscow" was built: the compositional basis of the novel is the "journey of ideas" of a rationalistic novel, rethought from the point of view of enlightening aesthetics. All abstract ideas in the novel are taken from observations of empirically given reality, therefore each chapter of the book has a central episode, the sequence of chapters is a sequence of ideas suggested by the author to the reader.

Thus, Lotman showed that the formation and development of literary genres within a specific historical period is due to the characteristics of the socio-political and philosophical systems of this period.

The problem of the interaction of the ideas of the French Enlightenment and Russian culture required the researcher to pay attention to the theoretical development of the problem of cultural translation and transformation, which the systems undergo when transferring to other national and sociocultural contexts, "changing the function of texts in the process of assimilation by their alien culture" [15, p. 111]. Lotman considers this phenomenon as an example of the concepts of history and historical progress. One of the main myths of the Enlightenment is the myth of the Golden Age. He devotes the article "The Idea of Historical Development in Russian Culture of the End of the 18th - the Beginning of the 19th Century" (1981) to an analysis of educational concepts. In Russia, the beginning of the 19th century, the idea of progress was closely connected with the revival of the national idea. The specifics of the "Russian Enlightenment" was manifested, according to Lotman, in rethinking Rousseau's main opposition "natural - twisted": the natural began to be identified with the national. "In the Russian Peasant, the "peasant", they saw "a man of Nature", in Russian - the natural language created by Nature herself" [8, p. 249]. Russian culture was thought to be true and close to the natural principle, opposing European culture as unnatural.

In a series of works on Enlightenment, a special place is occupied by the article "Russo and Russian Culture of the 18th - early 19th Centuries" (1967). According to Lotman, the philosopher's concept revived the utopian and maximalist ideas that had formed in Russian culture long before Russo appeared. Therefore, Lotman believes, Rousseau's philosophical heritage was organically perceived in Russia and for a long time continued to remain relevant. Lotman begins the study with the assumption that in the history of human thought at a certain stage a cultural and ideological type - "Russoism" naturally arises. Having built an abstract model of this phenomenon, he then uses it as a means of describing historical reality. This, in particular, allows Lotman to reveal the facts of the emergence of typologically "Russoist" systems outside the influence of Russo [25]. Lotman, highlighting Russo's main opposition: "man" (natural) - society (unnatural), used the structuralist term "opposition" in a historical and literary article to precisely match the description language with the description object. This article expresses the general methodological guidelines of this period in the work of Lotman.

In 1962, Lotman following V.Ya. Proppom transfers linguistic structural methods to literary criticism in search of "a methodology that would allow us to get rid of ignoring the artistic nature of verbal art and from subjectivity in its interpretation" [18, p. 52].

In the article "Reflection of the Ethics and Tactics of the Revolutionary Struggle in Russian Literature of the End of the 18th Century" (1965), he first substantiates the productivity of using structural methods in the analysis of historical, cultural and ideological phenomena, sets the task of studying "the concrete interweaving of ideological problems that create a unique structure of the ideological life of the era", and the construction of its consistent "model" [19, p. 7]. Lotman insists on the "fundamental possibility of constructing generative models in literary criticism" [11].

Lotman's last article, specially dedicated to Radishchev, "From the Commentaries on "Journey from St. Petersburg to Moscow" (1977), summarizes the work to restore the context in which contemporaries perceived "Journey from Petersburg to Moscow". During this period, Lotman, developing his idea that the necessary condition for understanding the writer's "world" is the reconstruction of the cultural outlook of his "ideal reader", addresses the problem of commentary on the literary text. In the article "Text and Audience Structure" (1977), the highlighted problem receives a theoretical justification. This approach formed the basis of the concept of commentary on "Eugene Onegin" (1980).

In the late 1950s and early 1960s Lotman published works devoted to the analysis of officially recognized classics, and in 1957 for the first time he directly addressed Pushkin's work and the history of new Russian literature, noting normativity as a stable feature of Russian literature, the connection between normativity and democracy,

a fundamental unity of Russian literature. Using the example of Blok, he writes about establishing the true boundaries of the historical period necessary for understanding events: "the chronological position is deeply symbolic, and the imperative need arises to look at Blok from the position of these two perspectives. <...> about the path that led to the Block, and about the road leading away from it" [10, p. 7]. Moreover, Lotman in the concept of "classical period" includes the activities of Pushkin and Chekhov, between the periods from Lomonosov to Karamzin and from the Bloc and the Symbolists to our time. Thus, Lotman insists on the correlation of the provisions of Pushkin and the general cultural situation of the 1830s, on the one hand, and Blok and the culture of the turn of the century, on the other. The block is conceptualized as the finalizer of the previous literary era. Constantly emphasizing the connections of Pushkin, Gogol, Lermontov with the "Age of Enlightenment", Lotman at the same time saw in their creative systems various trends that were revealed in later literature.

In the introduction to the "Creation of Karamzin" (1987), Lotman justifies writing the author's biography in the form of a *reconstruction novel*, a special case of "archeology of culture". Lotman writes: "The researcher <...> all the time must <...> combine his observations into a single and living whole. And his working methods are synthetic - the whole circle of "human sciences" should not be alien to him. But the novelist <...> has no right to create - he must recreate. " And further: "the most general studies of historical processes and the most concrete description of the thoughts, feelings and destinies of a human unit <...> are impossible without each other and equal in meaning" [22, p. 11-12]. Therefore, the essence of the book, which was originally called "Karamzin is the author of Karamzin," Lotman saw "in the analysis of Karamzin's works written in the first person, the restoration of the relationship between Dichtung und Wahrheit, a real biography and literary mythologies" [24, p. 337 - 338]. Lotman develops the theme of active self-formation of a person in life circumstances that oppose her as early as in Pushkin's biography [4] of 1981: "Pushkin was able to oppose poetic freedom to political unfreedom, to turn life into creativity" [7, p. 87].

When constructing a model of the object under study, the researcher must remember that the desired model will always, firstly, *simplify* the object, and secondly, contain the *elements introduced by the consciousness of the researcher himself*, i.e. elements of the culture in which this consciousness is formed. The meaning of the phenomenon arises on the background of what is opposed to this phenomenon, on the background of what it exists and in what tradition it is perceived: "Between the researcher and the writer he studies, complex Dialogue relations <...> the scientist must find in him something that is consonant with himself, some kind of mirror space, in which he himself can be reflected <...> the expansion of the studied space (if he has a sufficient degree of autocriticism and the breadth of research knowledge) will involuntarily introduce a correction that protects from subjectivity [12, p. 56].

Philology, Lotman believed, should become a serious professional occupation; for this, linguistics, mathematics, textology, archival affairs should be included in the competence of a literary critic [13, p. 86], for this Lotman developed a program for applying the methods of structuralism and semiotics. An objective literary analysis in the historian's prestructural works presupposes the correlation of the author's position with the general cultural situation, the consideration of literature as the arena of socio-political struggle, the identification of the author's ideology and mentality that determined the face of the era. Lotman formulates the concept of commentary, which in turn involves the construction of the cultural identity of the author. Building a research model of a work involves determining its audience. General studies of historical processes and a concrete description of a human unit are impossible without each other and are equal in value. The reconstruction of a model of a work of culture - a person or a text - is an organic part of the archeology of culture. Thus, each specific work, Lotman believes, recreates the image-model of cultural reality, which reflects the existence of people in this cultural type - everyday behavior, thinking, realities and everyday life. The researcher, being inside *his* type of culture, does not have the ability to directly perceive the work of art, in the scientific search for meaning and truth, the archeology of culture is called upon to give this possibility.

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宗教感觉是宗教信仰的基础: I.A. 伊林

RELIGIOUS FEELING AS THE BASIS OF RELIGIOSITY: I.A. ILYIN

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抽象。 本文考察了俄罗斯宗教哲学家I.A. 伊林 (Ilyin) 在正教的框架内, 分析了他关于宗教信仰的基本思想以及宗教情感和官方宗教信仰危机的原因。 哲学家认为宗教经验的独特性对于每个人都是独特的, 并认为需要将个人情感宗教经验作为存在任何宗教的健康基础。

关键词: 宗教, 宗教感觉, 宗教基础, 俄罗斯宗教哲学。

Abstract. *The article examines the work of the Russian religious philosopher I.A. Ilyin, analyzes his ideas about the basics of religiosity and the causes of the crisis of religious feeling and official religiosity within the framework of Orthodoxy. The philosopher considered the peculiarities of religious experience as unique to each person and argued the need for personal emotional religious experience as a healthy basis for the existence of any religion.*

Keywords: *religiosity, religious feeling, basics of religiosity, Russian religious philosophy.*

At the moment we are going through a difficult period of the history of Orthodoxy in Russia, it is no coincidence that the society is maturing the understanding that the condition for a successful solution to numerous social problems is the need to continue to unite efforts church and secular organizations and structures, the creation of mixed services, quickly and effectively responding to the acute problems of today and able to prevent social ills. Church and secular scholars are unanimous in their desire to form scientifically-based programs of spiritual, moral and physical recovery of society, and fundamental research has been initiated by the Church and secular science. social and religious.

Much is said today about the need for spiritual and moral renewal of Russia, the need to revive Orthodox traditions and values, to overcome spiritual and moral decline. Of course, such actions will help the Russian Orthodox Church, despite the difficulties of political, social, economic nature, more effectively to carry out social service, but there is another side of the problem, not social, but

spiritual content - a believer should take care of his faith, his spiritual purity and the conformity of his experience." When religion is a subject of curiosity, entertainment, fashion, or a tool for material gain, it loses its spiritual rank and ceases to be a religion. It is no secret that, knowing dogmas and teachings, performing rites, reading prayers many of us, nevertheless, are deprived of a living, creative religious feeling, personal religious experience, being Christians only by name. This "religiously religiously-composed people" is a testament to a deep spiritual and religious crisis, the severity and danger of which, in my opinion, the Church does not always understand today. In this situation, the appeal to the legacy of I.A. Ilyin is very relevant.

Ivan Ilyin is a religious philosopher whose work is not analyzed within the framework of the God-seeking tradition of the Russian religious-philosophical renaissance of the late 19th century - the beginning of the 20th century, associated with the names of V.V. Rosanov, Dm. Merezhkovsky, N.A. Berdyaeva, Vjach. Ivanova et al. But, at the same time, the phenomenon of the "new religious consciousness" is so broad and varied in content that the ideas of I.A. Ilyin, expressed by him in the works "Religious Meaning of Philosophy" (1914-23), "The Path of Spiritual Renewal" (1962), "Axioms of Religious (1951) are a natural product of the intellectual rise of religious and philosophical thought in Russia, which began at the turn of the century and is characterized by Berdyaev as "religious anxiety and seeking." Ilyin is an original and extraordinary thinker: not questions of dogmatic theology, but the history of religion, but analysis of a person's personal religious experience, his spiritual state, which is explored not from the point of view of religious opinion, come to the fore. psychology, and from the point of view of philosophical understanding of the concept of "spirit," the process of man acquiring his spirituality. [2]

It is in the absence, loss of personal living content of religious experience that I.A. Ilyin sees the cause of the crisis not only of the church, but also, as a result, of the crisis of civilization. Any religion, according to Ilyin, is an all-life and in character of the action of a living connection between man and God, suggesting "within the human subject" - a living subjective experience. Religion is not an external state for man, it is in the person himself and is carried out through him and for him, it is impossible without internal, immanent human experiences, and as a human condition is, above all, a religious experience. The experience, which is original and original in all people, is nurtured by every person throughout his life. The history of personal religiosity begins in early childhood and is formed in everyone's own way.

The religious experience of each person is unique and unique, which means that I.A. Ilyin concludes, alone. But by the "loneliness" of human religious experience, the thinker understands not churchlessness or extrachurchism, but his

(experience - A.S.) original form. Turning to God requires a person to concentrate, to be liberated from worldly impressions, influences, etc., and this is the "soul's departure" to the loneliness of her religious experience. There is nothing to replace this independent and lonely experience, every believer must go this way himself. Even joint prayer acquires its true meaning from someone who already knows how to pray on his own, or learns it, while others are looking in the temple not for prayers, but only for "oblivion of their inability to pray", receiving the illusion of religious experience. "It is at the door of a lonely soul that the very word of God knocks. It is this lonely door of our own - each of us must find in our own spiritual darkening and open it open open to the light of Revelation.

For man is a personal, free and responsible spirit and religion begins with personal spirituality." [3; 30]

Religious experience begins with a person's true acquisition of his own spirituality, his essence in appealing to God. True religiosity assumes in a person what Ilyin calls a feeling of "imtorium" - awe, an awareness of his own imperfection - a "sense of rank" that is part of the very essence of a religious act. This feeling inspires man, for he is in the necessary connection with the desire for self-improvement, self-development to the "spiritual-inspiring and radiating center of the universe", i.e. free being. Spirit is the gift of choice, the gift of freedom that can lead man to the fullness of freedom in God. True religiosity is the free ascent of man to God. But the true meaning of freedom, according to the philosopher, was perverted: in the history of human thought to the HU111 st. formed a completely different idea of freedom - freedom of "interminism", nihilism; The sacred was replaced by the mundane, the flat; faith is irony; the spirit of the Enlightenment turned out to be a spirit of grace, of insolence. It is in this that I.A. Ilyin sees the basis of the modern religious crisis "Man was blinded by the regularity of matter, the slenderness of reason and the power of formal will... has healed by such organs of the soul, which are powerless in appealing to the sacred, which take only the outer surface of objects and the abstract side of thoughts... Religious emptiness has become a criterion of enlightenment. And life, devastated from the shrine, has become little by little the true realm of vulgarity." [3; 49]

So, the spirit in its essence is the beginning of free, i.e. amateur, self-determining (and at the same time in the direction of the better, perfect), so spiritual life is an autonomous life: the maturity of the soul is determined by the depth and integrity of its autonomous Self. If the spirit is independent, "faith" ceases to be a belief in God and is replaced by trust in the opinions of others or rejection of personal religious experience. You can't believe "by order" - it's the way of disbelief. Autonomous religiosity is more difficult, but also higher (it is necessary to keep in mind that autonomy is not in the arbitrary invention of each of its individual religions). Unfortunately, it is very common (and in the Orthodox Church) the idea that true religiosity is based on authority, obedience, autonomous religiosity - heresy, arbitrariness.

Religious freedom implies, the thinker notes, not only the human right to faith, but also his right to disbelief: it is impossible to make god see and accept God. Power (state or ecclesiasty) makes the greatest mistake that weakens and undermines it by engaging in religious coercion that damages a person's spirituality, sincerity, and integrity of his faith. The most that is achieved along the way is the consent of man to subject himself to inner coercion - religion is a voluntary conversion to God, an appeal based not on fear and not on the smearing of earthly goods, where the whole meaning of man's attitude to God transferred to the personal interest of the begging, but on free spiritual love. Religion without a heart is a sham.

Ilyin writes a lot about the "diseases" of society, which have a religious basis, namely the degeneration of religious experience. The reason for the "great modern crisis of religiosity" he sees in the degeneration of the religious act, which constitutes a living basis of faith and religiosity, ending his reasoning on this subject with the following words: "From generation to generation people have lost not only religious act, but also the very idea of it, and, having lost, have forgotten to believe and no longer understood the great power and the meaning that are inherent in faith...; forgotten that religion needs a different "inner way of mind" ... and now, when they begin to guess about it, they do not know what kind of "other way" it is and what they need to change in themselves in order to enter it" [3;585]

As noted above, the true religious faith is spiritual and free, but I.A. Ilyin also speaks of her reasonableness, sharing the "distracted-thinking" mind and "spiritually-experiencedcontemplation" mind. In faith, the doubts of reason are overcome, while religious experience needs reason to test and ensure its subjectivity. It also raises the question of the essence and role of religious doubt. The thinker sees religious doubt as a natural result, which leads to a sense of religious responsibility. Religion is beyond religious doubt - religiosity is dead, frozen, blind, for religious doubt is not resolved by cleverness and distracted by evidence, but only by real experience.

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医源性损伤重建手术后肝外胆管狭窄和胆道消化吻合术的治疗体会
**EXPERIENCE IN TREATMENT OF EXTRAHEPATIC BILE DUCT
STRICTURES AND BILIODIGESTIVE ANASTOMOSES
AFTER RECONSTRUCTIVE SURGERY FOR IATROGENIC INJURIES**

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抽象。 本文介绍了使用微创X射线外科手术和内镜技术治疗胆管狭窄和胆道消化道吻合的经验。 介绍了35例患者的观察数据。

关键词: 医源性胆管损伤, 胆道消化吻合术的纠正。

Abstract. *The article presents the experience of treatment of strictures of the bile ducts and biliodigestive anastomoses using minimally invasive x-ray surgical and endoscopic techniques. The observation data of 35 patients are presented.*

Keywords: *iatrogenic damage to the bile ducts, correction of biliodigestive anastomoses.*

Purpose of the study: *improvement of the treatment results for patients with benign strictures of the bile ducts and biliodigestive anastomoses.*

Introduction. The treatment of patients with iatrogenic injuries and cicatricial strictures of the extrahepatic bile ducts (EBD) remains not only an urgent medical, but also a serious socio-economic problem. Along with an increase in the length of hospitalization and the cost of treatment, these complications are the main reasons for the deterioration of the quality of life, disability and deaths [1; 2; 3; 4; 5].

Previously widely used restorative surgical interventions are often ineffective in correcting laparoscopic lesions of the bile ducts and lead to the formation of postoperative strictures at various times after surgery in 60 - 100% of cases. This is due, on the one hand, to the mechanism and nature of the injury — a combination of mechanical and electrothermal effects, and, on the other hand, ischemia of the damaged duct due to a violation of blood supply, which is determined by the features of the axillary type of blood supply to EBD [6; 7; 8; 9; 10; 11].

At the same time, the use of reconstructive interventions in the volume of hepaticojejunostomy even in specialized centers of hepatobiliary surgery is accompanied by a significant number of early postoperative complications, reaching 40 - 50%, postoperative mortality at the level of 1.7 - 4%, and in 9 - 19% cases there is scarring of bilio-digestive anastomosis [12; 13]. The development against the background of cicatricial obstruction of the bile ducts and bilio-digestive anastomoses of obstructive jaundice and chronic cholangitis leads to the formation of fibrotic changes, the development of secondary biliary cirrhosis and portal hypertension. And if fibrotic changes can regress after restoration of normal bile outflow, then liver cirrhosis and portal hypertension in recent years are considered among the indications for liver transplantation [14; 15].

Repeated reconstructive and recovery operations in patients with cicatricial strictures of EBD and bilio-digestive anastomoses are associated with a number of difficulties caused not only by the mechanism and nature of the primary injury, but also by the presence of pronounced scar-sclerotic and infiltrative-inflammatory changes in the subhepatic space. In addition, it should be noted the elderly and somatic severity of patients. The above circumstances lead to a high risk of developing intra- and postoperative complications and deaths. In this connection, many of this group of patients are doomed to lifelong frame drainage with periodic (every 2 - 3 months) replacement of transhepatic drains.

In this regard, in recent years, interest in minimally invasive methods of treating patients with this pathology has increased. An analysis of the immediate and long-term results of treatment shows that the use of endoscopic or transdermal methods for dilatation and endoprosthesis of cicatricial strictures of the bile ducts and bilio-digestive anastomoses can be effective in 70 - 90% of cases [16; 17; 18; 19].

Materials and methods:

From 2006 to 2018, the Department of Abdominal Surgery of M.F. Vladimirsky Moscow Regional Research and Clinical Institute (MONIKI) treated 35 patients with strictures of the bile ducts, biliary-biliary anastomoses and biliary-digestive anastomoses. All patients are women aged 25 to 77 years. The causes of cicatricial obstruction were EBD injuries during laparoscopic (LCE) - 29 (82%) or open cholecystectomy (OCE) - 6 (18%).

The classification of H. Bismuth (2001) was used in the distribution of patients according to the level of strictures. Patients with primary strictures of the ducts and strictures of the ducts after reconstructive interventions had the first - 4 (12%) and second type of strictures - 6 (17%), in patients who had previously undergone reconstructive surgery, the level of strictures was higher: type 2 - 16 (47%); Type 3 - 3 (9%) and type 4 - 6 (15%). The clinical picture of patients was dominated by symptoms of obstructive jaundice and persistent cholangitis.

Results: In the treatment of 24 patients with strictures of biliodigestive anastomosis, transdermal-transhepatic (18), endoscopic (5) or trans fistula (2) access was used for balloon dilatation. In patients who underwent percutaneous transhepatic manipulations, after a dilatation session, a 14 Fr diameter drainage was left in the transanastomotic position. The interval between sessions was 2 to 3 months. After treatment, the drainage was transferred to the preanastomotic position for 2 to 3 weeks. In the absence of clinical, laboratory and instrumental (ultrasound + fistulography) signs of stricture, drainage was removed. In 5 cases, endoscopic correction was performed in patients who underwent reconstructive surgery according to the original method [20]. During surgery for iatrogenic damage, stricture of the pancreas, or common hepatic duct (CHD), a biliodigestive anastomosis is applied on the internal drainage on a loop disconnected along the Ru or on a long loop with Brown anastomosis. At the same time, gastrojeunoanastomosis with the blind end of the small intestine or with the leading loop of the small intestine is superimposed. Endoscopic interventions for strictures of biliodigestive anastomosis were performed through the formed internal gastrointestinal fistula. After balloon dilatation with endoscopic access, endoprosthetics of biliodigestive anastomosis were performed. For stenting, plastic stents of size 8 Fr. were used. Frequency of replacement every 3-4 months. In 4 patients, stents were removed, the condition of the anastomosis is satisfactory. One patient continues with internal stenting. In the treatment of 10 patients with primary strictures of the bile ducts and strictures of biliary-biliary anastomosis, endoscopic access was used. In two (2) cases of stricture of the zone of biliary-biliary anastomosis were complicated by choledocholithiasis. After balloon dilatation, endoscopic lithoextraction with sanitation of the bile ducts was performed. In all cases, after balloon dilatation, stricture zone arthroplasty were performed.

Conclusions:

Minimally invasive X-ray surgical and endoscopic techniques using balloon dilatation and prolonged drainage and arthroplasty can be an effective alternative to traditional reconstructive surgery. The effectiveness of endoscopic treatment of our patients using balloon dilatation and endoprosthetics was 78.6%. Our observations show that the formation of a biliodigestive anastomosis on the frame drains with the additional application of gastroenteroanastomosis allows, if necessary, endoscopic correction in an affordable way.

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北方地区绝经后妇女习惯性运动活动的研究
**THE STUDY OF THE HABITUAL MOTOR ACTIVITY
OF POSTMENOPAUSAL WOMEN LIVING
IN THE NORTHERN REGION**

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抽象。 该文章评估了绝经后(50-69岁)在北方生活超过10年的169名妇女的运动能力指标。 根据初步光密度测定法的结果,将研究对象分为3组:第1组-骨矿物质密度(BMD)正常的患者($n = 35$);第2组-BMD适度降低的个体($n = 78$);第3组-BMD明显降低的个体($n = 56$)。 揭示了运动活动的生理学低指标(在北部地区所有被调查的居民群体中,步行时花费的能量-AEE,行进距离-km,步数和花费在运动中的时间-分钟,但 随着BMD的降低,统计学上显着降低($p < 0.001$)。

关键词: 体育活动, 绝经后妇女, 北方, 骨矿物质密度。

Abstract. *The article assesses the indicators of motor activity in 169 women in the postmenopausal period (50-69 years), living more than 10 years in the North. The studied individuals were divided into 3 groups according to the results of preliminary densitometry: group 1 - individuals with normal bone mineral density (BMD) ($n = 35$); Group 2 - individuals with a moderate decrease in BMD ($n = 78$); Group 3 - individuals with a pronounced decrease in BMD ($n = 56$). Physiologically low indicators of motor activity were revealed (the amount of energy spent on walking - AEE, distance traveled - km, the number of steps and time spent on motor activity - min, in all groups of the surveyed residents of the northern region, but statistically significantly decreasing with decreasing BMD ($p < 0.001$).*

Keywords: *physical activity, postmenopausal women, North, bone mineral density.*

Introduction

Regular exercise is beneficial at any age. Lack of constant physical activity can lead to bone loss. A series of meta-analyzes showed that athletes have 25% higher BMD than people with normal physical activity, and the latter are 30% higher than people with low physical activity [1]. Lack of physical activity is one of the causes of many chronic diseases and conditions, which include osteoporosis, falls, bone fractures, etc. [2].

The pedometer is designed to collect information about the most common form of physical activity of a person - walking. Interest in the study of walking and related problems is quite high because walking was and still remains one of the most popular types of movement [3]. Of particular relevance is the study of motor activity in the northern latitudes, due to the peculiarity of the "northern type of metabolism" and adverse conditions for motor activity.

Purpose: to assess the motor activity of postmenopausal women living for a long time in the northern region as a risk factor for a decrease in bone mineral density.

Materials and methods. The study involved 169 women living more than 10 years in Khanty-Mansi Autonomous Okrug (KMAO), aged 50-69 years (mean age 60.6 ± 5.3 years). The examined individuals were divided into 3 groups according to the results of preliminary densitometry of the proximal femur and lumbar vertebrae: group I - individuals with normal BMD (T - criterion greater than -1 SD); group II - women with a moderate decrease in BMD (T-test from -1 SD to -2.5 SD); group III - women with a pronounced decrease in BMD without a history of fractures (T-test less than -2.5 SD). The exclusion criteria were: taking Ca and vitamin D preparations, taking glucocorticosteroids for more than 3 months, menopause for less than 2 years, diseases of the gastrointestinal tract, prolonged immobilization, alcoholism

To assess the motor activity of women, daily physical activity was monitored using a three-dimensional pedometer with activity monitor "Tanita AM-120E" (Japan). The following indicators were estimated daily for a week: energy consumption for physical activity (AEE/Kcal) equal to the difference between the total energy consumption (TEE/Kcal) and energy consumption at rest (BMR/Kcal), the number of steps per day, distance traveled (km) and walking time per day (min). The results obtained were compared with physiologically optimal values for adults of the corresponding age [3]. This study was conducted in compliance with the requirements of biomedical ethics and was accompanied by voluntary written informed consent of the subjects.

Statistical processing was performed using the MS Excel software package and Statistica 10 software. The arithmetic mean value (M), standard deviation (σ), maximum (max) and minimum (min) values were calculated. The significance of

differences in groups according to the studied parameters was analyzed using the Fisher-Student test. Differences at $p < 0.05$ were taken as significant.

Results. We revealed significant differences ($p, p_1, p_2 < 0.001$) of the average values of energy consumption spent on walking (AEE), distance traveled (km), the number of steps and time spent on physical activity (min), among all three comparison groups of postmenopausal women of the northern region.

The average values of energy spent on motor activity in the group of women with normal BMD were in the range of physiologically optimal indicators. In the group of women with a moderate decrease in mineral density, AEE values were almost 1.3 times less than the lower boundary of physiologically optimal values, and in women with a pronounced decrease in BMD, there was a significant decrease in energy spent on daily walking - more than 2 times (table . 1).

Table 1
Indices of locomotor activity in postmenopausal women, living in the northern region (per day)

| indicator | Physiologically Optimum Values | Examined persons (n=169) | | | | | |
|-----------|--------------------------------|--------------------------|------------|----------------|----------|----------------|----------|
| | | group 1 (n=35) | | group 2 (n=78) | | group 3 (n=56) | |
| | | M±σ | min↔max | M±σ | min↔max | M±σ | min↔max |
| AEEkKal | 400-600 | 503±22 | 168↔1091 | 375±108 | 136↔570 | 184±65 | 134↔369 |
| Km | 5-7 | 3,9±0,4 | 1,0↔10,2 | 1,6±0,7 | 0,6↔3,5 | 0,9±0,6 | 0,5↔2,9 |
| steps | 8000-10000 | 6181±317 | 1018↔12040 | 3189±137 | 890↔6050 | 2208,3±171 | 706↔6030 |
| min | 60-90 | 68,9±5,5 | 17↔168 | 28,1±12,2 | 9↔54 | 17,6±10,6 | 7↔45 |

Note: p - significance of differences between 1 and 3 gr.,

p¹ - significance of differences between 1 and 2 gr.,

p² - significance of differences between 2 and 3 gr. - <0,001

An adequate level of AEE was detected only in 9 (25.7%) individuals in the normal group and in 35 (44.9%) in the group with a moderate decrease in BMD. The level of AEE values above the optimal values was observed in 12 (34.3%) women in the normal group. A decrease in this indicator of varying severity was recorded in 14 (40%) people in the normal group, 43 (55.1%) people in the group with a moderate decrease in BMD and in all examined women with a pronounced decrease in BMD (table 2).

Table 2

The percentage of examined individuals with various indicators of locomotor activity (abs./%)

| indicator | Norm | | | Below normal values | | | Above normal values | | |
|-----------|-----------------|-----------------|-----------------|---------------------|-----------------|-----------------|---------------------|-----------------|-----------------|
| | 1 gr. (n=35) | 2 gr. (n=78) | 3 gr. (n=56) | 1 gr. (n=35) | 2 gr. (n=78) | 3 gr. (n=56) | 1 gr. (n=35) | 2 gr. (n=78) | 3 gr. (n=56) |
| AEEkKal | 9/25,7 | 35/44,9 | - | 14/40 | 43/55,1 | 56/100 | 12/34,3 | - | - |
| Km | 5/14,3 | - | - | 27/77,1 | 78/100 | 56/100 | 3/8,6 | - | - |
| steps | 7/20 | - | - | 26/74,3 | 78/100 | 56/100 | 2/5,7 | - | - |
| min | 12/34,3 | - | - | 16/45,7 | 78/100 | 56/100 | 7/20 | - | - |

The average values of the number of steps and the distance traveled per day, corresponding to the physiological norm, were not recorded in all three studied groups. In the group of people with normal BMD, the average number of steps taken and distance per day was the highest compared to similar indicators in other groups. Moreover, even women with normal BMD walked an average of 1800 steps and 1.1 km less than the lower boundary of physiological optimal values.

In the second group of subjects, the number of steps and the distance traveled was significantly lower than the optimal values by 2.5 and 3.1 times, respectively. In the group of people with a pronounced decrease in bone density, the average number of steps and distance traveled (km) per day were also reduced by 3.6 and 5.5 times (Table 1).

There was a decrease in the number of steps and distance traveled (km) in all examined individuals of groups 2 and 3 and in the vast majority of women in the normal group (Table 1).

Only 5 (14.3%) people from group 1 traveled a physiologically adequate number of kilometers per day, most - 27 (77.1%) of the examined individuals with normal BMD traveled less than the lower boundary of the reference values, and 3 (8.6%) people exceeded the established standards for the distance traveled.

A fifth of women with optimal BMD recorded an adequate average daily number of steps. The overwhelming majority - 26 (74.3%) did not take enough steps per day, and 2 (5.7%) women exceeded the physiologically optimal average daily number of locomotion (Table 2).

The time spent walking in group 1 was commensurate with the normative values. There was a decrease in the amount of time for motor activity in groups 2 and 3 by 2.1 and 3.4 times, respectively (Table 1). Walking time per day, corresponding to physiological norms and exceeding them, was recorded only in 12 (34.3%) and 7 (20%) women in the norm group, respectively. All other examined individuals allocated an insufficient amount of time per day for motor activity: 100% of cases in groups with a moderate and pronounced decrease in BMD and 16 (45.7%) cases in the normal group.

Thus, postmenopausal women with normal bone density have significantly better daily values of energy spent on physical activity, the number of steps and distance traveled, as well as time spent walking compared to women with a moderate and significant decrease in BMD characterized by a pronounced decrease in locomotor activity.

Discussion. The bone apparatus performs the function of mechanically supporting the body and therefore must adapt to daily stresses. With age, motor activity decreases, and the lifestyle becomes more passive and, as a result, the load on the bones changes with subsequent changes in bone mass and skeleton structure. Assessment of motor activity is a necessary tool in identifying the causes of a decrease in bone mineral density in postmenopausal women [4]. Clinical data demonstrate predominantly local effects of physical stress on the bone. Thus, studies of bone density in athletes performing physical activities, mainly related to running and jumping, revealed the highest BMD in loaded areas of the body [5]. It is proved that less traumatic aerobic loads are useful for postmenopausal women - these are physical exercises, during which oxygen is used as the main source of energy for muscle work. As a rule, these are exercises of small or moderate intensity, which can be performed for a long period of time in a certain rhythm (walking, close tourism, cycling, skiing, swimming, ice skating, rhythmic gymnastics). Long aerobic exercise forms stamina and is useful for maintaining overall health [6]. In addition, isometric (static: muscle tension without changing their length) exercises are useful while preserving the physiological curves of the spine [7].

Particularly noteworthy is the fact that a decrease in motor activity is also observed in women with normal BMD compared to physiologically optimal values, which may indicate a negative impact of climatic and geographical features of the northern region - long winters and low seasons, short summers - limit the time spent on fresh air and physical activity of women, especially older than 50 years.

Conclusions

1. In the vast majority of postmenopausal women living in the North, severe hypodynamia was detected.
2. In parallel with a decrease in locomotor activity, the bone mineral density also decreased statistically significantly ($p < 0.001$).
3. In order to prevent the development of osteoporosis and related fractures in the North, it is necessary to pay due attention to primary preventive measures, in particular, sufficient physical activity corresponding to the time of year and the age of women.

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不同体型人群正常步态运动的运动学评价
**KINEMATIC EVALUATION OF MOTION DURING NORMAL GAIT
OF PERSONS WITH DIFFERENT SOMATOTYPES**

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抽象。使用运动分析系统进行临床步态分析可用于诊断人肌肉骨骼系统的状态。大量的研究致力于步行的生物力学分析，但是尚未充分研究属于不同体型人群的步态的特殊性的问题。这项工作的目的是确定具有不同体型的健康行走男性的运动学和时空参数。

关键词：步态，运动，体型，运动学，Vicon，时空参数。

Abstract. *Clinical gait analysis using motion analysis systems is used to diagnose the state of the human musculoskeletal system. A large amount of research has been devoted to the analysis of biomechanics of walking, but the question of studying the peculiarities of the gait of people belonging to different somatotype groups is not yet sufficiently studied. The aim of the work is to determine the kinematics and spatial-temporal parameters of walking healthy men with different somatotypes.*

Key words: *gait, motion, somatotypes, kinematics, Vicon, spatial-temporal parameters.*

Introduction

In the recent past, limited scientific observation methods restricted clinical evaluation of gait and corresponding body movements. In addition, data analysis was rather slow in a clinical setting. Only in the late 20th and early 21st century, substantial progress in informatics technology with new software and hardware has propelled the study of human motion to the next level. The use of motion capture technology has brought research to a new stage of development. Despite the large number of studies devoted to the analysis of the biomechanics of gait, there are few studies kinematics of human gait belonging to different somatotypes groups [1, 3, 4]. In the available resources, we could not find works devoted to the study of comparing the spatial-temporal and kinematic parameters of gait with different somatotypes and similar indicators of a group of persons formed only taking into account gender and age (comparison group).

The aim of the work is to determine the spatial-temporal and kinematic parameters of the joints of the lower extremities of healthy men aged 18-25 years of various somatotypes.

Methods. The work was done in Astrakhan State University in the Center of three-dimensional study biomechanics of human movements using the Vicon motion capture system. Eighty healthy male subjects aged 18-25 years who did not complain of the musculoskeletal system problem at the time of the study were examined. Of these, fifty-one men were randomly selected and divided into three groups according to their somatotype. Somatotyping was carried out according to the method of Heath B.H. and Carter J.E.L.[2], with the release of endomorphy, mesomorphy and ectomorphy body type. The distribution of the studied group according to somatotypes was carried out as follows: out of the total number of studied endomorphy were six men (12.9%), mesomorphy were forty-one men (80.06%), and ectomorphy were four men (6.5%). Data acquisition and analysis of movements was done with help of Vicon equipment (Vicon, UK), including ten infrared digital cameras Vicon T40, a video camera Bonita 720, a Vicon Giganet Lab digital multiplex switch, Vicon Nexus and Polygon software, as well as a stabilometric force platform AMTI (AccuGaitACG, USA).

The study was approved by the Russian Ministry of Health represented by the Ethics Committee of the Astrakhan State Medical University on September 11, 2018 (No. 8).

The measurements were done for all participants at the same time of day, same light intensity, same noise intensity and ambient temperature. Everyone walked seven times a distance of 8 meters, along a straight line at the same speed. For data acquisition, the Plug-in Gait Full Body model with 39 markers.

The following kinematic parameters were analysed, including for the frontal axis: angle of flexion (positive digit) and extension (negative digit), for the sagittal axis: angle of adduction (positive digit) and abduction (negative digit), for the vertical axis: internal (positive value) and external rotation (negative digit).

The results of the analysis of gait cycle parameters were compared with similar data of persons of the same age, examined without taking into account the somatotype (comparison group). Processing of the obtained material was performed by using Microsoft Excel. The degree of accuracy of the study is determined by the probability of an accurate forecast less than or equal to 0.95%; significance level $P \leq 0.05$; Student's t-test used $t = 2$.

Results. An analysis of the data showed that the values characterizing the spatial-temporal parameters of gait in studied groups of ectomorphy and endomorphy differ statistically significantly from the results compiled taking into account only age and gender (comparison group). The following length of the lower extremities was recorded 0.98 ± 0.2 m. in the group of ectomorphy, 0.95 ± 0.2 m. in the group

of endomorphy, 0.86 ± 2 m. in the group of mesomorphy. Analysis of the obtained data showed that the values characterizing the spatial-temporal parameters of gait of ectomorphy and endomorphy are different from the results of the comparison group. The main differences affected the following parameters: gait speed, base of step, step time and double support. Endomorphy have a gait speed decrease of 0.09 m/s, an increase in the base of a step by 0.04 m., a step time by 0.03 s. and double support at 0.04 s.

Ectomorphy showed an increase in gait speed of 0.04 m/s, step time by 0.02 s., double support by 0.04 s. and stride length by 0.08 m. The spatial-temporal characteristics of mesomorphy did not differ much from the indicators of the comparison group.

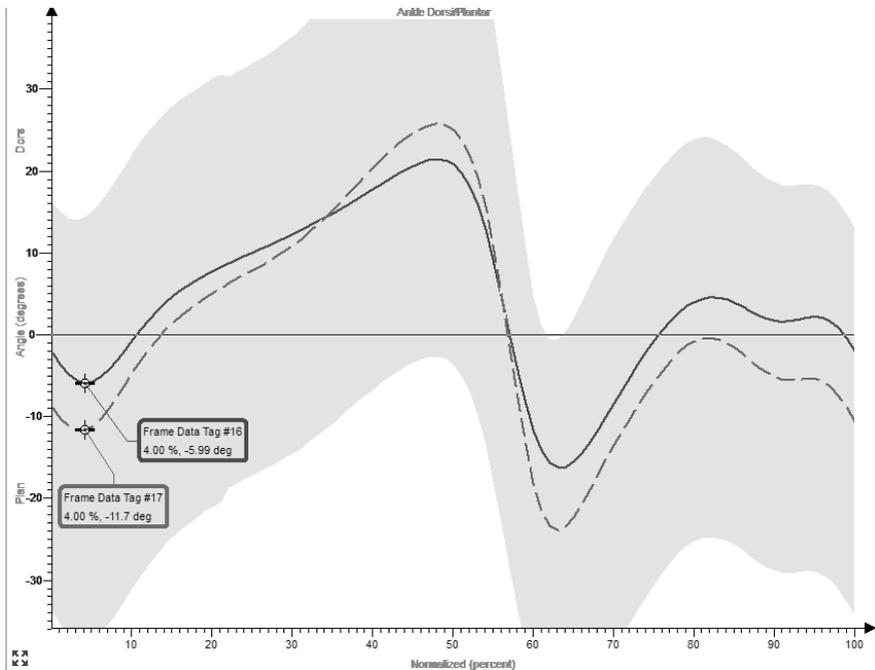


Figure 1. Flexion of ankle joint (solid line - data rate, broken line - data of the group of endomorphy)

Graphical analysis of movement of joints during the gait cycle (ipsilateral leg starting with the initial heel contact of the stance phase) revealed significant differences in individuals with endomorphy and ectomorphy body types.

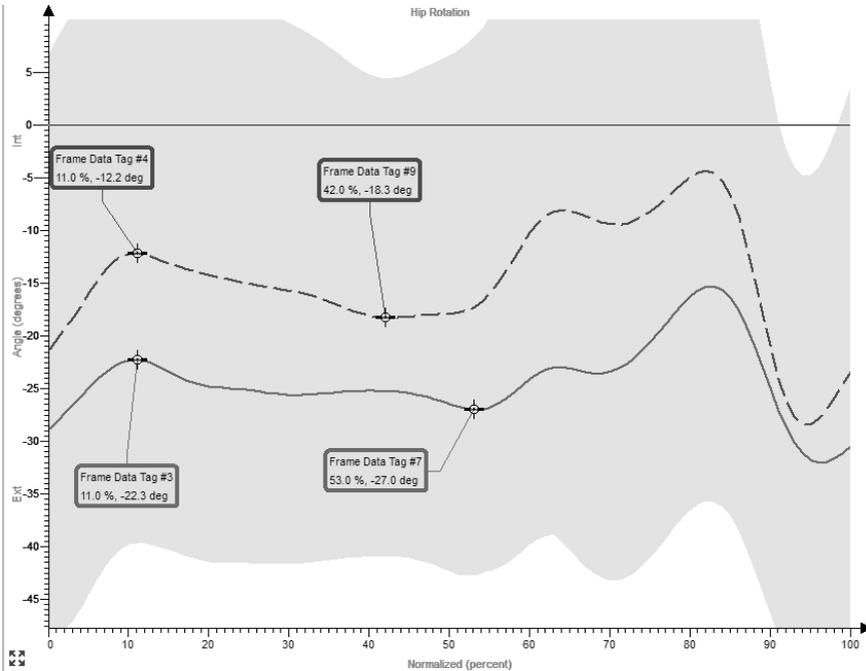


Figure 2. Rotation of hip joint in individuals of the ectomorphy type (solid line — normal data; broken line — data from the comparison group)

The ankle joint of men of an endomorphy body type in the support phase, an increase in the angle of plantar flexion relative to the comparison group without somatotyping was noted ($-11.7 \pm 0.96^\circ$ and $-5.99 \pm 1.25^\circ$, respectively) (Fig. 1), an increase in the angle of abduction ($-13.6 \pm 1.78^\circ$ and $-8.63 \pm 2.57^\circ$, respectively), an increase in the angle of internal rotation ($40.8 \pm 2.02^\circ$ and $32.2 \pm 1.84^\circ$, respectively). In the stance phase, this group of human showed an increase in the angle of plantar flexion in a bending relative to the comparison group ($-23.9 \pm 2.3^\circ$ and $-15.3 \pm 1.21^\circ$, respectively), an increase in the angle of internal rotation ($39.1 \pm 0.65^\circ$ and $35.1 \pm 0.95^\circ$ respectively) in the same joint.

In the hip joint of men of an endomorphy body type, in the support phase, the external rotation is increased relative to the comparison group ($-36.2 \pm 1.35^\circ$ and $-24.6 \pm 2.1^\circ$, respectively), in the stance phase this joint is in the state of external rotation, exceeding similar parameters in the comparison group with maximum values reaching $-35.3 \pm 0.9^\circ$ ($31.2 \pm 2.1^\circ$ in the comparison group) and minimum $-18.6 \pm 1.65^\circ$ ($-9 \pm 2.31^\circ$ in the comparison group) (Fig.2).

Discussion and conclusion. Spatial-temporal parameters of gait depend on their somatotype. In persons with an endomorphy body type, these differences are more pronounced and differences in persons with an ectomorphic body type are less pronounced. The revealed differences in the spatial-temporal characteristics are due, among other things, to differences in the ratio of the lengths of the segments of their lower limbs, which in turn proves the influence of anthropometric differences between individuals belonging to different somatotype groups on the gait pattern change. When creating reference bases of gait biomechanical parameters of people different gender and age, it is necessary to take into account their belonging to different somatotype groups.

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Kurakchay河及其支流（小高加索地区的阿塞拜疆部分）的冲积含金量的主要特征

**THE MAIN FEATURES OF THE ALLUVIAL GOLD CONTENT
OF THE KURAKCHAY RIVER AND ITS TRIBUTARIES
(AZERBAIJAN PART OF THE LESSER CAUCASUS)**

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抽象。 本文考虑了该地区最大和最希望的砂金矿河。 作者直接进行了数年的研究，使我们能够表达以下观点：金浓度的主要过程与水道最重要的侵蚀活动阶段有关，最高的金属浓度局限于中间河道，山谷的坡度有增有减。 按级别分布的金性质表明，较低的，更丰富的级别（由于根源和较高的级别而富集）发挥了某种储层的作用。

关键词：冲积含金，小高加索地区的阿塞拜疆部分，本地黄金来源

Abstract. *The article considers the largest and most promising river in the region for placer gold. The studies conducted by the author directly over the course of several years allow us to express the opinion that the main process of gold concentration is associated with the stages of the most significant erosive activity of the watercourse, the highest metal concentrations are confined to the middle course of the river, where there is an expansion and decrease in the slopes of the valley. The nature of the distribution of gold by levels indicates lower, richer levels, which are enriched both due to the root source, and due to higher levels, which play the role of a reservoir of a kind.*

Keywords: *alluvial gold bearing, Azerbaijan part of the Lesser Caucasus, indigenous sources of gold*

The basin of the Kurakchay River is tectonically included in the Göygöl system of uplift, Agjakend and Pre-Malokavkakh troughs. The axis of the Göygöl uplift runs along the channel of the Kurakchay River. Göygöl ore cluster in terms of its geological structure, ore content, central-type volcanic-plutonic structures, distribution pattern of igneous rocks, metasomatites, and sulfide-quartz mineralization, scale and intensity, formation and distribution of sulfur-pyritic and pyrite-ore ore stocks, after ore mineralization pyrite type, the formation of ore bodies

gold-silver-copper-molybdenum composition. The formation and placement of gold-sulfide-quartz and gold-sulfide-carbonate-quartz veins and vein zones, we can say that this site is similar to the Gadabay ore site [3, 321-354; 4, 211-238; 6, 47-60; 8].

The Kurakchay River is one of the largest in the Lesser Caucasus. The river at its source has a northern direction of flow, while near the village of Chayly it changes its channel and flows in a short-term direction. Large tributaries of Kurakchaya is the Buzluk, Garabulagsu, Sarysu, Shorbulagsu, and the small ones - Toganalasu, Chiragderesis and others, as well as some nameless tributaries, which in the origins of their basins, having a fan-shape, create a shallow hydrographic network of the above-mentioned basin.

About half of the washed concentrates contain signs of gold, with the majority of them located in its upper reaches, covering the tributaries of Garabulagsu, Kamochay and Azadchay. Gold signs from single to 4-5, reaching 10-20 grains in the upper reaches of this river (the region of Lake Göygöl) are associated with the Chiragderesi-Toganalinsky group of sulfur pyrite deposits, in the ores of which the gold content reaches 5 g / t. This allows us to attribute this site to the copper-porphyry ore system (also ore-magmatic) and to consider prospects from the point of view of identifying the actual gold and gold-bearing complexes. Highly promising placer deposits and occurrences like Chiragderesi, Todan, Garabulag (Kapyaz), Maranyal, Pant, Tillalyar, Agsu, Sarychukhur, etc. are distinguished at this ore cluster. (fig. 1)

It should be noted that the gold-bearing cavities have a cross-sectional dimension in diameter from several tens of cm to a few meters, sometimes more. The depth of the cavities and, accordingly, the thickness of the gold deposits is observed from tens of cm to the first meters. Signs of gold are found in the near-flat part of the cavity in a scattered form and in the bulk of loose formations [1; 10, 21-76;].

Legend: 1-modern deposits, alluvial boulder-pebbles, gravel, sand, 2-upper Quaternary deposits. Alluvial-proluvial-eluvial boulders, pebbles, sandy loam, loam, silt, 3-Upper Kimmeridge sub-stage. Flows of diabase and andesitic porphyrites and their tuffs, tuff breccias, tuff sandstones, 4-Upper Oxfordian Stage. Medium and thinly layered, siliceous reef limestones, 5-Batian layer. Tuff breccias, tufoconglomerates with fragments of quartz porphyrites, with breccia lenses, 6th Bajo tier. Tuff sandstones, tuff aleurolites, volcanoclastic rocks of different fragments, 7 Upper Cretaceous (Cognac-Santonian) sediments. Sandstones, tuff sandstones, pelitomorphous limestones, marls, 8-concentrate alluvial gold halos, 9-alluvial gold halos with up to 50 mg/m³, 10-alluvial gold halos with 50-100 mg/m³, 11-placer gold halos with 100-150 mg/m³, 12-halos of placer gold with a content of more than 150 mg/m³.

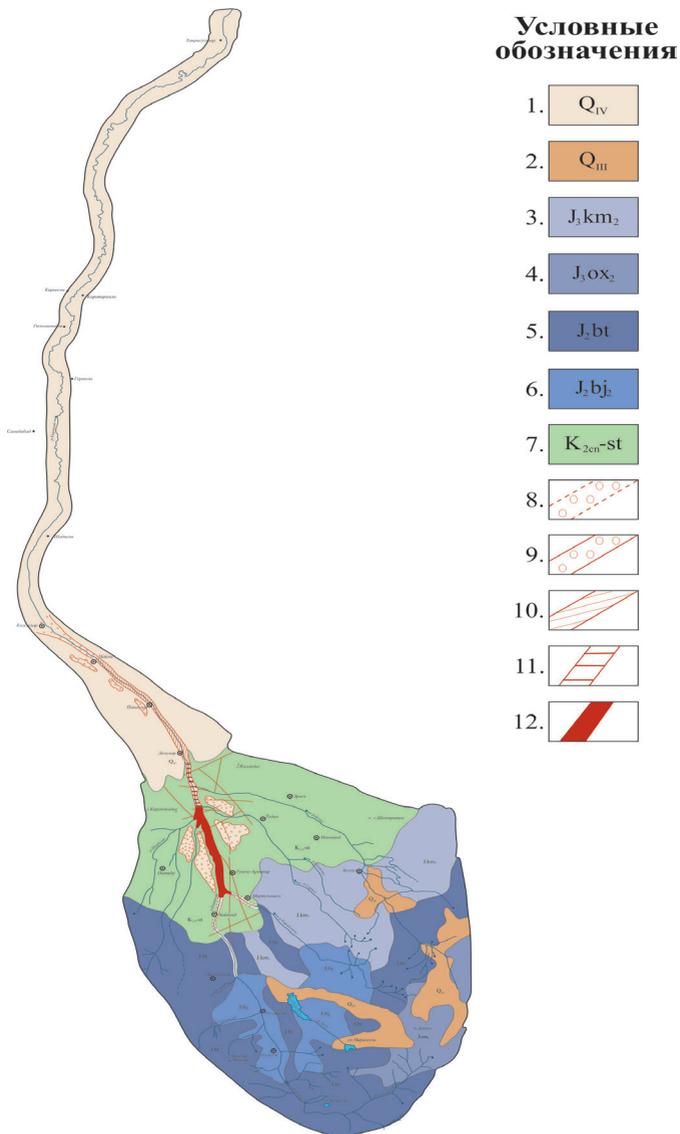


Fig. 1. Geological map of the river Kyurachchay (scale 1:50 000, compiled on the basis of the materials of the Malokavkazsky GRE)

The maximum accumulation of metal (1.5 g. And more) is observed in the near-flat part of the karst pits. Gold deposits consist of well-washed boulder and pebble-gravel material with sandy loam cement. The degree of rounding of deposits of karst placers is directly dependent on the length of the river valley. The sediments of this part of the river contain quite a lot of well-rounded pebbles and small boulders of quartz porphyry, to a varying degree, and fragments of vein quartz, the outlets of which are known at a considerable distance from the karst area. All these data and the findings of gold-bearing alluvium on higher terraces indicate that gold and alluvium were re-deposited in karst placers upon erosion of the above root sources and ancient terraces [2; 5, 21-28; 14].

As the bottom of the common features inherent in the karst placer, it should be noted the color of the deposits and the presence of densities of brown iron ore, due to which the gold deposits are painted mainly in reddish-brown.

The accumulation of gold deposits in the section of the river valley occurred in parallel with the processes of karst formation during its slow and prolonged development and transportation of gold from the areas of distribution of Jurassic deposits, or its redeposition from older alluvial placers. The entry of glandular matter and its conversion into brown iron gangues in this area is apparently associated with post-sedimentary mineral neoplasms in the upper parts of the river basin. The presence of deposits of brown iron ore in alluvial deposits of the described nature indicates the possible detection of karst relief forms, which, in turn, are favorable for the accumulation of gold placers and other heavy metals, and the established structural features of karst placers allow more efficient searches and evaluation. The thickness of the floodplain sediments, having a variable character, fluctuates within 1.5 m and occupy a local area. An analysis of data on the structure of the valley and the distribution of gold in it allows us to talk about the following features of the formation of the placer in the river valley. Kurakchay: the structure of the valley of the Kurakchay river is determined by the position of its sections in various morphostructures that experienced movements of different signs and amplitudes at the neotectonic stage; the main process of gold concentration is associated with the stages of the most significant erosive activity of the watercourse, expressed in the creation of super-deep cuts in the second level and in the bottom of the valley, most enriched in gold; the highest concentrations of metal are confined to the middle course of the river, where there is an expansion and decrease in the slopes of the valley; the nature of the distribution of gold over the levels shows that lower, richer levels are enriched both due to the root source and due to higher levels, which play the role of a kind of reservoir.

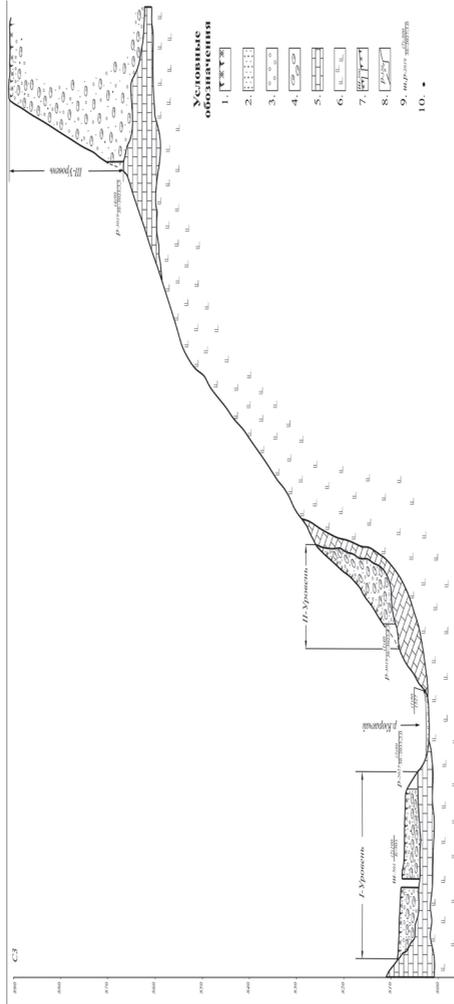


Fig. 2. Section along the line II-II of the basin of the Kurakchay river
 Legend: 1-soil-plant layer, 2-sand, gravel, 3-pebbles, 4-boulders, 5-limestones, 6-tuff breccias,
 andesite-basalt, 7-pits, 8-clearing, 9-gold content, 10- place of departure of bulk samples

On the river flow path, deposits of loose material have the following development pattern. From the watershed to the zone of final accumulation of loose formations, they accumulate; in the zone of primary accumulation, secondary accumulation and in the zone of final accumulation. These zones differ from each other in that the loose formations in them are disintegrated downstream of the river according to particle size distribution. Moreover, in terms of accumulation volume and favorable for the release of heavy metals, zone II is [7; 9; 10, 49-51]. Gold is mainly confined to the lower horizons and is found to be up to 3 mm in size of 1-3 digits (Fig. 2). Tier III has an areal shape in the form of plains on both banks of the river before the confluence of the Buzlug and Shorbulag rivers with the Kurakchay river. A distinctive feature of this level is the weak compaction (cementation) of debris and aggregate due to carbonate-calcite grease. Gold content is scarce, the average content is up to 50 mg/m³. [10, 101-112]

We believe that the amount of gold is correlated with the degree of saturation of gold-bearing karst sediments with brown iron deposits. The content of gold signs in karsts ranges from 50 mg/m³ to 1.5 g/m³, against 150-200 mg/m³ in channels (at the site of karst placement). The total average gold content in the floodplain of the river is 200 mg/m³. In the upper parts of the section of the floodplain terrace, we usually deal with single characters, while in the lower reaches they are 3-5 with sizes up to 3-5 mm. The second terrace is covered with alluvial sediments with a thickness of 4-10 m, containing single signs of gold.

In the selected Todan-Kamenny Bridge section, the content of free gold is from 20-80 mg/m³ to 553-800 mg/m³. In this case, the size of gold grains along the river reaches 2-5 mm. With regard to the gold content of level III, the identification of any pattern is difficult due to the high thickness of alluvial deposits. Nevertheless, from 1 to 2 signs of placer gold with sizes up to 1.5 mm, which are also common in boulders, are found here.

According to the above data, all the indicated terrace levels in the Kurakchay river basin to one degree or another carry gold, the source of which is gold ore occurrences identified by the right tributary of the Kurakchay river in the Garabulagsu river basin, pyrite sulfuric deposits of Chiragderesi, Toganaly and playing the role of collector high terrace levels. The fineness of gold is high and ranges from 900 to 940. The color is yellow, golden yellow. According to the rounding and according to the work carried out in the Kurakchay river basin, an alluvial-terrace morphogenetic type of placer is distinguished.

Analysis of the structure of the valley, the nature of the distribution of gold in it, allows us to conclude that the lithological sections of the terraces are mature from top to bottom, all available terrace levels are gold-bearing, gold is confined to boulders of the near-raft part of the section [11, 13, 14, 15].

On a short section of Kyurachchaya, karst voids of alluvial gold were revealed. The area of the segment is composed of Cretaceous terrigenous and bedrock. These rocks in the direction from the northwest to the northeast are cut off by the Kurakchay fault, transverse to the Pre-Malocaque fault. Alluvial deposits are distributed in the terraces of the river valley, at an altitude of 600-1000 m. In the valley of the Kurakchay river, the level of developing karst voids corresponds to the level of 600-820 m, in this zone the erosion section of the valley is 5-80 m. In the zones of karst voids, carbonate formations on the right the banks of the river are located horizontally, and on the left bank they have a northwestern extension. The size of most gold grains (over 50%) is about 1mm. Among the gold grains, isometric forms of quartz inclusions are found. Gold sample is high, varies in the range of 900-940. The indicated typomorphic characteristics of gold (degree of roundness, high fineness, etc.) indicate a certain range (about 5-8 km) of the primary deposit [3, 90-110; 7; 12].

In the area of the right tributary of the Kyurachchay River, the Kyapazsky perspective site with a total area of 35-40 km² is located. This area is part of the Göygöl ore district. After the discovery of the Chiragderinsky and Toganalinsky deposits of sulfur pyrites and the Bashkishlaksy deposits of barite in this zone, separate works on placer gold were carried out. In the process of these works, along with an assessment of the industrial prospect of alluvial gold bearing of river sediments of the rivers Kyurachchay, Garabulagsu, Sarysu, Buzlugchay and others, work was carried out on alleged sources of near and far drift. These are the yields of indigenous hydrothermally altered zones, the area of development of metasomatites.

A series of radical outcrops of hydrothermally altered zones with gold-copper mineralization have been discovered in the tributaries of the Garabulagsu and Sarysu, which is potentially promising in terms of identifying both its own and complex gold and copper deposits. Upper Bios, Batu effusive and Upper Jurassic, Cretaceous effusive-sedimentary, sedimentary rocks take part in the geological structure of the area.

Ore zones have a complex internal structure. In the central parts, the most severe changes are noted, such as near a fissured metasomatism, represented by kaolinization, pyritization, silicification, accompanied by vein-disseminated mineralization of copper. In some places, with a thickness of 2-3 m and a general silicification of the mass, the zones are penetrated by later low-power veins of quartz. Protruding on the relief, they form dyke-like forms.

On this basis, two groups are distinguished: earlier – northwest, later – superimposed. The first group has a small length, and are recorded along river valleys, and deep gorges. From the south-west to north-east, several zones are distinguished. Their thickness ranges from 2 to 20 m. In some places they are accompanied by dikes of gabbro-diabase composition. The gold content in them varies from 0.1 to 55, 1 g/t. They carry polymetallic mineralization.

The most widely developed and pronounced in the modern erosion section of the northeast strike zone. They are younger in age, secant in nature. About ten such zones stand out on the area, the most representative and studied can be specified only 4.

One of the most studied zones stands out on the right tributary of the Garbulagsu river. This zone is traced for 6 km, with a thickness of 4-70 m. The zone consists of highly silicified secondary quartzites, and finely dispersed dissemination of pyrite is also observed there. The second zone has also been studied, in some samples gold is noted up to 1 g/t, and in some from 1 to 5 g/t [8, 9, 13].

The conventionally named main zone has a 30 meter thickness and extends to the northeast. In this zone, the rocks are hydrothermally altered, strongly kaolinized, pyritized, and in some places turned into clay. Secondary copper minerals, such as malachite and azurite, are noted along the cracks. Streaky nesting clusters of finely dispersed silver-gray pyrite are also observed. Of the approximately 200 samples taken, gold is observed differently. Because in 29% - up to 1 g/t, about 61% -1-5 g/t, 8% - more than 5 g/t. The sizes of native gold taken from the prowlis vary from 1-4 mm. (fig. 3)

The mineralized zones of this area are located in the vicinity of the sulfur-pyrite ore stocks of the Chiragderinsky and Toganalinsky deposits, which in turn are surrounded by manifestations of gold-bearing ores of the same type, as well as metasomatic veins 3, 67-81; 10, 139-151.

In this regard, the possibility of the presence of separate isolated stocks with a vein-interspersed trail on Kapazskaya Square is not discounted. The most likely targets for copper and gold mining were precisely these stocks.

The area in the southeast joins and partially covers the western continuation of the ore-bearing structures of the Bashkishlak barite polymetallic, with a similar geological structure to the Chovdarsky deposit and an identical set of minerals. Several samples containing 0.4-1.5 g/t of gold were taken from vein zones with barite and from dumps of adits of the Bashkishlak deposit. The indicated data confirm the high prospectivity of alluvial gold bearing of the geological object under consideration and requires further, more detailed studies.

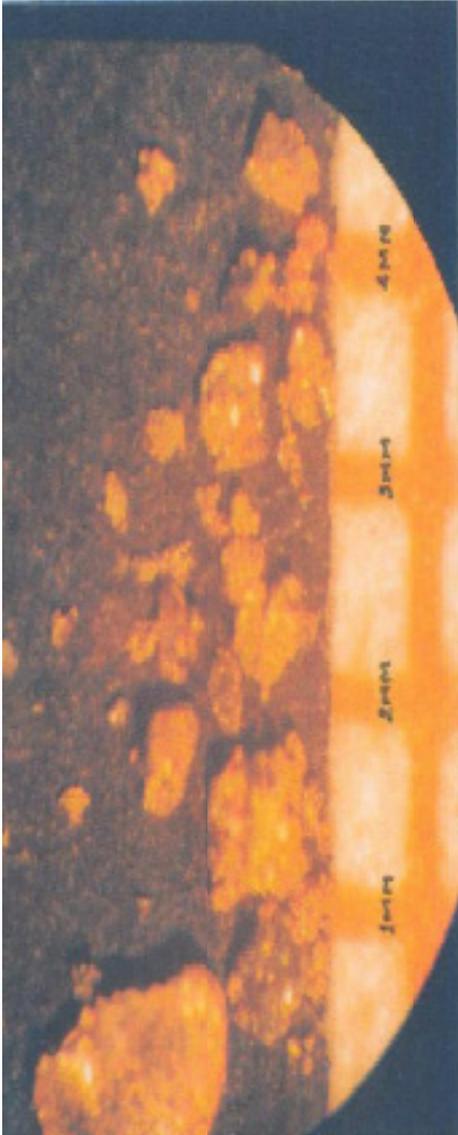


Fig. 3. Dimensions of native gold from the crushed samples

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UDC 552.5:553.98.048(470.53)

关于有效压力对碳酸盐岩石过滤电容特性的影响

**ABOUT THE INFLUENCE OF EFFECTIVE PRESSURE
ON FILTRATION-CAPACITIVE PROPERTIES OF CARBONATE ROCKS**

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注解。使用“AR-608”仪器(美国科勒斯特公司)在地层条件下研究了碳酸盐岩储集层的过滤电容特性。考虑了在该装置上工作的方法论问题和结果解释的特征。给出了石灰岩和白云岩在大气和地层条件下储层性质的动态,并估算了孔隙度的可压缩性。

关键词: 过滤电容性能, 孔隙率, 渗透率, 渗透率-孔隙率仪, 有效压力, 气体渗透率, 碳酸盐岩, 哈斯勒岩心支架。

Annotation. *The filtration-capacitive properties of carbonate reservoir rocks were studied in stratum conditions using an “AR-608” instrument (Korettest firm, USA). The methodological issues of work on this device and the features of the interpretation of the results are considered. The dynamics of reservoir properties under atmospheric and stratum conditions for limestones and dolomites is shown, and the compressibility of porosity is estimated.*

Key words: *Filtration-capacitive properties, porosity, permeability, permeameter - porosimeter, effective pressure, gas permeability, carbonate rocks, Hasler core holder.*

Filtration and capacity properties of carbonate rocks have been examined in formation conditions in apparatus “AP-608” (Coretest, USA). Methodical questions of work on that apparatus have been looked over and also peculiarities of received data interpretation. Dynamics of changing of filtration and capacity properties is shown from the effective pressure value, relations between filtration and capacitive properties have been arranged in atmospheric and formation conditions for limestones and dolomites, compressibility of porosity have been evaluated.

Keywords: Filtration-capacitive properties, porosity, permeability, permeameter, porosimeter, effective pressure, gas permeability, carbonate rocks, core holder of Hasler.

A quantitative assessment of the petrophysical properties of rocks in reservoir conditions is necessary for a reliable interpretation of well logging data, introduction of corrections for volumetric coefficients when calculating reserves and drawing up development projects [1]. Investigations of the filtration-capacitive properties (FCP) of the rocks were carried out on an "AR-608" instrument by the "Kore-test" company (USA), which was used to determine (K_g) and gas permeability (K_{pr}) under atmospheric conditions and real reservoir stresses.

The task of the FCP analysis was to clarify some features of changes in both porosity and permeability of oil and gas reservoir rocks depending on effective pressure (Ref), which was understood as the difference between rock and pore pressure. At an average depth (N) of productive deposits of 1,500 m, its value of 25 MPa was calculated as the real value of the effective pressure, calculated by the approximate formula $Ref. = 0.14H$ [2]. The studies carried out are of certain interest from the point of view of interpreting the results obtained on the "AR-608 instrument", since it is used in many organizations. Typical carbonate-type reservoirs — limestones and dolomites of the Bashkir and Tournais-Famennian deposits of the oil and gas bearing Perm region of the Ural-Volga province — were chosen as the object of research. For deposits of different ages, reservoir pressure was chosen the same with the aim of comparing rocks of different lithological composition and working out methodological issues. In the experiments, cylindrical samples with a diameter of 25.4 mm and a height of 20 ... 30 mm were used.3

The permeameter-porosimeter "AR-608" is equipped with a Hasler core holder, designed to work with rocks having a porosity of 0.1 ... 40% and a permeability of 0.001 ... 5000 fm² with a reservoir pressure of 3.5 ... 65 MPa. In addition to lateral, the instrument provides modeling of equilibrium axial pressure, which, according to [3], is a necessary condition for studying rocks in real conditions of their occurrence. In a first approximation, such an investigation with the same comprehensive compression is quite acceptable [2]. Permeability is subject to non-stationary filtration adjusted for slippage, and porosity is based on the Boyle-Marriott law. Due to the two-way input of the working agent into the sample, the device has a high measurement rate.

The measurement features on the "AR-608" instrument are that the first values of K_g and K_{pr} are recorded at $Reff = 3.5$ MPa and are taken as an analog of atmospheric conditions. In fact, this is an erroneous assumption, since with such a load in the reservoir significant deformation changes occur that cannot but affect the FCP. Therefore, atmospheric conditions will most likely correspond to porosity and permeability at an effective pressure of 1 MPa, at which the rock is practically not deformed and which is comparable to that used in Russian devices.

This is confirmed by the results of the analysis of porosity and permeability at $Ref = 1$ and 3.5 MPa in comparison with the data obtained at reservoir effective pressure, in our case, equal to 25 MPa (Table 1, Fig. 1). Values of K_g with $Ref. = 1$ MPa was found by extrapolation taking into account the regularity of the change in porosity in the range of $R_{ef} = 3.5 ... 25.0$ MPa.

Table 1.

| Well number | Sampling interval, m | Stratum | Type of rock | Sample | Cylinder number | Gas Porosity (Kg), % | | | | Gas permeability (Kpr), fm ² | | | | Коллектор | | |
|---------------|----------------------|-----------|--------------|--------|-----------------|----------------------|------------|-----------|----------------------------|-----------------------------------------|----------|------------|-----------|-----------|----------------------------|-------------------------------------|
| | | | | | | at 1 MPa | at 3.5 MPa | at 25 MPa | absolute change at 3.5 MPa | relative change at 3.5 MPa | at 1 MPa | at 3.5 MPa | at 25 MPa | | absolute change at 3.5 MPa | относительное изменение при 3,5 МПа |
| 259 | 1189,7...1194,8 | Bs | Limestone | 3 | 124032* | 7,64 | 7,41 | 6,97 | -0,23 | 34,3 | 0,08 | 0,07 | 0,059 | -0,007 | 33,3 | п |
| 53 | 1848,3...1857,1 | Fm | Dolomite | 114 | 124242 | 3,09 | 2,49 | 1,82 | -0,60 | 47,2 | 0,11 | 0,10 | 0,028 | -0,014 | 17,1 | с.л.к |
| 131 | 1914,0...1923,0 | Bs | Dolomite | 38 | 123815* | 2,70 | 2,30 | 1,36 | -0,40 | 29,9 | 0,048 | 0,037 | 0,007 | -0,011 | 26,7 | п |
| 53 | 1131,9...1134,9 | Bs | Limestone | 2 | 124092 | 9,70 | 9,41 | 8,86 | -0,29 | 34,5 | 0,58 | 0,54 | 0,480 | -0,04 | 40,0 | п |
| 259 | 1184,0...1189,7 | Bs | Limestone | 2 | 124031 | 9,08 | 8,87 | 8,47 | -0,21 | 34,4 | 1,02 | 0,99 | 0,940 | -0,03 | 37,5 | п |
| 53 | 1151,5...1158,5 | Bs | Limestone | 4 | 124094 | 10,90 | 10,49 | 9,68 | -0,41 | 33,6 | 1,90 | 1,80 | 1,502 | -0,14 | 35,2 | п |
| 53 | 1848,3...1857,6 | Fm | Dolomite | 116 | 124243* | 4,10 | 3,33 | 1,86 | -0,77 | 34,4 | 4,04 | 2,60 | 0,160 | -1,44 | 37,1 | п |
| 259 | 1215,0...1221,5 | Bs | Limestone | 9 | 124040 | 11,25 | 10,98 | 10,49 | -0,27 | 35,5 | 15,70 | 15,60 | 15,090 | -0,08 | 13,1 | п |
| 259 | 1194,8...1200,5 | Bs | Limestone | 4 | 124033 | 14,10 | 13,78 | 13,12 | -0,32 | 32,7 | 29,30 | 29,10 | 27,200 | -0,24 | 11,4 | п |
| 2306 | 1119,7...1123,2 | Bs | Limestone | 121 | 118758 | 13,30 | 12,96 | 12,40 | -0,34 | 37,8 | 27,00 | 26,90 | 26,090 | -0,11 | 12,1 | п |
| 259 | 1665,6...1672,0 | T | Limestone | 67 | 124303 | 17,30 | 16,75 | 15,81 | -0,55 | 36,9 | 109,10 | 98,80 | 82,160 | -10,3 | 38,2 | п |
| 259 | 1665,6...1672,3 | T | Limestone | 63 | 124297 | 14,60 | 14,01 | 12,98 | -0,59 | 36,4 | 203,70 | 194,50 | 151,860 | -9,20 | 17,7 | п |
| 2306 | 1018,0...1022,8 | Bs | Limestone | 6 | 118833 | 20,00 | 19,61 | 18,65 | -0,39 | 28,9 | 416,00 | 413,10 | 386,470 | -2,92 | 9,9 | п |
| 259 | 1665,6...1672,0 | T | Limestone | 70 | 124307 | 15,49 | 14,78 | 13,56 | -0,71 | 36,8 | 549,40 | 517,30 | 451,210 | -32,10 | 32,7 | с.л.к |
| 259 | 1672,7...1677,9 | T | Limestone | 75 | 124314 | 17,37 | 16,73 | 15,80 | -0,64 | 40,8 | 879,50 | 867,70 | 810,80 | -11,80 | 17,2 | с.л.к |
| 259 | 1672,7...1677,9 | T | Limestone | 78 | 124320 | 18,30 | 17,80 | 17,04 | -0,50 | 39,7 | 984,40 | 943,80 | 892,00 | -40,60 | 43,9 | п |
| 259 | 1672,7...1677,9 | T | Limestone | 74 | 124312 | 17,80 | 16,25 | 14,86 | -1,55 | 52,7 | 1360,00 | 1332,10 | 1181,19 | -27,91 | 15,6 | с.л.к |
| Change range | | | | | | 2,70— | 23— | 1,36— | 0,21—1,55 | 28,9...— | 0,048— | 0,037— | 0,007— | 0,007— | 11,4...43,9 | |
| Average value | | | | | | 20,0 | 19,61 | 18,65 | 52,7 | 1360,0 | 1332,1 | 1181,19 | 40,6 | | 25,8 | |
| | | | | | | 12,60 | 11,64 | 10,81 | 0,52 | 363 | 2693 | 2613 | 236,90 | 8,06 | | |

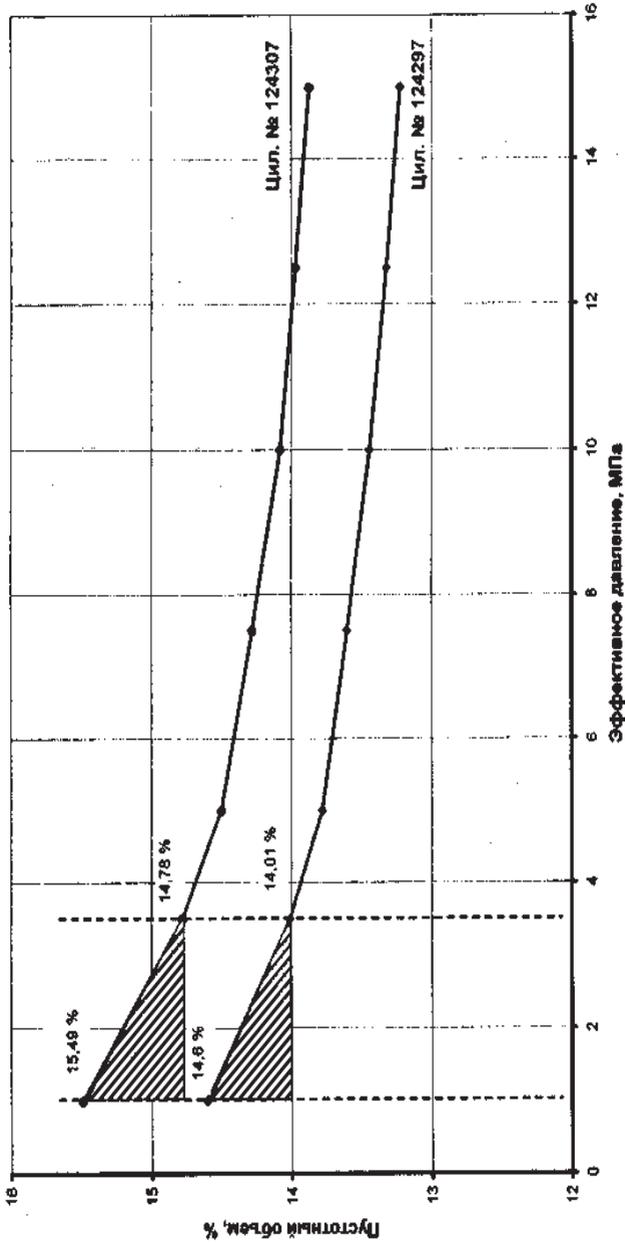


Fig. 1. Interpolation of the change in the void volume of carbonate rocks at an effective pressure of 1 MPa

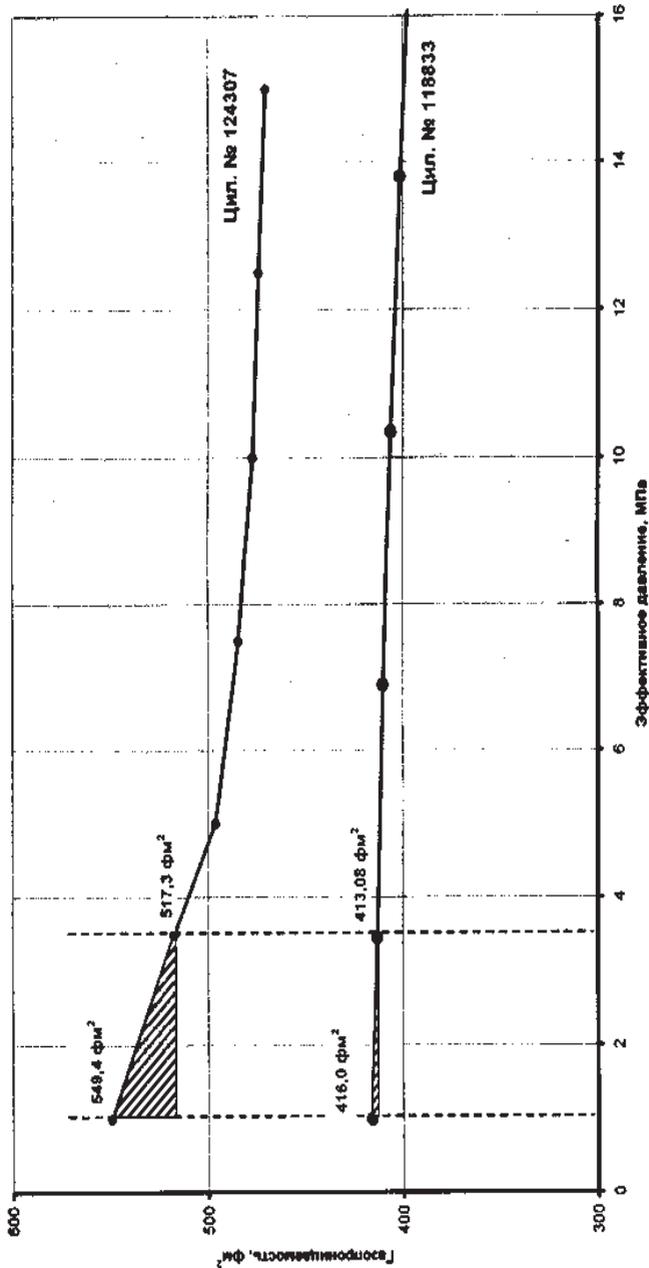


Fig. 2. Interpolation of changes in the gas permeability of carbonate rocks at an effective pressure of 1 MPa

Conclusions

The inconsistency with atmospheric conditions of the values of porosity and permeability, determined on the device "AR-608" at an effective pressure of 3.5 MPa, is shown, and a method for their correction is proposed.

For the Bashkir and Tournaisian-Franch deposits of the southern part of Prikamye, the values of open porosity and absolute gas permeability were determined for the first time, taking into account reservoir conditions.

Close correlation dependencies between the filtration-capacitive properties obtained under reservoir and atmospheric conditions are established, which allows a calculated estimation of real reservoir properties.

The dependences of absolute changes in permeability in layer conditions are differentiated taking into account lithological features of rocks separately for limestones and dolomites.

The compressibility coefficients of porosity are calculated at an effective reservoir pressure of 25 MPa and a tendency for their change depending on the initial porosity is shown.

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气候和人为因素影响下的Vilashchay水库水质变化
**CHANGE IN WATER QUALITY OF THE VILASHCHAY RESERVOIR
UNDER THE INFLUENCE OF CLIMATIC AND
ANTHROPOGENIC FACTORS**

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抽象。本文讨论了1986年在Masalli地区启用的Vilashchay水库水质的变化。根据世界气象组织的数据,2014年,气象观测历史上14个最热年份中有13个记录在21世纪。Vilashchay水库并未传递全球的全球气候变化和人类对自然的干预,并且水库中水的化学成分发生了剧烈的质变。在2005-2018年期间,水矿化增加了2.35倍,硬度增加了2.14倍,氯离子含量增加了2.74倍。营养素中亚硝酸根离子的含量增加了2.69倍,硝酸根离子的含量增加了2.71倍,铵离子的含量增加了3.67倍。由于受到有机和无机物质的污染,生化需氧量(BOD₅)也增加了1.5倍。在金属中,铁的量增加了2.18倍,铝的量增加了1.65倍,锌的量增加了1.33倍。悬浮固体量增加了3.33倍。

关键词: 水库, 全球, 观测, 人为, 水, 质量, 变化, 分析。

Abstract. *The article discusses changes in the water quality of the Vilashchay reservoir, which was commissioned in the Masalli district in 1986. According to the World Meteorological Organization, in 2014, 13 of the 14 hottest years in the history of meteorological observations were recorded in the 21st century. Global climate change in the world and human intervention in nature did not pass by the Vilashchay reservoir, and the chemical composition of the water in the reservoir underwent a sharp qualitative change. For the period 2005-2018, water mineralization increased 2.35 times, hardness - 2.14 times, the amount of chloride ions - 2.74 times. The amount of nitrite ions from nutrients increased by 2.69 times, ion nitrate by 2.71 times and ammonium ions by 3.67 times. As a result of contamination with organic and inorganic substances, the biochemical oxygen demand (BOD₅) also increased - by 1.5 times. Of metals, the amount of iron increased 2.18 times, the amount of aluminum - 1.65 times, and the amount of zinc - 1.33 times. The amount of suspended solids increased by 3.33 times.*

Keywords: *reservoir, global, observation, man-made, water, quality, change, analysis.*

Introduction. The Republic of Azerbaijan is in a drought zone, there is an acute shortage of water resources. In connection with global climate change, the issues of preservation and protection of water resources from pollution, as well as their effective use, are becoming particularly relevant.

Melting of glaciers, early flowering of plants, rising air temperatures, etc. are considered as a sign of global climate change [1]. According to the World Meteorological Organization, in 2014, 13 of the 14 hottest years in the history of meteorological observations were recorded in the 21st century [2]. According to climatologists and centers of global hydrometry, global climate change on Earth, especially global warming, is increasingly intensifies [2,3,4,5,6,7,8,9,10,11,12,13].

The key to preventing global climate change is the prevention of cruel interventions in nature, the use of weapons of mass destruction, the rejection of the material interests of giant corporations and their owners, as well as the unification of states [14]. As a result of global climate change and human impact, groundwater and surface water resources are also subject to drastic changes. Changes in water quality have a serious impact on soil and livelihoods, as a result, soil becomes saline and loses crop rotation, and people suffer from various diseases [15,16].

Taking all this into account, a number of measures have been developed to address the effects of global climate change and human impacts around the world. One of them is the World Water Week Forum, which has been organized since 1991 with the support of the Stockholm Water Institute. The forum is attended by 2,000 researchers, industrialists and politicians from 140 countries [17]. One of the most important tasks facing world scientists today is to combine efforts to create a cleaner and healthier environment and identify patterns that occur in water bodies in changing climatic conditions.

Purpose of the study is the study of changes in the water quality of the Vilashchay reservoir under the influence of global climate changes and anthropogenic factors.

Object of the study are the waters of the Vilashchay reservoir.

Research Methodology. Water samples were taken from the observation site on the lower part of the Shikhlar bridge in the Masalli region four times a year (during the last month of each season) and underwent laboratory analysis to determine the quality changes that occurred at the Vilashchay reservoir as a result of global climate change and anthropogenic impact. The total mineralization, ionic composition (HCO_3^- , CO_3^{2-} , Cl^- , SO_4^{2-} , Ca^{2+} , Mg^{2+} , Na^+ , K^+), suspended solids, total hardness, heavy metals (Fe^{3+} , Cu^{2+} , Al^{3+} , Zn^{2+}), nutrients (NO_2^- , NO_3^- , NH_4^+) and the indicator of biochemical oxygen demand (BOD_5) were determined in the selected samples. State standards were used in laboratory analyzes [18, 19, 20, 21, 22], guidelines and methodologies described in the practical guide [23, 24, 25, 26, 27, 28, 29].

Results and discussion. The power sources of the Vilashchay reservoir are the Vilash and Matara rivers. The reservoir was built in 1986 in the area of the village of Gariblar, Masalli district. The total reservoir volume is 46 million m³, usable volume is 38 million m³, dead volume is 8 million m³, surface area is 750 ha, dam length is 1700 m, height is 37 m, capacity is 838 m³ / s.

The first phase of its construction was commissioned in 1986. As a result, water supply to 11,000 hectares of cultivated land in Masalli was improved. The normal pressure level of the dam is 75.5 m, dead volume is 58 m, perimeter is 3807 m, maximum height is 33.85 m, maximum depth is 29.35 m.

A river reservoir, for the construction of which a mixture of clay soil, stone, gravel and crushed stone was used. A clay core was placed in the central part of the reservoir to prevent leakage from the dam. The reservoir was built for irrigation purposes [30].

Laboratory analysis of samples taken from the Vilyashchay reservoir (chemical composition and degree of mineralization), and accumulated long-term data [31] show that significant changes have occurred in the composition of water. The change in the degree of mineralization and the ionic composition of the Vilashchay reservoir are given in table 1.

Table 1
Change in mineralization, ionic composition and water hardness of the Vilashchay reservoir, mq/l

| Years | Mineralization | HCO ₃ ⁻ | Cl ⁻ | SO ₄ ²⁻ | Ca ²⁺ | Mg ²⁺ | Na ⁺ +K ⁺ | Hardness, mq.-ekv |
|-------|----------------|-------------------------------|-----------------|-------------------------------|------------------|------------------|---------------------------------|-------------------|
| 2005 | 739 | 214 | 155 | 152 | 100 | 23 | 96 | 7 |
| 2006 | 719 | 239 | 142 | 129 | 78 | 25 | 106 | 6 |
| 2007 | 518 | 122 | 27 | 216 | 30 | 9 | 115 | 2 |
| 2008 | 629 | 214 | 89 | 141 | 100 | 18 | 61 | 7 |
| 2009 | 873 | 214 | 195 | 202 | 120 | 24 | 120 | 8 |
| 2010 | 640 | 244 | 89 | 128 | 100 | 18 | 61 | 7 |
| 2011 | 591 | 320 | 71 | 42 | 65 | 21 | 72 | 5 |
| 2012 | 874 | 214 | 195 | 202 | 120 | 24 | 120 | 8 |
| 2013 | 832 | 214 | 231 | 140 | 110 | 36 | 102 | 9 |
| 2014 | 925 | 214 | 243 | 184 | 106 | 29 | 149 | 8 |
| 2015 | 544 | 183 | 71 | 144 | 55 | 33 | 58 | 6 |
| 2016 | 972 | 224 | 325 | 118 | 117 | 32 | 156 | 9 |
| 2017 | 1144 | 160 | 464 | 135 | 160 | 19 | 205 | 10 |
| 2018 | 1743 | 189 | 425 | 59 | 38 | 12 | 50 | 15 |

The water mineralization level in 2005 was 739 mg/l, and the hardness was 7 mEq/l, in 2018, these indicators were 1743 mg/l and 15 mEq/l, respectively. It also shows that there are significant changes in the ionic composition of the reservoir water. As a result of a 14-year laboratory analysis, the level of mineralization increased by 1004 mg/l, chloride ions - by 270 mg/l. It also shows that the degree of mineralization increased 2.35 times, the amount of chloride ions - 2.74 times, and stiffness - 2.14 times.

Table 2
Changes in the content of water ingredients in Vilashchay reservoir, mg/l

| Years | Suspended matter | BOD ₅ | NO ₂ ⁻ | NO ₃ ⁻ | NH ₄ ⁺ | Fe ³⁺ | Cu ²⁺ | Al ³⁺ | Zn ²⁺ |
|-------|------------------|------------------|------------------------------|------------------------------|------------------------------|------------------|------------------|------------------|------------------|
| 2005 | 9 | 2 | 0,026 | 0,73 | 0,12 | 0,03 | 0 | 0,091 | 0,003 |
| 2006 | 34 | 13 | 0,14 | 3,59 | 0,96 | 0,06 | 0,003 | 0,129 | 0,005 |
| 2007 | 91 | 42 | 0,106 | 0,56 | 2,68 | 0,1 | 0 | 0,104 | 0,008 |
| 2008 | 12 | 2 | 0,008 | 2,42 | 0,08 | 0,04 | 0 | 0,091 | 0,003 |
| 2009 | 0,015 | 4 | 0,74 | 0,04 | 0,003 | 0,03 | 0 | 0,115 | 0,007 |
| 2010 | 0 | 2 | 0,041 | 0,92 | 0,16 | 0,07 | 0,001 | 0,03 | 0,008 |
| 2011 | 1 | 3 | 0,002 | 0,28 | 0,04 | 0,03 | 0 | 0,03 | 0,007 |
| 2012 | 1 | 1 | 0,004 | 0,73 | 0,04 | 0,03 | 0 | 0,092 | 0,008 |
| 2013 | 8 | 2 | 0,04 | 2,04 | 0,06 | 0,05 | 0 | 0,098 | 0,004 |
| 2014 | 176 | 7 | 0,032 | 1,19 | 0,93 | 0,07 | 0 | 0,059 | 0,003 |
| 2015 | 10 | 2 | 0,025 | 0,94 | 0,12 | 0,06 | 0 | 0,09 | 0,004 |
| 2016 | 5 | 1 | 0,037 | 0,05 | 0,7 | 0,05 | 0 | 0,085 | 0,003 |
| 2017 | 31 | 4 | 0,048 | 12,54 | 0,64 | 0,07 | 0 | 0,112 | 0,004 |
| 2018 | 30 | 3 | 0,07 | 1,98 | 0,44 | 0,07 | 0 | 0,15 | 0,004 |

It was also found that the amount of nutrients is many times higher than normal (table 2). Over the past 14 years, the number of nitrite ions has increased 2.69 times, the number of nitrate ions - 2.71 times, and ammonium ions - 3.67 times. In addition, the biochemical oxygen demand (BOD₅) also increased 1.5 times. Although in 2005 the amount of suspended matter was 9 mg/l, in 2018 this indicator was 30 mg/l, which increased by an average of 3.33 times.

From table 2 it is seen that the number of iron compounds increased by 2.18 times, aluminum - by 1.65 times, and zinc compounds - by 1.33 times. Copper in the water of the reservoir was observed in 2006 and 2010, but in other years it was not found in the water.

Thus, studies conducted in 2005-2018 allow us to draw the following conclusions:

1. The water quality in the Wilashchay reservoir is subject to a sharp change as a result of natural and man-made impacts. In general, water quality is gradually deteriorating and this trend is becoming increasingly undesirable.

2. Mineralization of water and salt content, the amount of pollutants and metals vary over a wide range and exceed the maximum allowable limits for surface waters.

3. The above processes are even more important for the protection of water bodies and require the prevention of interference in river areas and their protection zones.

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在采矿企业清算期间通过使用机动车辆进行土地开垦的技术论证
**JUSTIFICATION OF TECHNOLOGIES FOR LAND RECLAMATION
DURING THE LIQUIDATION OF MINING ENTERPRISES
THROUGH THE USE OF MOTOR VEHICLES**

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抽象。这项工作的目的是证实已清算采矿企业领土上的林业填海造林技术的基础。作为所提出技术的小型集合体系统的基本能源手段，考虑使用机动车辆（摩托车和摩托车）。例如，这对于修复前建筑物，建筑物，工业场所，工业结构，垃圾填埋场（受干扰的土地）和堆石场下面的浅水平表面是有意义的。这项工作的主要目的是在职权范围内进行研究：“在以V. Grib命名的采矿和加工厂的受灾地区的恢复中的开垦方向”（组织-客户“ARKHANGELSKGEOOLDOBYCHA” JSC, 阿尔汉格尔斯克）。

关键词：森林经营，堆石场，梯田，播种单位，造林。

Abstract. *The purpose of the work is to substantiate the fundamentals of technologies for forestry reclamation of sites in the territory of liquidated mining enterprises. As the basic energy means of the system of small-sized aggregates of the proposed technologies, the use of motor vehicles (motoblocks and motorcycles) is considered. This is relevant, for example, for shallow horizontal surfaces that were under buildings, structures, industrial sites, industrial structures, landfills (disturbed lands) and rock dumps prior to remediation. The main objective of the work is to conduct research in the framework of the Terms of Reference "Directions of reclamation in the restoration of disturbed areas of the territory of the mining and processing plant named after V. Grib" (Organization - customer "ARKHANGELSKGEOOLDOBYCHA" JSC, Arkhangelsk).*

Keywords: *Forest management, rock dump, terrace, sowing unit, afforestation.*

Currently, there are: classification of disturbed lands, requirements for technologies for their restoration in areas of restoration, technology of the technical and biological stages, technological schemes, technological maps. There are recommendations for mechanization. An assortment of tree and shrub crops, grass mixtures, which have good growth and development in adverse conditions in dif-

ferent zones with biological characteristics of the species composition and type of forest stands, was selected [1]. Here, large-sized equipment is proposed as a means of mechanization for the technical beginning of reclamation. The biological stage of reclamation involves, first of all, the use of manual labor. Planting and sowing afforestation in the reclaimed area involves the use of hand tools (Schulz rifle, Kolesov's sword, shovel, etc.).

If the horizontal plot for biological reclamation is large in area and belongs to a re-compacted territory, then special aggregates are recommended for its forestry use when sowing commercial tree species. It can be, for example, a widespread shredder - PDN-1 cultivator (scarifier-mounted disk shredder) [2]. The layout of this machine includes a sowing apparatus, which provides row-hole sowing of seeds of operational (commercial) conifers. This machine is aggregated with heavy large-sized wheeled or tracked tractors and justifies itself on planting forest crops in the above extreme conditions.

During forestry reclamation on small contoured disturbed land plots, taking into account the required relocations of a large-sized unit, sowing of forest crops will lead to significant specific energy costs. In this regard, the obvious positive potential and the novelty of the technological process of reclamation of disturbed lands, for this case, consists in the application of technology based on the use of small-sized equipment, for example, motor units.

It should be noted that the possible prospects of afforestation on shallow contaminated land plots using a sowing unit made on the basis of a moped (or motorcycle) have been proved (Fig. 1) [3].

The object of scientific research is a working prototype of the sowing equipment installed on a ZiD-50-01 moped (see Fig. 2).

The frame of the machine (2) consists of 3 beams that are attached to the tubular frame of the moped (1). The support wheel of the frame (3) is mounted on the axle (11) and equipped with a load (12) to ensure stability in cornering and when driving on bumps. On the front (relative to the moped) beam there is an adjustment device (13) of the convergence angle for the support wheel. The coulter mounting unit includes: a disc coulter (5), its hub, an axis with bearings and a rigid frame (4). The central beam of the frame is a rectangular sheet that is installed at predetermined angles of attack and inclination, which maintains the required opener angles. The sowing part is a labyrinth type sowing device (6) on a common shaft (8) with a support drive roller (7). The ratio of the diameter of the support roller and the number of metering devices on the sowing device is selected to provide 0.75 m for the sowing step required by forestry conditions. The roller is installed in a fork (9), which is connected to the central part of the beam through a rigid universal joint (10). This mount reduces the load on the structure and improves the maneuverability of the unit. A harrow in the form of a train, which is made of a chain, is used to plant seeds.

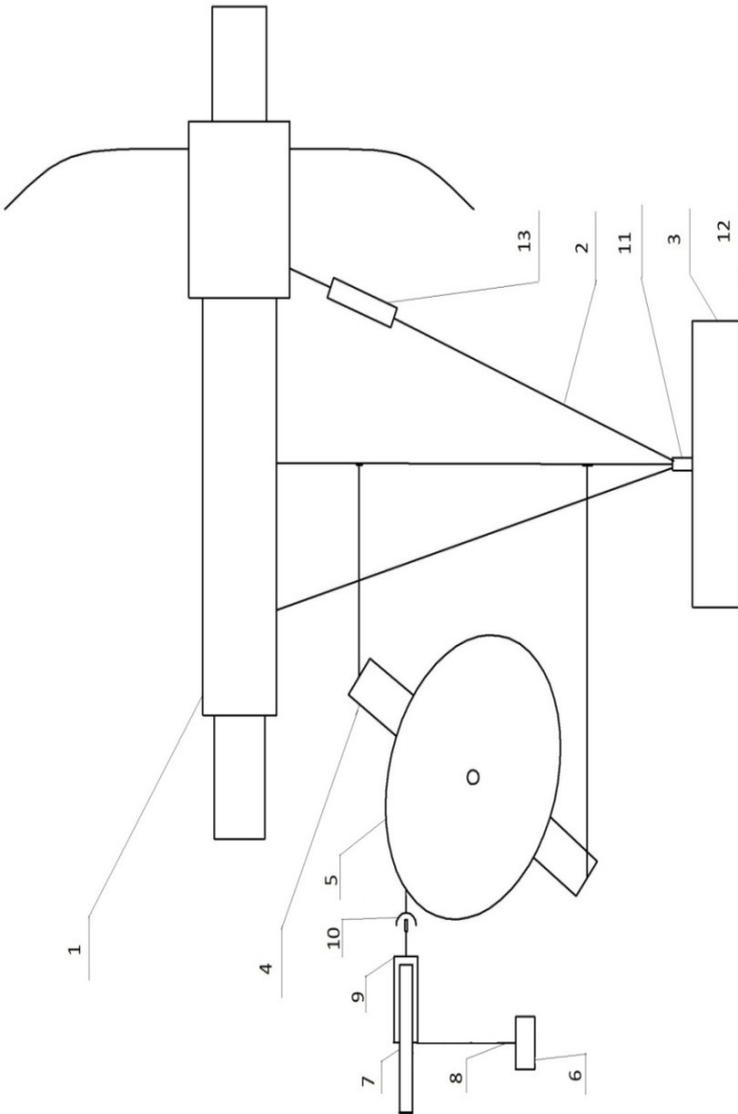


Fig. 1. The layout of the sowing unit based on the moped ZiD-50-01

1-moped (motorcycle), 2-frame, 3- frame support wheel, 4-frame, 5-disc coultter, 6- labyrinth type metering unit, 7- drive-wheel, 8- axis, 9- fork, 10- universal joint, 11- axis, 12- load, 13- toe-in angle adjustment

Our work is about a preliminary analysis of the use of a sowing unit on a motor chassis in the conditions of forestry reclamation of disturbed lands. This technological option is provided by sowing coniferous production crops for forestry use.



Fig. 2. Appearance of the prototype in tests in the conditions of the industrial site of the quarry (see Fig. 3)



Fig. 3. Degraded disturbed land of the industrial site near the geological mine

The above source [1] provides recommendations for flattening slopes with various types of mechanisms during forestry reclamation of residual mine workings, for example, in open-pit coal mining.

To reduce the slopes by means of incremental development, excavators can be used: ECG-4.6; EO-10011D; E-1252B; E-12503; E-2505 (dragline), for the entrance of which to the dump the entrance semi-trench must be passed. All this requires a significant amount of energy. In our opinion, in this case, the significant positive potential and the novelty of the technological process of landfill reclamation are hidden in the use of technologies based on the use of small-sized motor vehicles, for example motor blocks.

The prospect of afforestation of rock dumps made on the terraces through the use of so-called microterracer is substantiated and proved [4]. In this regard, we created a working prototype of a walk-behind tractor and developed a design of a hinged working body of a screw type (Fig. 4).



Fig. 4. A prototype of the screw working body of the microterracer

On the basis of this walk-behind tractor, a layout of the aggregate is proposed - a microterracer for operation on the slopes of rock dumps (Fig. 5). The auger is located in the front of the unit along the machine and has a hydraulic drive from the power take-off shaft made on the walk-behind tractor. A rotating auger crashes into the blade array, and with the forward movement of the unit, the captured soil moves by blades to the central part of the machine under the bottom of the walk-behind tractor. In the rear part of the unit frame, a blade - scraper is installed at a certain angle (Fig. 5). As a result, the soil, as the machine moves forward, falls on the surface of the blade - scraper, and due to its angular orientation, it collides with the terrace on the left along the walk-behind tractor. As a result of this, the required profile of the horizontal terrace is formed (Fig. 5 - right sketch).

Thus, the horizontal terrace area provides for the movement of the manufactured sample of the sowing unit along it on the basis of the walk-behind tractor already noted above [5] (Fig. 6). It should be noted that with subsequent maintenance of forest stands, the terrace will significantly increase their effectiveness.

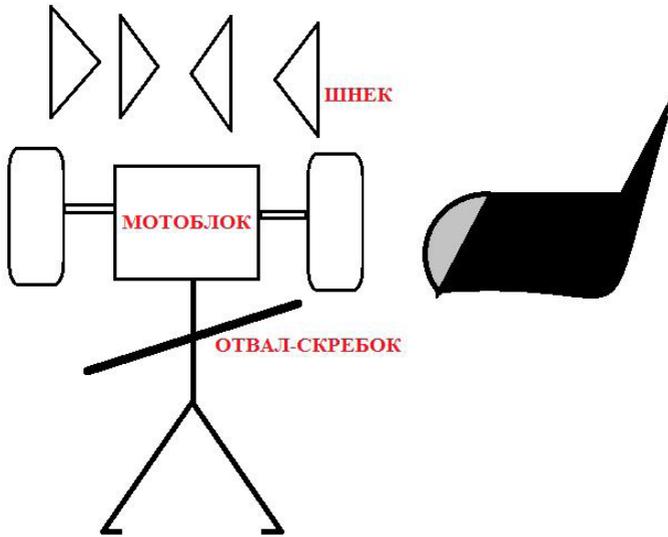


Fig. 5. Unit layout - a microterracer based on a walk-behind tractor



Fig. 6. An experimental sowing unit based on a motoblock

Conclusions and recommendations

1. To reduce energy intensity, improve the environmental efficiency of the process of reclamation of degraded disturbed small-contour land plots, it is advisable to use technology based on the use of sowing units based on motor chassis, for example motorcycles and mopeds.
2. A promising type of forestry reclamation of waste dumps can be considered the production of afforestation on terraces made on the slopes of dumps.
3. To optimize energy intensity, improve the environmental friendliness of the process of forestry reclamation of waste dumps, it is advisable to use the technological system “microterracer + sowing unit” on the chassis of walk-behind tractors.

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波纹管补偿器容错控制中的无损检测分析
**ANALYSIS OF NONDESTRUCTIVE TESTING IN FAULT TOLERANCE
CONTROL OF BELLOWS COMPENSATORS**

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抽象。无损检测广泛用于各种工业设施的控制和诊断：管道，罐，压力容器，罐，塔，塔，反应器设备，石油产品罐，起重设备等。被认为是无损检测的类型，基本要求。选择了一种更有效的管道波纹伸缩缝监测（诊断）方法。

关键词：波纹管伸缩缝；非破坏性测试；无损检测的类型；声发射控制；超声波测试；形变；容错能力。

Abstract. *Nondestructive testing is widely used for control and diagnostics of various industrial facilities: pipelines, tanks, pressure vessels, tanks, columns, reactor equipment, tanks of petroleum products, lifting equipment, etc. are considered types of non-destructive testing, basic requirements. A more effective method for monitoring (diagnostics) of bellows expansion joints of pipelines has been selected.*

Keywords: *bellows expansion joints; nondestructive testing; types of nondestructive testing; acoustic emission control; ultrasonic testing; deformation; fault tolerance.*

Compensators are used in all industries where there are pipelines: from the energy industry (including nuclear), as part of the pipelines of ships and ships of the Navy to the automotive industry [1].

Compensators are devices, elastic and tensile within the limits of their own flexible deformations, used in pipelines of various technological systems. The main function of compensators is considered to be the formation of an impermeable connection of moving elements of pipelines [2].

There are four types of compensators. Oil seals are used to compensate for temperature deformations of steam pipelines of heating systems. Lens expansion joints are used to compensate for thermal expansion of the pipeline. If it is neces-

sary to reduce the transmission of vibration in pipelines, flexible vibration inserts are used. In ship systems, where compactness and reliability of compensating elements are essential, only bellows compensators are used. They have a number of advantages over other types of compensators. In contrast to the gland and lens, bellows compensator does not require maintenance during the entire service life. It is a simple, reliable and cost-effective solution [1].

Bellows expansion joints (an element used in the pipeline system), adopted worldwide, are considered to be a more effective way to reduce overload in pipeline systems by absorbing the deformation of a flexible membrane consisting of one or more corrugations (figure 1).



Figure 1. Expansion bellows

The practicality of using bellows expansion joints lies in the fact that this type of expansion joint does not require maintenance during application. In this case, the bellows belongs to the non-renewable (incorrigible) component, and the period of its operation mostly determines the term of maintenance-free operation of pipelines in which it is used. The period of operation of the bellows compensator directly depends on the properties of the materials from which it is made. It is mandatory to conduct tensile testing of material samples to failure in order to establish the basic constants of the material [3].

To control the fault tolerance of bellows expansion joints, a variety of non-destructive testing methods are used. This article will consider the types of nondestructive testing, the main requirements for nondestructive testing, selected a more effective method for monitoring the bellows expansion joints of pipelines.

Nondestructive testing is based on obtaining information about the quality of the tested materials and products in their interaction with substances or physical fields in the form of electrical light, sound or other signals. Modern methods of nondestructive testing in accordance with GOST 18353-79 are divided into nine main types: radiation, acoustic, magnetic, eddy current, electric, radio wave, thermal, optical, and penetrating substances (molecular) [4].

Methods of each type of NC are classified according to the nature of the interaction of physical fields or substances with the controlled object, primary informative features and methods of obtaining primary information.

Magnetic control-based on the analysis of the interaction of the magnetic field with the controlled object. The physical basis of magnetic control is the use of magnetic properties of materials, in particular, the demagnetizing factor, magnetic resistance and refraction of magnetic lines of force.

* Electrical control-based on the registration of the parameters of the electric field interacting with the controlled object, or arising in the controlled object as a result of external influence.

* Eddy current control-based on the interaction of the electromagnetic field of the eddy current Converter with the electromagnetic field of eddy currents induced in the controlled product, the density of which depends on the properties of the materials.

* Radio wave control-based on the interaction of radio emissions with the materials of the controlled products. It is observed in the absorption, diffraction, reflection, refraction of an incident wave, or the interaction of an incident or reflected wave. In addition, radiotelescope can be used specific resonant interaction effects of radiowave radiation.

* Thermal control-based on the registration of changes in the thermal or temperature fields of controlled objects caused by defects.

* Optical control-based on the interaction of light radiation with the surface of the controlled object. When light falls with the radiation flux on the material, it decomposes into its components. Depending on the properties of the material, this decomposition may be different.

* Acoustic control-based on the use of ultrasonic waves. Vibrations in the deformable medium propagate in the form of a wave. A set of particles having the same phase of oscillation forms a surface or wave front. The wave front is perpendicular to the direction of wave propagation.

* Molecular (penetrant Control) is based on the penetration of substances and registration of the indicator pattern of the exposed surface.

* Radiation control-based on the registration and analysis of ionizing radiation in its interaction with the controlled product. Ionizing radiation includes x-rays and gamma rays, as well as streams of charged or neutral particles. X-ray radiation is electromagnetic radiation and occurs in an x-ray tube when accelerated elec-

trons are decelerated. The kinetic energy of the braking electrons is converted into electromagnetic energy emitted as photons.

Nondestructive testing is subject to the following basic requirements:

- 1) the possibility of effective control at various stages of manufacture, operation and repair of products;
- 2) the ability to control the quality of products for most of the specified parameters;
- 3) the consistency of the time spent on the control with the operating time of other technological equipment;
- 4) high reliability of control results;
- 5) possibility of mechanization and automation of control of technological processes, and also control of them with use of the signals given out by means of nondestructive control;
- 6) high reliability of flaw detection equipment and the ability to use it in different conditions;
- 7) simplicity of control methods, technical availability of controls in production, repair and operation.

One of the most urgent problems of national importance in Russia is the introduction of a comprehensive system of technical diagnostics of trunk pipelines, including control of corrosion and stress-strain state of pipelines, in-line inspection, based on the use of modern control technologies using ultrasonic, electromagnetic and other modern physical methods of inspection [5].

In modern conditions, with a wide variety of methods and devices requires a thorough analysis to select the most efficient and cost-effective nondestructive testing. The principle of choosing methods of non-destructive testing of materials and products is based on their classification characteristics [6]. The main features are: the nature of the interaction of physical fields or substances with the controlled object, primary information characteristics, indication of primary information, final information. Each method has its own area of most effective application.

In this case, the most promising and effective directions in the field of diagnostics of trunk pipelines include:

- ultrasonic inspection focused on detection and localization of defects or continuous collection of data on the current state of the pipe walls using multi-sensor devices passed inside the pipe;
- application of acoustic emission for remote control of large structures.

Acoustic, ultrasonic methods (in accordance with GOST 18353-79) research, diagnosis and control, allow you to get huge amounts of information about the state of materials and structures. A large number of modern means of non-destructive testing are acoustic. The lack of monitoring, refusal to use acoustic control leads to fault tolerance of many complex technical objects.

The use of nondestructive testing, in particular acoustic testing, affects the fault tolerance control of bellows expansion joints. Timely determination of the results of fault tolerance control of the compensation link and the state of the weld affects the degree of reliability of any pipeline system. Particular attention should be paid to acoustic emission control of bellows compensators and pipelines in General.

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UDC 551.51

航空天气预报以及在机场和机场使用现代天气预报传输方法。
METAR, Internet等天气预报传输方式

**WEATHER FORECASTS IN AVIATION AND THE USE
OF MODERN METHODS OF TRANSMISSION
OF WEATHER FORECASTS IN AIRPORTS AND AIRFIELDS.
METAR, INTERNET AND OTHER TYPES OF WEATHER FORECAST
TRANSMISSION METHODS**

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抽象。本文致力于使用在机场和机场条件下的现代数据传输方法,对俄罗斯民航和极端航空气象飞行条件的预测进行分析。民用航空和实验航空的天气预报是借助现代高科技设备和软件进行的一系列活动。为了决定飞机的起飞,必须从进行安全飞行的可能性的位置分析天气状况。为此,有必要考虑飞行期间天气状况的全部可用信息。我们使用SIGMET, METAR, TAF等现代国际法规,分析了从整个行程的飞行时间的突触可预测性获得特定数据时在大气中发生的过程的动力学。

关键词:概要分析,预报地图,气象飞行条件,国际气象法规 SIGMET, METAR, TAF。

Abstract. *this article is devoted to the analysis of the forecast of meteorological flight conditions of civil and extreme aviation in Russia, using modern methods of data transmission in the conditions of airports and airfields. Weather forecasting for civil aviation and experimental aviation is a set of activities carried out with the help of modern high-tech equipment and software. To make a decision on the departure of the aircraft, it is necessary to analyze weather conditions from the position of the possibility of performing a safe flight. To do this, it is necessary take into account the full range of available information on the state of weather conditions during the flight. We analyze the dynamics of the processes occurring in the atmosphere at the time of receiving the specific data from synoptic predictability on the time of flight for the entire route with the use of modern international codes, SIGMET, METAR, TAF.*

Key words: *SYNOPTIC analysis, forecast maps, meteorological flight conditions, international meteorological codes SIGMET, METAR, TAF.*

Introduction. The preparation and execution of flights in civil and experimental aviation (CaEA) is carried out on the basis of international and federal rules, where the forecasting of meteorological flight conditions (MFC) is one of the main tasks, the solution of which reduces the risk of possible negative phenomena that reduce flight safety. The regularity and timeliness of the provision of meteorological information to aircraft in the Russian Federation is carried out by Roshydromet, including through the recommendations of the World Meteorological Organization (WMO). This article is devoted to the analysis of the MFC forecast of civil aviation in Russia using modern methods of data transmission in airports and airfields.

Main part. Weather forecasting for civil aviation and experimental aviation is a set of measures carried out using modern high-tech equipment and software. The structural associations that carry out the preparation and provision of data for CaEA are the Federal State Budget Institutions (FSBI) of Roshydromet, which include special aviation meteorological centers and civil aviation meteorological stations (AMC, CMS). Today, Roshydromet has 257 AMC and ACMS, which are located at the airports of the Russian Federation and are part of 10 federal state budgetary institutions (FSBI) of Roshydromet. With the commissioning of automated AMC and CMS, the ability of meteorological stations at airports and aerodromes to continuously monitor the weather front and transmit data on the height of the lower boundary of clouds and their modification, the presence of ice or icing, horizontal, inclined and vertical visibility, atmospheric pressure, temperature and humidity, as well as wind speed and direction is increased. The frequency of tracking meteorological data was reduced in the range of 1, 3, 5 minutes, or 10 and 15. The capabilities of the equipment allow the information to be taken from the sensors almost at the time of its recording and transmitted using special software to air users.

For the processing of MFC data and its analysis, Roshydromet integrated computer systems are used, on which hydrodynamic objects are simulated in real time, weather conditions are analyzed and predicted. For the effectiveness of the forecast, the bases of the world forecasting zonal centers, as well as the centers of seismology and volcanology, are used.

Meteorological flight support (MFS) is a system that includes a set of actions that can be divided into 4 blocks: receiving and transmitting meteorological data, developing MFC forecasts and providing aviation users with meteorological information (Fig. 1).

Meteorological support for flights at aerodromes and at airports is directly implemented by special meteorological services attached on the ground: meteorological aviation centers and AMC and ACMS stations with and without synoptic part. The functions of specialized meteorological organs with a synoptic part are as follows:

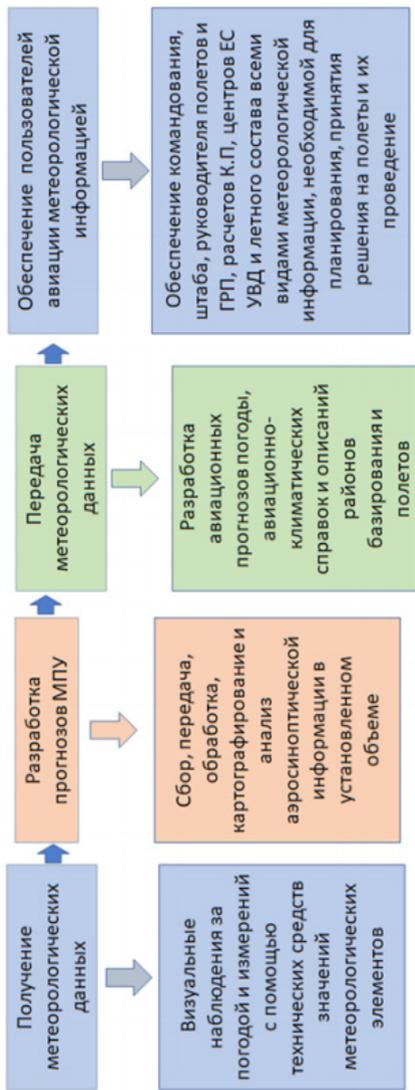


Fig. 1. The structure of meteorological support for flights

- monitor weather conditions at aerodromes and airports; - make synoptic weather forecasts;
- when the weather conditions worsen, they make warnings at the aerodrome or airport for air routes of flights;
- conduct consultations with flight crews;
- prepare flight documentation for air consumers according to weather forecast;
- train and conduct briefings with personnel and crews of aircraft in the competence of meteorological observations;
- carry out maintenance of meteorological equipment and instruments, including repair, installation and dismantling of meteorological equipment;
- oversee the information work of operational network units attached to AMC;
- control the flow of meteorological information to civil aviation users;
- study and monitor the weather conditions of the assigned territory for compiling climate maps and descriptions;
- compose sections of meteorological support in general flight operations instructions at aerodromes and airports;
- provide interested air traffic control authorities (ATC etc.) with information about seismic and volcanic activity, volcanic eruptions, cloud formation or volcanic ash; - compile information summaries using the international meteorological codes SIGMET (Significant Meteorological) or AIRMET;
- information transfer on broadcasting channels of VHF, ATIS and VOLMET;
- Transmission of meteorological information using the international METAR code (Meteorological Terminal Aviation Routine Weather Report).

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Примеры SIGMET

WSAJ31 UBBB
UBBB SIGMET 1 VALID 240430/240830 UBBB
UBBB BAKU FIR EMBD TS OBS NE, E OF E049 TOP FL390 MOV E 20KT
NC=

UBBB SIGMET 1 VALID 121330/121730 UBBB-
UBBB BAKU FIR EMBD TS FCST TOP FL340=

UBBB SIGMET 6 VALID 112100/120100 UBBB-
UBBB BAKU FIR EMBD TS FCST TOP FL340=

Примеры METAR

METAR UAAA 170930Z 35002MPS 320V070 9999 FEW050CB
BKN200 24/01 Q1014 88CLRD65 NOSIG=

METAR UAFM 170930Z 36004MPS CAVOK 27/M02 Q1013 TEMPO
27007G12MPS=

METAR OPKC 171000Z 24012KT 5000 HZ SKC 34/21 Q1001 NOSIG=
    
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Fig. 2. An example of an informational message using the SIGMET and METAR codes

An example of an informational message using the SIGMET and METAR codes is shown in Fig. 2.

In order to make a decision to take off an aircraft, it is necessary to analyze weather conditions from the perspective of the possibility of performing a safe flight. For this, the whole range of available information about the weather conditions during the flight is taken into account. The dynamics of the processes occurring in the atmosphere at the time of obtaining specific data with synaptic predictability for the flight along the entire route, all available data on the weather condition, the nature and direction of the development of atmospheric processes that will lead to changes in weather conditions during the flight are analyzed. It is necessary to understand not only what weather conditions are observed in the area or along the route of the planned flight, but also to determine what these conditions are related to and how they can change in the future, i.e. imagine their future condition. This can be done by conducting an aerosynoptic analysis of the meteorological situation.

Aerosynoptic analysis is carried out by comparing and complex processing of meteorological data units. Table 1 presents the meteorological blocks that must be operated on to obtain an aerosynoptic forecast.

A comparative analysis of aerosynoptic materials with a greater degree of certainty assesses the development of processes occurring in the atmosphere, determines the genesis of pressure systems and the advancement of air fronts, and changes in air masses.

When considering in more detail the methods for transmitting weather forecasts at airports and aerodromes, it should be noted that there are several international meteorological codes of various specifications, such as METAR, SPECI, TAF, SIGMET, etc.

International Aeronautical Meteorological Code METAR. With the help of this weather code, actual or regular weather is recorded both in the conditions of airfields and at a single automatic weather station. The METAR code contains data on the time of the survey, the specific location, visibility, wind speed and direction, precipitation, cloud cover (especially with respect to cumulus clouds), atmospheric pressure, ambient temperature, dew point deficit. The main information of the report may also be supplemented by a near-synoptic forecast.

If the international METAR code contains records about the actual, current state of weather conditions, then the SPECI (aviation selected special weather report) code records weather changes in the conditions of the airfield or in a single automatic weather station or special reports.

Table 1*Blocks of meteorological information for compilation of aerosynoptic analysis*

| № | Meteorological information blocks for aerosynoptic analysis compilation | Description of Actions | Determinations |
|----------|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| 1 | Atmospheric weather monitoring | Measurements and Observations | Ground layers and altitudes of the free atmosphere |
| 2 | Actual weather maps | Synoptic mapping | Ground layers of the atmosphere and altitude in flight conditions |
| 3 | Aerological charts | Estimate and graphic construction in a timely manner: 00, 06, 12 and 18 hours UTC | Temperature-wind sounding of the atmosphere at altitudes in flight conditions |
| 4 | Maximum Wind Maps | Radio sounding at 00, 06, 12 and 18 hours UTC | The position of the axis of the jet stream (JS) |
| 5 | Maps of the tropopause (spatial position) | Radio sounding at 00, 06, 12 and 18 hours UTC | Pressure hPa, temperature °C, dew point deficit |
| 6 | Patterns of radar meteorological observations | Mapping Using Weather Locators | Wind speed and direction, cloud movements, including cumulus activity, formation of cyclones, atmospheric fronts |
| 7 | Maps of nephanalysis | Cloud mapping from satellite observations | Key indicators of cloud cover: boundaries, quantity, structural features |
| 8 | Predictive maps of special events | Front Forecast Mapping | Marks of the centers of cyclones and anticyclones |
| 9 | Predictive maps of wind and air temperature | Compiled 4 times a day 00, 06, 12 and 18.00 UTC | Drawing in numbers and conventional signs of meteorological information and data of synoptic analysis |

Observations are carried out regularly and on special events. The bulk of the work is done by automatic meteorological stations (AMS), Fig. 3. The AMS collects and processes the incoming meteorological data, forms a summary taking into account the encoding, and passes it to aviation users (ATC and other interested parties).



Fig. 3. Automatic meteorological station collecting and transmitting meteorological data

Weather events are monitored regularly during the flight every 0.5 hours, a summary of the current weather condition (METAR code) or changes in weather conditions, deterioration in any indicators or improvements (SPECI code) is removed. In the absence of flights at the aerodromes, the AMS takes meteorological data every hour. If necessary, or on the instructions of ATC, reports on METAR or SPECI codes are removed by the AMC when requesting information to compile a predictive analysis of the dynamics of weather phenomena.

The format of weather reports transmitted by AMC in accordance with international rules contains the following information:

- METAR or SPECI summary type header;
- aerodrome index code;
- accurate time of observation (MSC and UTC);
- wind speed and direction at the surface of the earth;
- current weather, its manifestations;
- number, shape and height of the lower border of clouds;
- ambient temperature and dew point;

- atmospheric pressure relative to sea level QNH (Question Nautical Height) and relative to the location level of the airfield QFE \$;
- phenomena preceding current weather (Rew'w');
- forecast for aircraft landing (trend line), taking into account the dynamics of phenomena;
- additional information on RMK (the presence of turbulence, icing, ice, cumulus clouds, thunderstorms, etc.). In fig. 4 shows the encoding scheme METAR and SPECI.

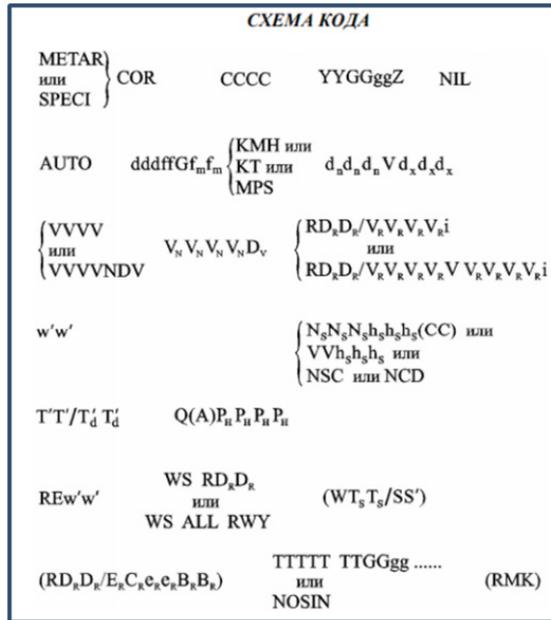


Fig. 4. The encoding scheme METAR and SPECI

- For example:
- 25085G122KMh - wind direction 250 °, average speed 85 km/h, maximum speed (gusts) 122 km/h;
 - P49MPS – wind speed of more than 50 m/s and more; - P99KT - wind speed of more than 100 knots or more;
 - P199KMh – wind speed of more than 200 km/h.
- P (peak) - more (highest point, maximum).

International Aeronautical Meteorological Code TAF (terminal aerodrome forecast). With the help of this code, weather conditions relative to aerodromes or airports are forecasted. The name TAF must be displayed at the beginning of the

forecast. The summary must necessarily show information about the wind, visibility of the RVR, cloud cover, weather events. The selection of code groups contains a different number of characters, if any element of the code is not predicted, then these symbols are not inserted into the general summary.

The TAF weather forecast lasts from 6 to 30 hours. Every 3 hours, regular current TAF forecasts are displayed.

Conclusion. The provision of meteorological safety for flights throughout the route, including at aerodromes and airports, is supported by the international meteorological codes of the world meteorological organization WMO and ICAO - the international civil aviation organization.

The main meteorological codes include METAR, SPECI, TAF and SIGMET, where METAR and SPECI - transmit information read by the AMS about the actual weather at the aerodrome and about its changes for the better or for the worse; TAF - transmits the weather forecast for the airfield; SIGMET - storm warning and warning about aviation weather hazardous events.

Using weather coding, it is possible to transmit meteorological reports of current weather and synoptic forecasts directly to aviation users throughout the flight route.

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论褐煤企业人事劳动的多元化
**ON THE DIVERSIFICATION
OF BROWN COAL ENTERPRISE PERSONNEL LABOR**

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First Deputy CEO

«Razrez Berezovskiy» JSC

抽象。 为了确保可持续的效率, 建议褐煤公司在员工劳动多元化的基础上进行多元化经营。 建议根据特定雇员的生产职能价值及其活动结果的标准对特定雇员的劳动进行评估。 给出了工人和企业整体劳动多元化的算法, 并给出了其实现的实例。

关键词: 褐煤企业, 人员, 活动, 多元化, 价值, 生产功能, 结果。

Abstract. *To ensure sustainable efficiency, it is advisable for the brown coal company to diversify its activities on the basis of diversification of the labor of its employees. An assessment of the need to diversify the labor of a particular employee is proposed to be carried out according to the criteria of the value of its production function and the results of its activities. The algorithm of labor diversification of workers and the enterprise as a whole, as well as an example of its implementation are presented.*

Keywords: *brown coal enterprise, personnel, activity, diversification, value, production function, results.*

Introduction

Given the changing energy balance in the world and the country, increased competition in the coal and labor market, limited and cyclically changing demand for brown coal, it is advisable to diversify its activities to ensure viability of the brown coal mining enterprise [1]. The involvement of personnel in this process and the necessary investment at the initial stage of resources for the preparation of production and activities for their change have a significant impact on the results of diversification of enterprises [2-4]. The basis for effective diversification of the enterprise is the diversification of the labor of its employees. To diversify the work of workers, their interest in increasing their competencies is necessary. The task of the employer is to engage the employee in the diversification of his work in order to expand the economic space of the enterprise as a whole, to form an effective system of improvements and encourage employees to master the functions for the production of new services [5, 6].

Key concepts

Diversification of a brown coal mining enterprise – is the expansion of the economic space of the activities of workers and the enterprise to ensure sustainable competitiveness by improving the production functions of workers in its organizational structure, ensuring an increase in their own value based on the formation and development of the release of goods and services required, as well as the required development of the enterprise.

Employee diversification – is an expansion of the economic space of the employee's activity, based on the improvement of his production function, providing an increase in its value and an increase in the efficiency of using its potential.

Expansion of the economic space of activity – mastering the production of new products (goods or services) and entering new areas of activity, allowing to increase the income of the employee and the enterprise.

Employee production function – the purpose and composition of its activities, the implementation of which provides the required result of labor.

Improving the production function – changing its purpose and composition, aimed at improving the results of the employee.

Value of production function – its importance for achieving the goals of the enterprise.

Activity value – demand for services with this quality.

Value of performance results – the usefulness of the results of a particular employee in the process of achieving the goals of the enterprise.

Diversification level – the degree of expansion of the economic space of workers and enterprises in comparison with the base state.

New features for other divisions, enterprises – functions previously not performed by the employee, the implementation of which allows him to release new goods and services.

Assessment of the need for diversification of employee labor

It is advisable to assess the need and priority to diversify the activities of a particular employee through the use of matrices of the value of his production function and performance results.

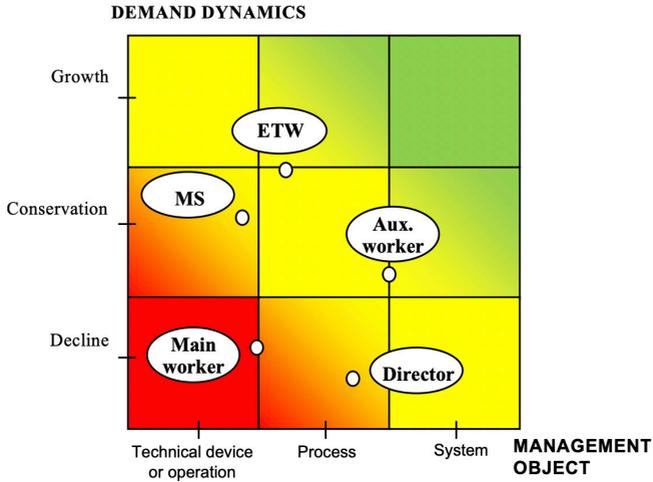
The value of production functions in the labor market is determined by the level of tasks solved by the employee in relation to the management object, which must be controlled in this position. That is, the criterion of the value of functions is the state of the corresponding control objects (Table 1, Fig. 1, a). The indicators reflecting the value of production functions are: the amount of remuneration for a given position, the availability of vacancies and the number of people per seat during the competition for the position, as well as the turnover of staff in this position.

The criterion of the value of the activity of a particular employee is the safety and efficiency of the processes carried out by the employee, his subordinates and the enterprise / unit as a whole (see table. 1, Fig. 1, b). Indicators of the value of the activity are the risks of injuries and accidents (economic risks), process efficiency, staff turnover in the unit (for the head), time and quality of solving problems.

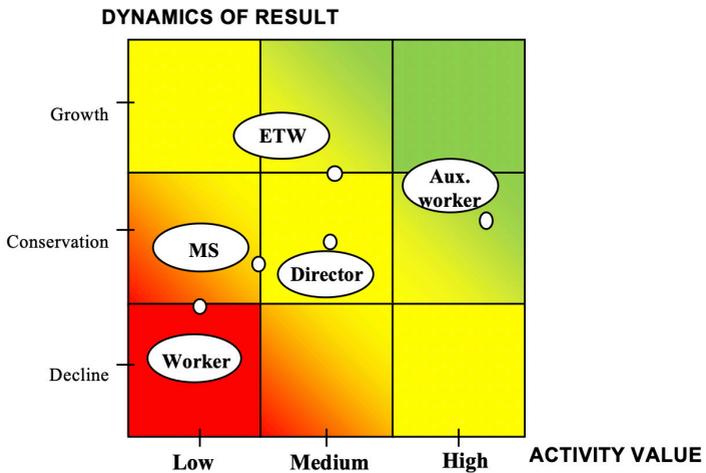
Table 1
Evaluation scale of the production function and employee activities

| Score | Production function characteristics | | | Activity Characteristics | | | Employee value (EV) |
|-------|-------------------------------------|----------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------|---------------------------------|---------------------|
| | Management Object (MO) | Demand dynamics (DD) | The value of the production function (VPF) | Activity value (AV) | Dynamics of results (DR) | Activity results value (ARV) | |
| 3 | System | Grows | High - the tasks of innovative development and reproduction are being solved | High - long-term efficiency and safety at the forefront | Grows | High - highly competitive | "Golden Fund" |
| 2 | Process | Kept at previously reached level | Medium - the tasks of reproduction and improving its parameters being are solved | Medium - efficiency and safety at the level of medium-sized enterprises / departments in the industry | Kept at pre-viously reached level | Medium - regionally competitive | "Backbone" |
| 1 | Technical device or operation | Decreases | Low - the tasks of reproduction are being solved | Low - unacceptable efficiency and safety | Decreases | Low - non-competitive | "Ballast" |

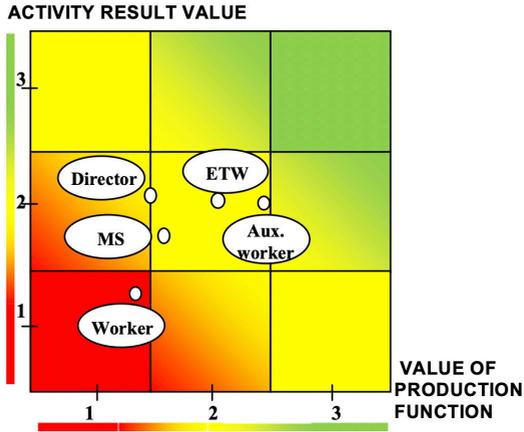
a) production function



b) activity results



c) employee



MS - main experts; ETW - line managers of departments (site managers, foremen, etc.)

Fig. 1. Matrices for assessing the value of employees by management level (2019)

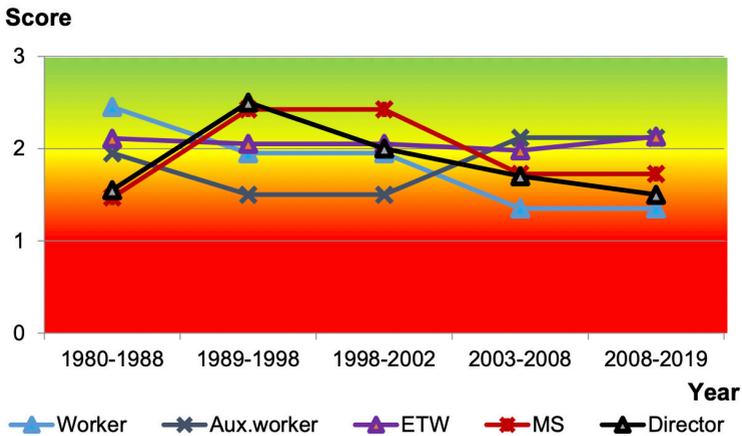


Fig. 2. Graphs of changes in the value of production functions of managers, specialists and workers

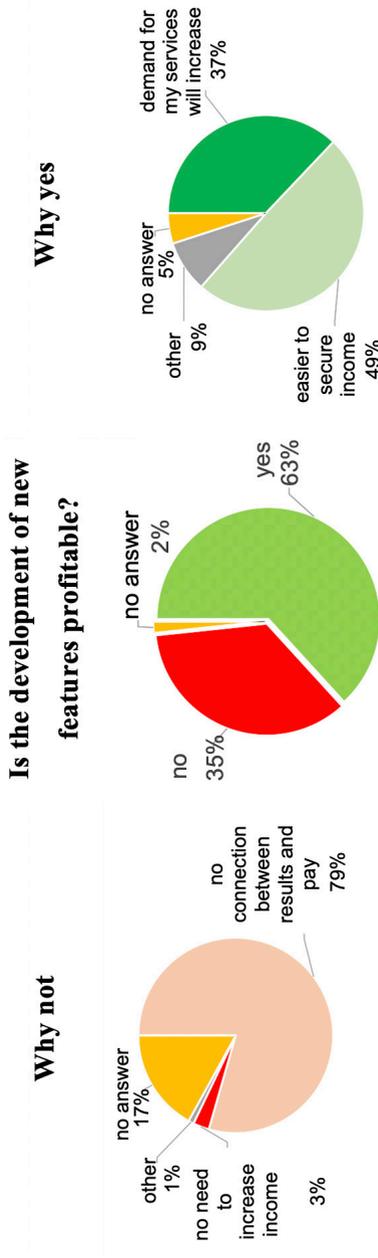


Fig. 4. The results of employee appraisal of utility diversification of its activities (229 people, including 206 workers)

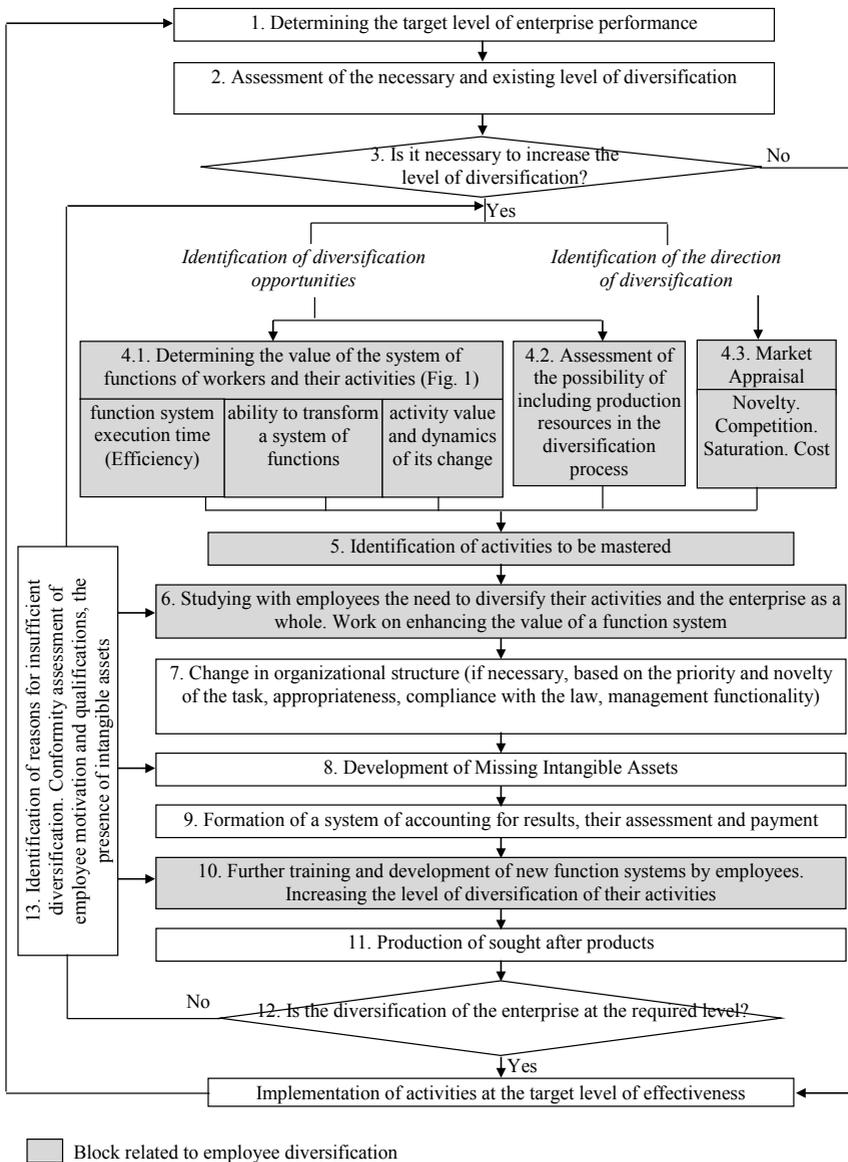


Fig. 5. Algorithm for improving the efficiency of a brown coal enterprise based on the diversification of its activities

The resulting performance characteristic of an individual employee as a subject of market relations is estimated using the matrix “Value of production functions - Activity results value” (Fig. 1, p).

An analysis of the activities of managers and specialists showed that the value of production functions periodically changes (Fig. 2), and in order to be competitive for an employee (from director to worker), it is necessary to master the required functions and increase the efficiency of their activities [7].

As can be seen from Figure 2, since the 90s of the XX century the value of the production functions of the director and the main workers has been declining; specialists - rise, then falls; line managers - maintained at the same level; auxiliary workers - growing.

The expansion of the economic space of activity allows to increase vitality and competitiveness, increase the company's revenue and income of a specific unit, group of employees, employee. Schematically, the model of expanding the economic space of the employee's activity is presented in Figure 3.

A survey of employees of “Razrez Berezovskiy” JSC showed that about half of the respondents understand the benefits of developing additional functions, i.e. in fact, they benefit from the diversification of their labor, and they see it in the possibility of increasing their income and increasing the demand for their services (Fig. 4).

Diversification Algorithm

Based on the foregoing approach, an algorithm has been developed to increase the efficiency of the brown coal enterprise by diversifying the labor of its employees, containing the following steps: determining the value of the production functions performed and the results of the activities of each employee; determination of products demanded in the market; selection by matrices of the highest priority areas of diversification and those workers who need it; determination of the appropriate production functions of workers; the formation of an appropriate organizational structure; the development of new markets for services and goods (Fig. 5, grayed out).

An example of the implementation of the developed block of the algorithm for diversifying the activities of workers in “Razrez Berezovskiy” JSC.

At the first stage, opportunities were analyzed and directions of diversification were determined. An analysis of the market and the properties of coal mined at the opencast showed that it is appropriate to master the production of brown coal coke and its briquetting [8-10]. Based on the results of the market needs assessment, it was decided to master the production of brown coal coke.

The next step was an assessment of available resources, which showed that it is possible to remove one boiler from the technological process of generating thermal energy for the production of new products and replace it with an energy-technological plant for the production of coke powder.

The employees of the heating workshop discussed the need for the production of a new product and the development of new functions by them.

Evaluation of the efficiency of the time use of workers in the boiler house of the heating workshop showed that they have unused labor potential, which means that there is the possibility of involving them in the development of a new product. The possibility of mastering by an operator of a conventional boiler the functions of an operator of an energy technology installation is high, since the configuration of the boiler remains unchanged.

As a result, after the appropriate preparation of production by the enterprise management, as well as the modernization of the boiler on their own and by the forces of a special organization, the workers of the boiler house began to master a new production function.

Its development allowed to enter the release of a completely new product. As a result, the company's commercial service was able to present competitive products on the market for use in another, metallurgical, industry. The staff increased their competence and qualifications, thereby increasing the value of their activities, and began to earn more.

Summary

To ensure the long-term viability of the brown coal enterprise, it is necessary to organize and support the continuous diversification of labor of workers. Such diversification consists in assessing the employee's labor potential, identifying and realizing the possibilities of increasing the efficiency of its use on the basis of the development of new demanded functions and increasing the quality of already performed functions.

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关于带有罗盘和尺子的椭圆的构造
**ABOUT CONSTRUCTION OF THE ELLIPSE
WITH COMPASS AND A RULER**

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抽象。 本文介绍了圆锥截面理论的发展历史, 研究了一种用圆规和直尺构造椭圆的方法, 该方法不同于已知的圆锥, 并给出了此方法的原理。

关键词: 圆锥截面理论的发展历史, 椭圆形, 带有罗盘和尺子的几何构造。

Abstract. *The article gives an excursion into the history of the development of the theory of conic sections, considers a method for constructing an ellipse using a compass and a ruler, different from the already known ones, and gives a rationale for this method.*

Keywords: *history of the development of the theory of conic sections, ellipse, geometric constructions with compass and a ruler.*

Ancient Greek scientists knew only a few lines, different from straights and circles, which they received in connection with the three famous tasks of antiquity: about doubling the cube, about trisection of the angle, about squaring the circle.

Menehm (IV century BC) proposed conical sections to solve these problems, that is, curves formed when the cone intersects with a plane perpendicular to one of the generators. He received three different curves, depending on which cone dissected - acute-angled, rectangular or obtuse.

Later, Apollonius (III century BC) called them an ellipse, a parabola hyperbola. He made sections in an arbitrary cone with a plane at any angle to the axis of the cone.

The founder of the modern theory of curves is rightfully considered the great

German artist and scientist A. Dürer (1471-1528). His writings set forth the foundations of geometry and theory of perspective; the doctrine of regular polyhedra is considered in detail; proposed solutions to the famous problems of antiquity (most likely, it should be said – shown the impossibility of solving them using a compass and a ruler); The theory of curved lines is given.

Ellipse (Greek - defect) (Fig. 1) - this curve is one of the conical sections. It can be defined as a figure consisting of all points of the plane, the sum of the distances from which to two given points and (foci) is a constant, usually denoted by $2a$

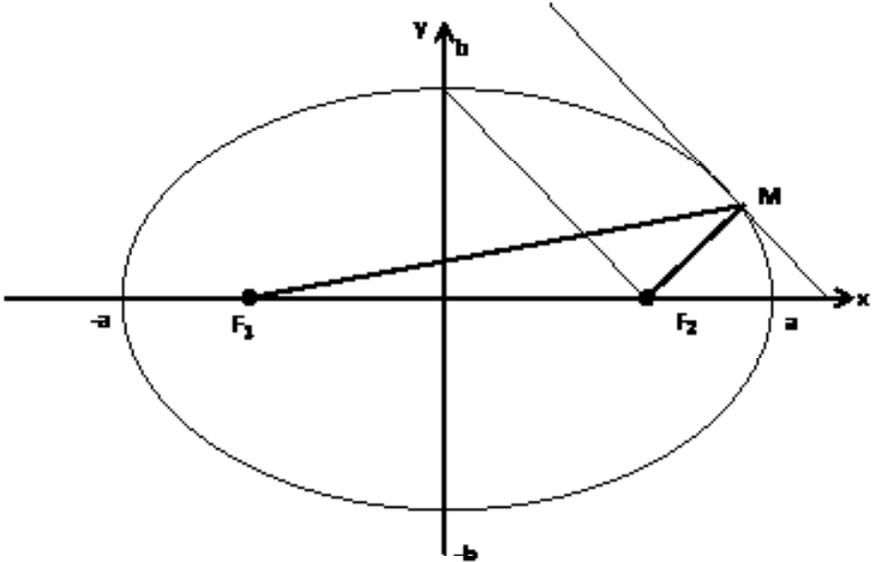


Fig. 1. Ellipse

Eric T. Bell, in his book “Mathematics - the Queen and the Servant of Sciences” wrote: “It cannot be denied that literally at first glance the circle attracts us with its simplicity, however, even the most conservative astronomer needs only a passing acquaintance with the ellipse to make sure that the ideal simplicity of the circle is akin to a meaningless smile. Compared to the information that the ellipse carries, the circle gives nothing. Perhaps, counting on the physical simplicity of the Universe, we also think in circles, projecting our elementary thinking onto the infinitely complicated world around us.”

Mathematicians tend to study things that seem completely meaningless, but centuries pass, and these studies acquire enormous scientific value. It is hardly possible to find a better example of this than the study by the ancient Greeks of second-order curves other than a circle: an ellipse, parabola and hyperbola.

The first to begin to study them was one of the students of Plato - Menehm. Until the seventeenth century, when Kepler discovered that the planets are moving in ellipses, and Galileo proved that the projectile trajectory is a parabola, these curves, so to speak, did not find application. Apollonius of Perga, an ancient Greek geometer who lived in the III century BC, devoted a huge treatise to these curves. In his book "Conical sections", he first showed how you can get all four curves, including a circle, cutting through the same cone at different angles.

After the line and the circle, the ellipse is the simplest of all plane curves. The definition of an ellipse underlies a well-known method of constructing it. Insert two buttons on a sheet of paper, put a loop of thread on them and pull it with the tip of a pencil as shown in the figure (Fig. 2). Drawing a pencil around the buttons, you draw an ellipse [3].

The ellipse can be drawn in other ways. To demonstrate one fun way, you will need a frying pan and a cardboard circle with a diameter half that of the pan. Paste material on the inside of the pan so that the circle does not slip off during rotation. Use strips of duct tape to fasten a sheet of paper at the bottom of the pan. Puncture the circle anywhere with the sharpened end of the pencil until it touches the paper and start rolling the disc along the edge of the pan. An ellipse appears on paper. If you pierce the disk in the center, the pencil draws a circle.

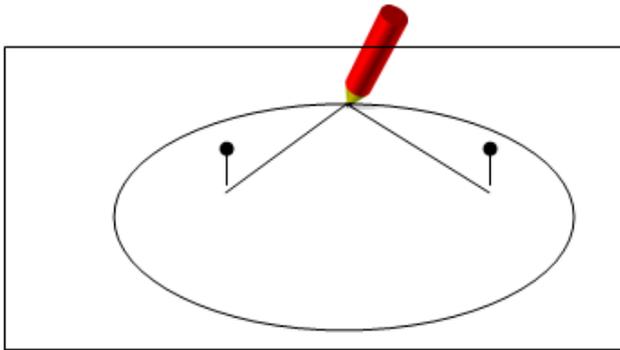


Fig. 2. Building an ellipse with a thread and a pencil

Although the ellipse is not so simple as the circle, nevertheless, it is more common in everyday life. The fact is that any circle becomes an ellipse, if you look at it at an angle. In addition, all the shadows cast by circles and balls are ellipses. Tilt the glass with water (the glass can be either cylindrical or conical), and you will see that the surface of the water has taken the shape of an ellipse.

One of the most remarkable properties of an ellipse is its optical property [1]: a ray launched from one focus, after reflection, falls into another focus. This property underlies the interesting acoustic effect observed in some caves and artificial structures, the arches of which are elliptical in shape. If you are in one of the foci, then the speech of a person standing in another focus is heard as well as if he is nearby, although in reality the distance is great.

If you rotate an ellipse around a line passing through its foci, we get an ellipsoid. If you cover it from the inside with a mirror layer, then this mirror surface has interesting properties:

a) If a point light source is located in one of the foci, then all the rays pass through the second focus after reflection from the walls of the ellipsoid.

b) If you place a point source of light in one of the focal points of an ellipsoid and produce an “instantaneous” flash, then some time after multiple reflections from the ideal mirror surface of the ellipsoid, all the rays will practically concentrate along its major axis.

There are ways to build ellipse points using a compass and a ruler. For example, in the manual [2] on page 60, 61, two methods are described. Another - the author's is proposed in this article. The following problem is being solved.

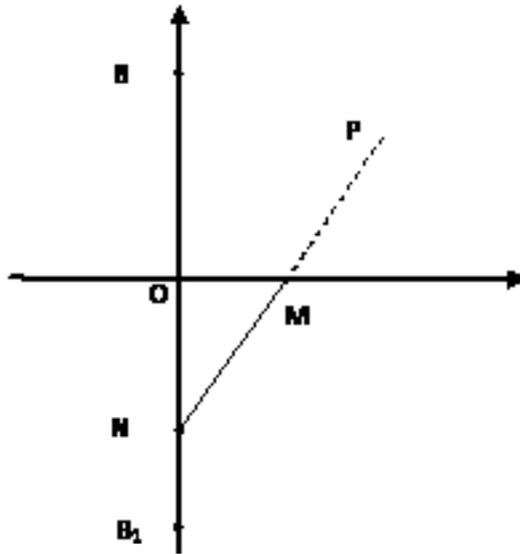
On the plane, point O and two segments with lengths a , b are given; $a > b$. Build ellipse points with these half axes and center O.

In the solution, we draw through O two mutually perpendicular lines, we call one of them horizontal and the other vertical. On it, we postpone the segment $OB = b$ up, down, we postpone the segment $OB_1 = a - b$. We take an arbitrary point N between O and B_1 , construct a circle centered at this point of radius $a - b$. It crosses the horizontal at two points; we choose the one to the right of O. We denote it by M. Draw the line NM. Let us describe a circle with center M of radius b . It crosses the line at two points. Let P be the one that lies “northeast”. This will be the desired point of the ellipse.

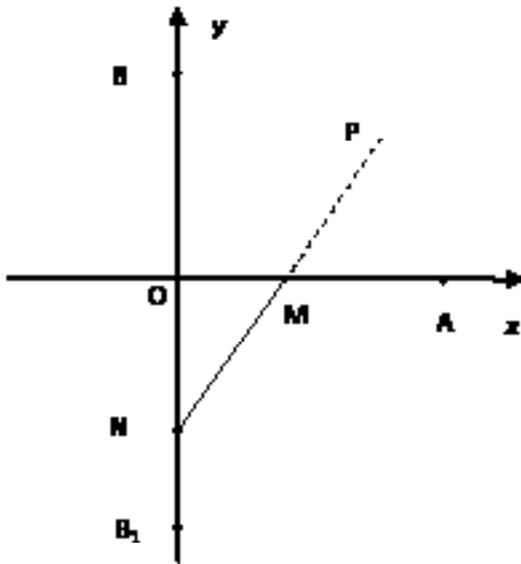
Changing N, we obtain new points of the ellipse.

Figure 3a) illustrates the construction described. Figure 3b) serves for its justification, given below.

a)



a)



b)

Fig. 3 Construction of ellipse points

Suppose t -a parameter that varies on the interval $[0, a-b]$ and serves to specify the coordinates of the points N, M, P . Suppose $N(0; -t)$, then $M(\sqrt{(a-b)^2 - t^2}; 0)$.

We write the equation of the line NM as

$$y = \frac{tx}{\sqrt{(a-b)^2 - t^2}} - t, 0 \leq t < a - b \quad (1)$$

and the circle equation as $(x - \sqrt{(a-b)^2 - t^2})^2 + y^2 = b^2$.

To find the point P , we combine these equations into a system and solve it. We reduce the system to the quadratic equation

$$\frac{1}{(a-b)^2 - t^2} x^2 - \frac{2}{\sqrt{(a-b)^2 - t^2}} x + 1 - \frac{b^2}{(a-b)^2} = 0.$$

Omitting the details, we indicate its roots

$$x_{1,2} = (1 \pm \frac{b}{a-b})\sqrt{(a-b)^2 - t^2}.$$

Since the abscissa of the point P must be larger than the abscissa of the point M , only the first root is suitable:

$$x_p = \frac{a}{a-b}\sqrt{(a-b)^2 - t^2}. \quad (2)$$

Then from equality (1) we have

$$y_p = \frac{b}{a-b} t. \quad (3)$$

It is easy to verify that x_p, y_p satisfy the ellipse equation

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, \text{ so that the point } P \text{ belongs to it for any } t \in [0; a - b].$$

Note that at $t = 0$ the point P coincides with the right vertex $A(a, 0)$ of the ellipse, and at $t = a - b$ it goes to the upper boundary of $B(0, b)$. Thus, using formulas (2) and (3), a parametric definition of the arc AB of the ellipse is obtained. Placing the necessary signs in the right-hand sides in these formulas, we obtain the parametric tasks of the remaining arcs.

The right-hand sides of equalities (2), (3) can be rewritten, respectively, in the form

$$a\sqrt{1 - (\frac{t}{a-b})^2}, b\frac{t}{a-b}.$$

Here the fraction $\frac{t}{a-b}$ is between 0 and 1, so it is the sine of a certain angle

$$\varphi \in [0; \frac{\pi}{2}].$$

Then equalities (2), (3) can be written as

$$x_p = a \cos \varphi, \quad y_p = b \sin \varphi.$$

We obtain the well-known parametric task of the ellipse.

In conclusion, we offer readers, lovers of algebra, to solve the following problem.

Write down a system of equations in which the first equation is the equation of a circle with center M , radius " b ", and the second equation is the equation of an ellipse. Prove that one of the solutions of the system is the pair (x_p, y_p) .

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